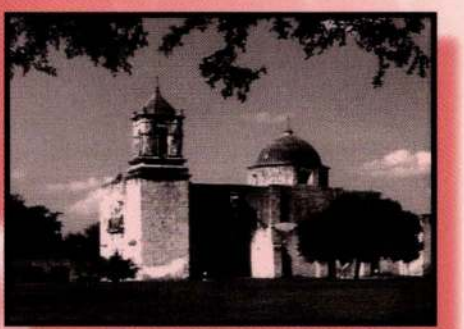
SAN ANTONIO

INFORMS Annual Meeting San Antonio Fall 2000 November 5-8







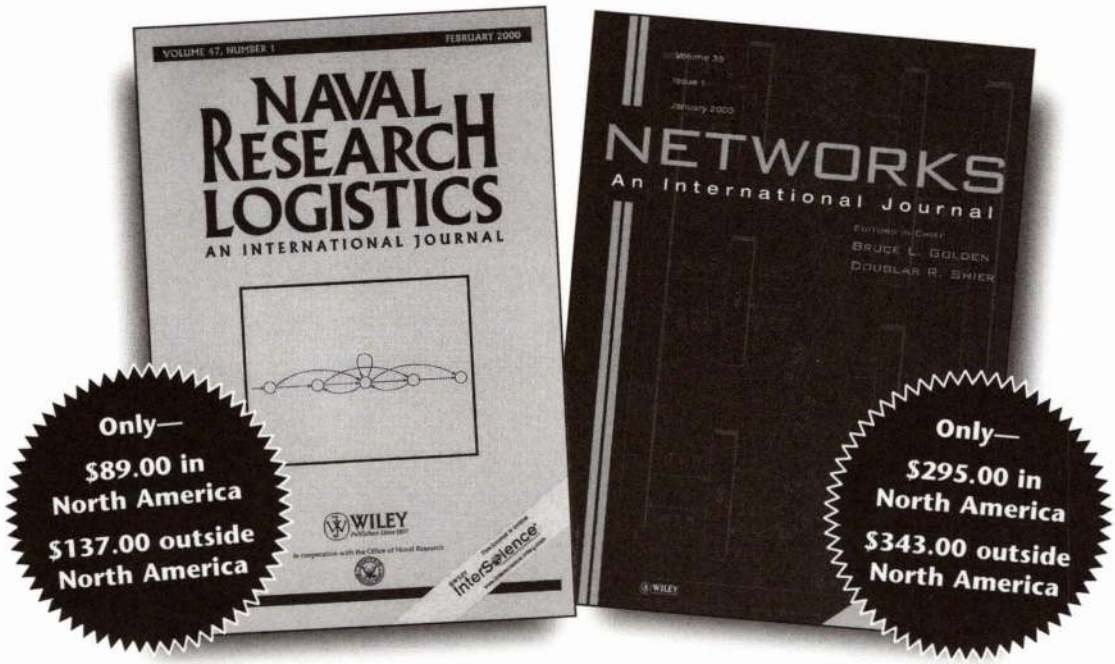
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Way Kuo
Royce E. Wisenbaker Chair in Innovation
Associate Vice Chancellor
Executive Associate Dean, Dwight Look College of Engineering
Assistant Director, Texas Engineering Experiment Station

Ladies and Gentlemen,

On behalf of the organizing committee of the INFORMS 2000 meeting, I would like to welcome you to San Antonio, Texas, on November 5-8, 2000. INFORMS has traditionally held both a fall and spring meeting, and the association recently announced that to better meet the needs of its attendees, the two meetings are combined into an annual conference, beginning with the San Antonio meeting.

San Antonio is one of the most popular conference cities in the United States. A warm climate combined with an atmosphere richly steeped in history and tradition make San Antonio unique. As the eighth largest city in the U.S., San Antonio provides every convenience and an unusually wide array of different kinds of entertainment to the seven million visitors per year. The city has been a crossroads and a meeting place. As a result of the diverse backgrounds of those who settled there, the spirit of the American west and the deep south still mingle with the charm of Old Mexico to create an atmosphere that is unlike that of other major U.S. city.

The theme of integrating theory and application has always been one of the fundamental underlying tenets of OR/MS conferences. This year, we have chosen to emphasize it directly because we believe that such integration has become more critical than ever before. As the local committee, we are very excited about the prospect of hosting INFORMS 2000 here in Texas, and we work diligently to assure industry, as well as academic, involvement in the event. In addition to the regular sessions, we have invited two plenary speakers: Frank Jones of IBM on "The Integrated Supply Chain as An Enabler of E-Business," and John D. C. Little of MIT on "The World Is Coming Our Way: OR/MS Opportunities in E-Commerce."

The technical program will feature tracks in decision analysis and decision support systems, scheduling, manufacturing, supply chain management, inventory management, planning, mathematical programming, metaheuristics, military applications, quality and reliability, stochastic systems and many others. In addition, we present to you several tutorials and an exciting plant tour at the Southwest Research Institute.

Many deserve recognition, including members of the San Antonio Local Committee, members of the INFORMS Meetings Committee and Julie Eldridge and Ginni McGee of the INFORMS staff for their dedicated service. Special thanks also go to the co-sponsors of the meeting: IBM, I2 and Texas A&M University's Industrial Engineering Department and the Look College of Engineering.

Way Kuo, General Chair
INFORMS 2000

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IN APPRECIATION

San Antonio 2000

On behalf of the entire Local Committee for the San Antonio 2000 Annual Meeting, I want to express our deep appreciation to the companies and organizations that have provided major sponsorship for this event. With their support, we have been able to enhance important forums such as the Doctoral Colloquium, encourage attendance by students and international colleagues, and enhance many other aspects of the meeting. Our sincere thanks to these organizations for their generous funding.

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Look College of Engineering

Way Kuo, Ph.D.
General Chair - INFORMS 2000

Program At A Glance

INFORMS Annual Meeting, San Antonio 2000

Note: Technical sessions are held at the Convention Center and Marriott Rivercenter. Check the Master Track Schedule for specific room locations.

Sunday, November 5

8:30-10:00am	Technical Sessions (SA)	Convention Center & Marriott
10:00-10:15am	Coffee Break	Convention Center-Level 2 Marriott – Ballroom Foyer
10:15-11:45am	Technical Sessions (SB)	Convention Center & Marriott
1:15-2:45pm	Technical Sessions (SC)	Convention Center & Marriott
2:45-3:00pm	Coffee Break	Convention Center – Level 2 Marriott – Exhibit Hall
3:00-4:30pm	Technical Sessions (SD)	Convention Center & Marriott
4:45-5:45pm	Subdivision Business Meetings	Convention Center & Marriott
6:30-8:00pm	Welcome Reception	Marriott - Exhibit Hall

Monday, November 6

8:15-9:45am	Technical Sessions (MA)	Convention Center & Marriott
9:45-10:00am	Coffee Break	Marriott – Exhibit Hall
10:00-11:00am	Plenary: Frank Jones, IBM	Marriott -Salons H & I
11:15am-12:15pm	Plenary: Welcome & Awards	Marriott - Salons H & I
1:15-2:45pm	Technical Sessions (MC)	Convention Center & Marriott
2:45-3:00pm	Coffee Break	Convention Center – Level 2 Marriott – Exhibit Hall
3:00-4:30pm	Technical Sessions (MD)	Convention Center & Marriott
4:45-5:45pm	Plenary: Edelman Award Reprise	Marriott -Salons H & I
6:00-7:00pm	Subdivision Business Meetings	Convention Center & Marriott
7:30-9:30pm	General Reception	Institute of Texan Cultures

For walking instructions and buses, go to Commerce St. exit of Marriott Rivercenter.

Tuesday, November 7

8:15-9:45am	Technical Sessions (TA)	Convention Center & Marriott
9:45-10:00am	Coffee Break	Marriott – Exhibit Hall
10:00-11:00am	Plenary: Omega Rho Lecture, John Little	Marriott -Salons H & I
1:00-2:30pm	Technical Sessions (TC)	Convention Center & Marriott
2:30-2:45pm	Coffee Break	Convention Center – Level 2 Marriott – Exhibit Hall
2:45-4:15pm	Technical Sessions (TD)	Convention Center & Marriott
4:30-6:00pm	Technical Sessions (TE)	Convention Center & Marriott
6:15-7:15pm	Subdivision Business Meetings	Convention Center & Marriott

Wednesday, November 8

8:30-10:00am	Technical Sessions (WA)	Convention Center Only
10:00-10:15am	Coffee Break	Convention Center – Level 2
10:15am-11:45	Technical Sessions (WB)	Convention Center Only

Schedule of Special Events

	Location	From	To
Friday, November 3			
CPMS Practice Issues Forum Registration	Room 1 (M)	6:30p	10:00p
Saturday, November 4			
IEEE Editors Meeting	Suite 530 (M)	8:00a	4:00p
CPMS Practice Issues Forum	Room 7 (M)	8:00a	6:30p
Meetings Committee Meeting	Meetings Suite (M)	8:30a	5:00p
Organization Dissertation Award & Reception	Room 17 & 18 (M)	10:00a	9:00p
CPMS Practice Issues Forum Lunch	Room 8 (M)	12noon	1:00p
INFORMS Executive Committee Meeting	Suite 529 (M)	1:00p	8:00p
Meeting Registration	Ballroom Foyer (M)	3:00p	7:00p
INFORMS Membership Meeting	Salon I (M)	5:00p	6:00p
CPMS Practice Issues Reception/Dinner/Meeting	Room 8 (M)	6:30p	10:00p
Membership Committee Meeting	TBD	7:00p	9:00p
Sunday, November 5			
Meeting Registration	Ballroom Foyer (M)	7:30a	5:00p
CIST	Salon J & Room 2 (M)	8:00a	6:00p
INFORMS Board Meeting	Rooms 17 & 18 (M)	8:00a	6:00p
Guest Breakfast	Atrium Lounge	8:30a	10:00a
Dantzig Dissertation Award Finalist Presentations	Room 12 (M)	10:15a	11:45a
COIN INSTALLFEST	Room 216A(C)	10:15a	2:45p
Section/Society/Fora Officers Lunch	Suite 544 (M)	12noon	1:30p
Job Fair	Salon M (M)	12noon	2:00p
Military Applications Society Council Meeting	Room 16 (M)	12:30p	2:30p
Joint Colloquium Committee Meeting	Suite 514 (M)	12noon	1:00p
Wagner Prize Session	Salon L (M)	3:00p	4:30p
MSOM Reception	Room 205 (C)	4:45p	5:45p
Decision Analysis Society Boat Ride	Boat Landing, Marriott Rivercenter	4:45p	6:00p
Roundtable Reception/Dinner	Salon L (M)	5:30p	8:00p
Subdivision Nominating Assembly - Division D	Room 216B (C)	5:45p	6:30p
Roundtable Meeting	Salon M (M)	8:00p	11:00p
Welcome Reception	Exhibit Hall	6:30p	8:00p
Minority Forum & Women in OR/MS Joint Reception	Salon K (M)	7:30p	9:30p
Student Reception	Salon J (M)	7:30p	9:30p
Monday, November 6			
Board/Editors/Committee Chairs Breakfast	Room 2 (M)	7:00a	8:00a
Roundtable Meeting	Salon M (M)	7:00a	5:00p
Meeting Registration	Ballroom Foyer (M)	7:30a	5:00p
Teacher Program	Salon J (M)	8:00a	5:00p
3MAS	Rooms 13, 14 & 16 (M)	8:00a	5:00p
INFORMS Board Meeting	Rooms 17 & 18 (M)	8:00a	11:00a
Guest Breakfast	Atrium Lounge	8:30a	10:00a
Poster Sessions	Ballroom Foyer (M)	9:00a	5:00p
Invited Plenary - Frank Jones, IBM	Salon H & I (M)	10:00a	11:00a
Section/Society Subcommittee Meeting	Suite 544 (M)	10:30a	12noon
DAS Officers Council Meeting	TBD	10:30a	1:00p
Welcome & Awards Plenary Session	Salon H & I (M)	11:15a	12:15p
ACORD Luncheon	Room 2 (M)	12noon	1:30p
Transportation Science Luncheon	Room 18 (M)	12noon	1:00p
Social Sciences Luncheon	TBD	12noon	1:00p
Omega Rho Executive Committee Meeting	Garden Cafe	12:15p	1:15p
OR Editors Meeting	Room 17 (M)	12noon	1:30p
Subdivision Committee Meeting	Suite 530 (M)	12noon	2:30p
Education Committee Meeting	Garden Cafe	12:30p	1:30p
Journal Editors-in-Chief Meeting	Suite 514 (M)	1:00p	4:00p
Wagner Prize Award Presentation	Room 2 (M)	3:00p	3:30p
INFORMS Board & Roundtable Meeting	Rooms 17 & 18 (M)	3:00p	4:30p
Presidents Reception for the Roundtable	Rooms 17 & 18 (M)	4:30p	6:00p
Edelman Reprise Plenary - Jeppesen Sanderson	Salon H & I (M)	4:45p	5:45p
IOL Meeting/Reception	Room 2	6:00p	7:30p

CPMS Isolated Practitioners Workshop	Salon L (M)	6:00p	7:00p
SICUP Business Meeting	Room 10	6:00p	7:00p
JOC Meeting	Salon G	7:00p	7:45p
General Reception	Institute for Texan Cultures	7:30p	9:30p
Tuesday, November 7			
Chapter/Student Chapter Breakfast/Nominating Assembly	Room 2 (M)	7:00a	8:00a
Consulting Forum Organizational Meeting	Suite 544 (M)	7:00a	8:00a
Meeting Registration	Ballroom Foyer (M)	7:30a	5:00p
3MAS	Rooms 13, 14 & 16 (M)	8:00a	5:00p
CPMS Congress	Salon J (M)	8:00a	10:00a
Chapter Subcommittee Meeting	Suite 530 (M)	8:00a	9:30a
CPMS Council Meeting	Salon J (M)	10:00a	12noon
Guest Breakfast	Atrium Lounge	8:30a	10:00a
Finance Committee Meeting	Presidents Suite (M)	8:30a	10:00a
Student Chapter Subcommittee Meeting	Room 2 (M)	8:00a	9:00a
Omega Rho Distinguished Lecture - John D. C. Little	Salon H & I (M)	10:00a	11:00a
Publications Committee Meeting	Publications Suite (M)	10:00a	11:30a
Future Local Committee Meetings	Meetings Suite (M)	1:00p	4:00p
Wednesday, November 8			
Registration	Ballroom Foyer (M)	8:00a	10:00a
3MAS	Rooms 13, 14 & 16 (M)	8:00a	5:00p

Schedule of Subdivision Business Meetings

	Location	From	To
Sunday, November 5			
Accounting, Auditing & Tax	Room 8 (M)	4:45p	5:45p
E-Business	214C (C)	4:45p	5:45p
Location Analysis	209 (C)	4:45p	5:45p
Logistics	214B (C)	4:45p	5:45p
Management Control Systems	Room 11 (M)	4:45p	5:45p
Quality, Statistics & Reliability	Room 12 (M)	4:45p	5:45p
Railroad Applications	007A (C)	4:45p	5:45p
Revenue Management	Room 7 (M)	4:45p	5:45p
Simulation	208 (C)	4:45p	5:45p
Technology Management & Management of Productivity & Technology	Room 4 (M)	4:45p	5:45p
Telecommunications	Room 3 (M)	4:45p	5:45p
Information Systems	Room 2 (M)	6:15p	7:15p
Monday, November 6			
Applied Probability	Salon A (M)	6:00p	7:00p
Aviation Applications	Room 4 (M)	6:00p	7:00p
Computing	Salon G (M)	6:00p	7:00p
Decision Analysis	Salon B (M)	6:00p	7:00p
Financial Services	Room 5 (M)	6:00p	7:00p
Group Decision & Negotiation	Room 6 (M)	6:00p	7:00p
Health Applications	Salon C (M)	6:00p	7:00p
Marketing	Room 11 (M)	6:00p	7:00p
MSOM	Salon D (M)	6:00p	7:00p
Organization Science	Room 9 (M)	6:00p	7:00p
Social Science Applications	Salon K (M)	6:00p	7:00p
Transportation Science	Room 8 (M)	6:00p	7:00p
Tuesday, November 7			
Forum on Women in OR/MS	006D (C)	12noon	1:00p
Artificial Intelligence	007D (C)	6:15p	7:15p
ENRE	007B (C)	6:15p	7:15p
INFORM-ED	Room 6 (M)	6:15p	7:15p
Military Applications	Rooms 13 & 14 (M)	6:15p	7:15p
Optimization	006B (C)	6:15p	7:15p
Public Programs & Processes	007A (C)	6:15p	7:15p



Audio/Visual Equipment

An overhead projector and screen will be provided at no cost in each room for all technical sessions. Use simple transparencies with large print and bring blank transparencies for revisions and answers to questions. Other equipment must be ordered ahead of time at the speaker's expense. On-site AV requests will not be honored.

Guidelines for Session Chairs

Each session will last 90 minutes. The chair is responsible for starting and ending the session on time, letting speakers know when time is running short and for filling out and returning the Session Attendance Forms. Equal time should be given to each presentation and speakers should adhere to the allotted time. Presentations should be made in the order shown in the program. Please review your session to determine that the information is complete. Contact your speakers to confirm that they will make their scheduled presentations. If you are unable to chair your invited or sponsored session, it is your responsibility to find a replacement.

Guidelines for Speakers

The room and location of your session are listed in the Master Track Schedule. Be on time for your session and check in with the session chair. Presentations should be limited to key issues with a brief summary. Time your presentation to fit within your designated time span and leave an opportunity for questions and audience participation. Bring copies of your paper to distribute or provide a handout with written information relating to your oral presentation. INFORMS does not produce proceedings with complete papers. To obtain complete copies of any papers abstracted in the program, please contact the authors directly at the addresses supplied online.

Book Display

Don't miss the book and literature display in the Exhibit Hall in Booth 7. See new titles from Academic Press, Blackwell Publishers, CRC Press, EDP Sciences, Walter de Gruyter, Inc., Edward Elgar Publishing Inc., Lawrence Erlbaum Associates, Inc., Morgan Kaufmann Publishers and National Academy Press.

Cyber Café

New in San Antonio! Bring your own laptop to the Cyber Café to access your email and the Web. Other computers are also available if you don't have a laptop. Name badges must be worn for admittance. The Cyber Café will be open in the Exhibit Hall during the following hours:

Sunday, November 5	12:00noon - 5:00pm
Monday, November 6	9:00am - 5:00pm
Tuesday, November 7	9:00am - 5:00pm

Exhibit Hall

Name badges must be worn for admittance to the Exhibit Hall, located in the Marriott Rivercenter during the following hours:

Sunday, November 5	12:00noon - 5:00pm & 6:30 - 8:00pm*
Monday, November 6	9:00am - 5:00pm
Tuesday, November 7	9:00am - 5:00pm

* The Exhibit Hall will reopen Sunday evening for a new Welcome Reception. Registered attendees are invited to the reception for the chance to meet colleagues and renew acquaintances.

Guest Program

The Guest Program includes a continental breakfast for registered guests on Sunday, Monday and Tuesday mornings. Registered guests are also welcome to attend the Welcome Reception on Sunday evening and the General Reception on Monday evening. Guests will receive a colored name badge that must be worn for admittance to these events and will also receive tickets with their registration materials. They are not eligible to attend any of the technical sessions or enter the Exhibit Hall.

Guest Tour - $30

Sunday, November 5
9:00am - 1:00pm

A guided bus tour of San Antonio includes a stop at the Botanical Gardens with 33 acres of formal gardens, wild flowers of the Texas Hill Country and the unique underground conservatory with its rare and exotic plants. The tour also includes a visit to the McNay Art Institute. The Institute is housed in a Mediterranean mansion built around a courtyard and reflecting pool. It is rated one of the best small museums in the country and has works by Van Gogh, Matisse, Picasso and Renoir among others. Take a drive through Brackenridge Park with its Japanese Tea Gardens, rock bridges and aquatic and semitropical flowers. The tour will end at the Mission San Jose - Queen of the Texas Missions. Established in 1720, it is considered the most beautiful, best fortified and most prosperous of all the missions. There is a new visitor's center with a small theater, featuring a short film about the missions and an exhibit explaining why the missions were established and a bookstore with gifts and mementos.

The bus will leave from the Commerce Street exit of the Marriott Rivercenter.

Please present the ticket found in your registration materials.

Hotel Accommodations
The Marriott Rivercenter Hotel is the host hotel for the San Antonio meeting. A block of rooms has been reserved for INFORMS attendees - our special conference rate is $174 single/double.

Plant Tour - $15

Monday, November 6
9:00 - 11:30a



Southwest Research Institute (SwRI), founded in 1947, is an independent, nonprofit, applied engineering and physical sciences research and development organization devoted to technology development and transfer.
The Institute occupies 1,200 acres in San Antonio, Texas. More than 2,700 employees work in almost 2 million square feet of laboratories, workshops and offices. The Institute has 9 technical divisions cooperating in multidisciplinary approaches to problem solving. The tour will include an overview of the Southwest Research Institute, a talk by staff from SwRI's Automation and Data Systems Division and a brief laboratory visit.

The bus will leave from the Commerce Street exit of the Marriott Rivercenter.

Please present the ticket found in your registration materials.

Transportation
The city of San Antonio is served by the San Antonio International Airport, which is approximately 13 miles from the downtown River Walk area and the Marriott Rivercenter Hotel. Taxi companies operate minivans with 7-passenger capacity, large sedans with 5-passenger capacity and smaller vehicles with 4-passenger capacity. All cabs charge the same rates. There is no extra charge for luggage or additional persons.

SATRANS Airport Shuttle also offers round-trip or 1-way service from the airport to downtown hotels from 7:00a - 1:00a daily; service from downtown to the airport begins at 5:00a daily. Fares are $8 1-way and $14 round-trip. For reservations and further information, call 210-281-9900.

Weather
San Antonio has a temperate climate - you can count on clear blue skies, breezes and sunshine virtually year-round. In early November, there is little chance of rain, with daytime temperatures ranging in the low 70s and falling into the high 40s at night.

Registration

The registration fee includes admittance to all technical sessions, the New Welcome Reception on Sunday evening, the General Reception on Monday evening and the Exhibit Hall. Name badges MUST be worn to all INFORMS sessions and events. Go to the INFORMS registration desk to replace lost badges. Meals are not included in the registration fee. There is an additional fee for all special paid events listed on the registration form. ALL ATTENDEES, INCLUDING SPEAKERS AND SESSION AND CLUSTER CHAIRS, MUST REGISTER AND PAY THE APPROPRIATE REGISTRATION FEE.

Refund & Cancellation Policy: Registration payments will be refunded only if a written cancellation is received in the Rhode Island Meetings Department no later than November 1, 2000. Cancellations may be sent via email to meetings@informs.org or faxed to 401-274-3189 and must meet this deadline.

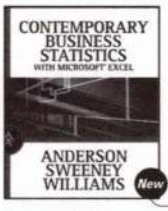
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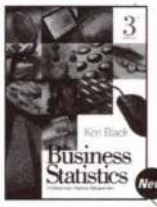
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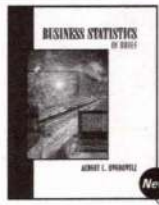
Black
Business Statistics: Contemporary Decision Making, 3e



Getz
e.stat for Business and Economics



Minieka/Kurzeja
Statistics for Business with Computer Applications



Ovedovitz
Business Statistics in Brief

Anderson/Sweeney/Williams
Statistics for Business and Economics, 7e

Anderson/Sweeney/Williams
Essentials of Statistics for Business and Economics, 2e

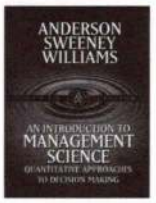
Eldredge
An Excel Companion for Business Statistics

Gerbing
Relevant Business Statistics Using Microsoft™ Excel

Kvanli/Pavur/Guynes
Introduction to Business Statistics: A Computer Integrated, Data Analysis Approach, 5e

Tabbush/Trueman/Levine/Opler
The MBA Primer Online Verstion for Business Statistics

MANAGEMENT SCIENCE/QUANTITATIVE METHODS



Anderson/Sweeney/Williams
An Introduction to Management Science: Quantitative Approaches to Decision Making, 9e



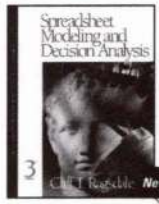
Anderson/Sweeney/Williams
Quantitative Methods for Business, 8e



Bertsimas/Freund
Data, Models, and Decisions: The Fundamentals of Management Science



Camm/Evans
Management Science and Decision Technology



Ragsdale
Spreadsheet Modeling and Decision Analysis, 3e

Anderson/Sweeney/Williams
Contemporary Management Science with Spreadsheets

Anderson/Sweeney/Williams
The Management Scientist: Version 5.0 for Windows 95 and Windows 98

Bell
Management Science/Operations Research: A Strategic Approach

Chan New 2001©
Location Theory and Decision Analysis with Facility-Location and Land-Use Models CD-ROM

PRODUCTION/OPERATIONS MANAGEMENT

Gaither/Frazier
Production and Operations Management, 8e

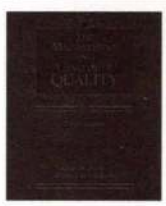
Markland/Vickery/Davis
Operations Management: Concepts in Manufacturing and Services, 2e

Morton
Production Operations Management

QUALITY MANAGEMENT



Evans/Dean
Total Quality: Management, Organization and Strategy, 2e



Evans/Lindsay
Management and Control of Quality, 4e

Heizer/Nathan
Cases in Total Quality Management: Manufacturing and Services

LOGISTICS

Coyle/Bardi/Langley
Management of Business Logistics, 6e

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Also Meeting in San Antonio

Friday & Saturday, November 3 - 4

INFORMS 2000 Doctoral Colloquium

Ramada Emily Morgan Hotel

The INFORMS Doctoral Colloquium will be held preceding the INFORMS San Antonio Meeting. The Department of Industrial Engineering at Texas A&M University is proud to host the INFORMS meeting and the Doctoral Colloquium. The Colloquium provides a unique opportunity for interaction between doctoral students and professionals. Approximately 25 professional participants will make presentations and lead panel discussions on issues and technical areas related to academic and industrial careers in OR/MS.

Registration for the Doctoral Colloquium will begin at 4:30p, Friday, November 3, at the Ramada Emily Morgan Hotel, 705 East Houston Street, in downtown San Antonio. A welcome reception will be held that evening and the Colloquium sessions will take place on Saturday. On Saturday evening, a banquet will be held at one of the popular Riverwalk restaurants. Visit http://ie.tamu.edu/informs2000 and http://www.informs.org/Conf/SanAntonio2000 for updates and program changes.

Sunday, November 5
8:00a - 6:00p

5th Conference on Information Systems & Technology (CIST)

Salon J & Room 2 - Marriott Rivercenter

Being held in conjunction with the INFORMS San Antonio Meeting, the 5th CIST meeting will run all day on Sunday. The theme of the conference is the emerging electronic markets, with special emphasis on economics of information systems as a framework for analysis of these markets and on telecommunications as the major vehicle for the delivery of electronic goods and services. Registrants must also register for the INFORMS meeting. For further information, go to http://munin.utdallas.edu/cist or contact the conference co-chairs: Joakim Kalvenes at kalvenes@utdallas.edu or Haim Mendelson at haim@haim.stanford.edu.

Monday - Wednesday, November 6 - 8
8:00a - 5:00p

Third International Meeting of the Military Applications Society (3MAS)

Rooms 13, 14 & 16 - Marriott Rivercenter

The Third International Meeting of the INFORMS Military Applications Society (3MAS) will be held concurrently with the INFORMS Annual Meeting, November 5 - 8, 2000 in San Antonio, Texas.

3MAS Theme:
Military Operations Research/Management Science at the Millennium: Past/Present/Future

- Get "up to speed" via stimulating military OR/MS presentations and tutorials
- Network with other MAS members
- Attend related INFORMS presentations
- See the famous San Antonio River Walk and the nearby Alamo
- Plenary Speakers:
  - Col. Dennis Mroczkowski (USMC, Ret.; Historian at Ft. Monroe, VA)
  - Dr. Katherine McGrady (Center for Naval Analysis)
  - Dr. Greg Parnell (USMA Professor)
  - Simulation/military expert James F. Dunnigan

Special 3MAS Amenities:

- Reduced room rates at a nice motel very near the Marriott Rivercenter Hotel, the main 3MAS/INFORMS site in downtown San Antonio;
- A printed 3MAS program;
- 3MAS "Ready Room" in the Marriott Rivercenter Hotel;
- Preferred seating at 3MAS presentations;
- A PC-CD including all 3MAS presentations;
- Some other surprise treats just for 3MAS registrants.

For more information or for 3MAS paper submissions and corporate sponsorship, please see the MAS website at http://www.zianet.com/pdjang/mas/index.htm or contact Dr. George Huntley, 3MAS Organizer, Cmdt, US Army Logistics Mgt. College, Fort Lee, VA 23801-1705; 804-765-4265 (DSN 539-, Fax -4648); huntleyg@aol.com.

Proud 3MAS sponsors: Raytheon, Teledyne Brown Engineering and the US Army Logistics Management College.

Note that the 3MAS conference registration fee of $50 is required of all 3MAS attendees and presenters, with the exception of the plenary speakers. This is in addition to the required INFORMS registration fee. To register for the 3MAS/INFORMS meeting, go to http://www.informs.org/Conf/SanAntonio2000/

3MAS Plenary
Wednesday, November 8
8:45 - 10:15a
Crockett Room - La Quinta Inn

Military Speaker Looks into Crystal Ball
James F. Dunnigan

Mr. Dunnigan is the author of numerous books, including "The Quick and Dirty Guide to War" and "The Complete Wargamer's Handbook." He is the founder of Simulations Products, Inc. and is a highly successful and innovative developer of commercial war games; he has personally designed many games. He regularly lectures at the US Army War College and is a frequent on-camera consultant for various television news programs. Mr. Dunnigan's website is http://www.jim.dunnigan.com.

The Military Applications Society invites all 3MAS and INFORMS meeting attendees to come and listen to one of the nation's foremost military operations researchers. 3MAS registrants will get preferential seating.

Saturday, November 4



CPMS Practice Issues Forum

8:00a - 6:30p

Room 7 - Marriott Rivercenter

Transcending Disciplines: When a Traditional OR Model is not Enough

Industry leaders will present opportunities of methodologies developed through combining OR and other fields, such as AI or IS. We will explore ways these disciplines reinforce one another and will provide an overview of the most up-to-date applications in areas ranging from online advertising to supply chain management. Some of the areas explored will include intelligent software agents, combining rule-based techniques and optimization algorithms, expert systems etc.

For program information and updates, visit http://www.informs.org/subdiv/Section/SectionPages/CPMS/index.html

Organization Science Dissertation Proposal Competition

10:00a - 9:00p

Rooms 17 & 18 - Marriott Rivercenter

The Organization Science Dissertation Proposal Competition, now in its 10th year, is one of the most prestigious competitions of its kind available to doctoral students studying organizational issues. Past winners have joined the faculties of such prestigious business schools as Stanford, Wharton and UCLA.

The 15-page dissertation proposals are reviewed in a first round of reviewing, in which the top 8 proposals are identified. This year, 3 reviewers reviewed each proposal. The 8 finalists travel to the INFORMS Annual Meeting in San Antonio to present their proposal to a panel of distinguished academic judges. Judgments are based on soundness of theory, methodological rigor and contribution to knowledge of organizations. In keeping with the mission of the INFORMS College on Organization Science, boldness and innovation are important criteria in the judging process. Proposals address issues related to organization theory, strategy or organizational behavior. Finalists receive detailed feedback from the final round judges. First prize includes registration, lodging and $500 toward airfare and expenses for the 2001 Organization Science Winter Conference. It also includes a one-year subscription to Organization Science.

The organizer of this year's competition is Nick Argyres, University of Southern California, Marshall School of Business, Los Angeles, CA 90089-0808; 213-740-5552; (fax) 213-740-3582; nargyres@marshall.usc.edu.

INFORMS Membership Meeting

5:00 - 6:00p

Salon I - Marriott Rivercenter

All INFORMS members are urged to attend the membership meeting on Saturday, November 4. Meet the newly elected officers and Board members and take the opportunity to thank the outgoing officers and Board members for their hard work. Wine and cheese will be served.

Sunday, November 5

COIN INSTALLFEST

Linux: Session SB, 10:15 - 11:45a

Windows: Session SC, 1:15 - 2:45p

Room 216A - Convention Center

The Common Optimization INterface, COIN, is an initiative to promote open source software for the OR community. During the Installfest, participants will download and build the open components currently in COIN, gain an understanding of the structure and standards used by COIN, acquire hands-on experience working with the source code and learn how open source can help them professionally. Two Installfests will be held: one for Linux and one for Windows users. Bring your laptop and network card to participate. No laptop? Come observe and add your voice to the open source discussion.

Job Fair

12noon - 2:00p

Salon M - Marriott Rivercenter

The INFORMS Job Placement Service will hold its Fall Job Fair from 12noon - 2:00p in Salon M in the Marriott Rivercenter. Representatives from major OR/MS employers will be available to meet with job seekers and set up on-site interviews. Bring copies of your resume.

- Job Seekers: The Job Fair is open to all INFORMS members who have signed up with JPS. JPS provides online job listings to read and provides employers with online access to your resume. The service is FREE for INFORMS members; there is a nominal charge for non-members.
- Employers: Participation in the Job Fair is open to all employers enrolled in JPS on a first-come, first-served basis. There is a nominal fee of $20 to participate in the Job Fair. We will provide a table, chairs and a sign with your organization's name. You are encouraged to bring your own recruiting literature and are welcome to bring your own (small) display.

JPS provides an online listing of your job opening, online access to resumes of job seekers and a downloadable database of these resumes. There is a charge of $200 for the first job listing; additional job listings from the same organization are $100 apiece.

Daniel H. Wagner Prize for Excellence in Operations Research Practice

3:00 - 4:30p

Salon L - Marriott Rivercenter

CPMS, The Practice Section of INFORMS, is holding the Daniel H. Wagner Prize for Excellence in Operations Research Practice session. The judging will emphasize the quality and coherence of the analysis used in practice, along with good writing, strong analytical content and verifiable practice successes. Three finalists will present their papers in Session SD41.

The Wagner Prize Award will be presented on Monday, November 6 from 3:00 - 3:30p in Room 2 of the Marriott Rivercenter.

New Welcome Reception

6:30 - 8:00p

Exhibit Hall - Marriott Rivercenter

Everyone is invited to attend the Welcome Reception to help INFORMS launch our new yearly meeting format. The Reception will be held in the Exhibit Hall so you'll also be able to get an extra look at the exhibitors' booths. Take the chance to network and meet up with colleagues whom you may not have seen since the last INFORMS meeting!

Please present the ticket included in your registration materials for admittance.

Forum on Minorities in OR/MS

7:30 - 9:30p

Salon K - Marriott Rivercenter

In an attempt to foster under-represented minority participation in OR/MS, we would like to invite all attendees to attend the Minority Forum. The purpose of the forum is to encourage more minority participants in OR/MS, develop close ties among those interested in increasing the number of minority participants in OR/MS and to disseminate information about the issues facing minority researchers and practitioners. A joint reception with the Forum on Women in OR/MS will be held, followed by a brief presentation. The Forum on Minorities in OR/MS portion of the reception is sponsored by IBM and the INFORMS Roundtable.

Forum on Women in OR/MS Reception

7:30 - 9:30p

Salon K - Marriott Rivercenter

Everyone who supports encouraging women and diversity in the OR/MS profession is invited to a reception, Sunday from 7:30 - 9:30p in Salon K of the Marriott Rivercenter. This year, WORMS is pleased to co-host the event with the new Forum on Minorities in OR/MS. Following the joint reception, the Forum on Minorities will hold a brief kick-off meeting. The Forum on Women in OR/MS portion of the reception is sponsored by Vector Research.

Student Reception

7:30 - 9:30p

Salon J - Marriott Rivercenter

All registered students should attend the Student Reception on Sunday evening for the opportunity to socialize and network with other students in your own field and those with different specialties and interests.

Please present the ticket included in your registration materials for admittance.

Monday, November 6



Teacher Program
8:00a - 5:00p
Salon J - Marriott Rivercenter

The middle/high school/community college math and science teachers program will be composed of introductory OR and computer application presentations, followed by teacher hands-on participation. Probability modeling, computer simulations, queueing (waiting line) models and linear programming models will follow an introduction to OR/MS. Attendees, who are also welcome to attend the general conference, will each receive copies of all program materials: videos, software packages with instructions and teacher/student activity guides and Teacher Introduction Modules.

OR in Practice Poster Sessions
9:00a - 5:00p
Ballroom Foyer - Marriott Rivercenter

The Academic Practitioner Interface Committee (APIC) and IBM will jointly host a poster session during the INFORMS meeting in San Antonio. The poster session will showcase the applications of OR/MS in different industries and stimulate discussions between OR/MS practitioners and academics. Please don't miss the chance to view these innovative posters and to speak with the presenters!

Welcome & Awards Session
11:15a - 12:15p
Salon H & I - Marriott Rivercenter

The San Antonio Local Committee and the INFORMS Board Members invite everyone to attend the Welcome & Awards Session. Dr. Way Kuo, the San Antonio General Chair and John Birge, INFORMS President, will address the audience. The following awards will be presented: the President's Award, the INFORMS Prize, the Kimball Medal, the Dantzig Dissertation Award, the Lanchester Prize, the Expository Writing Prize and the Edelman Award.

CPMS Isolated Practitioner Workshop
6:00 - 7:00p
Room 16 - Marriott Rivercenter

CPMS, the Practice Section of INFORMS, sponsors workshops on topics of interest to isolated practitioners, i.e., the Lone Rangers, of OR/MS. The 17th workshop in this series will address timely issues that affect the growing isolated practitioner community. All are welcome to participate in the workshop and discussion to be held Monday evening. Wine and cheese will be served.

General Reception
7:30 - 9:30p
The Institute of Texan Cultures

The San Antonio Local Committee invites you to the INFORMS General Reception at the Institute of Texan Cultures for a real taste of Texas and a unique opportunity to learn about Texas and its people! The Institute of Texan Cultures is a statewide educational center concerned with the history and diverse cultures of Texas. The Exhibit Floor has displays from 27 cultural and ethnic groups with publications, special exhibits and photographic collections. The unique gift shop will be open during the reception.

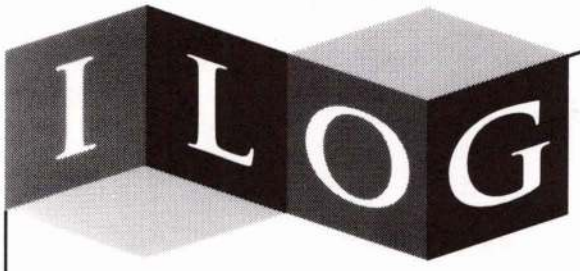
Buses will leave from the Commerce Street exit of the Marriott Rivercenter and will shuttle continually between the hotel and the Institute. The Institute is approximately a 15-minute walk from the Marriott Rivercenter - if you choose to walk, get directions at the bus departure point.

Please present the ticket found in your registration materials at the door.

Tuesday, November 7

Forum on Women in OR/MS Business Meeting & Lunch
12noon - 1:00p
Room 006D - Convention Center

Interested in issues related to women professionals in OR/MS? Come join us for lunch and lively conversation at our business meeting, Room 006D at the Convention Center. Box lunches will be provided for the first 30 attendees, thanks to the generous support of Level 3 Communications.



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Plenary Presentations

Monday, November 6 • 10:00 - 11:00am
Salon H & I - Marriott Rivercenter

Invited Plenary: The Integrated Supply Chain as an Enabler of E-Business Transformation

Frank Jones, *IBM Corporation, Vice President, Integrated Supply Chain; frankjon@us.ibm.com*

E-business clearly has become "the next big thing." As the rate and pace of the e-business phenomenon continue to accelerate — and as projections for business and consumer spending via e-commerce continue to inflate — designing and deploying an end-to-end supply chain model become increasingly important for companies large and small. Mr. Jones will discuss the continuing e-business/e-commerce transformation, with a particular emphasis on the supply chain and value chain integration. He will also discuss practical considerations that companies face in developing their e-business strategies.



Bio: Frank Jones joined IBM Endicott in 1966, following graduation from Virginia State University. His career has included a broad variety of manufacturing management and executive assignments, including general manager of the Brooklyn, New York plant, Mid-Hudson Valley, New York, site general manager and Poughkeepsie, New York plant manager and vice president of worldwide S/390 manufacturing and the Poughkeepsie senior location executive. In August 1997, he was named vice president of manufacturing and procurement, IBM Server Group, where he was responsible for the manufacture of IBM's S/390, AS/400 and RS/6000 server products at 8 plants around the world. Mr. Jones assumed his present position on the Corporate Technology and Manufacturing staff in August 1999. As vice president, Integrated Supply Chain, he provides direction to all of the company's worldwide supply chain and manufacturing organizations and is responsible for IBM's worldwide distribution system. In addition, he is responsible for IBM's environmental affairs.

Monday, November 6 • 4:45 - 5:45pm
Salon H & I - Marriott Rivercenter

Edelman 2000 Reprise Plenary: Improving Performance & Flexibility at Jeppesen Sanderson: The World's Leading Aviation Information Company

Elena Katok, *Pennsylvania State University; ekatok@psu.edu*

William Tarantino, *Center for Army Analysis; tarantin@caa.army.mil*

Ralph Tiedeman, *Jeppesen Sanderson, Inc.; ralph.tiedeman@jeppesen.com*

Jeppesen Sanderson, Inc., the world's leader in the aviation information industry, maintains, manufactures and distributes flight manuals with critical safety information for more than 300,000 pilots and 400 airlines worldwide. Jeppesen's customer service level started to deteriorate when a growing product line of more than 100,000 aviation charts overwhelmed its production system. We developed a suite of optimization-based decision support tools that improved production planning and revealed the value of OR to Jeppesen managers. Concurrently, we developed a novel and general method for evaluating and justifying investments in production technology. The impact of our work included a reduction in lateness and improvements in production processes, which led to a decrease in customer complaints, a reduction in costs of nearly 10%, an increase in profit of 24% and the creation of a new OR group. Two years later, Jeppesen is fully committed to OR, with OR-based decision support systems spreading to all areas of the company.

Tuesday, November 7 • 10:00 - 11:00am
Salon H & I - Marriott Rivercenter

Omega Rho Distinguished Lecture: The World is Coming Our Way: OR/MS Opportunities in E-Commerce

John D.C. Little, *MIT, Institute Professor; jlittle@mit.edu*

In the early days of OR/MS, the biggest challenge frequently was to gain managerial acceptance of models. While this issue has not exactly disappeared, a new technology has appeared on the scene. Today, increasing numbers of business transactions are moving to the Internet, where, by necessity, many of the decisions must be pre-programmed into web software as algorithms and rules. This is a world made to order for OR/MS. Opportunities exist for models, optimization and construction of decision rules in a host of new applications. These include such diverse areas as supply chain management, manufacturing, customer service, e-tailer system design, pricing, advertising, web congestion control and more. We examine several of these, especially focusing on applications in marketing. The future appears rich with opportunities and we brush caution aside to speculate about a few of them. If OR/MS does not pick up the challenge of providing models for the new era, other fields will!



Bio: John D.C. Little is an Institute Professor at MIT, where he teaches and does research in marketing at MIT's Sloan School. He has also done research in optimization, queueing and traffic signal control. In queueing, he is known for "Little's Law." Professor Little received a BS in physics in 1948 and a PhD in physics and OR in 1955, both from MIT. He taught at Case Western Reserve from 1957-62 and since then, has been at MIT. Among his honors, Professor Little has received the Converse and Parlin Awards of the American Marketing Association and was elected to the National Academy of Engineering. He has also served as a president of both ORSA and TIMS and after their merger became the first president of INFORMS.

Tutorial Presentations

Sunday, November 5

Session SB05

Tutorial: Moment Problems & their Applications in Probability Theory, Finance, Stochastic Networks & Combinatorial Optimization

Dimitris Bertsimas, *MIT; dbertsim@mit.edu*

Problems involving moments of random variables arise naturally in many areas of mathematics, economics and OR. How do we obtain optimal bounds on the probability that a random

variable belongs in a set, given some of its moments? How do we price financial derivatives without assuming any model for the underlying price dynamics, given only moments of the price of the underlying asset? How do we obtain stronger relaxations for stochastic optimization problems exploiting the knowledge that the decision variables are moments of random variables? Can we generate near optimal solutions for a discrete optimization problem from a semi-definite relaxation by interpreting an optimal solution of the relaxation as a covariance matrix? We demonstrate that convex, and in particular semi-definite, optimization methods lead to interesting, and often unexpected, answers.

Session SB15

Tutorial: Coordinating Production, Distribution & Pricing Decisions in the Supply Chain

David Simchi-Levi, *MIT; dslevi@mit.edu*

The influence of the Internet and e-commerce on the economy in general, and supply chain management in particular, has been tremendous. Changes are happening so fast and the scope is breathtaking! General Motors, for instance, has recently announced, (*Wall Street Journal* 2/22/2000) that the company is completely changing the way it is designing, building, selling and delivering its products. The challenge is to allow customers to customize and order cars online and have the car show up at the door in about 4 days. To execute this business model, General Motors has to reconsider the entire supply chain, including the way they partner with suppliers, the manufacturing activities and the marketing and pricing of their products. Specifically, vehicle design has to change to allow easy configuration of finished goods, factories and suppliers have to be integrated and transportation time should be reduced significantly. We analyze various supply chain models that deal with the coordination of production, distribution and pricing decisions related to this new business model.

Session SB16

Tutorial: Preference Function Modeling

Jonathan Barzilai, *Dalhousie University; jonathan.barzilai@dal.ca*

PFM is a new, intuitive, easy-to-use but powerful decision methodology based on a rigorous mathematical theory. This presentation will introduce the basic concepts and theory underlying PFM as well as Trillium/PFM, a software package that implements this methodology.

Session SC27

Tutorial: Breaking the Mold – Using Commercial Software & Experiential Learning to Teach the First Management Science Course

Matthew J. Liberatore & Robert L. Nydick, *Villanova University*

Our approach to teaching the first course in MS is predicated upon 2 beliefs: MS is more important to business education than ever and students can implement MS more easily than ever. What is required is a radical change in the way the first MS course is conducted. Spreadsheets offer important advantages in teaching MS. However, we offer a proven alternative to spreadsheets that synthesizes MS modeling, commercial software and experiential learning to drive a MS course that adds value to the curriculum. We illustrate how to apply our integrated approach to 3 MS modules: mathematical programming, DA and simulation. Specifically, we demonstrate how to present a motivating example for each module using PowerPoint lecture modules linked with commercial software. The supporting software packages are LINGO and its modeling language for mathematical programming, Expert Choice for the AHP and Extend for simulation. The first pass at modeling provides the necessary groundwork for developing the necessary groundwork for developing more complex and realistic applications. The goal of each is to prepare the student to accept the challenge of successfully modeling an important problem within his or her own organization. We share lessons learned regarding the development of student projects that create value for organizations and present examples of successful student projects that have reached various stages of implementation. Many of these might never have been attempted, let alone successfully completed, without the power that commercial software offers. The learning system we present enables us to state during the first class that our goal is to have every student complete one successful implementation within one year of completing the course. We believe that our approach leads to a paradigm shift: the focus changes from what could/would be done with MS to what students can/will do with MS. This session will interest anyone who wishes to empower ordinary students to produce extraordinary results.

Session SC41

Tutorial: The Roundtable Presents Small Business Innovative Research Grants & How to Win Them

Joe Discenza, *SmartCrane, Inc., a Daniel H. Wagner Associates company; joeh@discenza.com*

Small business innovative research programs provide opportunities for practitioners, new graduates and university departments to obtain seed funding for investigation of new methods and development of new commercial products. This tutorial will cover topic selection, proposal writing and strategies for commercialization.

Session SD23

Tutorial: Statistical Analysis of Simulation Output

David Goldsman, *Georgia Institute of Technology; sman@isye.gatech.edu*

The analysis of simulation output data is difficult - such output rarely satisfies the independence and normality assumptions one finds in standard statistics texts. We outline a number of ways around these problems. We also demonstrate these techniques on a number of real-world examples.

Monday, November 6

Session MA02

Tutorial: Applying Advanced Integrated Real-Time Decision Support Systems to Help Airlines Move to the Next Level of Efficiency

Gang Yu, *University of Texas at Austin; yu@uts.cc.utexas.edu*

Price, flexible schedules, on-time performance, safety, satisfactory in-flight services, proper baggage handling and convenient ticket purchases, measure the airline's product. To meet these demands and to provide a high-quality and low-cost product, airlines spend a tremendous amount of resources, time and effort to generate profitable and cost-effective fare classes, flight

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A straightforward topic organization makes this text ideal for introductory business statistics courses.

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schedules, fleet plans, aircraft routes, crew pairings, gate assignments, maintenance schedules, food services plans, training schedules and baggage handling procedures. However, not enough emphasis is placed on the integration and timeliness of systems used to support each of the tasks. Many airlines still rely on, if any, fragmented, isolated, inefficient, fragile systems that generate sub optimal, localized, uncoordinated, untimely solutions for their daily as well as planning decisions. The need for integrated and efficient DSSs to effectively manage airlines planning and operations will be illustrated through examples. Optimization methodology and state-of-the-art technology for implementing these systems will also be discussed.

Session MA17

Tutorial: Integrated Supply Chain Planning for Semiconductor Industries

Mahesh Rajasekharan & Ben Mathias, *i2 Technologies Inc.*

Complex supply chains involving many different in-house fabrication and assembly facilities, foundries and subcontractors characterize semiconductor companies. Long manufacturing cycle times and short product life cycles characterize the business environment. Hence, accurate forecasting, enterprise-wide supply chain planning, strategic fulfillment and delayed product differentiation are critical for success. Further, optimizing scarce capacity is very important since fabrication facilities are very expensive (new fabs typically cost between $1 to $2 million). We examine the key decisions and inputs and outputs involved in the fundamental semiconductor planning processes of demand planning, master planning, factory planning, demand fulfillment and collaboration with customers and subcontractors/foundries. The main objective is to provide a totally integrated end-to-end planning framework that enables tactical execution based on strategic decisions/objectives.

Session MA30

Tutorial: Global Optimization in Action

Janos Pinter, *Pinter Consulting Services, Inc./Dalhousie University; pinter@is.dal.ca*

Continuous GO is aimed at finding the global solution in general nonlinear models. We highlight the most important GO models, discuss adaptive partition strategies to solve (Lipschitz-) continuous GO problems, present the essential convergence results and key algorithm implementation aspects, describe the LGO software and review several interesting GO applications.

Session MC02

Tutorial: Dynamic Resource Management: Problems, Models & Algorithms

Warren Powell, *Princeton University; powell@princeton.edu*

In an era where the rapid interchange of information is growing, the challenge of managing resources efficiently in a dynamic setting is becoming increasingly important. We motivate this area with a series of real applications drawn from freight transportation, military operations, vehicle routing, logistics and distribution and management of agricultural commodities. Then, we provide a modeling vocabulary that merges concepts from optimization, simulation, dynamic programming and control theory. This vocabulary allows us to talk about these problems in a scientific way and to then formulate them mathematically using an elegant notation that naturally captures important dimensions that are often ignored in classic formulations. We refer to our problem class as "dynamic resource transformation problems" (DRiPs). The presentation of our modeling framework is organized around the emerging business of managing fleets of business jets (known as fractional ownership). Using this application, we illustrate concepts such as resource layering, variable aggregation, complex system dynamics, multi-agent control and information profiles. After presenting the basic problem class, we then introduce an algorithmic meta-strategy based on adaptive dynamic programming for multi-stage LPs. We show how the structural properties of multi-stage LPs allow us to formulate continuous value function approximations, combining the strengths of optimization and simulation. We show that we can solve large-scale deterministic problems (in particular, certain classes of integer programs) to near optimality, while using a technique that is easily adapted to stochastic problems. It is sometimes useful to refer to the resulting method as an "optimizing simulator." We capture the "intelligence" of optimization with the flexibility of simulation in representing system dynamics.

Session MC15

Tutorial: The Digital Business Community: Supply Chains to Market Places

Amiya Chakravarty, *Tulane University; amiya.chakravarty@tulane.edu*

Companies in a DBC must be integrated seamlessly to enable quick response to changes in customer preferences, technology and competition. Handoff inefficiencies may creep in among partners from misalignments in information flows, delivery formats and schedules. To ensure knowledge sharing and alignment in business processes, companies may redesign flows of goods, information and funds. How should capabilities, process-alignment, network-flows and system-transparency be determined in such a DBC? How should rules of collaboration for resource sharing, information sharing and task management be arrived at? How should standards and commonalities in the community be leveraged for competitive advantage?

Session MC46

Tutorial: Mining Spatial Data

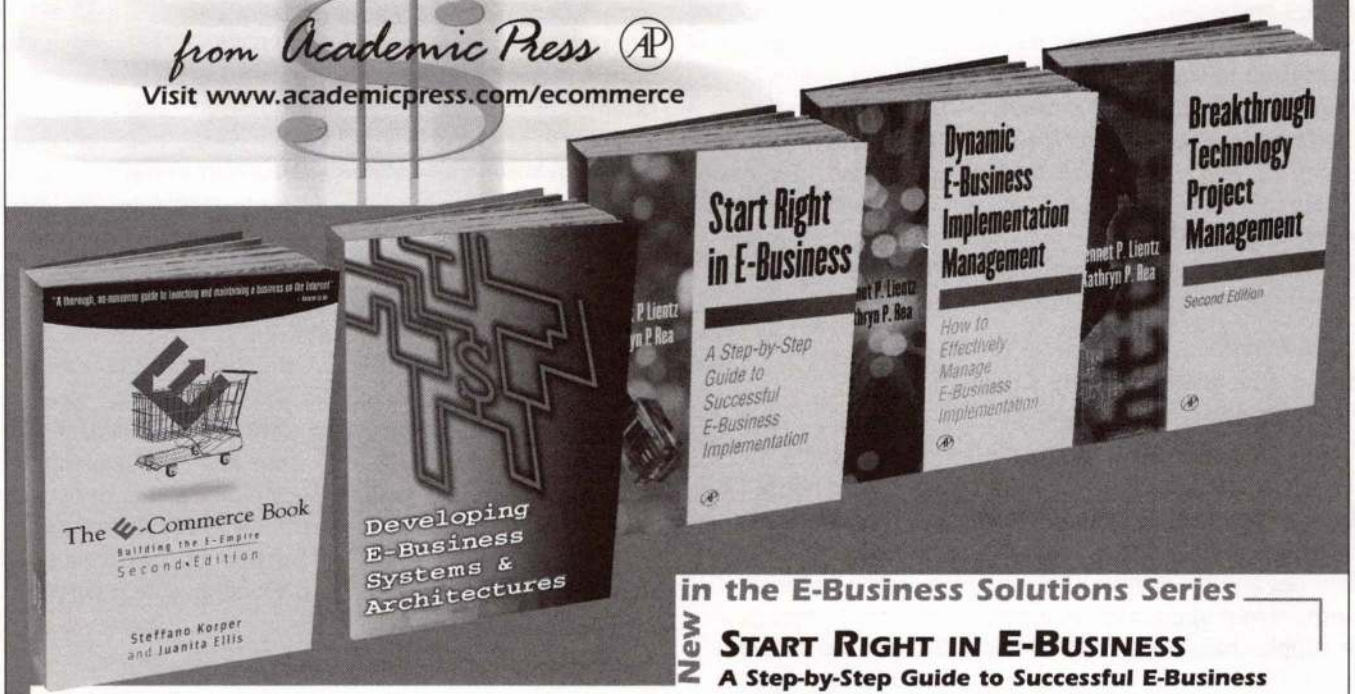
Yupo Chan, *University of Arkansas at Little Rock; novascorp@dayton.net*

We show people how to extract useful geographic information in real time. While there are other "data mining" tutorials, we focus on extracting information to support such applications as facility location, where a facility can be anything from a depot/warehouse to a military target. We also discern trends and patterns on a map, such as spatial signals/communications, weather and pollution plumes. Among other tools, all this information can be exploited through a GIS to allow for easy retrieval and processing. The presentation is based on 3 books by the presenter. Operational software is part of the discussion.

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This book provides managers with an overview of the major concepts of e-business and a roadmap to help them develop a strategic plan of their own. Its focus is on the development of architectures and the re-engineering of IT groups to support the development of distributed, component-based applications.

November 2000, Paperback 250 pp. $34.95/£23.95 (tentative)

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June 2000, Paperback 266 pp., $44.95/£28.95

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This project management book emphasizes "breakthrough" management, which is multitasking in cyberspace. This book addresses the "how" in systems and technology project management. Most other books address the "what."

December 2000, 380 pp., $44.95/£28.95(tentative)

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Session MD02
Tutorial: Theoretical Foundations of Systems Engineering
George A. Hazelrigg, *National Science Foundation; ghazelri@nsf.gov*

Systems engineering involves decision making with respect to all aspects of the system. Good systems engineering demands adequate generation of system alternatives and proper selection of the best alternatives from among this set. Selection is the domain of decision theory. We will discuss the underlying concepts of decision making under uncertainty applied to engineering systems. We will cover the proper formulation of a system objective function for system optimization and show pitfalls in many commonly used methods of system design.

Session MD05
Tutorial: Traffic Modeling for Queues and its Impact on Performance Analysis
Peter Glynn, *Stanford University; glynn@leland.stanford.edu*

We discuss 3 different types of traffic environments: short-range dependent with light (marginal) tails, short-range dependent with heavy tails and long-range dependent with light tails. Specifically, we describe the qualitative behavior of a queue fed by such traffic, i.e., heavy-traffic scaling, most likely path to buffer overflow, relaxation time, etc.

Session MD09
Tutorial: Revenue Management & Dynamic Pricing
E. Andrew Boyd, *PROS Revenue Management; aboyd@prosm.com*

RM has been employed with great success in the airline, hotel and car rental industries for many years. We introduce the basic concepts of RM and discuss some of the many new industries where RM is being employed. We also discuss the relationship with dynamic pricing, auctions and exchanges.

Tuesday, November 7

Session TA02
Tutorial: Multi-Agent Systems
Abhi Deshmukh, *University of Massachusetts; deshmukh@farm.ecs.umass.edu*

Multi-agent systems, where loosely coupled decision makers or problem solvers coordinate their activities to tackle a larger problem beyond their individual capabilities, has emerged as a powerful paradigm for representing and solving complex problems. The growth of this field has not only been spurred by the advances in distributed computing and wide spread information connectivity but also by the changing business environment. Supply chains and extended enterprises are ideal applications of multi-agent decision making due to the inherently distributed capabilities and goals of different participants. This tutorial gives an introductory treatment of the research issues related to multi-agent coordination and presents several application domains where multi-agent systems can be used to coordinate complex, distributed business problems. The tutorial is in 3 parts: the first discusses results in distributed decision making, the second gives an overview of different applications of multi-agent systems in industrial problems and the third highlights some of the open research issues in multi-agent systems.

Session TA14
Tutorial: Modern Experimental Design I: Planning & Analysis
C. F. Jeff Wu, *University of Michigan; jeffwu@umich.edu*

This tutorial is based on the book "Experiments: Planning, Analysis & Parameter Design Optimization" by Wu & Hamada (2000, Wiley). The first part will focus on the choice of experimental plans (2-, 3- or mixed-level) fractional factorials and orthogonal arrays) and modeling and analysis techniques. Real experiments are used for illustration.

Session TC14
Tutorial: Modern Experimental Design II: Parameter Design for Variation Reduction & Quality Improvement
C. F. Jeff Wu, *University of Michigan; jeffwu@umich.edu*

It was proposed (Genichi Taguchi) as an off-line approach to variation reduction and quality improvement. We will discuss the motivation and tools developed in the last decade including planning techniques (cross arrays and single arrays) and modeling techniques (location-dispersion and response modeling). Real experiments are used for illustration.

Session TE05
Tutorial: Some Mathematical Models of Cancer Treatment
Lawrence M. Wein, *MIT; lwein@mit.edu*

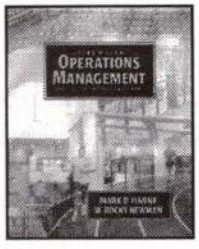
We will describe several (about 5) mathematical problems concerning the analysis, design and/or control of traditional (chemotherapy, radiation, surgery) and novel (gene therapy, angiogenesis inhibitors) cancer therapies. We will omit most of the mathematical details and instead focus on the biological aspects of the model formulations and the insights from our analyses.

Session TE10
Tutorial: Sensitivity Analysis for Scheduling Problems
Nicholas G. Hall & Marc E. Posner, *Ohio State University; hall.33@osu.edu & posner.1@osu.edu*

We introduce a variety of new directions in formulating and solving sensitivity analysis questions. Although we focus on applications to scheduling problems, many of these questions and solution approaches can be applied to other optimization problems. For some problems, we provide fast methods to determine when a previously optimal solution remains optimal. Other methods restore an optimal solution after a parameter change. For some problems, sensitivity analysis results depend on the position of the job with changed parameter. We identify situations where performing additional or a different type of computational work during optimization facilitates sensitivity analysis. The value of studying the sensitivity of an optimal sequence instead of the sensitivity of an optimal schedule is also considered. We discuss which types of sensitivity analysis questions are intractable because the scheduling problem is intractable. We provide an example of how to derive bounds on the additional cost incurred by using a previously optimal schedule after a parameter change. We also demonstrate that an optimal schedule can be used to improve worst case heuristic bounds when the data is modified. Our results are illustrated using examples from well-known scheduling models.

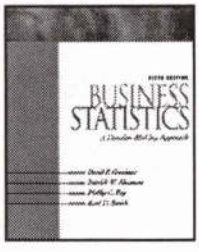
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Integrated Operations Management, 1e
Mark Hanna and W. Rocky Newman

Introducing the first OM textbook written from the perspective that most students taking this course are ***not majoring in Operations.*** The authors emphasize the cross-functional role of operations and how everyone in a company is involved in making operational decisions.



Business Statistics: A Decision-Making Approach, 5e
David Groebner, Patrick Shannon, Phillip Fry, and Kent Smith

This comprehensive text presents descriptive and inferential statistics with a rich assortment of business examples and real data and an emphasis on decision-making. There is significant emphasis on using statistical software as a tool, with most examples presented in a spreadsheet environment. Minitab and Excel are featured as well.

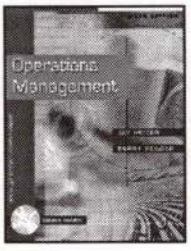
SimQuick
David Hartvigsen

This easy-to-use computer package for process simulation runs in the Excel spreadsheet environment. The software/booklet can be used in Operations Management, Management Science and Supply Chain Management courses.

Decision Modeling with Microsoft Excel, 6e
Jeffrey Moore and Larry Weatherford

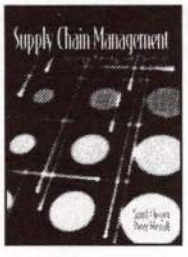
This text introduces students to the key ideas of modeling and management decision making that will be important to them throughout their careers.

Learning Business Statistics with Microsoft Excel
John Neufeld



Operations Management, 6e and Principles of Operations Management, 4e
Jay Heizer and Barry Render

These best selling texts continue their rich tradition of excellence with two new chapters on Operations Technology, the Internet and ERP, and E-Commerce and Operations. The authors have also added additional homework problems and enhanced the coverage of services and e-commerce.



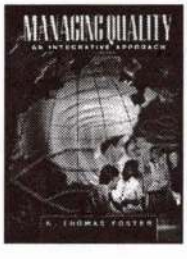
Supply Chain Management: Strategy, Planning and Operations
Sunil Chopra and Peter Meindl

This text brings together the strategic role of the supply chain, key managerial concepts in supply chain management, and the tools and techniques for supply chain design and planning.



Project Management for Business and Technology Principles and Practice, 2/e
John Nicholas

This comprehensive text covers all aspects of project management: qualitative and quantitative with many practical examples in both business and technology.



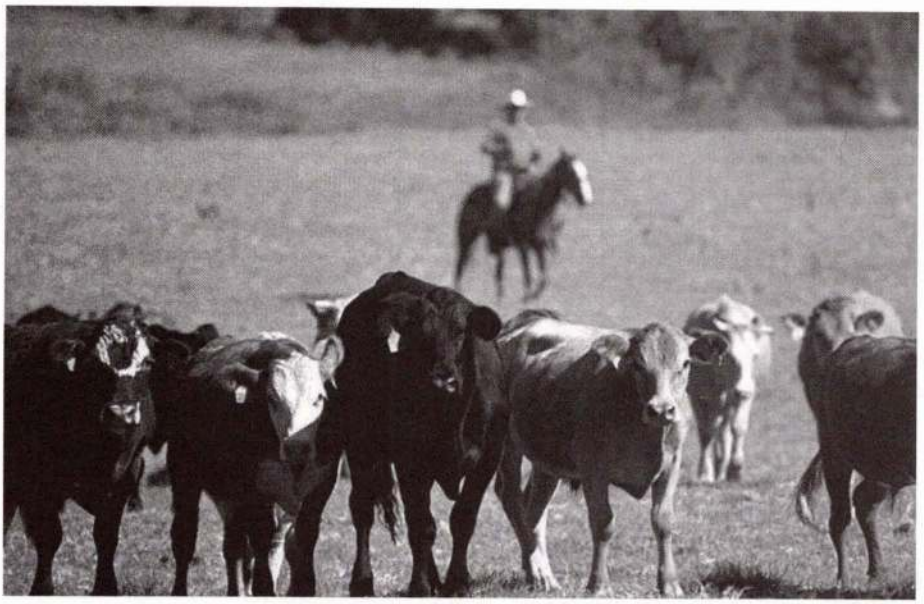
Managing Quality: An Integrative Approach, 1e
S. Thomas Foster

This textbook is a comprehensive introduction to the field of quality management, integrating the emerging body of knowledge in the areas of quality theory, quality assurance, and quality control.

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Exhibitor Software Demonstrations



SC45, 1:15 – 2:45p
Duxbury/Thomson Learning
Sam Savage;
savage@leland.stanford.edu

INSIGHT.xla:
Business Analysis Software

INSIGHT.xla: Business Analysis Software for Microsoft Excel is a suite of Excel add-ins for simulation, decision analysis, forecasting, queueing and optimization. Sam Savage will demonstrate how easy it is to use INSIGHT with practical illustrative examples and discuss how INSIGHT with its accompanying textbook can be used in the classroom.

McGraw-Hill/Irwin
James Fitzsimmons; jfitz@mail.utexas.edu

Effective Use of Simulations in Teaching Service Operations Management

The attributes and advantages of ServiceModel, professional simulation software from the ProModel Corp., will be addressed along with how Professor Fitzsimmons has integrated its use into his course on service management. As time permits, we will also demonstrate various electronic solutions, available from McGraw-Hill, to implement online courses.

SD45, 3:00 – 4:30p
Dash Optimization, Inc.
Alkis Vazacopoulos; alkis@dashopt.com

The attributes and advantages of ServiceModel, professional simulation software from the ProModel Corp., will be addressed along with how Professor Fitzsimmons has integrated its use into his course on service management. As time permits, we will also demonstrate various electronic solutions, available from McGraw-Hill, to implement online courses.

MacKichan Software, Inc.
Barry MacKichan; barry@mackichan.com

Increase Your Productivity with Scientific WorkPlace 3.5

This presentation will cover the basic uses of Scientific WorkPlace 3.5 to write for publication, to compute and plot using the included computer algebra system (either MuPAD or Maple) and to publish mathematics on the Web. We will show a large number of examples.

MA45, 8:15 – 9:45a
Applied Decision Analysis LLC
Katie Odem;
katie.odem@us.pwcglobal.com

Introducing DPL 5.0, Decision Analysis Software

DPL is professional decision analysis software using influence diagrams, decision trees and spreadsheets. Graphical outputs include rainbow diagrams, risk profiles, policy trees and policy summaries. New in DPL 5.0: time-series percentiles, 2-way rainbow diagrams and much more!

MC45, 1:15 – 2:45p
LINDO Systems, Inc.
Mark Wiley; mwiley@lindo.com

Modeling with LINDO, LINGO & What's Best!

LINDO Systems will highlight the recent speed enhancements to linear and integer solvers and will demonstrate our new Callable Library and line of popular modeling packages: LINDO — our powerful linear and integer programming engine, LINGO — our integrated modeling language with linear/nonlinear solvers and What'sBest! — our large scale linear/nonlinear spreadsheet solver.

Maximal Software, Inc.,
Bjarni Kristjansson; info@maximal-usa.com

Using the MPL OptiMax 2000 Component Library with VBA for Excel and Visual Basic

The OptiMax 2000 is a highly anticipated Component Library (API) designed to take full advantage of the ActiveX Automation component software technologies from Microsoft. Using step-by-step examples, we will demonstrate how to use the OptiMax 2000 to seamlessly integrate MPL into VBA for Excel/Access, Visual Basic, Visual C++, Delphi, Java and the Web, thus easily creating customized end-user applications to solve real-world optimization problems.

MD45, 3:00 – 4:30p
Imagine That, Inc.
David Krahl; davek@imaginethatinc.com

Simulation Modeling with Extend™

Come see why Extend™ is the acknowledged standard for discrete event and continuous simulation in top universities and corporations worldwide. View a demonstration of powerful Extend features such as top-down/bottom-up hierarchy, built-in activity-based costing, customizable animation, 1-click output analysis, automatic confidence intervals, sensitivity analysis and integrated development and authoring environments, PLUS our new source code debugger, direct data-linking with other applications using OLE and ODBC and built-in optimizer.

ILOG, Inc.,
Irv Lustig; ilustig@ilog.com

Introducing ILOG Concert Technology

ILOG has recently released new versions of all its optimization components, based on ILOG Concert Technology. This new foundation for the ILOG Optimization Suite provides C++ modeling objects for constraint programming and mathematical programming applications. Come see how ILOG Concert Technology reduces your development time for applications based on ILOG CPLEX and ILOG Solver.

TA47, 8:15 – 9:45a
IBM
Robert H. Clark; roclark@us.ibm.com

OSL Version 3

IBM will demonstrate the enhanced performance and usability of OSL Version 3. The demonstration will include a vehicle routing application and integration of the optimization technology with spatial modeling techniques.

TC47, 1:00 – 2:30p
AutoSimulations, Inc.
Jay Stacey; jay_stacey@autosim.com

AutoMod

AutoMod allows you to experiment in the virtual world to save time and money in the real world. AutoMod, an easy-to-use true-scale 3D simulation tool, combines the ease of a simulator with the power of a simulation language and includes templates for material handling, manufacturing and continuous flow. Come see why AutoMod is the simulation software of choice.

Frontline Systems, Inc.
Daniel H. Fylstra; dfylstra@frontsys.com

Solving Challenging Large-Scale Optimization Problems in Excel with the Premium Solver Platform

The Premium Solver Platform, Frontline Systems' new "flagship" spreadsheet solver product, supports multiple "plug-in" Solver engines. We'll demonstrate several new Solver engines solving linear programming problems with up to 65,000 constraints, nonlinear problems with thousands of constraints and very challenging mixed-integer and non-smooth optimization problems.

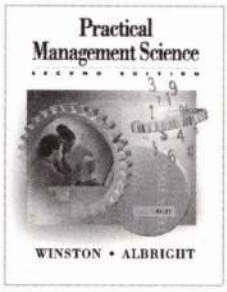
TD47, 2:45 – 4:15p
Paragon Decision Technology
Marcel Roelofs; marcel.roelofs@paragon.nl

AIMMS & Multi-Agent Technology

Autonomous multi-agent technology will be the principal new feature in the presentation of the revolutionary AIMMS 3 modeling system during the software demonstration by Paragon Decision Technology. AIMMS is an all around development environment for creating complex and easily maintainable decision support applications.

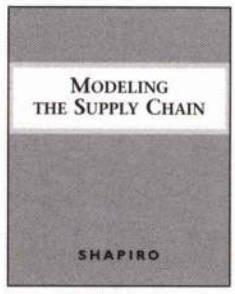
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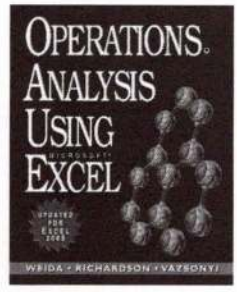
Apply analytical models to supply chain planning problems.

Jeremy Shapiro
Modeling the Supply Chain
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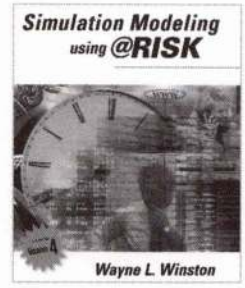
Use Microsoft® Excel to solve Operations problems.

Nancy Weida, Ronny Richardson, and Andrew Vazsonyi
Operations Analysis Using Microsoft® Excel
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This book provides a practical introduction to Monte Carlo simulation applied to problems in Finance, Marketing, and Operations.

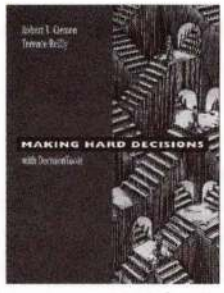
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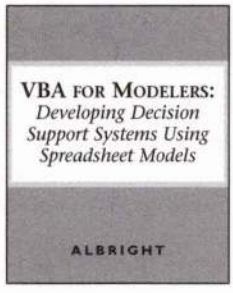
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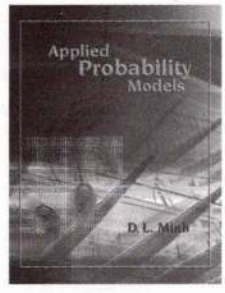
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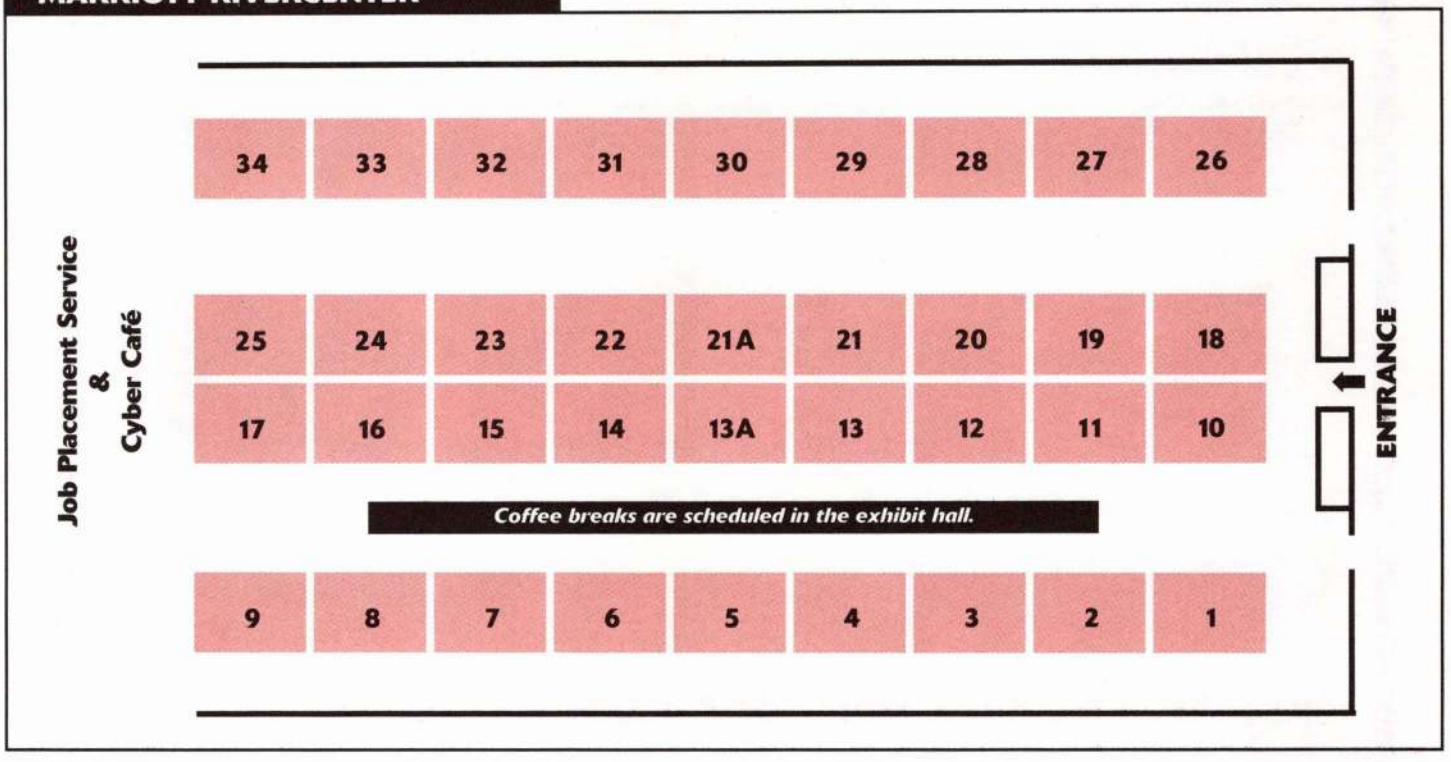
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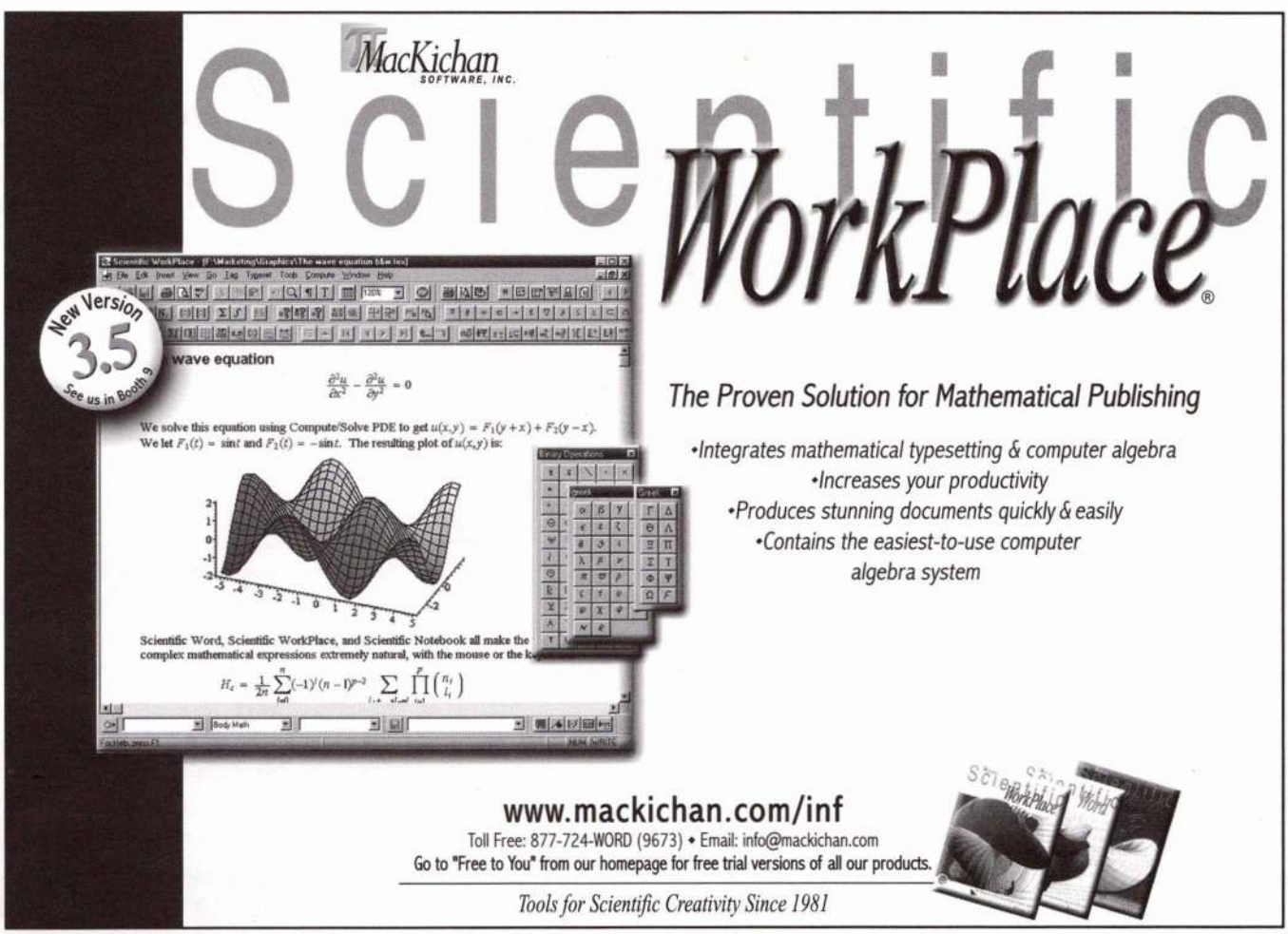
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PLANNER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY
SA 8:30 - 10:00	MA 8:15 - 9:45	TA 8:15 - 9:45	WA 8:30 - 10:00
SB 10:15 - 11:45	**INFORMS Plenary** 10:00 - 11:00 **Frank Jones - IBM**	**Omega Rho Plenary** 10:00 - 11:00 **John D. C. Little**	WB 10:15 - 11:45
SC 1:15 - 2:45	**WELCOME & AWARDS** 11:15 - 12:15		
SD 3:00 - 4:30	MC 1:15 - 2:45	TC 1:00 - 2:30	
	MD 3:00 - 4:30	TD 2:45 - 4:15	
	Edelman Plenary 4:45 - 5:45 **Jeppesen Sanderson**	TE 4:30 - 6:00	

San Antonio Master Track Schedule

		SUNDAY				MONDAY			TUESDAY				WEDNESDAY	
Track	Room	SA	SB	SC	SD	MA	MC	MD	TA	TC	TD	TE	WA	WB
		8:30-10:00	10:15-11:45	1:15-2:45	3:00-4:30	8:15-9:45	1:15-2:45	3:00-4:30	8:15-9:45	1:00-2:30	2:45-4:15	4:30-6:00	8:30-10:00	10:15-11:45
1	207A	Decision Analysis				Decision Analysis			Decision Analysis					
2	207B	Decision Analysis				Tutorials				DEA			AHP	Risk Analysis
3	205					MSOM								Dynamic Models
4	206A					MSOM								Comb. Mfg
5	206B					Applied Probability								
6	Rm. 8					Transportation Science								Transportation
7	Rm. 6					Education								
8	214C	Finance			Bus. Apps.	E-Business			E-Business & Enterprise Integration					
9	Rm. 7	Revenue Management						Tutorial	Military Applications			Inventory Mgmt.		
10	210B	Scheduling												
11	211	Integer Programming												
12	212A	Logistics and Supply Chain Management											Inventory Management	
13	212B	Manufacturing & Logistics												
14	213A	Product Development			Aviation Applications			Int. Prog.	Tutorials		FMS			
15	213B	Quantitative Models in Supply Chain Management					Tutorial	Scalable Stats.	Supply Chain Mgmt.		Mgmt. of Technology		DSS	Transport. Model.
16	214A	MCDM									Stochastic Programming			
17	214B	Optimization: Network Flows					Optimization: Performance of Supply Networks			Forecasting		OR in Sport	Transportation Mgmt.	
18	214D	E-Commerce										Supply Chains		
19	Rm. 3	Technology Innovations & Operations					Product Development							
20	Rm. 5	Tabu & Scatter Search				Computational Intelligence			Strategic Planning			Model. Lang.		
21	209	SICUP							Facilities Plng.	Location Analysis				
22	210A	Health Applications								Innovation/Entrepreneurship		Health Apps.		
23	208	Simulation								Bidding	Auctions		Simulation	
24	006A	Material Handling				Warehousing & Distribution		Retail Ops.	Product./Train.	Telecommunications				
25	006B	Optimization: Nonlinear Programming				Optimization: LP & Complementarity						Optimization: Global Optimization		
26	006C	Stochastic Models & Applications						Queueing/Inv.	OR/MS in the Service Industries					
27	006D	Job Search		Tutorial	WORMS	Project Management		Inventory	Reliability & Quality Control					
28	007A	Social Science	Networks/Graphs	RASIG					Public Programs & Processes					
29	007B	Energy - Electricity Markets							Ops. Mgmt.	Environment/Natural Res.			Ops. Mgmt.	
30	007C	Computing Society												
31	007D	Computing Society								Artificial Intelligence				
32	Rm. 9	Technology Management				Telecomunications			Organization Theory		Production & Scheduling			
33	Rm. 10	FMS	Production Planning			Production & Scheduling			Scheduling			Mfg. Systems		
34	Rm. 11	Decision Analysis				DSS	MCDM		Economics			Vehicle Routing		
35	Salon B	Forecasting		Information Systems										
36	Salon C	Inventory Management		Logistics Management		Operations Management								
37	Salon G	Optimization Techniques					Int. Prgrm.	LP & Apps.						
38	Salon A	NLP		Industry Applications			Pub. Prgrm.	Semi. Ind.						
39	Salon K	Marketing				Comp. Intell.	New Product Development							
40	Rm. 1	Queueing	Reliability	Stats/Quality	Stoch. Proc.	Applied Probability		Struct. Models						
41	Salon L	Accounting		Roundtable	Wagner Prize	CPMS OR in Practice								
42	Rm. 12	Dantzig Diss.				QSR								
43	Rm. 4	Risk Management				Technology Management								
45	Salon D	Software Demonstrations												
46	216		COIN INSTALLFEST			Transport.	Tutorial		DEA					
47	Rm. 17								Software Demonstrations					

Orange: Marriott Rivercenter Black: Convention Center

Sunday 08:30-10:00

SA01 Panel: Government Applications of Decision Analysis

Sponsor: Decision Analysis Society
Sponsored Session
Chair: Thomas A. Edmunds, Lawrence Livermore National Laboratory, Decision Sci. Group, 7000 East Ave. Livermore, Livermore, CA, edmunds2@llnl.gov

1) Panel: Government Applications of Decision Analysis, ***John Ziagos***, Lawrence Livermore National Laboratory, Decision Sci. Group, 7000 East Ave. Livermore, Livermore, CA, ***Gregory S. Parnell***, US Military Academy, Dept. of Systems Eng., West Point, NY 10996-1779, fg7526@exmail.usma.edu, ***Detlof Von Winterfeldt***, University of Southern California, Sch. of Policy/Planning/Dev., Los Angeles, CA 90089, detlof@aol.com, ***Thomas A. Edmunds***, Lawrence Livermore National Laboratory, Decision Sci. Group, 7000 East Ave. Livermore, Livermore, CA, edmunds2@llnl.gov

Because decisions in the government sector often require consideration of a wide range of non-economic objectives and must be acceptable to a diverse set of stakeholders, they can be more complex than decisions in the private sector. We will describe some of our experiences in introducing decision analysis techniques into government decision processes...

SA02 Representation & Solution of Asymmetric Decision Problems

Sponsor: Decision Analysis Society
Sponsored Session
Chair: Prakash P. Shenoy, University of Kansas, School of Bus., Summerfield Hall, Lawrence, KS 66045-2003, pshenoy@ukans.edu

1) Representing & Solving Asymmetric Decision Problems, ***Thomas D. Nielsen***, Aalborg University, Dept. of Computer Sci., Frederik Bajers Vej 7C, Aalborg, DK-9220, Denmark, raistlin@cs.auc.dk, ***Finn V. Jensen***

We present a formal framework called "asymmetric influence diagrams" based on influence diagrams that allows an efficient representation of asymmetric decision problems. We also give an algorithm for solving asymmetric influence diagrams by decomposing the problem into symmetric subproblems.

2) Asymmetry in Decision Making in Practice, ***Zvi Covaliu***, Fair, Isaac & Co., Inc., Corporate Dr., Ste. G, Baltimore, MD 21236, zvicovaliu@fairisaac.com

We address the prevalence, significance and variety of asymmetry in decision-making in practice in a number of applications. In particular, we provide examples from decision problems in project management and credit and risk management and identify asymmetries peculiar to these applications.

3) Representing Asymmetric Bayesian Decision Problems using Belief Functions, ***Liping Liu***, Southern Illinois University, Dept. of Mgmt., Carbondale, IL 62901-4627, lliu@siu.edu, liu@infonet.cba.siu.edu, ***Prakash P. Shenoy***

By viewing asymmetry as an uneven numerical specification of probabilities and utilities, a belief functions provide a most natural and compact representation of asymmetric decision problems. It avoids dummy events and acts, and degenerate probabilities and utilities. It also takes full advantage of numerical coalescence.

4) A Note on Asymmetry in Decision Problems, ***Riza Demirer***, University of Kansas, Sch. of Bus., Summerfield Hall, Lawrence, KS 66045-2003, riza@ukans.edu, ***Prakash P. Shenoy***

Several methods have been proposed for representing and solving asymmetric decision problems. However, it is not clear whether these methods are capable of representing every asymmetric problem. We study several asymmetric decision problems and examine their representation and solution using existing methods.

SA03 Supply Chain Management

Sponsor: MSOM
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Chair: Gerard Cachon, University of Pennsylvania, The Wharton Sch., 1300 SH-DH, Philadelphia, PA 19104, gpc@mail.duke.edu

1) Beyond Revenue Management: Dynamic Auctioning of Capacity in Overloaded Production Systems, ***Rene Caldentey***, MIT, Sloan Sch. of Mgmt., E53-343, Cambridge, MA 02139, rcaldent@mit.edu, ***Lawrence M. Wein***

We consider a M/M/1 queue that has a higher arrival rate than service rate. In this setting, auctioning capacity slots to the highest bidders has the potential to significantly increase system revenues, by revealing customers' willingness-to-pay. We analyze this system using queueing theory and auction theory.

2) Quantifying the Benefits of Supply Chain Visibility, ***Bin Yu***, Columbia Business School, Grad. Sch. of Bus., 3022 Broadway, Uris Hall 407, New York, NY 10027, ***Fangruo Chen***

We present a supply chain inventory model with one supplier and one retailer. In one scenario, the supplier makes her production schedule visible to the retailer so the latter can accurately determine the leadtime for each of his orders. In the other, there is no sharing of information. By comparing these scenarios, we begin to understand the value of supply chain visibility.

3) Supply Chain Competition: How More Information Can Hurt You, ***Krishnan S. Anand***, Northwestern University, Kellogg Grad. Sch. of Mgmt., Evanston, IL 60208, k-anand@nwu.edu

I model the supply chains of 2 firms competing in the same output market. While most previous work has focused primarily on either market-structure (competition) or the firms' internal activities (supply chains), this model studies the interaction between the 2. The results have important strategic implications for example, more information may make a supply chain worse off, even in the absence of incentive problems.

4) The Vice & Virtue of Channel Stuffing, ***Gerard Cachon***, University of Pennsylvania, The Wharton Sch., 1300 SH-DH, Philadelphia, PA 19104, gpc@mail.duke.edu

Channel stuffing occurs when a manufacturer encourages a retailer to purchase more stock than needed to cover short run sales, i.e., when the retailer forward buys. This practice has generally been admonished, but this paper finds that channel stuffing may be quite rational.

SA04 Planning & Assignment of Workers

Sponsor: MSOM
Sponsored Session
Chair: David A. Nembhard, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706-1572, nembhard@engr.wisc.edu

1) Worker Training & Assignment in Manufacturing Cells, ***Bryan A. Norman***, University of Pittsburgh, 1033 Benedum Hall, Dept. of IE, Pittsburgh, PA 15261, banorman@engrng.pitt.edu, ***Wipawee Tharmmaphornphilas***, ***Kim L. Needy***, ***Bopaya Bidanda***

We propose a methodology for identifying and assigning the necessary worker skills in manufacturing cells. Then, using these skills, we develop worker training programs and job assignments in order to maximize cell performance. We also consider different training policies and their effect on cell performance.

2) Queueing Analysis of the Robustness of Skill Chaining Strategies for Cross-Trained Workers, ***Mark P. Van Oyen***, Loyola University, Dept. of ISOM, 25 East Pearson St., Chicago, IL 60611, mvanoye@luc.edu, ***Wallace J. Hopp***

We discuss the strategic use of "D-skill chaining", an approach to worker cross-training appropriate for both serial and parallel production systems. With N stations, N workers are each given D skills. Stochastic queueing models and simulation demonstrate the robustness of the "opportunity" for performance improvement using dynamic worker assignments.

3) Work Group Effects on Worker Speed, ***Kenneth L. Schultz***, Indiana University, Kelley Sch. of Bus., 1309 East 10th St., Bloomington, IN 47401, keschult@indiana.edu, ***Richard Garrett***, ***David A. Nembhard***

Recent behavioral research suggests that the speed of a worker is correlated with the speed of others in their work group. It suggests that workers slow down or speed up based on the pace of their co-workers. We use empirical data from a radio manufacturing line to measure and provide evidence of this effect.

4) Worker Assignments in an Environment of Change, ***David A. Nembhard***, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706-1572, nembhard@engr.wisc.edu

With increases in make to order and smaller batch sizes workers are often subject to being on the learning curve frequently. We examine methodologies that aid in assigning workers to various tasks in order to improve overall productivity in this environment.

SA05 Analysis & Control of Communications Networks

Sponsor: Applied Probability Society
Sponsored Session

Chair: Doug Down, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, down@isye.gatech.edu

1) Dynamics of a Congestion Pricing Model, *A. J. Ganesh*, Microsoft UK, UK, ajg@microsoft.com

We study the use of pricing as a mechanism for allocating bandwidth in communication networks. Starting with a 0/1 pricing scheme proposed by Gibbens & Kelly, we use a distributed control framework to study whether providing more information to users can lead to faster convergence to an efficient allocation of bandwidth in the network.

2) Overloading a Queueing Network: Bifurcations in Path Behavior, *David M. McDonald*, University of Ottawa, Dept. of Math. & Stats., 585 King Edward Ave., Ottawa, Ontario, K1N 6N5, Canada, dmdsg@omid.mathstat.uottawa.ca

When the heaviest loaded node in a Jackson network overloads, the other nodes remain stable with larger loads. If, however, the network is modified so that an idle server helps the busy ones then the numbers of customers in the other nodes perform a Brownian excursion.

3) A Conditional Large Deviation Result for Levy Processes, *Gregory Richardson*, University of Texas, Dept. of Math., RLM 8. 100, Austin, TX 78712-1082, gregorys@math.utexas.edu, ***Takis Konstantopoulos***

We look at the way a communications node, driven by certain Levy heavy-tailed -type input, overflows, and identify the optimal path, which, as in similar situations, consists of a large jump, instead of building up linearly. We also discuss some implications of this result.

4) Asymptotics for Polling Models with Limited Service Policies, *Woojin Chang*, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, woojin@isye.gatech.edu, ***Doug Down***

We develop expressions for the exact asymptotics of exponential polling models under limited service policies. In addition, we explore the implications of these results for system performance (contrasting with usual measures such as expected waiting times) and buffer allocation problems.

SA06 Road Pricing

Sponsor: Transportation Science Section
Sponsored Session

Chair: Donald W. Hearn, University of Florida, Ctr. for Applied Opt., ISE Dept., Gainesville, FL 32611, hearn@ise.ufl.edu

1) Toll Pricing for Variable Demand Traffic Assignment Models, *Mehmet B. Yildirim*, University of Florida, Ctr. for Applied Opt., ISE Dept., Gainesville, FL 23611, ybayram@cao.ise.ufl.edu, ***Donald W. Hearn***

We propose a variable demand traffic assignment model with side constraints on aggregate flows and demand. Special cases of this model include the elastic demand traffic assignment problem with/without side constraints and the combined distribution-assignment model. We characterize the toll set for the model and then extend the toll pricing framework to the variable demand case.

2) A Congestion Pricing Scheme on the San Francisco Bay Bridge, *Kara Kockelman*, University of Texas, Dept. of Civ. Eng., ECJ 6.9, C1761, Austin, TX 78712, kkockelm@mail.utexas.edu, ***Katsuhiko Nakamura***

Daganzo's proposed scheme for reducing congestion via pricing and rationing on a highway with a single bottleneck, assuming socio-economic classes with different values of time, is applied to the San Francisco Bay Bridge; Pareto-improving solutions are sought. The focus is on work trips from the east side of the bridge to downtown San Francisco.

3) Mixed Multinomial Choice Models for Analyzing Congestion Pricing Strategies, *Saul Castelar*, University of Texas, 3607 Greystone Dr., #1812, Austin, TX 78731, scastelar@mail.utexas.edu, ***Chandra Bhat***

A stated preference survey conducted in the San Francisco Bay area is used to examine the travel behavior responses of Bay Area commuters to different congestion pricing schemes on Bay Area bridges. A mixed multinomial choice formulation, that accommodates correlation in repeated-choices from the same individual, is applied in the analysis.

4) Evaluation of High Occupancy Toll Lanes using Dynamic Traffic Assignment with a Stochastic Mode Choice Model, *Pamela M. Murray*, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712, p.murray@mail.utexas.edu, ***Hani S. Mahmassani, Ahmded F. Abdelghany***

HOT lanes provide a new travel alternative that has not been adequately modeled with conventional planning tools. A stochastic mode choice model is incorporated in a dynamic traffic assignment-simulation procedure to analyze the performance and evaluate the effectiveness of alternative dedicated lane configurations and pricing strategies.

SA07 Constructive Methods for Dealing with Special Classroom Issues

Sponsor: INFORM-ED
Sponsored Session

Chair: James J. Cochran, Louisiana Tech. University, Dept. of Comp. IS & Anlysis, Coll. of Admin. & Bus., Ruston, LA 71272, cochran@cab.latech.edu

1) Teaching Modeling across the Business Curriculum, *Christopher J. Zappe*, Bucknell University, Dept. of Mgmt., Lewisburg, PA 17837, zappe@bucknell.edu

We explore how the teaching of modeling can be enhanced by making connections with concepts and problems from various disciplines within business administration. Specific illustrations that demonstrate the efficacy of modeling in such areas as accounting, finance, human resources, marketing and operations will be provided.

2) Extending Instruction Beyond the Quantitative Methods Classroom, *Priscilla Chaffe-Stengel*, California State University, 5245 North Backer Ave., MS PB07, Fresno, CA 93740-8001, pchaffe@csufresno.edu

Core courses in quantitative methods remain a significant challenge for business undergraduates. We report the effects of extending instruction beyond traditional class time. Analyses include objective measures of course successes for participants and non-participants and subjective measures of satisfaction. Additional time spent and number of sessions attended are included.

3) Using the Web to Support a Management Science Course Offered Partly via Distance Learning, *Matthew J. Liberatore*, Villanova University, Dept. of Decision & IT, Villanova, PA 19085, matthew.liberatore@villanova.edu, ***Robert L. Nydick***

We describe the use of Web CT to support a 50% distance learning, 50% face-to-face version of the first MBA course in MS. Organization of the materials, class requirements including homework, exams and terms project and the use of the calendar, chat rooms and private messaging are discussed.

4) Who Wants to be a Millionaire: The Classroom Edition, *James J. Cochran*, Louisiana Tech. University, Dept. of Comp. IS & Anlysis, Coll. of Admin. & Bus., Ruston, LA 71272, cochran@cab.latech.edu

When teaching an introductory Statistics course that meets in long uninterrupted class periods, the author wanted to give students a short pedagogically productive break. Who Wants to be a Millionaire: the Classroom Edition was developed to meet this objective. We explain how the game is administered and give a brief demonstration.

SA08 Financial Engineering

Sponsor: Financial Services Section
Sponsored Session

Chair: Kian Esteghamat, Princeton University, Dept. of ORFE, Princeton, NJ 08544, kestegha@princeton.edu

1) Irreversible Investment & Growth Option: Strategy & Valuation, *Wenlong Weng*, Stanford University, 108G Escondido Village, Stanford, CA 94305, wxweng@leland.stanford.edu, ***John P. Weyant***

We consider the irreversible investment problem of a firm facing stochastic demands in a continuous time framework. The investment decision has to be made in a finite time horizon, and the value of the investment hinges on the growth options it creates. We develop a quasi-analytic approach to the investment problem. We derive an optimal investment strategy...

2) A Jump Diffusion Model for Option Pricing with Three Properties: Leptokurtic Feature, Volatility Smile & Analytical Tractability, *S. G. Kou*, Columbia University, Dept. of IE/OR, Mudd Bldg., New York, NY 10027, kou@ieor.columbia.edu

Two empirical puzzles have got much attention recently: the leptokurtic feature that the return distribution of assets may have a higher peak and 2 (asymmetric) heavier tails than those of the normal distribution and an empirical abnormality called "volatility smile" in option pricing. To explain them, a jump diffusion model is proposed...

3) Fundamental Stochastic Electricity Price Modeling, *Graydon*

L. Barz, McKinsey & Co., 1015 Peggy Ln, Menlo Park, CA 94025, graydon_barz@mckinsey.com

Because of its non-storability, electricity price behavior is driven mainly by the microeconomics of its production and consumption. Therefore, we propose an approach grounded in these fundamentals. The approach is intuitive, simple and effective, providing substantial insight and confidence in predicting the evolution of price behavior.

4) A Boundary Crossing Model of Counterparty Performance, ***Kian Esteghamat***, Princeton University, Dept. of ORFE, Princeton, NJ 08544, kestegha@princeton.edu

Creditors are familiar with use of net worth as a measure of borrower solvency. This notion can be generalized with a performance state-vector as the indicator of credit quality. We demonstrate a simple, flexible market-based approach for treating counterparty performance in terms of crossings of a state-vector through boundaries.

SA09 Airline Revenue Management

Sponsor: **Revenue Management Section/Aviation Applications Section Sponsored Session**

Chair: P. V. Krishnarao Pinnamaneni, Enron Corp., 1400 Smith St., Houston, TX 77479, pkrishn@enron.com

1) Managing Airline Distribution Channels for Improved Revenue, ***E. Andrew Boyd***, PROS Revenue Management, 3223 Smith St., Ste. 100, Houston, TX 77006, aboyd@prosrm.com

The myriad of distribution channels for seat inventory coupled with complex business practices and legacy software systems has led to an extremely complicated environment for RM. We discuss solutions to many of the challenges facing RM today, including alliances and e-distribution channels, with a focus on simplification and improved revenue generation.

2) Airline Revenue Management with Demand Driven Dispatch, ***Judy A. Pastor***, Continental Airlines, jpasto@coair.com

By matching aircraft capacity to demand on a departure by departure level, estimates of unconstrained demand can be verified. Other lessons about RM can also be learned and will be discussed.

3) Airline Seat Inventory Control with Group Demand, ***Youyi Feng***, Enron Corp., 1400 Smith St., Houston, TX 77002, fengyy@comp.nus.edu.sg, ***Baichun Xiao***

We consider an airline seat control model with group demand. Although monotonicity of marginal seat revenue is observed in most airline RM models, it does not explain group discount fares. We show that it is uncertainty and risk consideration that leads to discount fares for group demand.

4) The Impact of O&D vs. Leg Forecasting on the Demand Unconstraining Process, ***Ed Kambour***, PROS Revenue Management, 3223 Smith St., Ste. 100, Houston, TX 77006, ekambour@prosrm.com, ***Shankar Sivaramakrishnan, E. Andrew Boyd***

Theoretical and simulation results are presented highlighting the differences in forecasting and unconstraining at the O&D and leg levels. The results are applicable to industries other than the airline industry, with proper interpretations on "leg" and "O&D".

SA10 Scheduling Manufacturing/Service Systems

Cluster: **Scheduling**
Invited Session

Chair: Chelliah Sriskandarajah, University of Texas at Dallas, Sch. of Mgmt., Box 830688, MS JO4.7, Richardson, TX 75083-0688

1) Scheduling Internet Advertising: A Space-Sharing Problem, ***Subodha Kumar***, University of Texas at Dallas, Sch. of Mgmt., Box 830688, JO 4.7, Richardson, TX 75083-0688, subodha@utdallas.edu, ***Varghese S. Jacob, Chelliah Sriskandarajah***

Consider the problems of scheduling ads on Web page, where the space allotted for ads is limited. It has to be decided that which ads will be selected to appear on Web page and how they will be placed, in order to maximize the profit. We develop hybrid heuristics by combining GAs with efficient heuristics.

2) Scheduling in Openshop Robotic Cells for Productivity Gains, ***Inna Drobouchevitch***, University of Texas at Dallas, Sch. of Mgmt., Box 830688, JO 4.7, Richardson, TX 75083-0688, innas@utdallas.edu, ***Suresh P. Sethi, Chelliah Sriskandarajah, Jeffrey B. Sidney***

Robotic cells are used in repetitive production of identical parts. A robotic cell contains 2 or more robot-served machines. The cycle time is the time to produce a part in the cell. We investigate the productivity advantage of openshop robotic cells to flowshop cells by comparing their cycle times.

3) Scheduling & Lot Streaming in Machine Shops with No-Wait in Process, ***Nicholas G. Hall***, Ohio State University, 301 Hagerty Hall, 1775 South College Rd., Columbus, OH 43210-1144, halln@cob.ohio-state.edu, ***Gilbert Laporte, Esaignani Selvarajah, Chelliah Sriskandarajah***

Consider the problems of minimizing the makespan in no-wait flowshops and 2 machine openshops producing multiple products with detached setup times, using lot streaming. We show that these problems are equivalent to classic TSPs with a pseudopolynomial number of cities. We develop and test computationally efficient heuristics.

4) Production Scheduling with Cost Variations & Demand Forecast Updates, ***Houmin Yan***, Chinese University of Hong Kong, Dept. of SE/EM, Ho Sin Hang Engineering Bldg., Hong Kong, Shatin NT, PR China, yan@se.cuhk.edu.hk, ***Sitong Tan***

We study a problem of determining a production sequence and production quantities for multiple products with both demand forecast updates and cost variations. For the unconstrained problem, we discuss special cases that can be solved by some simple sequencing rules. For the problem with capacity constraints, an optimal algorithm is presented to solve the special cases.

SA11 Recent Advances in Airline Optimization

Cluster: **Integer Programming**
Invited Session

Chair: Ahmad I. Jarrah, Transport Dynamics Inc., 103 Carnegie Ctr., Ste. 317, Princeton, NJ 08540, jarrah@transdynamics.com

1) Advances in the Airline Crew Pairing Problem, ***Amy M. Cohn***, MIT, Dept. of Civil & Environ. Eng., Rm. 1-229, Cambridge, MA 02139-4307, amycohn@mit.edu, ***Cynthia Barnhart***

The airline crew pairing problem is an integral part of airline planning. Although the basic model is well established in the literature, there is significant room for enhancement to improve solution quality and computational performance and to expand the model scope. We present our models, algorithms and computational results.

2) Optimizing Personnel Training & Deployment at Airlines, ***Benjamin G. Thengvall***, CALEB Technologies Corp., 9130 Jollyville Rd., Austin, TX 78759, ben@calebtech.com, ***Michael F. Arguello, Gang Yu***

Deploying a work force to meet an airline's business plan requires a coordinated management approach. Intelligent timing of new hires and transitional training for pilots and flight attendants can provide significant revenue enhancing opportunities. We will present an overview of the problem and a framework for its solution.

3) A New Approach to Aircraft Rotation Planning, ***Dimitry Keselman***, Idmon Corporation, 2141 Powers Ferry Rd., Ste. 310, Marietta, GA 30067, dkeselman@optimization.com, ***Roy E. Marsten***

One of the most important and desirable features of an aircraft rotation is the ability to fly all fleet planes on the same route (one sub-rotation). We discuss some graph and linear programming models employed to ensure the one sub-rotation property during the fleeting and rotation building phases.

4) Airline Crew Scheduling with Time Windows & Plane Count Constraints, ***Diego Klabjan***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, klabjan@uiuc.edu, ***Ellis L. Johnson, George L. Nemhauser***

Airline planning consists of several problems that are currently solved separately. We address a partial integration of schedule planning, aircraft routing and crew scheduling. In particular, we provide more flexibility for crew scheduling while maintaining the feasibility of aircraft routing by adding plane count constraints to the crew scheduling problem. We assume that the departure times of flights have not yet been fixed...

SA12 Strategic Issues in Supply Chain Management

Cluster: **Logistics & Supply Chain Management**
Invited Session

Chair: Jovan Grahovac, Tulane University, Freeman Sch. of Bus., 7 McAlister Dr., New Orleans, LA 70118, jovan.grahovac@tulane.edu

1) Capacity & Backlog Management in Service-Oriented Supply Chains, ***Edward G. Anderson***, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, edward.anderson@bus.utexas.edu, ***Douglas J. Morrice***

Although there is much research on managing inventory in supply chains, very little is available on managing capacity in the absence of inventory, which is a

typical problem in service supply chains. We begin to fill this void by analyzing supply chain capacity management strategies enabled by electronic business

2) Entry & Competition in Multi-Echelon Supply & Distribution Networks, ***Scott Carr***, UCLA, Anderson Sch. of Mgmt., Los Angeles, CA 90095, ***Uday S. Karmarkar***

We study cost structure and competition in supply networks for multi-echelon assembly and distributive structures. Entry at any tier incurs a fixed cost entrants then choose production quantities. The entry game is characterized as a Nash equilibrium while post entry competition is modeled as a "successive Cournot oligopoly".

3) Using a Dual Strategy of Make-to-Stock & Make-to-Order, ***Kyle D. Cattani***, University of North Carolina, Kenan-Flagler Bus. Sch., CB 349, Chapel Hill, NC 27599-3490, kyle_cattani@unc.edu, ***Ely Dahan, Glen Schmidt***

The decision between MTS and MTO production is impacted by customer preferences (some prefer to buy from inventory, others prefer customized products), and by costs. We develop a simple model to determine the optimal production choice, which may be strict MTS, strict MTO, or a combination of MTS and MTO.

4) An Inventory Model with a Two-Tiered Service Level Model for a "Bricks & Clicks" Retailer, ***Doug Thomas***, Pennsylvania State University, Smeal Coll. of Bus. Admin., University Park, PA 16802-3005

While the growth in e-tailing and consumer-direct delivery certainly puts traditional retailers at risk, these retailers still offer value to consumers through better service, including easier returns/exchanges and permitting the customer to physically examine the product. Companies choosing to augment their physical presence with an on-line presence, a "bricks and clicks'' strategy, attempt to capture the best of both worlds...

SA13 Information Coordination in Logistics

Cluster: **Manufacturing & Logistics**
Invited Session
Chair: Suvrajeet Sen, University of Arizona, Dept. of SIE, Tucson, AZ 85721, sen@sie.arizona.edu

1) Defense Distribution Center DC Supply Chain Network: Factors that Impede/Influence the Flow of Information, ***Rekha S. Pillai***, Oak Ridge National Laboratory, Oak Ridge, TN 37831, ***Glen Harrison, Cheng Liu, Michael R. Hilliard, Mark Entner***

We analyze the DDC supply chain network. A main objective is to improve asset visibility across DDC supply chain to improve customer confidence, meet customer requirements, and reduce inventory and supply chain cost. We identify factors that impede visibility and determine requirements for DDC Supply Chain Network to improve information flow and increase visibility.

2) Product Tracking for Improved Service in a Global Supply Chain Network, ***Pius J. Egbelu***, Iowa State University, Dept. of IMSE, 2019 Black Engineering, Ames, IA 50011-2164, pegbelu@iastate.edu

Many assembled products in today's market are built from components and subassemblies made by different manufacturers. These manufacturers often don't have the same manufacturing capabilities nor do they share similar customer service policies. Furthermore, the quality of the end product reflects the strengths and weaknesses of all the manufacturers whose components make up the product. Product coding for ease of tractability and improved customer service will be discussed.

3) Time-Scale Coordination in Integrated Organizations, ***Suvrajeet Sen***, University of Arizona, Dept. of SIE, Tucson, AZ 85721, sen@sie.arizona.edu

Organizations consisting of multiple units often make decisions in different time scales: aggregate production planning decisions are made on a much longer time scale, than dispatching, routing and scheduling decisions. Closing the loop between these decisions plays an important role in coordinating different units within an organization. We will outline a framework within which such coordination can be modeled and a decentralized control approach developed.

SA14 EPD Mini-Cluster: Web/IT Driven Product Development I

Cluster: **Product Development**
Sponsor: **Technology Management Section**
Invite/Sponsor Session
Chair: Vish V. Krishnan, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, krishnan@mail.utexas.edu

1) Design Automation Usage Patterns during Complex Electro-Mechanical Developpment, ***Nitin Joglekar***, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, joglekar@bu.edu, ***Daniel E. Whitney***

Our study of automation usage patterns in the aerospace industry shows that rising design complexity and linkages with supply chain management issues influence the structure of the development process. We document how the development time is expended and show that the IT/infrastructure development consumes a significant amount of resources.

2) R&D Performance Measures that are Linked to Strategy, ***Christoph H. Loch***, INSEAD, Blvd. de Constance, Fountainbleau Cedex, 77305, France, christoph.loch@insead.fr, ***Stefan Tapper***

Companies often struggle to assess R&D performance. No widely accepted performance measurement system for R&D exists. We show how the Research Group of the diamond producer GemStone developed a research performance measurement system that is appropriate for the risky projects typical in R&D and which supports business strategy. The process derives operative measures for R&D from the company strategy...

3) Role of Information Technology in Product Development: Implications for Problem-Solving & Knowledge Creation, ***Stefan Thomke***, Harvard Business School, Morgan Hall T63, Soldiers Field, Boston, MA 02163

With pressure to conduct product development faster and more efficiently, firms are increasingly turning to new technologies such as computer simulation. I will propose that these new technologies can fundamentally change problem-solving and knowledge creation that will require firms to rethink how they manage and organize their development activities.

SA15 Inventory & Coordination

Cluster: **Quantitative Models in Supply Chain Management**
Invited Session
Chair: Lingxiu Dong, Washington University, Olin Sch. of Bus., 1 Brookings Dr., CB 1133, St. Louis, MO 63130-4899, dong@olin.wustl.edu

1) Implementing an Inventory Management Strategy with Retailer Cooperation, ***Sridhar Tayur***, Carnegie Mellon University, Grad. Sch. of Indust. Admin., Pittsburgh, PA 15213, stayur@cyrus.andrew.cmu.edu, stayur@andrew.cmu.edu

We present the development, analysis and use of mathematical models in an actual implementation when a supplier of RTA furniture has access to her retailer's inventory-forecasting-promotion-ordering strategy.

2) Vertical & Horizontal Pricing under Uncertainty, ***Nils Rudi***, University of Rochester, Simon Sch. of Bus., Rochester, NY 14627, rudi@simon.rochester.edu, ***David F. Pyke***

We consider a scenario where a manufacturer sells to independently owned retailers. These retailers use lateral transshipments for risk pooling purposes. We examine how the use of transshipments affects the manufacturer and the system performance.

3) Implications of a Pooled Return Policy, ***Alexander O. Brown***, Vanderbilt University, Owen Grad. Sch. of Mgmt., 401 21st Ave. South, Nashville, TN 37203, alex.brown@owen.vanderbilt.edu, ***Christopher S. Tang***

Single-product returns policies allow return of a fraction of the order for a product. We consider a multi-product returns (pooled) policy in which the total returns are limited to a fraction of the total order across all products, comparing the profit and decisions to that of the single-product policy.

4) Selling a Build-to-Order Manufacturer: A Supplier's Pricing Problem, ***Lingxiu Dong***, Washington University, Olin Sch. of Bus., 1 Brookings Dr., CB 1133, St. Louis, MO 63130-4899, dong@olin.wustl.edu, ***Nils Rudi***

Introducing component commonality across brands affects the profit sharing in a system where a subcontractor purchases components from multiple suppliers and assembles to order for multiple brands. The selling behavior (component wholesale price) of the component suppliers when they are independent or integrated reveals opportunities in collaboration across brands.

SA16 Multiple Objective Programming

Cluster: **MCDM**
Invited Session
Chair: Minghe Sun, University of Texas, Coll. of Bus., Divison of Mktg. & Mgmt., San Antonio, TX 78249-0634, msun@utsa.edu, msun@lonestar.utsa.edu

1) withdrawn - chair request of 9/7, ***James P. Ignizio***, University

of Virginia, Sch. of Eng. & Applied Sci., PO BOx 400747, Charlottesville, VA 22904-4747

2) Nonlinear Goal Programming using Genetic Algorithms, ***Mitsuo Gen***, Ashikaga Institute of Technology, Dept. of IE, Ashikage, 326-8558, Japan, gen@ashitech.ac.jp

The use of GAs to improve results of nonlinear goal programming analysis is presented.

3) Finding Integer Efficient Solutions for Multiple Objective Network Programming Problems, ***Minghe Sun***, University of Texas, Coll. of Bus., Divison of Mktg. & Mgmt., San Antonio, TX 78249-0634, msun@utsa.edu, msun@lonestar.utsa.edu

An algorithm for finding integer efficient solutions for multiple objective network programming problems is proposed and implemented. The algorithm may find all integer efficient solutions or the one closest to the ideal point in the neighborhood of a fractional efficient solution obtained by solving an augmented weighted Tchebycheff network program.

4) Data Mining in Credit Card Portolio Management: A Multiple Criteria Decision Making Approach, ***Yong Shi***, University of Nebraska, Coll. of IS&T, Omaha, NE 68182-0392, yshi@unomaha.edu

A multiple criteria linear programming approach has been identified as the alternative technology to predict cardholder future behavior in credit card portfolio management. Testing a small development sample indicated that this approach is fully controlled, and a sample size of 3000 is suitable for robustness. The method works well with multiple groups.

SA17 Theory & Computation

Cluster: Network Flows
Sponsor: Optimization Section
Sponsored Session
Chair: Jane L. Snowdon, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598-0218, snowdonj@us.ibm.com

1) A New Column Generation Approach for Airline Crew Scheduling, ***Tina L. Shaw***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332, tshaw@isye.gatech.edu, ***Ellis L. Johnson***

Shortest path subproblems have been successfully used to dynamically generate columns for airline crew scheduling problems. We present a new shortest path network and hybrid column generation approach for fast solutions to the LP relaxations along with a B&P method that yields good IP solutions.

2) Column Generation for Airline Scheduling Problems, ***Jane L. Snowdon***, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598-0218, snowdonj@us.ibm.com, ***Francisco Barahona, John J. Forrest, Laszlo Ladanyi***

Airline scheduling at major airlines involves optimizing over many trillions of variables. Managing the problem size requires effective column generation. We explore 2 schemes for column generation, one based on subgradient duals and the other motivated by a quadratic programming formulation. We conclude with

3) A Second-Stage Network Recourse Problem in Stochastic Airline Crew Scheduling, ***Joyce Yen***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, jyen@engin.umich.edu, ***John R. Birge***

We model the stochastic airline crew scheduling problem as a 2-stage stochastic program in which the first stage is a set covering problem and the second stage is a network recourse problem. We discuss results from various algorithms to solve this problem and present results on generating disruption scenarios.

SA18 Electronic Commerce

Cluster: E-Commerce
Invited Session
Chair: Gary J. Koehler, University of Florida, Dept. of DIS, Box 117169, Coll. of Bus., 351 Stuzin Hall, Gainesville, FL 32611-7169, koehler@ufl.edu

1) EDI, XML & the Myth of Semantic Transparency

We review foundational principles of (semantic) communication, and in light of them, the first-trade problem in EDI. We discuss how XML can address the problem and argue that its capacities to do so are severely limited. We conclude with discussion of how to solve the problem, giving illustrative examples.

2) Does Location Matter in an E-Commerce World? Application of Location Theory & Spatial Economics to Consumer-Based E-Commerce, ***Brian E. Mennecke***, Iowa State University, Dept. of MIS, 300 Carver Hall, Ames, IA 50011, ***Troy J. Strader***

We apply location theory, which is a branch of spatial economic theory, to marketing behavior in a business-to-consumer e-commerce environment with the goal of developing a framework for understanding the role of location in both e-commerce and brick-and-mortar transactions.

3) Economics of Unsolicited Email Advertising, ***Ram Gopal***, University of Connecticut, Sch. of Bus., U-41, 368 Fairfield Rd., Storrs, CT 06269, ***Zhiping Walter, Arvind Tripathi***

Unsolicited commercial emails impose significant negative network externalities (NNE) on email users. In this research we design a trusted third party mechanism termed AdMediation that can mutually benefit both sellers and email users. The proposed mechanism can eliminate NNE and enable the use of email as an effective advertising tool.

4) Competition in the E-Economy, ***Erik Rolland***, University of California, AGSM, Riverside, CA 92521, ***John H. Gerdes, Jr.***

The introduction of the Web has led to an emerging change in the benefits derived from using IT. The change has led to a new research focus: the battle for the consumer surplus. This is different from the past IT benefits focus, in that it concentrates more on the firm's revenue side rather than cost side...

SA19 Strategic Management of Technology

Cluster: Technology Innovations & Operations
Invited Session
Chair: Alan Pearson, Manchester Business School, R&D Res. Ctr., Booth St. West, Manchester, M15 6PB, UK, a.pearson@fs2.mbs.ac.uk

1) Strategic Management of New Technology, ***Alan Pearson***, Manchester Business School, R&D Res. Ctr., Booth St. West, Manchester, M15 6PB, UK, a.pearson@fs2.mbs.ac.uk, ***Peter Swann, Tim Watts***

There has been much debate about the timescales required to exploit scientific and technological developments. Are they shortening or not? The answer to this question must be contingent upon the type of technology and the market environment. We discuss a recent research project in which we made an in depth study of virtual reality...

2) Requirements for Capability Maturity Models to Improve Communication in Virtual Organizations, ***P. M. Wognum, O. A. M. Fisscher***

Current capability maturity models have been developed to improve performance of development projects. Capabilities at different maturity levels have been defined for projects to perform in a controlled way, for organizations to facilitate their projects and for the people to improve their way of working. Capability maturity models are still mainly internally focused...

3) Integrated Design Capabilities & Technology Management, ***K. Debackere***

In order to keep up with the new product development race that occurs in many industries today, the innovative organization has to become much more adaptive in responding to technological and market changes. In order to achieve this, innovation management has to develop an integrated design capability that allows for fast product experimentation and adaptation...

4) Information & Communication Technology Divergence in the Context of Information & Communication Technology Convergence, ***David L. Hawk, Alok K. Chakrabarti***

ICT has been sufficiently developed to become another commodity infrastructure but there is more to it. It is argued that the technical dimension will not really be a key factor in future development and that further growth, development and change is coming from the perceived potential in novel and innovative human-directed applications of the technical infrastructure. This shift from ICT to ITC is explored.

SA20 Extensions & Applications of Heuristic Search

Cluster: Tabu & Scatter Search
Invited Session
Chair: David L. Woodruff, University of California, GSM, Davis, CA 95616, dlwoodruff@ucdavis.edu

1) Metaheuristics & their Applications in Transportation & Logistics Problems, ***Buyang Cao***, ESRI, Inc., 380 New York St., Redlands, CA 92373

Metaheuristics have recently been widely applied to various difficult optimization problems due to their efficiency. We specifically use tabu search techniques together with other search strategies, i.e., restart, cost oscillation, etc., to solve optimization problems from transportation and logistics area. We

demonstrate the economic benefit achieved by methaheuristics.

2) A Blackboard Architecture Applied to Maximum Likelihood Clustering, ***David L. Woodruff***, University of California, GSM, Davis, CA 95616, dlwoodruff@ucdavis.edu, ***Torsten Reiners***

We describe an algorithm that provides significant improvements in the ability to perform maximum likelihood clustering. It combines heuristic search strategies via a blackboard architecture to obtain good starting points for an estimator defined as a continuous optimization problem. The architecture is novel because it exploits connections between continuous and discrete spaces to facilitate storage, communication and exploitation of heuristic search information...

3) Using Explicit Memory in Restart Methods, ***Arne Lokketangen***, Molde College, Britvegen 2, Molde, 6400, Norway, ***Fred W. Glover***

Increasing attention has recently been given to restart methods, both for constructive and local search heuristics. We look at ways to reduce the customary reliance on randomization in such methods, relying instead on explicit adaptive memory processes. We illustrate the mechanisms on a portfolio of satisfiability.

SA21 Session I

Cluster: SICUP
Invited Session
Chair: Gerhard Waescher, Martin-Luther-Universitaet Halle, Wirtschaftswissenschaften, Produktion & Logistik, Halle, Saale, D-06099, Germany, waescher@wiwi.uni-halle.de

1) Uses of the 1-Dimensional Gilmore-Gomory LP Cutting Stock Algorithm, ***Robert Haessler***, University of Michigan, Business Sch., Ann Arbor, MI 48109-1234, robert_haessler@ccmail.bus.umich.edu

We explore the ways in which the Gilmore-Gomory LP algorithm for solving one-dimensional cutting stock problems can be used to help solve a variety of cutting and packing problems. The examples range from simple bin packing to 3-dimensional trailer loading.

2) 1-Dimensional Cutting: A State-of-the-Art Survey, ***Gerhard Waescher***, Martin-Luther-Universitaet Halle, Wirtschaftswissenschaften, Produktion & Logistik, Halle, Saale, D-06099, Germany, waescher@wiwi.uni-halle.de

I will review advances which have been achieved during the last decade in one-dimensional cutting. Not only problems of the cutting stock bin-packing type will be considered, but also problems from other classes which are usually not covered in the area of cutting and packing.

SA22 Resource Utilization in Health Care

Sponsor: Health Applications Section
Sponsored Session
Chair: Michael W. Carter, University of Toronto, Dept. of MIE, 5 King's College Rd., Toronto, Ontario, M5S 3G8, Canada, carter@mie.utoronto.ca

1) Assigning Anaesthetists to Operating Rooms via Multi-Dimensional Analysis, ***John T. Blake***, DalTech., Dept. of IE, PO Box 1000, Halifax, Nova Scotia, B3J 2X4, Canada, john.blake@dal.ca, ***Sandi Eaves***

The Queen Elizabeth Health Sciences Centre, located in Halifax, is Atlantic Canada's largest hospital. We discuss a model for automating the current process of scheduling anaesthetists manually to more than 40 operating rooms each day. The model is a standard assignment problem in which the "cost" of assigning an anaesthetist to a room is determined from a multi-dimensional penalty function.

2) withdrawn - chair request of 10/4, ***Sophie D. Lapierre***, Ecole Polytechnique, CRT, CP 6179, Succ. Centre-ville, Montreal, Quebec, H3C 3A7, Canada, sophiel@crt.umontreal.ca, ***Marko Blais***

3) Managing Home Care Resource Utilization & Waiting Lists, ***Michael W. Carter***, University of Toronto, Dept. of MIE, 5 King's College Rd., Toronto, Ontario, M5S 3G8, Canada, carter@mie.utoronto.ca, ***Rebecca Chan***, ***Edmon Chung***, ***Linda M. Lakats***

In Ontario, home care services are delivered by regional centres, Community Care Access Centres. All requests for home care are funneled through a single agency. With acute care, hospital bed closures and an emphasis on shorter length of stay, there has been a dramatic increase in the pressure on home care delivery over the past 5-10 years...

4) withdrawn - chair request of 9/22, ***Kevin J. Leonard***, University of Toronto, Dept. of Health Admin., 2 Queen's Park Crescent West, Toronto, Ontario, M5S 1A8, Canada, k.leonard@utoronto.ca

SA23 Web-Based Simulation

Sponsor: Simulation Section
Sponsored Session
Chair: Arnold H. Buss, Naval Postgraduate School, OR Dept., Monterey, CA 93943-5000, abuss@nps.navy.mil

1) Reuse Strategies for Discrete Simulation Software, ***Michael Pidd***, Lancaster University, Dept. of MS, Lancaster, LA1 47X, England, UK, m.pidd@lancaster.ac.uk, www.lancs.ac.uk/staff/smamp/default.html

There are many formal approaches to software re-use in the computing community. Software re-use has also long been a concern for the simulation and modeling communities. We review developments in software re-use as they apply to discrete simulation.

2) A Framework for Agent-Based Simulation, ***Ronald F. Woodaman***, Naval Postgraduate School, OR Dept., Monterey, CA 93943-5000, rfwoodam@nps.navy.mil

We present a framework for implementing agents in discrete-event simulation models. The framework defines generic interfaces for agents to use and manage rules that interact with models of the agents' physical environment. This will be applied to a scenario involving a Marine Corps infantry squad conducting peace enforcement operations in an urban environment.

3) Distributed Component-Based Simulation, ***Arnold H. Buss***, Naval Postgraduate School, OR Dept., Monterey, CA 93943-5000, abuss@nps.navy.mil

A component-based simulation framework is extended to support dynamic, self-organizing configuration and enables federates to appear and disappear from the simulation during execution. Emphasis is on flexibility and speed of configuration rather than speed of execution.

SA24 Facilities Design

Cluster: Material Handling
Invited Session
Chair: Rajan Batta, SUNY, Dept. of IE, 342 Bell Hall, North Campus, Buffalo, NY 14260-2050, batta@acsu.buffalo.edu

1) Placement of New Facilities under a Mixed Planar/Network Representation of Facility Layout, ***Rajan Batta***, SUNY, Dept. of IE, 342 Bell Hall, North Campus, Buffalo, NY 14260-2050, batta@acsu.buffalo.edu, ***Selcuk Savas***, ***Rakesh Nagi***

We provide a mixed planar/network representation for facility layout where machines, cells or departments are planar entities of finite size and the material flow between these entities occur on material handling paths constituting a network structure. We then consider 2 situations for the placement of new facilities where perturbations to the existing network are either allowed or not.

2) Design of Zone-Based Tandem Layout for Automated Guided Vehicle Systems, ***Wooyeon Yu***, Iowa State University, Dept. of IE/MS, Ames, IA 50010, ***Pius J. Egbelu***

Apartitioning algorithm for a tandem AGV system based on the concept of zones as against loops is developed. The algorithm simultaneously determines transfer points. A performance comparison between the conventional and the zone-based tandem AGVS was undertaken. With respect to system performance under the same operating conditions is presented.

3) Improved Integrated Scheduling & Logistics in an Assembly Environment using Concepts from Column Generation, ***Muhammad F. Anwar***, University of Memphis, INSE, 312 Engineering Bldg., Memphis, TN 38152, manwar@memphis.edu, ***Rajan Batta***, ***Rakesh Nagi***

A new heuristic based on ideas from column-generation is developed to solve the integrated AGV-workcenter scheduling problem, which is NP-hard. The master problem selects the sequence of operations and their assignment to multiple replicates so that the makespan is minimized. The subproblem generates new sequences of operations with an attempt to minimize reduced cost...

SA25 Nonlinear Programming Algorithms for Semidefinite Programming

Cluster: Nonlinear Programming
Sponsor: Optimization Section
Sponsored Session

Chair: Renato D. C. Monteiro, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, monteiro@isye.gatech.edu

1) Solving Semidefinite Programs via Nonlinear Programming: Theory & Algorithms, ***Renato D. C. Monteiro***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, monteiro@isye.gatech.edu, ***Sam Burer***, ***Yin Zhang***

We show that a large class of linear and/or nonlinear SDP problems can be converted into nonlinear optimization problems over "orthants" of the form $\Re^n_{++} \times \Re^N$, where n is the size of the matrices involved in the problem.

2) A Nonlinear Programming Algorithm for Solving Semidefinite Programs via Low-Rank Factorization, ***Sam Burer***, Georgia Institute of Technology, Sch. of Math, Atlanta, GA 30332, burer@math.gatech.edu, ***Renato D. C. Monteiro***

We discuss an algorithm for solving SDPs in which the semidefiniteness of the matrix variable is maintained via an implicit low-rank factorization. The rank of the factorization is chosen minimally so as to enhance computational speed. Strong computational results are reported.

3) A Nonlinear Programming-Based Interior-Point Method for Semidefinite Programs, ***Robert J. Vanderbei***, Princeton University, Dept. of OR & Civil Eng., Princeton, NJ 08544, rvdb@princeton.edu, ***Hande Y. Benson***

We show how to formulate SDP problems as smooth convex NLP problems and describe modifications to a generic interior point method for NLP to make it applicable to SDP. Preliminary computational results will be given.

SA26 Modeling Queues with Power-Tailed Interarrival and/or Service Distributions: In Honor of Carl Harris

Cluster: Stochastic Models & Applications
Invited Session
Chair: Donald Gross, George Mason University, Dept. of Systems Eng. & OR, Fairfax, VA 22030-4444, dgross@gmu.edu

1) Dedication of Session to Carl M. Harris, 1940-2000, ***Saul I. Gass***, University of Maryland, 8809 Maxwell Dr., Potomac, MD 20854-3123, sgass@rhsmith.umd.edu, ***Donald Gross***

Carl's role in putting this session together and highlights and reminiscences of his eminent career in OR are presented.

2) G/M/c Queues with Power-Tailed Interarrival Times & a Level Crossing Computational Method for their Analysis, ***Percy H. Brill***, University of Windsor, Dept. of MS, Math & Stats., Faculty of Bus., Windsor, Ontario, N9B 3P4, Canada, brill@uwindsor.ca, ***Carl M. Harris***

We analyze the waiting time in G/M/c queues having power-tailed interarrival times, analytically using a level crossing method. This method provides numerical results when interarrival times have Pareto, folded Cauchy or log-normal distributions. Simulations confirm the results. Applications to Internet traffic are discussed.

3) A Transform Approximation Method & its Use in Analyzing Queues with Heavy-Tail Arrival or Service Distributions, ***Martin J. Fischer***, MITREtek Systems, Telecomm. & Networking, 7525 Colshire Dr., McLean, VA 22101-7400, mfischer@mitretek.org, ***Carl M. Harris***

We present and discuss the use of a TAM in the analysis of queues that have heavy- or long-tailed arrivals or service distributions. Computational experiences with TAM and performance improvement techniques are discussed. Comparisons with simulation, level crossing and other methods are presented. Comparisons with simulation, level crossing and other methods are presented.

4) Simulation of Power-Tail Distributions in Queueing Probems, ***Donald Gross***, George Mason University, Dept. of Systems Eng. & OR, Fairfax, VA 22030-4444, dgross@gmu.edu, ***Carl M. Harris***, ***Denise M Masi***

Using power-tail distributions in discrete-event simulation modeling of Internet congestion (often necessary in the absence of analytical results) can be fraught with difficulty, especially when dealing with high coefficients of variation. We illustrate these difficulties and compare simulation to the numerical procedures of the previous 2 papers.

SA27 Panel: The Academic Job Search for PhD Students

Chair: Russell D. Meller, Virginia Tech., Dept. of ISE, 250 New Engineering Bldg., Blacksburg, VA 24061, rmeller@vt.edu

1) Panel: The Academic Job Search for PhD Students

Former academic search chairs will provide PhD students with an outline of the academic job search, i.e., application, interview, offer process, etc. They will also provide their guidance on some of the dos and don'ts.

SA28 The Internet & Social Science Applications

Sponsor: Social Science Applications College
Sponsored Session
Chair: Myron Hatcher, California State University, Dept. of IS/DS, Craig Sch. of Bus., Fresno, CA 93740, myron_hatcher@csufresno.edu

1) Ethics, Cultures & Generations: Is there a Difference?, ***Gerald Jones***, California State University, Dept. of IS/DS, Craig Sch. of Bus., Fresno, CA 93740, geraldj@csufresno.edu

We report on the results of research conducted to determine if the generational and cultural differences noted by previous researchers affects decision making. Data were collected from academics on 2 continents representing different cultures. Results provide insight into how important culture and generational affects are in making ethics impacted decisions.

2) Using Bootstrap Financing Techniques to Fund New & Small Business Firms, ***Amir A. Jassim***, California State University, Dept. of Finance & Bus. Law, Craig Sch. of Bus., Fresno, CA 93740, amirj@csufresno.edu

Many new entrepreneurs and small business owners find the prospect of raising capital to be a daunting task and a major stumbling block in starting or expanding their existing business. They may have excellent ideas about a new product/service or improving an existing one but have little knowledge about money and finance. We explain the various bootstrap financing techniques...

3) Internet Potential Impact on Health Care, ***Myron Hatcher***, California State University, Dept. of IS/DS, Craig Sch. of Bus., Fresno, CA 93740, myron_hatcher@csufresno.edu

The potential impact of Internet and Intranets will be discussed. Results from a national survey of acute care hospitals will indicate potential directions.

4) Design Implications of the Internet on Medical Software, ***Thaddeus W. Usowicz***, California State University, School of Bus., San Francisco, CA 94127-2716, usowicz@sfsu.edu

The Internet has serious implications for different user interfaces for health care. Realization and ease-of-use has brought about more knowledgeable patents and misdirected parents. At the same time, health care personals have successfully integrated information in practice.

SA29 Auctions & Bidding in the Electric Power Industry

Cluster: Bidding
Sponsor: ENRE
Sponsor/Invite Session
Chair: Shmuel S. Oren, University of California, Dept. of IE&OR, 4135 Etcheverry Hall, Berkeley, CA 94720, oren@ieor.berkeley.edu

1) Strategic Bidding under Uncertainty in a Competitive Electricity Market, ***Alvaro Baillo***, Universidad Pontificia Comillas, Inst. de Investigacion Tec., Albert Aguilera 23, Madrid, 28015, Spain, alvaro.baillo@iit.upco.es, ***Mariano Ventosa***, ***Michel Rivier***, ***Andres Ramos***

Bidding into the electricity wholesale organized markets turns out to be a very complex matter for generation companies. We have developed a systematic and automatic procedure to deal with the sort-term day-ahead 24-hour bidding decision making. It consists of a probabilistic optimization tool oriented to the construction of profit-maximizing hourly offer curves.

2) Design of Auctions for Hierarchically Substitutable Ancillary Services, ***Shmuel S. Oren***, University of California, Dept. of IE&OR, 4135 Etcheverry Hall, Berkeley, CA 94720, oren@ieor.berkeley.edu

The California ISO procures 4 types of reserves to ensure system reliability: regulation, spinning reserves, nonspinning reserves and replacement reserves. Those are hierarchically substitutable in the sense that each reserve type can be used to meet demand for the subsequent types. We analyze alternative auction designs that recognize that substitutability.

3) Pay-as-Bid Auctions for Ancillary Services, ***Rajnish Kamat***, University of California, Dept. of IEOR, Berkeley, CA 94720,

kamat@ieor.berkeley.edu, ***Shmuel S. Oren***

We use an equilibrium bid function approach to analyze the implications of a pay-as-bid auction for hierarchically substitutable ancillary services. Bids specify reserve type and price per MW. The system operator selects bids so as to meet realized demand for all ancillary services at minimum total cost and each selected bid is paid its bid price.

4) Solving for Equilibrium Prices in Security-Constrained, Unit Commitment Auction Markets for Electric Power using MIP, ***William R. Stewart***, College of William & Mary, Sch. of Bus., PO Box 8795, Williamsburg, VA 23187-8795, william.stewart@business.wm.edu, ***Benjamin F. Hobbs***, ***Michael H. Rothkopf***, ***Udi Helman***, ***Richard P. O'Neill***, ***Paul M. Sotkiewicz***

We present a comprehensive formulation of the security-constrained unit commitment auction problem for electricity markets. We consider several examples of such auction problems and solve them using MIP. We show how the solution of the MIP can be used to generate prices and quantities that clear the market.

SA30 Connecting Modeling Languages with other Systems

Sponsor: Computing Society
Sponsored Session
Chair: Robert Fourer, Northwestern University, Dept. of IEMS, 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, 4er@iems.nwu.edu

1) Using Shared Libraries (DLLs) to Extend an Algebraic Modeling Language, ***David M. Gay***, Bell Labs, Lucent Technologies, 600 Mountain Ave., Murray Hill, NJ 07974, dmg@research.bell-labs.com

One way to add flexibility to an algebraic modeling language is to permit introducing certain kinds of extensions by means of shared or dynamic-link libraries (DLLs). We sketch the uses of shared libraries and describes their use with AMPL language to introduce new functions and table handlers.

2) AIMMS as an Object in Other Applications, ***Johannes J. Bisschop***, Paragon Decision Technology BV, PO Box 3277, Haarlem, 2001 DG, The Netherlands, j.j.bisschop@paragon.nl, ***Marcel Roelofs***

We will focus on the usability of AIMMS models as optimization components in other applications such as spreadsheets and e-commerce packages. Special attention will be paid to an Excel add-in and an intuitive COM object library to interface with languages such as Visual Basic and VBScript.

3) Hooking Non-Traditional Solvers to an Algebraic Modeling Language, ***Robert Fourer***, Northwestern University, Dept. of IEMS, 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, 4er@iems.nwu.edu, ***David M. Gay***

New optimization techniques are forcing algebraic modeling languages to adopt new approaches in communicating problems to solvers. Global optimization and constraint programming solvers may need to see explicit expression trees, while accepting diverse nonsmooth and combinatorial expression forms. We take examples from several solver interfaces to the AMPL modeling language.

4) Interactive GUI Objects in AIMMS, ***Marcel Roelofs***, Paragon Decision Technology, PO Box 3277, Haarlem, 2001 DG, The Netherlands, marcel.roelofs@paragon.nl, ***Johannes J. Bisschop***

In some planning and scheduling applications, the end-user wants to manipulate both the input and output data in a graphical manner. We will focus on 2 of the several interactive GUI objects in AIMMS: the advanced interactive network object for spatial planning and the flexible interactive Gantt chart for scheduling.

SA31 Technologies in Supply Chain Management

Sponsor: Computing Society
Sponsored Session
Chair: Ramesh Sharda, Oklahoma State University, 329 Coll. of Bus. Admin., Stillwater, OK 74078, sharda@okstate.edu

1) Network Security & the Business Value-Chain: Past, Present & Future, ***Susan J. Chinburg***, Oklahoma State University, B4-CBA, Stillwater, OK 74078, schinbu@okstate.edu, ***Mark Weiser***, ***Ramesh Sharda***

E-commerce is changing the nature of business. Computer networks and security of those networks have become critical business functions. We will review the related network security issues for each part of the business value chain. Network security processes will be reviewed along with recommendations for future research.

2) Flexible Shop Floor Control Systems, ***Baskar Krishnamoorthy***, Oklahoma State University, 322 Engineering North, Stillwater, OK 74078, bask@okstate.edu, ***Manjunath Kamath***

In today's dynamic and competitive environment, frequent reconfigurations are becoming increasingly necessary on the shop floor. Our focus is on the design of flexible shop floor control systems that can accommodate changes to the physical system and control/decision-making logic. Some preliminary work on the development of a generic control architecture will be presented.

3) A User-Oriented Framework for Process & Performance Modeling of Enterprise Systems, ***Manjunath Kamath***, Oklahoma State University, 322 Engineering North, Stillwater, OK 74078, mkamath@okstate.edu, ***Nikunj Dalal***, ***William Kolarik***, ***Amy Hing-Ling Lau***

We explore preliminary issues relating to the design, development, and testing of a user-oriented framework for process and performance modeling of enterprise (ERP) systems. The goal of this interdisciplinary project - just funded by NSF - is to integrate specific methods from engineering and business for improving enterprise-wide processes.

4) Evaluation of Cuts & Formulations of the Quadratic Knapsack Problem, ***Syam S. Menon***, Oklahoma State University, 309 CBA, Stillwater, OK 74078, smenon@mstm.okstate.edu, smenon@gsbpop.uchicago.edu, ***Linus Schrage***

The QKP is known to be much harder than the linear knapsack problem of similar size. It is encountered in important applications, from location to telecommunications and compiler design. We analyze, both analytically and computationally, several integer programming approaches for solving the QKP.

SA32 Trust & Governance in Interorganizational Relations

Sponsor: Organization Science Section
Sponsored Session
Chair: Bill McEvily, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, bmcevily@andrew.cmu.edu

1) Trust Asymmetries in Interorganizational Dyads: Exploring Causes & Consequences, ***Bill McEvily***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, bmcevily@andrew.cmu.edu, ***Akbar Zaheer***, ***Vincenzo Perrone***

We challenge the assumption that exchange partners hold a symmetric view of their interorganizational relationship. We explore whether trust is mutual and the extent to which the determinants and consequences of trust vary across the dyad. Data from both sides of 99 buyer-supplier dyads are used to test predictions.

2) The Interplay of Interpersonal & Interorganizational Trust in Biotechnology Alliances, ***Akbar Zaheer***, University of Minnesota, Carlson Sch. of Mgmt. 3-370, 321 19th Ave. South, Minneapolis, MN 55455, azaheer@csom.umn.edu, ***Shawn Lopstrom***, ***Varghese George***

We examine interpersonal trust across organizational boundaries and the relationship between interpersonal and interorganizational trust, based on interviews from both sides of 6 biotechnology alliances. We find that interorganizational trust is not merely an aggregation of interpersonal trust and the 2 forms of trust are sometimes driven in opposite directions.

3) Substitutes or Complements? Exploring the Relationship between Formal Contracts & Relational Governance, ***Laura Poppo***, Virginia Tech, Dept. of Mgmt., Pamplin 2007 (0233), Blacksburg, VA 24061, lpoppo@vt.edu, ***Todd R. Zenger***

Trust and relational governance are commonly viewed as substitutes for complex, formal contracts in exchange relations. Indeed, some argue that formal contracts promote opportunistic behavior that destroys trust. We develop and test an alternative perspective that formal contracts and relational governance function as complements. Using data from a sample of information service exchanges, we find empirical support for this complementary relationship.

4) The Impact of Network Structure on Business Survival after Customers Fail: A Routine-Based View, ***Anand Swaminathan***, University of California, Grad. Sch. of Mgmt., 1 Shields Ave., Davis, CA 95616-8609, aswaminathan@ucdavis.edu, ***Glenn Hoetker***, ***Will Mitchell***

How does the structure of buyer-supplier networks affect supplier survival following customer failure? We test propositions concerning auto sector customer size and status, relationship duration and supplier autonomy. We compare effects for modular and architectural components and for customer acquisition and failure. The study follows a routine-based theory of strategy.

SA33 Flexible Manufacturing Systems
Contributed Session

Chair: Sheo G. Misra, Misra Associates, 5 Catalpa St., Morgantown, WV 26505-3677

1) An Algorithm Combining Computer Simulation & Intelligent Searching Method for the Machine Layout in an FMS, *Joon-Mook Lim*, Waseda University, Dept. of IMSE, 3-4-1 Shinjuku-ku, Tokyo, 169-8555, Japan, iac99082@mn.waseda.ac.jp, ***Kazuho K. Yoshimoto, Jae Kook Lim***

We deal with the layout problem of an integrated automated manufacturing system which has a number of machine centers placed along a built-in automated storage/retrieval system. Recognizing the limits of existing approaches, we propose a new algorithm combining the computer simulation and intelligent searching method.

2) withdrawn - author request of 10/16, *Ranga V. Ramasesh*, Texas Christian University, Neeley Sch. of Bus., Box 32868, Fort Worth, TX 76129, r.ramasesh@tcu.edu, ***Shailesh S. Kulkarni, Maliyakal D. Jayakumar***

3) Economic & Process Models for Manufacturing Operations, *Sheo G. Misra*, Misra Associates, 5 Catalpa St., Morgantown, WV 26505-3677

Unit manufacturing operations are at the heart of every manufacturing system. Economic and process models are essential tools in designing, developing, planning, optimizing and controlling manufacturing operations and systems. The status of the development and application in these models is presented along with real world problems and challenges that influence their use.

SA34 Decision Analysis I
Contributed Session

Chair: Alan J. Brothers, Battelle PNNL, PO Box 999 K8-03, Richland, WA 99352, alan.brothers@pnl.gov

1) A Fuzzy Logic Approach to Buffer Control in Asynchronized Transfer Mode Networks, *Constance A. Lightner*, Fayetteville State University, 2529-5 Buffalo Church Rd., Sanford, NC 27330, clightner@uncfsu.edu, ***Shu-Cherng Fang, Henry L. Nuttle***

A fuzzy buffer controller is developed to minimize cell loss in ATM switches. The proposed fuzzy controller sequences cells in buffers based upon the corresponding priority class, end-to-end delay parameter and congestion status. Then cells are scheduled and/or discarded according to the sequenced positions. Then cells are scheduled and/or discarded according to the sequenced positions.

2) A Metamodel Approach to Sensitivity Analysis of Capital Investment Decisions, *Ravipim Chaveesuk*, University of Pittsburgh, 207 Dunstan Hall, Auburn, AL 36849, racst31@pitt.edu, ***Alice E. Smith***

A metamodel approach and design of experiment can be used to understand the effect of uncertain input factors on investment decisions. Three types of metamodels are investigated for performing sensitivity analysis of a capital investment: polynomial regression, dual kriging and neural networks. The performance of each type of metamodel is illustrated through a case study.

3) Decision Support for optimizing Health Care Technology Assessment, *Elliot B. Sloane*, Villanova University, Coll. of Commerce & Finance, 800 Lancaster Ave., Villanova, PA 19085, ebsloane@villanova.edu

Medical technology decisions have become very complex, pitting devices, surgical techniques, pharmaceutical compounds and genetically-engineered alternatives against each other. One of the world's leading research laboratories, ECRI, successfully pioneered 2 analytical techniques to identify optimal resource allocation strategies for government and health care providers...

4) A Database for Multi-Attribute Evaluation, *Alan J. Brothers*, Battelle PNNL, PO Box 999 K8-03, Richland, WA 99352, alan.brothers@pnl.gov, ***Antoinette L. Slavich***

We describe a database for evaluating whether to extend a vendor's multi-billion dollar government contract. The database contained ratings on an objectives hierarchy and documented their basis. It facilitated systematic group evaluation and basis development on limited access computer share drives. It also helped coordinate the evidential basis with the evaluation.

SA35 Forecasting I
Contributed Session

Chair: J. Scott Armstrong, University of Pennsylvania, The Wharton Sch., Philadelphia, PA 19026, armstrong@wharton.upenn.edu, hops.wharton.upenn.edu/forecast

1) Forecast Competition Results in Predicting Monthly Natural Gas Sales in Ohio, *Hisham M. Choueiki*, PUCO, 180 East Broad St., 3rd Floor, Columbus, OH 43215, puco_choueik@pucvms.a1.ohio.gov, ***David L. Wang***

We investigate the accuracy of our previously built neural network forecasting model with the "more traditional" ARIMA time series model in predicting the monthly natural gas sales for each of the 4 largest LDCs in Ohio. Our results indicate the superiority of the neural network model over the ARIMA model.

2) Updating Arima Predictions for Temporal Aggregates, *Yue Fang*, University of Oregon, Coll. of Bus. 1208, Eugene, OR 97403, yfang@darkwing.uoregon.edu, ***Sergio Koreisha***

We develop and extend previous investigations on the temporal aggregation of ARMA predictions. Given a basic ARMA model for disaggregated data, 2 set of predictors may be constructed for future temporal aggregates: predictions based on models utilizing aggregated data or on models constructed from disaggregated data for which forecasts are updated as soon as the new information becomes available...

3) Forecasting Financial Statements, *Anibal C. Irarrazabal*, Universidad Catolica de Chile, Vicuna MacKenna 4860, Santiago, Chile, airarraz@ing.puc.cl

Most financial statements analysis tasks are undertaken with a forward-looking decision in mind. The best way to forecast future performance is to do it comprehensively, by forecasting not only earnings, but also cash flows and balance sheet. Some cases will be presented.

4) Principles for Forecasting: What We Know & What We Know We Don't Know, *J. Scott Armstrong*, University of Pennsylvania, The Wharton Sch., Philadelphia, PA 19026, armstrong@wharton.upenn.edu, hops.wharton.upenn.edu/forecast

Despite much research on forecasting since 1960, advances in forecasting practice are modest. There are 3 reasons: most research is irrelevant to applications, what is relevant has been difficult to use and what has been easily available has been ignored. I provide a DSS to address these issues.

SA36 Inventory Management I
Contributed Session

Chair: Arnab Bisi, University of British Columbia, Fac. of Commerce, 2053 Main Mall, Vancouver, BC, V6T 1Z2, Canada, abisi@coe.ubc.ca

1) A Mathematical Evaluation of the Negative Binomial Approximation in a Multi-Echelon Inventory Model, *Adriano O. Solis*, University of Texas, Dept. of Info & Dec. Sci., Coll. of Bus. Admin., El Paso, TX 79968-0544, ronnisolis@aol.com, ***Charles P. Schmidt, Michael D. Conerly***

Graves (1985), Lee & Moinzadeh (1987) and Graves (1996) provided computational evidence in support of negative binomial approximations to the distributions of certain random variables arising in 3 different multi-echelon inventory models. For the latest model (Graves, 1996), we provide the first mathematical evaluation of the effectiveness of the approximation.

2) Approximate Optimization of a Two-Level Inventory System, *Sven B. Axsater*, Lund University, Dept. of IE, PO Box 118, Lund, S221 00, Sweden, sven.axsater@ie.lth.se, http://server1.ie.lth.se/IE/Sven/

We consider a 2-echelon inventory system with a central warehouse and a number of retailers facing stochastic demand. All installations apply continuous review installation stock (R, Q) policies. There are linear holding and backorder costs. We present a simple technique for approximate optimization of the reorder points.

3) Optimal Payment Time for a Retailer with Allowed Shortage & Delay in Payment, *A. A. M. Jamal*, Southeastern Louisiana University, Dept. of Mgmt., 1104 Rue Cannes, Hammond, LA 70402, ajamal@selu.edu, ***Bhaba Sarker, Shaojun Wang***

We develop a model for optimal cycle and payment time for a retailer in deteriorating-item inventory problems where the wholesaler allows a credit period to the retailer for payment without penalty. The model includes planned shortages. The system is modeled for cost minimization to determine the optimal payment under various system parameters. The model is solved by using a iterative procedure.

4) withdrawn - author request of 10/6, *Eric C. Jackson*, Michigan State University, Eli Broad Coll. of Bus., East Lansing, MI

48824, jacks351@pilot.msu.edu, ***Ram Narasimhan***, ***David Mendez***

5) Optimal Policy for the N-Period Censored Newsvendor Problem, ***Arnab Bisi***, University of British Columbia, Fac. of Commerce, 2053 Main Mall, Vancouver, BC, V6T 1Z2, Canada, abisi@coe.ubc.ca, ***Martin L. Puterman***, ***Xiaomei Ding***

We investigate the demand censoring effect of unobservable lost sales on the optimal policy in N-period news vendor inventory models with general parametric demand distributions and unknown parameters. Using the Bayesian MDP approach, we show that the optimal inventory level for censored demand is higher than the Bayesian myopic policy.

SA37 Optimization Techniques I

Contributed Session

Chair: Illya V. Hicks, Texas A&M University, Dept. of IE, 241 Zachry Engineering Ctr., College Station, TX 77843, ivhicks@caam.rice.edu

1) Application of Tabu Search to a Special Class of Multicommodity Distribution Systems, ***Siavash Pasalar***, Sharif University of Technology, Dept. of IE, Azadi Ave., Tehran, Iran, pasalar@me.umn.edu, ***Kourosh Eshghi***

In order to have a better distribution system in a multi-plant company, we have formulated the problem as a multi-stage multi-commodity network flow model. For solving the relatively large obtained model we have developed a special version of tabu search technique. The details of the approach and computational results are reported.

2) Studying Neighborhood Functions for Discrete Optimization Problems, ***Derek E. Armstrong***, University of Illinois, 1206 West Green St., Urbana, IL 61801-2906, dearmstr@uiuc.edu, ***Sheldon H. Jacobson***

The effectiveness of local search algorithms on discrete optimization problems is influenced by the choice of neighborhood function. Closed form expressions and formulas are given for the number of neighborhood functions, of a particular size, with no local minima that are not global minima.

3) A Modified Benders Approach as Lower Bound for Manufacturing Supply Chains Cost, ***Ana Maria Sarmiento***, SUNY at Buffalo, 7338 Parkridge Blvd., Apt. 481, Irving, TX 75063, as1@eng.buffalo.edu, www.acsu.buffalo.edu/~as1, ***Rakesh Nagi***

A modified Benders approach is presented to obtain a lower bound to the integrated cost of manufacturing supply chains obtained from a network of possible options. Costs considered are setup, production, holding and backorder at the manufacturing locations and transportation and selection cost at the links between them. The integrated cost is obtained...

4) Got Minor?, ***Illya V. Hicks***, Texas A&M University, Dept. of IE, 241 Zachry Engineering Ctr., College Station, TX 77843, ivhicks@caam.rice.edu

Branch decompositions and branchwidth were introduced by Robertson & Seymour. We present an algorithm to test for minor containment in graphs using branch decompositions.

SA38 NLP I

Contributed Session

Chair: Kurt M. Bretthauer, Indiana University, Dept. of Op. & Dec. Tech., Kelley Sch. of Bus., Bloomington, IN 47405, kbrettha@indiana.edu

1) Relations between Q-Convergence & R-Convergence, ***Ming Y. Wang***, Chinese Academy of Sciences, PO Box 2719, Beijing, 100080, China, wmy@lsec.cc.ac.cn, ***Ya X. Yuan***

We propose some nice properties and relations between Q-convergence and R-convergence under some conditions.

2) An Analytic Center Cutting Plane Method for the Convex Semi-Definite Feasibility Problem, ***Mohammad Oskoorouchi***, McGill University, Fac. of Mgmt., 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1W5, Canada, oskoorom@management.mcgill.ca, www.crt.umontreal.ca/~shahram, ***Jean-Louis Goffin***

A convex semi-definite feasibility problem is to find a point in a bounded convex set with a non-empty interior. This set contains a full dimensional ball and is contained in a compact convex set defined by convex matrix inequalities, called the set of localization. The semi-definite feasibility problem arises in many semi-definite relaxations of combinatorial optimization...

3) Convex Quadratic Inequalities for Mixed 0-1 Quadratic Programs, ***Garud Iyengar***, Columbia University, Mudd Bldg., Rm. 314, 500 West 120th St., New York, NY 10027, garud@ieor.columbia.edu, ***Mehmet Tolga Cezik***

We develop a technique for generating convex quadratic cuts for mixed 0-1 quadratic programs. These cuts are generated by projecting down appropriately chosen linear cuts separating the current iterate from the semidefinite lifting of the feasible set. We also introduce the notion of the volume of a quadratic cut and develop a cut generation technique that trades off volume with cut violation...

4) The Nonlinear Resource Allocation Problem with Block Diagonal Constraints, ***Kurt M. Bretthauer***, Indiana University, Dept. of Op. & Dec. Tech., Kelley Sch. of Bus., Bloomington, IN 47405, kbrettha@indiana.edu, ***Bala Shetty***, ***Siddhartha Syam***

We present algorithms for solving a class of nonlinear resource allocation problems (or, nonlinear knapsack problems) that include additional specially structured constraints. Both continuous and integer variable versions of the problem are considered. Computational testing of the algorithms will be reported.

SA39 Marketing I

Contributed Session

Chair: Chaim M. Ehrman, Loyola University, 820 North Michigan Ave., Marketing Dept., Chicago, IL 60611, cehrman@luc.edu

1) Using Within- & Across-Market Heterogeneity for Optimal Allocation of Promotional Budgets, ***Vishal Singh***, Northwestern University, Kellogg Grad. Sch. of Mgmt., 2001 Sheridan Rd., Evanston, IL 60208, v-singh1@nwu.edu, ***Sachin Gupta***

We develop a random coefficient logit model to explore differences in price sensitivity and effectiveness of promotional tools across markets. Using household panel data from 50 major markets in the US, we decompose the total heterogeneity in parameters into household differences and systematic regional differences. We utilize demographic and lifestyle variables for individual households to explain the unobserved heterogeneity...

2) The Effect of Relationship Marketing on Perceived Service Quality: A Study of Banks in India, ***Koushiki Choudhury***, Indian Institute of Management, 108 Maniktala Main Rd. SINP, Block 2, Flat 14, Calcutta West Bengal, 700054, India, koushiki@hotmail.com, ***Avinandan Mukherjee***

Practicing relationship marketing is imperative in today's competitive banking environment. Using in-depth interviews, we explore relationship marketing strategies being pursued by Indian banks and their effect on customer perceived service quality (using SERVQUAL) and show that perceived service quality is a function of the relationship marketing strategies of banks.

3) Optimization Model for Media Selection & Planning, ***Ding Zhang***, SUNY, Sch. of Business, Oswego, NY 13126, zhang@oswego.edu, ***James Molinari***, ***Kenneth Shaw***, ***June Dong***

We present an optimization model for media selection and planning. Additivity and separable weights properties will be presented. An application in e-commerce will be discussed.

4) On Streamlining Information Search in Marketing Journals, ***Chaim M. Ehrman***, Loyola University, 820 North Michigan Ave., Marketing Dept., Chicago, IL 60611, cehrman@luc.edu

When one conducts an information search in the marketing area, one typically finds the discipline to be focused along diversified areas. Research papers can be along the following concentrations: psychology, sociology, anthropology, management, probability and statistics, MS, information science, etc. In order to enhance the efficiency of information search, 47 marketing journals were rated on their ability to disseminate new information to the discipline...

SA40 Queueing Systems

Contributed Session

Chair: Greg Miller, Stephen F. Austin State University, Box 13040 -SFA Station, MNB 312, Nacogdoches, TX 75962, miller@math.sfasu.edu

1) A Semi-Markov Decision Model with Partial Information for a System with M Parallel Queues & One Server, ***Rita M. Rodrigues***, Brazilian Institute for Sp Research, Av. dos Astronautas, 1758 Jardim da Granja, Sao Jose dos Campos, SP 12201-970, Brazil, rita@lac.inpe.br, ***Solon V. Carvalho***

We want to minimize the long-run expected average cost of a system with M parallel and independent queues and only one server. Customers arrive in each queue according to a Poisson process and the service times have general distribution. This system is modeled as a semi-Markov decision process with partial information.

2) Optimal Threshold Policies in a Workload Model with a Variable Number of Service Phases per Job, ***Gido Brouns***, Eindhoven Univ. of Tech., PO Box 513, Eindhoven, 5600 MB, The Netherlands, ace@win.tue.nl, http://www.win.tue.nl/~ace, ***Jan van der Wal***

We consider a basic model for 2 essential on-line decisions that must be taken in workload models. The first is the decision to either continue or abort the service of a job. The second concerns the decision to either accept or reject new jobs. We show that under certain regularity conditions, there exist optimal threshold policies for these 2 decisions.

3) A Queueing Network Model for Capacity Planning of Prisons in the Netherlands, ***Rommert Dekker***, Erasmus University Rotterdam, Burg. Oudlaan 50, Rotterdam, 3062PA, The Netherlands, rdekker@few.eur.nl, http://www.few.eur.nl/few/people/rdekker, ***Ad Ridder***, ***R. Korporaal***

We describe a queueing network with blocking after service that is embedded in a DSS to support capacity planning of prisons. In particular, we predict the probability that a criminal is sent home because of a shortage of cells.

4) Queue Network Modeling of Job Shops for Workload Control, ***Ahmet Haskose***, Lancaster University, Dept. of MS, Mgmt. School, Lancaster, LA1 4YX, UK, a.haskose@lancaster.ac.uk, ***Brian G. Kingsman***, ***Dave J. Worthington***

Recently, manufacturing strategies have focused on speed of response to customer as much as cost and quality for competitive advantage. Workload control is one such strategy. Its basis is an extension of Little's formula. Exact and approximate open queueing network models for general job shops are presented.

5) Estimation of the Coefficient of Variation for Unobservable Times in the M/G/1 Queue, ***Greg Miller***, Stephen F. Austin State University, Box 13040 -SFA Station, MNB 312, Nacogdoches, TX 75962, miller@math.sfasu.edu, ***U. Narayan Bhat***

An estimator of the service-time coefficient of variation is presented for the purpose of discriminating between families of distributions useful in the M/G/1 queue. Assuming the service time random variable is unobservable, we base all of our inference on data collected from the imbedded Markov chain in the M/G/1 system.

SA41 DEA Applications in Accounting

Sponsor: **Accounting, Auditing & Tax Section**
Sponsored Session

Chair: Rajiv Banker, University of Texas at Dallas, Sch. of Mgmt., Box 830688, MS JO43, Richardson, TX 75083-0688, rbanker@utdallas.edu

1) Fundamental Analysis of Stocks via Two-Stage Data Envelopment Analysis, ***Cristina Abad***, University of Texas at Dallas, MS J043, Richardson, TX 75083-0688, meiga@utdallas.edu, cristina.abad@uca.es, ***Sten A. Thore***, ***Joaquina Laffarga***

Fundamental analysis of stocks links financial data to firm value in 2 consecutive steps, a predictive information link (current financial data - future earnings) and a valuation link (future earnings - firm value), with special emphasis on these market valuations.

2) Evaluating Super-Efficiency Procedures in Data Envelopment Analysis for Outlier Identification & Ranking Efficient Units, ***Hsihui Chang***, University of Texas at Dallas, Sch. of Mgmt., MS JO43, Richardson, TX 75083-0688, swchang@utdallas.edu, ***Rajiv Banker***

Monte Carlo simulation experiments are to evaluate the relative performance of the super-efficiency procedures for outlier identification and ranking efficient units. We find that the super-efficiency model does not perform well for ranking efficient units. However, it performs satisfactorily for outlier identification when some observations may be contaminated with random noise.

3) Predictive Ability of Data Envelopment Analysis Efficiency Scores, ***Raj Mashruwala***, University of Texas at Dallas, Sch. of Mgmt., MS JO43, Richardson, TX 75083-0688, rajmash@utdallas.edu, ***Rajiv Banker***, ***Constantine Konstant***

An analytical model demonstrates the incremental information content of DEA efficiency scores in predicting future profits, given current profits. Empirical analysis of data from a chain of retail stores provides evidence in support of the predictive ability of DEA efficiency scores.

SA42 Firm Capabilities, Firm Evolution & Industry Dynamics

Sponsor: **Organization Science Section**
Sponsored Session

Chair: Tammy L. Madsen, Santa Clara University, Dept. of Org. Analysis & Mgmt., Leavey Sch. of Bus., Santa Clara, CA 95053, tmadsen@scu.edu

1) Managerial Time Horizons & New Product Introduction, ***Gordon B. Walker***, SMU, Cox Sch. of Busl, PO Box 750333, Dallas, TX 75275-0333, gwalker@mail.cox.smu.edu, ***Richard J. Makadok***

No abstract supplied.

2) Entrant & Incumbent Adjustment to Deregulation, ***Tammy L. Madsen***, Santa Clara University, Dept. of Org. Analysis & Mgmt., Leavey Sch. of Bus., Santa Clara, CA 95053, tmadsen@scu.edu, ***Gordon B. Walker***

We compare incumbent and entrant adjustment to deregulation as a fundamental institutional change in the trucking industry, 1980-1993. Using an evolutionary model of firm growth, findings illustrate that entrants adjust faster to the new regime and that their production function has a more predictable pattern of growth compared to incumbent firms...

3) Exploiting Exploration, ***Anne Marie Knott***, University of Pennsylvania, The Wharton Sch., 2021 Steinberg Hall, Philadelphia, PA 19104-6370

One of the more persistent themes in the management literature is the tension between success in a competitive environment vs. survival in a changing environment. Success in the competitive environment involves exploitation of a firm's existing capabilities (March, 1991 Levinthal & March, 1993). Survival in a dynamic environment involves exploration for new capabilities (March, 1991 Levinthal & March, 1993)...

SA43 Risk Management I

Contributed Session

Chair: Arun Verma, Cornell University/FISC, 634 Rhodes Hall, Ithaca, NY 14850, averma@tc.cornell.edu, http://www.cs.cornell.edu/home/verma/AD

1) Pricing the Credit Risk with Regime Switch Models, ***Wei Chen***, University of Iowa, 15 MLH, Iowa City, IA 52242, wei-chen@uiowa.edu, ***Raj Jagannathan***

The credit risk is the risk that an obligation will not be paid and a loss will result. Using Markov regime switch processes, we generalize the previous researches on credit risks by incorporating both transition risks and short spread risks. The necessity of this generalization is also justified.

2) The Effects of Financial Liberalization on the Tunisian Banking Industry: A Non-Parametric Approach, ***Moez Hababou***, York University, Schulich Sch. of Bus., Rm. 344, 4700 Keele St., North York, Ontario, M3J 1P3, Canada, mhababou@ssb.yorku.ca, ***Wade D. Cook***, ***Gordon Roberts***

We examine the impacts of similar reforms on the efficiency of the banking system in Tunisia, a country whose economy has been reshaped by IMF/World Bank prescribed economic adjustment plans since 1987. Using various DEA models and panel data covering 1992-1997, we evaluate the individual effects of each component of the reforms on the banking industry overall.

3) withdrawn - author request of 9/18, ***Craig A. Friedman***, Morgan Stanley & Co., 1585 Broadway, New York, NY 10036, craig.friedman@msdw.com

4) Dynamic Hedging using a Reconstructed Local Volatility Function, ***Arun Verma***, Cornell University/FISC, 634 Rhodes Hall, Ithaca, NY 14850, averma@tc.cornell.edu, http://www.cs.cornell.edu/home/verma/AD, ***Thomas F. Coleman***

We compare the dynamic hedging performance of the deterministic local volatility function method with the usual constant and implied volatility approach. As is well know, implied volatilities of stock option prices show a smile behavior; this means that the constant volatility Black-Scholes model does not capture the dynamics of the underlying price correctly...

Sunday 10:15-11:45

SB01 Practitioners' Award Competition

Sponsor: **Decision Analysis Society**
Sponsored Session

Chair: Detlof Von Winterfeldt, University of Southern California, Sch. of Policy/Planning/Dev., Los Angeles, CA 90089, detlof@aol.com

1) Practioners' Award Competition

Each year, the Decision Analysis Society of INFORMS presents an award for the best application of decision analysis. The finalists for the award will each present a summary of their work with the winner announced in the afternoon awards session.

SB02 New Directions in Behavioral Research

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Jean L. Kahwajy, International Institute for Management Development, 23 Chemin de Bellerive, PO Box 915, Lausanne, CH-1001, Switzerland, kahwajy@imd.ch

1) Subjective Probability Judgments: Partition Dependence, ***Robert T. Clemen***, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708-0120, clemen@mail.duke.edu, ***Craig Fox***

We present evidence that subjective probabilities depend critically on how the event space is partitioned. Our results suggest that judges compromise between "ignorance prior" probability (equal mass across partitions) and probability based on support for the target event (as in support theory). We discuss implications for probability elicitation in practice.

2) Measuring Financial Investor's Risk Aversion, ***Philippe Delquie***, INSEAD, Blvd. de Constance, Fontainebleau, France, philippe.delquie@insead.fr, ***Gillaume Cousin***

We seek to devise a method for measuring an investor's risk aversion that fulfills 2 requirements: it asks preference questions meaningful to the individual and the resulting measure will translate into financial portfolio selection in a theoretically sound fashion.

3) Consulting Experiences in Decision Analysis, ***Elizabeth Ewing***, Strategic Decisions Group, 2440 Sand Hill Rd., Menlo Park, CA 94025

The hard part of decision consulting is integrating ideas, analysis and implementation with diverse personalities and competing interests. Some tricks of the trade have been discovered and will be discussed.

4) How to Hear & How to be Heard, ***Jean L. Kahwajy***, International Institute for Management Development, 23 Chemin de Bellerive, PO Box 915, Lausanne, CH-1001, Switzerland, kahwajy@imd.ch

The hard part of decision making is interpersonal communications. This research concerns the role that individuals play in reversing negative situations. It offers a radically different approach to negotiations and a productive strategy for being heard and for overcoming prevailing erroneous or negative expectations.

SB03 System Dynamics in Operations Management

Sponsor: MSOM
Sponsored Session

Chair: Edward G. Anderson, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, edward.anderson@bus.utexas.edu

1) Feedback Dominance in the Service Profit Chain, ***Rogelio Oliva***, Harvard Business School, Soldiers Field Rd., Bakery Library Rm. 182, Boston, MA 02163, roliva@hbs.edu

The service profit chain is a widely used conceptual framework linking employee satisfaction, customer satisfaction and loyalty and financial performance. The framework relies on a series of reinforcing mechanisms. A system dynamics model is used to determine the dominant feedback mechanisms under different scenarios and derive policies to improve performance.

2) Information Relvance & Rigor as Antecedents to Strategic Clarity: Using SD to Test SAP's Strategic Enterprise Management Module with BS, ***James L. Ritchie-Dunham***, University of Texas, Dept. of MSIS, 3615 Aspen Creek Parkway, Austin, TX 78749, jimrd@sdsg.com

Decision makers often lack clarity in how to satisfy their multiple stakeholders, because they use improperly filtered and irrelevant information for decisionmaking. ERPs claim to fix this managerial uncertainty in strategic decisionmaking. This research tests that claim and explores an explanation of the process

3) Using Real Options to Value Flexibility in Product Development Projects, ***Edward G. Anderson***, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, edward.anderson@bus.utexas.edu, ***David N. Ford***

Product development projects suffer regularly from unexpected changes in requirements which induce significant rework. Flexible product architectures can reduce the resulting rework, but only at a price. We use real options theory in a system dynamics model to determine how much a firm should pay for this flexibility

SB04 Logistics Modeling & Analysis

Sponsor: MSOM
Sponsored Session

Chair: Ananth V. Iyer, Purdue University, Krannert Sch. of Mgmt., West Lafayette, IN 47907-1310, aiyer@mgmt.purdue.edu

1) Lot-Sizing under Postponement & Downward Substitution for a Perishable Product, ***Jayashankar Swaminathan***, University of California, Berkeley, msj@haas.berkeley.edu, ***Simge Kukukyavuz***

We study a lot-sizing problem from the bio-technology industry with 3 interesting characteristics related to inventory management: perishability, postponement and substitution. The product considered is a reagent for detecting DNA sequences. We find the optimal lot-size under constant and varying deterministic demands and evaluate the benefits of investing in technology to mitigate the constraints on perishability and conversion.

2) An Integrated Supply Chain Model with Lead-Time Dependent Demand, ***Saibal Ray***, University of Waterloo, MS Dept., Waterloo, Ontario, N2L 3G1, Canada, ***Elizabeth M. Jewkes***, ***Yigal Gerchak***

We model an integrated supply chain where customer demand is a function of price and announced lead-time (AL) while price itself depends on AL. Operating costs exhibit economies of scale. The objective is to maximize the firms' profit, taking into consideration revenue and WIP holding, investment and raw material inventory costs.

3) Selling to a Newsvendor who Incurs Operating Costs, ***Richard Cho***, University of Waterloo, Dept. of MS, Waterloo, Ontario, N2L 3G1, Canada, ***Yigal Gerchak***

The coordination literature models retailers as costless operations, other than costs of mismatches between demand and product availability. Yet retailers incur operating costs and part of the drive for efficiency involve controlling them. We endow Lariviere & Porteus' selling to the newsvendor model with retail operating costs and explore the implications.

4) Managing Capacity under Mixed Steady & Random Demand, ***Ananth V. Iyer***, Purdue University, Krannert Sch. of Mgmt., West Lafayette, IN 47907-1310, aiyer@mgmt.purdue.edu, ***Apurva Jain***

We model the use of capacity when demand is a mixture of steady and random orders. We model the lead time and inventory cost impact of the following approaches pooled capacity, splitting capacity and use of scheduling priorities. We discuss managerial implications of each of these approaches.

SB05 Tutorial: Moment Problems & their Applications in Probability Theory, Finance, Stochastic Networks & Combinatorial Opt.

Sponsor: Applied Probability Society
Sponsored Session

Chair: Dimitris Bertsimas, MIT, Sloan Sch. of Mgmt., E53-359, OR Ctr., 50 Memorial Dr., Cambridge, MA 02139, dbertsim@mit.edu

1) Tutorial: Moment Problems & their Applications in Probability Theory, Finance, Stochastic Networks & Combinatorial Optimization, ***Dimitris Bertsimas***, MIT, Sloan Sch. of Mgmt., E53-359, OR Ctr., 50 Memorial Dr., Cambridge, MA 02139, dbertsim@mit.edu

Problems involving moments of random variables arise naturally in many areas of mathematics, economics and OR. How do we obtain optimal bounds on the probability that a random variable belongs in a set, given some of its moments? How do we price financial derivatives without assuming any model for the underlying price dynamics, given only moments of the price of the underlying asset?...

SB06 Sequential & Combined Travel Forecasting Models

Sponsor: Transportation Science Section
Sponsored Session

Chair: David E. Boyce, University of Illinois, Dept. Civil & Materials Eng., 3073 ERF, 842 West Taylor St., Chicago, IL 60607-7023, dboyce@uic.edu

1) Propagation of Uncertainty in Multi-Stage Travel Demand Models, ***Yong Zhao***, University of Texas, Dept. of Civil Eng., ECJ 6.9, C1761, Austin, TX 78712, ***Kara Kockelman***

Large-scale travel demand models are generally estimated sequentially, with results of one model acting as inputs to subsequent models. Typically, only point estimates are passed forward, rather than estimates of variation and covariation. We investigate the nature of uncertainty propagation with typical travel demand models, thereby assessing the impact of the neglect of such variations.

2) An Origin-Based Approach to Solving a Combined Travel Choice Model, ***David E. Boyce***, University of Illinois, Dept. Civil & Materials Eng., 3073 ERF, 842 West Taylor St., Chicago, IL 60607-7023, dboyce@uic.edu, ***Hillel Bar-Gera***

A combined model of origin-destination, mode and route choice for the Chicago region is solved with a new algorithm based on Bar-Gera's origin-based method. Accuracy of the solution and performance of the algorithm are compared to the traditional Evans algorithm for solving this problem.

3) A New Strategy for Accelerating the Frank-Wolfe Algorithm for the Traffic Assignment Problem, ***Der-Horng Lee***, Naational University of Singapore, Dept. of Civil Eng., Singapore, 117576, Singapore, dhl@nus.edu.sg, ***Yu Nie***

A new strategy for accelerating the Frank-Wolfe algorithm is presented. This strategy modifies the search direction by unlimitedly combining previous extreme points. Based on abundant computational results, the proposed modified Frank-Wolf algorithm is appropriate when an accurate solution is needed.

4) Micro-Assignment of Travel Demand with Activity/Trip Chains, ***Ahmded F. Abdelghany***, University of Texas, Dept. of Civ. Eng., ECJ 6.2, Austin, TX 78712, afaissal@mail.texas.edu, ***Hani S. Mahmassani***

A simulation-assignment model of travel demand with activity chains is presented. Experiments are conducted to compare trip-based assignment (with conventional models) to the proposed approach which recognizes trip chains. Pitfalls of inappropriately recognizing trip chains using current practice assignment models are illustrated.

SB07 Skills Assessment for OR/MS

Sponsor: **INFORM-ED**
Sponsored Session

Chair: Gary W. Shulberg, Defense Supply Center Philadelphia, 700 Robbins Ave., Bldg. 36-3, #3198, Philadelphia, PA 19111-5096, gwshulberg@dscp.dla.mil

1) Genesis of an Assessment of Analytical Skills for a Workforce Development Program, ***Allan Rosen***, Defense Supply Center Philadelphia, 700 Robbins Ave., Bldg. 3B, #5149, Philadelphia, PA 19111-5096, arosen@dscp.dla.mil

DSCP has initiated a program to define the diversity of business skills required of its current and future workforce, to assess skill levels, and to enhance capabilities. We will discuss the research involved and the obstacles encountered in the creation of this program and their importance to OR/MS educators and practitioners.

2) Development & Analysis of an Assessment for a Workforce Development Program, ***Margaret G. Barton***, US Office of Personnel Management, 230 South Dearborn St., DPN 30-3, Chicago, IL 60604, mgbarton@opm.gov, ***Patrick J. Sharpe***

A 2-phased process, designed to assess the proficiency of a contracting workforce sample with regard to competencies identified as critical to job performance in a changing workplace, will be presented. Scoring procedures, as well as ways in which OR/MS educators and practitioners can be informed by the results, will be discussed.

3) Using Webforms to Gather Perceptions of Technical Expertise, ***Judith A. Barlow***, Florida Institute of Technology, 150 West University Blvd., Melbourne, FL 32901, jbarlow@fit.edu, http://winnie.fit.edu/~jbarlow, ***David D. Hott***

Are incoming freshman or seasoned faculty more comfortable using technology? Web-based survey documents are used to gather information about the degree to which School of Business students and faculty have integrated technology in their lives. Initial results, including student and faculty perceptions of each other's technical expertise, are presented.

4) Using Webforms to Support the Design of an Information Technology Course, ***David D. Hott***, Florida Institute of Technology, 150 West University Blvd., Melbourne, FL 32901, dhott@raven-villages.net, dhott@fit.edu, ***Judith A. Barlow***, ***Karen Chambliss***, ***David Dorsett***, ***Terry Lease***, ***Roger Manley***, ***Barbara Gugliotta Pierce***, ***Michael Slotkin***

New IT tools continue to evolve so rapidly that it is necessary to continuously review which tools to include in a core business curriculum. A collaborative strategy for developing and maintaining a core set of IT skills is presented. Web-based survey documents are used to communicate and document the process.

SB08 Financial Management I

Contributed Session

Chair: Liqun Xu, National University of Singapore, Dept. of Finance & Acct., FBA1 02-03, 15 Law Link, Singapore, 117591, Singapore, fbaxulq@nus.edu.sg

1) Optimal Portfolio of Reconfigurable & Dedicated Machining Systems under Demand Uncertainty, ***Wichai Narongwanich***, University of Michigan, IOE Dept., 2205 Hubbard St., Apt. 6, Ann Arbor, MI 48105, wichai@engin.umich.edu, ***Izak Duenyas***, ***John R. Birge***

We determine the optimal portfolio of capacity, consisting of DMS capable of producing one product generation and RMS capable of producing several product generations, to satisfy demand over time. The inter-arrival time of 2 consecutive product generations is uncertain and the new product will completely replace the old product. Interesting structural results are provided.

2) Bank Stock Return Sensitivities to the Long- & Short-Term Interest Rates: A Bivariate GARCH Approach, ***Iqbal Mansur***, Widener University, Dept. of Mgmt., One University Pl., Chester, PA 19013, iqbal.mansur@widener.edu, ***Elyas Elyasiani***

A bi-variate GARCH methodology is employed to investigate the relative sensitivities of bank stock returns to short- and long-term interest rates and their respective volatilities. Results indicate that the short-term interest rate and its volatility have greater impact on bank portfolio returns and volatility than the long-term rate. Innovations in short- and long-term interest rates are not captured equally by movements in the market index.

3) Approximate Pricing & Exercising of High-Dimensional American Options: A Duality Approach, ***Martin Haugh***, MIT, OR Ctr., E40-149, Cambridge, MA 02139, mhaugh@mit.edu, ***Leonid Kogan***

We propose an algorithm for pricing high-dimensional American options based on approximate dynamic programming using neural networks to approximate the value function. We also develop upper and lower bounds on option prices which are general enough to be used in conjunction with other approximate methods of pricing American options.

4) Intertemporal Predictability, ***Liqun Xu***, National University of Singapore, Dept. of Finance & Acct., FBA1 02-03, 15 Law Link, Singapore, 117591, Singapore, fbaxulq@nus.edu.sg, ***Hong Chen***, ***Zhuangbo Tang***

We present a novel method to examine inter-temporal predictability in financial markets. Incorporating neural networks, we have developed computerized systems to predict large short-term trends of asset prices. Different statistical tests and the bootstrap reality check for testing the data-snooping effect strongly support the validity of the method.

SB09 Applications of Revenue Management I

Sponsor: **Revenue Management Section**
Sponsored Session

Chair: Georgia Perakis, MIT, Sloan Sch. of Bus., OR Ctr., 50 Memorial Dr., Rm. E53-359, Cambridge, MA 02139, georgiap@mit.edu

1) Pricing Models for the Sea Cargo Industry, ***Anton J. Kleywegt***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, anton.kleywegt@isye.gatech.edu, anton@isye.gatech.edu, ***Lior Iaroslavitz***

The Ocean Shipping Reform Act came into effect on May 1, 1999. The Act allows ocean carriers to enter into confidential contracts with shippers, charging prices that depend not only on the route and commodity, but also on the shipper and the time of year. We discuss some pricing models that carriers can use.

2) Golf Revenue Management, ***Sheryl E. Kimes***, Cornell University, Sch. of Hotel Admin., 335A Statler, Ithaca, NY 14853, skimes@twcny.rr.com, ***Alfonso Delgado-Muerza***

Golf courses possess the conditions necessary for the application of RM. We present a strategic framework for the application of RM to golf and present the results of an extensive study on the implementation of RM at a university golf course.

3) Restaurant Revenue Management, ***Romy Nakagawa***, MIT,

OR Ctr., E40-130, 1 Amherst St., Cambridge, MA 02139, romy@mit.edu, ***Dimitris Bertsimas***

Utilizing integer, approximate dynamic, stochastic programming and stochastic approximation methods, we develop new policies for revenue maximization in a restaurant by determining when, if at all, to seat an incoming party. Computational results show that our methods enhance revenue relative to the industry practice of FCFS by 3-10%.

4) Revenue Management in the Multi-Family Housing Industry, ***Donald M. Davidoff***, Talus Solutions, Inc., 4751 Best Rd., Waterstone, Ste. 300, Atlanta, GA 30337, ddavidoff@talussolutions.com, ***Nancy M. Pyron***

Multi-family housing represents a new frontier for RM. This industry shares many characteristics with traditional RM industries, but presents new challenges, e.g. extremely long lengths of stay and relatively small transaction density. We explore similarities and differences between multi-family housing and traditional RM industries and discuss several of the most pressing challenges that must be met to solve this intriguing challenge.

SB10 Innovations & Applications of Integer Programming

Cluster: **Scheduling**
Invited Session

Chair: Renato E. de Matta, University of Iowa, 108 Pappajohn BAB, Iowa City, IA 52242, renato-dematta@uiowa.edu

1) The Capacity Expansion Problem, ***Renato E. de Matta***, University of Iowa, 108 Pappajohn BAB, Iowa City, IA 52242, renato-dematta@uiowa.edu, ***Vernon N. Hsu***

We investigate a dynamic capacity expansion problem with capacity deterioration. We consider situations where the deterioration rate depends on the capacity's acquisition period. In a MIP model, we capture the capacity acquisition and replacement decisions and develop an efficient solution procedure. Computational results are presented.

2) A Linear Continuous-Time Model in Batch Sizing/Schedulng with a Minimum Number of Events, ***Monique Guignard***, University of Pennsylvania, Wharton Sch., Dept. of OPIM, Philadelphia, PA 19104-6366, guignard@wharton.upenn.edu, ***Siqun Wang***

Let an event represent a time around which at least one product level changes. The resulting event-indexed MILP model requires fewer binary variables than time-indexed models and it handles unequal batch-length, product re-usage, merging and diverging production lines and minimum and maximum batch sizes. We will present some computational results.

3) Integrated Scheduling of Job Processing & Job Delivery, ***Zhi-Long Chen***, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu, ***Chung-Yee Lee***

We present models that integrate schedules for processing jobs in job shops and schedules for delivering finished jobs to customers. We will investigate problem complexity and propose algorithms for some cases.

4) The Work Scheduling Problem with Job Assignment Flexibility, ***Emmanuel Peters***, Warner Lambert Inc., 201 Tabor Rd., Bldg. 86-1, Morris Plains, NJ 07950, emmanuel.peters@wl.com, ***Renato E. de Matta***

We find the optimal mix of jobs in work schedules for several groups of workers with non-homogeneous skills. A B&P procedure is proposed which minimizes total labor cost. We demonstrate this procedure in developing work schedules for bus drivers.

SB11 Combinatorial Optimization Algorithms in Computer Network Applications

Cluster: **Integer Programming**
Invited Session

Chair: Olivier Goldschmidt, Make Systems, 200 Regency Forest, Cary, NC 27511, olivier@makesys.com

1) Local Search with Perturbations for the Prize-Collecting Steiner Tree Problem in Graphs, ***Mauricio G. C. Resende***, AT&T Labs Research, Information Sci. Research, Florham Park, NJ 07932, mgcr@research.att.com, ***S. A. Canuto***, ***Celso Ribeiro***

Given an undirected graph G with node prizes and edge weights, the prize-collecting Steiner tree problem seeks a subtree of G which minimizes the sum of the weights of its edges plus the prizes of the nodes not spanned. We describe a multi-start local search algorithm (implementation) for this problem.

2) Combinatorial Approaches to SONET Design Problems, ***Eli V. Olinick***, SMU, Dept. of Comp. Sci. & Eng., Sch. of Eng. & Applied Sci., Dallas, TX 75275-0122, olinick@seas.smu.edu

We consider problems of minimizing ADM costs in a network of SONET rings. Sites are connected to multiple rings, but traffic between 2 sites cannot be split between rings. We develop heuristics and approximation algorithms for these difficult design problems by modeling them as edge-partitioning problems on the demand graph.

3) Heuristic Approximation Algorithms for Problems in Circuit Design, ***Steven T. Cosares***, Dowling College, Dept. of Math, Oakdale, NY 11769

No abstract supplied.

4) Heuristics for the Exact Topology Network Design Problem, ***Olivier Goldschmidt***, Make Systems, 200 Regency Forest, Cary, NC 27511, olivier@makesys.com

Given a fixed graph topology and a link cost matrix, the exact topology network design problem is to match the nodes of the network with the vertices of the topology to minimize the total cost of the network. We consider heuristics based on assignment problem and on partial solutions of the quadratic assignment problem for solving this problem.

SB12 Technology Supply Chains

Cluster: **Logistics & Supply Chain Management**
Invited Session

Chair: Geoffrey G. Parker, Tulane University, Freeman Sch. of Bus., 7 McAlister Dr., New Orleans, LA 70118, geoffrey.parker@tulane.edu

1) Decomposition of Designs within a Technology Supply Chain, ***Nitin Joglekar***, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, joglekar@bu.edu, ***Charles H. Fine***

We model the payoff from increasing system design performance through task decomposition during a finite market window of opportunity, subject to integration penalty. Optimal outsourcing policy is characterized in terms of design modularity and speeds of performance enhancement, termed clock speed, for the system design firm and its supplier respectively.

2) Finding a Firm's Equilibrium Clockspeed as a Function of Production Introduction Costs & Industry, ***Gilvan C. Souza***, University of North Carolina, Kenan-Flagler Bus. Sch., McColl Bldg., CB 3490, Chapel Hill, NC 27599-3490

We model a market where consumers care about technology and price. Market demand is stationary and split between two firms using a market share attraction model. The problem is formulated as a non-0 sum stochastic game. We find numerical equilibria regarding the firms' clockspeed - pace of new product

3) From Buyer to Integrator: The Transformation of the Supply Chain Manager in the Vertically Disintegrating Firm, ***Geoffrey G. Parker***, Tulane University, Freeman Sch. of Bus., 7 McAlister Dr., New Orleans, LA 70118, geoffrey.parker@tulane.edu, ***Edward G. Anderson***

We describe the change in supply-chain management toward supply-chain integration. As large firms disaggregate into linked chains of focused firms specializing in distinct areas, those focused firms paradoxically require more highly skilled generalists, "supply-chain integrators," capable of coordinating product development, marketing, production, and logistics within and across organizational boundaries.

SB13 Panel: Research Directions in Manufacturing Logistics

Cluster: **Manufacturing & Logistics**
Invited Session

Chair: S. David Wu, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015-1582, david.wu@lehigh.edu

1) Panel: Research Directions in Manufacturing Logistics, ***Morris A. Cohen***, University of Pennsylvania, The Wharton School, Dept. of OPIM, 1300 SH-DH, Philadelphia, PA 19104-6366, ***Robin Roundy***, Cornell University, Dept. of OR/IE, 216 Rhodes Hall, Ithaca, NY 14853, robin@orie.cornell.edu, ***Nicholas G. Hall***, Ohio State University, 301 Hagerty Hall, 1775 South College Rd., Columbus, OH 43210-1144, halln@cob.ohio-state.edu

Research in manufacturing logistics expands the traditional scope of production and operations management to include issues such as supply chain coordination, electronic commerce, and the integration of manufacturing and other business functions. This panel will discuss recent and future trends for research in this

area.

SB14 EPD Mini-Cluster: Industry-Academia Panel

Cluster: Product Development
Sponsor: Technology Management Section
Invite/Sponsor Session
Chair: Vish V. Krishnan, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, krishnan@mail.utexas.edu

Co-Chair: Nitin Joglekar, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, joglekar@bu.edu

1) Panel: Web/IT Driven Product Development

A panel of researchers and practitioners will address the following questions: What are some important research dimensions of web-driven product development? Is this theme a logical extension of research on information-driven design? What are some important trends emerging in practice?

SB15 Tutorial: Coordinating Production, Distribution & Pricing Decisions in the Supply Chain

Cluster: Quantitative Models in Supply Chain Management
Invited Session
Chair: David Simchi-Levi, MIT, Dept. of Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1171, Cambridge, MA 02139, dslevi@mit.edu

1) Tutorial: Coordinating Production, Distribution & Pricing Decisions in the Supply Chain, *David Simchi-Levi*, MIT, Dept. of Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1171, Cambridge, MA 02139, dslevi@mit.edu

The influence of the Internet and e-commerce on the economy in general, and supply chain management in particular, has been tremendous. Changes are happening so fast and the scope is breathtaking! General Motors, for instance, has recently announced, (Wall Street Journal 2/22/2000) that the company is completely changing the way it is designing, building, selling and delivering its products...

SB16 Tutorial: Preference Function Modeling

Cluster: MCDM
Invited Session
Chair: Jonathan Barzilai, Dalhousie University, Dept. of IE, PO Box 1000, Halifax, Nova Scotia, B3J 2X4, Canada, jonathan.barzilai@dal.ca, http://www.ScientificDecisions.com

1) Tutorial: Preference Function Modeling, *Jonathan Barzilai*, Dalhousie University, Dept. of IE, PO Box 1000, Halifax, Nova Scotia, B3J 2X4, Canada, jonathan.barzilai@dal.ca, http://www.ScientificDecisions.com

PFM is a new, intuitive, easy-to-use but powerful decision methodology based on a rigorous mathematical theory. This presentation will introduce the basic concepts and theory underlying PFM as well as Trillium/PFM, a software package that implements this methodology.

SB17 Network Flows: Recent Advances in Networks

Cluster: Network Flows
Sponsor: Optimization Section
Sponsored Session
Chair: Pinar Keskinocak, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, pinar@isye.gatech.edu

1) Accessing Nearby Copies of Replicated Objects in a Distributed Environment, *Andrea W. Richa*, Arizona State University, Dept. of Comp. Sci. & Eng., Box 875406, Tempe, AZ 85287-5406, aricha@asu.edu, ***Greg Plaxton*, *Rajmohan Rajaraman***

We design a simple, space efficient randomized algorithm for accessing shared replicated objects that tends to satisfy each access request with a nearby copy, ensuring efficient utilization of network resources. We show that under the particular cost model considered, the expected cost of an individual access is asymptotically

2) An Exact Solution Method for the Network Loading Problem, *F. Sibel Salman*, Carnegie Mellon University, GSIA, 5000 Forbes Ave., Schenley Park, Pittsburgh, PA 15232, fs2c@andrew.cmu.edu

We give an exact solution method for the problem of routing traffic between pairs of nodes of an input graph simultaneously and installing cables on the edges of the graph to accommodate flow at minimum cost. The method relies on a B&B algorithm that solves relaxations (in the form of the multicommodity flow problem)...

3) Algorithms for Solving Time-Dependent & Dynamic Network Flow Problems, *Sarah Stock Patterson*, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708-0120, sarah.sp@duke.edu, ***Elise D. Miller-Hooks***

We present algorithms for solving time-dependent and dynamic network flow problems. These problems have the common objective of finding the minimum time paths along which to send the supply between a set of sources and sinks in time-dependent (w.r.t. travel times, arc and node capacities and supply) and dynamic (w.r.t. flow) networks.

SB18 Applying Marketing Science to E-Commerce

Cluster: E-Commerce
Invited Session
Chair: Lee G. Cooper, UCLA, The Anderson Sch., 110 Westwood Plaza, Ste. B518, Los Angeles, CA 90095-1481, lee.cooper@anderson.ucla.edu

1) withdrawn - chair request of 10/17, *Eric T. Bradlow*, University of Pennsylvania, Wharton Sch., Ste. 1400 SH-DH, 3620 Locust Walk, Philadelphia, PA 19104, ebradlow@wharton.upenn.edu, ***Joel Steckel***

2) Forecasting Customer Purchases in a Nonstationary Environment, *Bruce G. S. Hardie*, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, England, UK, ***Peter S. Fader***

As e-commerce companies examine the notion of customer lifetime value, the need to forecast purchasing emerges. Traditional approaches assume stationary purchasing (possibly allowing for attrition). However, many new markets are characterized by evolving behavior. We develop a model that captures evolving preferences and attrition, and compare it to benchmark models.

3) A Segment- & Customer-Oriented Recommendation Engine, *Lee G. Cooper*, UCLA, The Anderson Sch., 110 Westwood Plaza, Ste. B518, Los Angeles, CA 90095-1481, lee.cooper@anderson.ucla.edu

The basic e-commerce recommendation engine in use until the beginning of this year has been the collaborative filter - an algorithmic technique that infers the tastes of customers from past purchases. We compare a collaborative filter to a recommendations engine based on geodemographic segments and the customers own history of purchases.

SB19 Technology Operations & Information Systems: ERP Systems

Cluster: Technology Innovations & Operations
Invited Session
Chair: Antonio Arreola-Risa, Texas A&M University, Dept. of IOM, Grad. Sch. of Bus., College Station, TX 77843-4217, tarreola@tamu.edu

1) ERP's Dirty Little Secret, *Mark L. Spearman*, University of Alabama, Coll. of Commerce & Bus. Admin, 366 Alston Hall, Box 870226, Tuscaloosa, AL 35487-0226, mspearman@cba.ua.edu

Thirty-five years after Joseph Orlicky developed MRP, the short cuts taken remain in the latest incarnation of manufacturing control software: ERP. While it was understandable that some corners were cut using the computer technology of the 1960s, it is inexcusable today. While it appears that the only alternative are the extremely complex "advanced planning systems," this does not have to be the case..

2) Empirical Study on Enterprise Information System Strategies in the Japanese Pharmaceutical Industry, *Kazuhiko Yasuda*, *Hiroko Suzuki*

In the Japanese pharmaceutical industry, efforts towards business efficiency and continuous BPR are critical issues as well as the development of new efficacious medicines. ERP is very useful for BPR and implemented in many enterprises. We take a survey research using a questionnaire and explore a state-of-the-art and problems of enterprise information system in the pharmaceutical industry.

3) An Operations Research Perspective on Internet Security Issues, *Henry C. Co*, California Polytechnic & State University, Coll. of Bus., Pomona, CA 91768, hco@csupomona.edu

With the recent high-profile hackers' attack on the Internet, it is unmistakable

that Internet security is the biggest concern in e-commerce. Just like other security risks in business, Internet security risk can and should be managed and minimized. We examine various Internet security issues from an OR perspective. Issues explored include Internet security risks...

4) ERP Systems: Post-Implementation Experiences & Strategies, ***Antonio Arreola-Risa***, Texas A&M University, Dept. of IOM, Grad. Sch. of Bus., College Station, TX 77843-4217, tarreola@tamu.edu

There are 2 kinds of companies: those that fail miserably to implement ERP systems and those that fail miserably immediately after implementing ERP systems (Michael Hammer Seminar Foundation). We present research findings regarding post-implementation experiences of ERP systems and the post-implementation strategy of a company that recently finished the implementation of an ERP system.

SB20 Tabu Search Applied to Military Logistics Problems

Cluster: Tabu & Scatter Search
Invited Session

Chair: J. Wesley Barnes, University of Texas, Dept. of Mech. Eng., Austin, TX 78712, wbarnes@mail.utexas.edu

1) A Quick-Running Routing Algorithm for UAV Reconnassance Operations, ***Robert Harder***, AFIT, Dept. of Operational Sci., ***Gary Kinney***, ***James T. Moore***, ***Raymond R. Hill***

We present a Java-based vehicle routing algorithm using tabu search as the solution engine. A user interface is developed to allow Predator unmanned aerial vehicle operators to employ this algorithm to develop UAV routes. Empirical results based on standard test problems are presented along with details of the algorithm implementation into operational practice.

2) A Group Theoretic Tabu Search Approach to the Aerial Fleet Refueling Problem, ***Victor D. Wiley***, University of Texas, Grad. Program in OR, vicwiley@mail.utexas.edu, ***J. Wesley Barnes***

A simplified version of the aerial fleet refueling problem may be modeled as a multi-depot VRP with time window and route length constraints. Using the symmetric group on n letters, we present a GTTS approach to this problem. The GTTS approach uses the group theoretic concepts of function composition and conjugation to construct and implement move neighborhoods...

3) Using Group Theory to Characterize Metaheuristic Search Neighborhoods, ***David L. Neuway***, University of Texas, Grad. Program in OR, Austin, TX 78712, ***J. Wesley Barnes***

We present some findings from recent research that help the understanding of the power and limitations of some commonly used metaheuristic search neighborhoods.

4) Tabu Search Applied to the Weapon Assignment Problem, ***Christopher A. Cullenbine***, AFIT, Dept. of Operational Sci., ***Mark A. Gallagher***, ***James T. Moore***

US Strategic Command analyzes potential nuclear weapon force structures with the WAM. A typical integer program inside WAM includes over 16 goals, 500,000 decision variables and 70,000 constraints. We demonstrate that tabu search obtains excellent solutions in about 15 minutes. This approach provides better support for nuclear policy decisions.

SB21 Session II

Cluster: SICUP
Invited Session

Chair: Guntram Scheithauer, Dresden University of Technology, Inst. for Numerical Math, Dresden, D-01062, Germany, scheit@math.tu-dresden.de

1) Using Extra Dual Cuts to Accelerate Column Generation, ***Jose M. Valerio De Carvalho***, Universidade do Minho, Dept. Producao e Sistemas, Braga, 4710-057, Portugal, vc@ci.uminho.pt

We derive a family of dual cuts for the one-dimensional cutting stock problem and show how inserting a polynomial number of cuts of this family in the restricted master problem helps to reduce the number of columns generated, the number of degenerate pivots and computational time.

2) Pattern Reduction in Cutting Pattern Problems, ***Horacio H. Yanasse***, INPE Brazilian Sp Research Institute, Av. Dos Astronautas 1758, CP 515 Sao Jose dos Campos, Sao Paulo, 12201-970, Brazil, horacio@lac.inpe.br, ***Marcelo S. Limeira***

We propose a hybrid procedure to obtain a reduced number of patterns in cutting problems. In the first stage, we generate (good) patterns that once cut, simultaneously complete the demands of items contained in them. We reduce the problem, solve it and then pattern reduction techniques, proposed previously in the literature, are

3) Solving 1-Dimensional Cutting Stock Problems Exactly with a Cutting Plane Algorithm, ***Guntram Scheithauer***, Dresden University of Technology, Inst. for Numerical Math, Dresden, D-01062, Germany, scheit@math.tu-dresden.de

A cutting plane approach for solving cutting stock problems is presented. The computation and the choice of suitable cutting planes are investigated for an algorithm based on column generation. Results of extensive computational experiments are reported.

4) withdrawn - chair request of 10/2, ***Robert E. Johnston***, Monash University, Australian Pulp & Paper Inst., Victoria, 3800, Australia, r.e.johnston@eng.monash.edu.au

SB22 Modeling Health Care Operations

Sponsor: Health Applications Section
Sponsored Session

Chair: Murray J. Cote, Trinity University, San Antonio, TX 78212-7200, mjcote@trinity.edu

1) Development of a Simulation & Data Visualization Tool to Assist in Strategic Operations Management in Emergency Services, ***Shane Henderson***, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, shane.henderson@umich.edu, ***Andrew J. Mason***

We describe a powerful decision support tool, BartSim, that may be used to assist in the problem of emergency vehicle deployment. BartSim employs simulation to perform what-if analyses, and graphical tools to analyze both actual and simulated results. BartSim has been extensively used to assist in decision making for an ambulance organization in New Zealand.

2) Synergism between Modeling & Operational Evaluation: Examples in Health Care Reengineering, ***George Miller***, Vector Research, Inc., PO Box 1506, Ann Arbor, MI 48106, millerg@vrinet.com

We explore the benefits of combining operational evaluation with model-based analysis to study the reengineering of healthcare delivery. We illustrate a conceptual approach to this type of analysis with several examples drawn from previous studies in the areas of telemedicine proliferation and adoption of disease management practices.

3) Medical Application of Engineering Risk Analysis & Anesthesia Patient Risk Illustration, ***Elisabeth M. Pate-Cornell***, Stanford University, Dept. of MS & Eng., Stanford, CA 94305-4024, mep@leland.stanford.edu

Engineering probabilistic risk analysis methods can be used in the medical domain. We present a dynamic analysis of anesthesia accidents, relate the parameters to practitioner problems (competence and alertness) and to the system's management to assess the patient risk reduction benefits of improvements such as regular re-training and increased supervision of the residents.

4) Forecasting Hourly Bed Census for Hospital Care Units, ***Murray J. Cote***, Trinity University, San Antonio, TX 78212-7200, mjcote@trinity.edu, ***Benito Flores***

A challenging aspect of daily hospital operations is determining appropriate staffing for a given bed census. We develop an autoregressive forecasting model to predict hourly census for a care unit, examine the forecast bias and its implication on staffing and consider the cost of forecast errors in relation to staffing.

SB23 Simulated Annealing Applications

Sponsor: Simulation Section
Sponsored Session

Chair: Bruce C. Shultes, University of Cincinnati, Mech., Ind. & Nuclear Eng., PO Box 210116, Cincinnati, OH 45221-0116, bruce.shultes@uc.edu

1) A Simulated Annealing Approach for Evaluating ANSI Form Tolerances, ***Liu Hong***, University of Cincinnati, Mech., Ind. & Nuclear Energy, PO Box 210116, Cincinnati, OH 45221-0116, hongl@email.uc.edu, ***Bruce C. Shultes***, ***Sam Anand***

The accurate evaluation of form tolerances as defined by the ANSI Standard requires efficient methods for solving complex nonlinear problems. We present a general simulated annealing approach for evaluating form tolerances. Empirical results for several examples are presented and compared with results from existing methods found in the literature.

2) Periodic Transportation Scheduling under Uncertainty, ***Tito Homem-de-Mello***, Ohio State University, 210 Baker Systems, IWSE Dept., 1971 Neil Ave., Columbus, OH 43210-1271, homem-de-mello.

1@osu.edu, ***Anton J. Kleywegt***

We discuss a logistics problem where products are distributed to customers according to a regularly periodic schedule rather than through placed orders. The goal is to optimally route the delivery vehicles taking uncertainy into account. We use a sample-average version of simulated annealing to solve the problem.

3) An Efficient Sampling Approach to Probabilistic Optimization Methods, ***Ki-Joo Kim***, Carnegie Mellon University, Civil & Environ. Eng. Dept., 5000 Forbes Ave., Pittsburgh, PA 15213, kijoo@andrew.cmu.edu, ***Urmila Diwekar***

Efficient simulated annealing (ESA) and stochastic annealing (ESTA) are developed by changing move generation mechanism. A novel sampling technique is used for uniform move generation resulting in shorter Markov chain length. ESA and ESTA are observed to be up to 60% more efficient than the conventional ones.

4) Using Simulation to Find Feasible Schedules with Real-Time Constraints, ***Bruce C. Shultes***, University of Cincinnati, Mech., Ind. & Nuclear Eng., PO Box 210116, Cincinnati, OH 45221-0116, bruce.shultes@uc.edu

Hard real-time constaints arise in the specification of embedded software creating a class of complex scheduling problems. Heuristics for constructing schedules exist, but schedules are not necessarily feasible. We present a new approach that searches for feasible schedules. This approach is compared with the current state of practice through examples.

SB24 Material Handling Systems Integration

Cluster: Material Handling
Invited Session
Chair: Sonia Bartolomei-Suarez, University Puerto Rico, Dept. of IE, Box 9043, Mayaguez, PR 00681-9043, sonia@ece.uprm.edu

1) Incorporating the Impact of Order Dispatching & Material Handling in the Effectiveness of Modular Manufacturing in the Apparel Industry, ***Viviana I. Cesani***, University Puerto Rico, Dept. of IE, Mayaguez, PR 00681-9043, ***Veronica Melendez***

Modular manufacturing is an integral part of a comprehensive effort designed to improve productivity in the apparel industry. It has been suggested that by switching from the traditional bundle system to manufacturing modules, companies can achieve lower throughput times and significantly reduce their WIP inventory. We examine the influence that operational factors have on the performance of modular systems...

2) Pull-Based Supply Chain Allocation for Multi-Products in Multi-Echelon Distribution Systems, ***Pongchai Athikomrattanakul***, Iowa State University, Ames, IA 50011, ***Pius J. Egbelu***

We propose a primal-dual decomposition method to allocate resources in a pull-based supply chain, customer demand driven, multiple echelon distribution consisting of m manufacturing centers, n warehouses and p customers. Based on an MIP model, we decompose the original problem into a master problem and subproblem to seek solution to the distribution problem.

3) Evaluation of Quadratic Assignment Problem Solution Techniques on the Integration of Assembly Planning & Material Handling Problems, ***David E. Miro-Feliciano***, University Puerto Rico, Dept. of IE, Mayaguez, PR 00681-9043, ***Sonia Bartolomei-Suarez***

A computer-based assembly planning system with an imbedded SA solution algorithm was developed for solving a QAP that integrates assembly problem and material handling. The effectiveness of using SA and a search algorithm based on reactive tabu-search (RTS) are compared. Two case studies are used in a comparative analysis to determine how well RTS compares with SA...

4) A Simulation Model-Based Approach for Predictive Maintenance of Conveying Equipment, ***Erasmo Lopez***, University of Texas, MIE Dept., El Paso, TX 79968-0521, ***Luis R. Contreras***, ***Arunkumar Pennathur***

We present a simulation model based on a theoretical framework for integrating equipment design variables, i.e, equipment age, wear, life, failure and reliability distributions, etc, and variables related to operating conditions of conveying equipment, i.e, temperature, load, sound, vibration, lubricant debris, etc., both of which contribute to machine breakdown...

SB25 Nonlinear Programming, Integer Programming & Interior-Point Algorithms

Cluster: Nonlinear Programming
Sponsor: Optimization Section
Sponsored Session
Chair: Yin Zhang, Rice University, Dept. of CAAM, Houston, TX 77005, zhang@caam.rice.edu

1) The Sphere of Convergence of Newton's Method on Two Equivalent Systems from Nonlinear Programming, ***Maria Cristina Villalobos***, University of Texas, Dept. of Math, El Paso, TX 79925, ***Richard A. Tapia***, ***Yin Zhang***

We study local behavior of a Newton logarithmic barrier function method and a Newton primal-dual interior-point method for the nondegenerate inequality constrained optimization problem, in particular, the radius of the sphere of convergence. Our theoretical and numerical results are clearly in favor of using Newton primal-dual methods for solving the optimization problem.

2) An Algorithm for Ellipsoidal Approximation of Polytopes with an Application in Integer Programming, ***Liyan Gao***, Rice University, Dept. of CAAM, Houston, TX 77005, ***Yin Zhang***

The maximum volume ellipsoidal approximation of polytopes (MVE) has applications in many areas. We propose a practical primal-dual interior point method to solve the MVE problem and compare the performance of our method with that of Khachiyan & Todd's algorithm. We apply our maximum volume ellipsoidal approximation algorithm as a subroutine in solving the IP problem based on Lenstra's algorithm...

3) An Interior-Point Gradient Method for Optimization Problems with Simple Bounds, ***Amr S. El-Bakry***, ExxonMobil Upstream Research Company, PO Box 2189, Houston, TX 77252-2189

A new first-order interior-point method for minimizing a continuously differentiable function with simple bounds will be introduced. The search direction is computed using a distance function defined on the cone of nonnegative real numbers. Preliminary numerical results will be presented.

4) Approximation of the MAXCUT Problem through an Unconstrained Optimization Problem, ***Yin Zhang***, Rice University, Dept. of CAAM, Houston, TX 77005, zhang@caam.rice.edu

We formulate a relaxation of the maxcut problem as an unconstrained optimization problem. Local minima of this problem can be obtained very efficiently which, surprisingly, lead to high quality approximate solutions to the maxcut problem.

SB26 Queueing Models

Cluster: Stochastic Models & Applications
Invited Session
Chair: William L. Cooper, University of Minnesota, Dept. of Mech. Eng., 111 Church St. SE, Minneapolis, MN 55455-0111, billcoop@me.umn.edu

1) On Truncation Properties of Finite-Buffer Queues & Queueing Networks, ***Xiuli Chao***, NJIT, Dept. of IME, University Heights, Newark, NJ 07102, chao@megahertz.njit.edu, ***Masakiyo Miyazawa***

We show that several truncation properties of queueing systems are consequences of a simple property of censored stochastic processes. We first establish a Markov chain result and then apply it to single-server batch arrival batch service queues with finite buffers and queueing networks with finite buffers and batch movements.

2) Queues with Skorohod/Loynes Representations, ***William L. Cooper***, University of Minnesota, Dept. of Mech. Eng., 111 Church St. SE, Minneapolis, MN 55455-0111, billcoop@me.umn.edu, ***V. Schmidt***, ***Richard F. Serfozo***

We consider processes that are regulated to stay within a finite or infinite interval. Potential inputs or outputs are disregarded when they would lead to a state outside this region. We describe the relationship of such processes to a variant of the Skorohod problem and Loynes' stationary waiting time representation.

3) Stochastic Production Planning, ***German Riano***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, ***Steven T. Hackman***, ***Richard F. Serfozo***

We will address the problem of how to find proper input rates tc feed a production network to meet a given set of requirements. Random processing times and congestion are taken into account in the model.

4) Reversible Markov Processes & Spatial Queueing Systems,

Richard F. Serfozo, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, rserfozo@isye.gatech.edu, ***Xiaotao Huang***

In a spatial service system, the state of the system is a point process that describes the numbers of customers in subsets of the space. It evolves over time as a reversible Markov process. We characterize the stationary distribution of such systems. Basics of reversibility on uncountable spaces are included.

SB27 Panel: The Industry Job Search for PhD Students

Chair: Russell D. Meller, Virginia Tech., Dept. of ISE, 250 New Engineering Bldg., Blacksburg, VA 24061, rmeller@vt.edu

1) Panel: The Industry Job Search for PhD Students

INFORMS members from industry will provide PhD students with an outline of the industry job search, i.e., application, interview, offer process, etc. They will also provide their guidance on some of the dos and don'ts, as well make a contrast with the academic job search.

SB28 Networks & Graphs

Contributed Session

Chair: James F. Campbell, University of Missouri, Coll. of Bus. Admin., 8001 Natural Bridge Rd., St. Louis, MO 63121, campbell@umsl.edu

1) Equilibrium Modeling on Capacitated Networks, ***Hamdouch Younes***, CRT, 4580 Queen Mary App. 402, Montreal, Quebec, H3W 1W6, Canada, younes@crt.umontreal.ca, ***Patrice Marcotte***, ***Nguyen Sang***

We advocate the use of the concept of strategies and their network-theoretic representation as hyperpath, for modeling equilibrium flows in networks involving arcs with rigid capacities. Both theoretical and computational salient features of this approach will be discussed and preliminary supporting computational results presented.

2) A Cutting Plane Solution Approach to the Parallel Replacement Problem under Economies of Scale, ***Joseph C. Hartman***, Lehigh University, IMSE Dept., Mohler Lab., 200 West Packer Ave., Bethlehem, PA 18015, jch6@lehigh.edu, www.lehigh.edu/~jch6/jch6.html

The parallel replacement problem determines optimal timing of asset disposal and procurement decisions for a group of assets over a finite horizon under the assumption of fixed and variable costs. An integer programming formulation is presented with a cutting plane solution approach and experimental results.

3) Error Bounded Heuristic Algorithms for Large-Scale Dynamic Programming, ***Matthew D. Bailey***, University of Michigan, 1950 Traver Rd., Apt. 206, Ann Arbor, MI 48105, mdbailey@engin.umich.edu, ***Robert L. Smith***

We propose and analyze a generic heuristic algorithm that successively eliminates feasible solutions. At each step, it is guaranteed that the remaining solution set has a solution within an a priori error from the optimal. This is illustrated using dynamic programming with guaranteed error bounds.

4) Solving Hub Arc Location Problems, ***James F. Campbell***, University of Missouri, Coll. of Bus. Admin., 8001 Natural Bridge Rd., St. Louis, MO 63121, campbell@umsl.edu, ***Andreas Ernst***, ***Mohan Krishnamoorthy***

Hub arc location problems involve designing hub networks by locating arcs with reduced unit flow costs. We present integer programming formulations for several models with different path and network constraints. We also report computational results for 2 optimal solution approaches.

5) Cyclic Schedules for Kirkman Problems, ***Gerald L. Thompson***, Carnegie Mellon University, 5000 Forbes Ave., Pittsburgh, PA 15213-3890, gt04@andrew.cmu.edu

I will present algorithms for generating cyclic schedules to Kirkman school girl problems with $n = 12k + 6$ where $k > 0$ is an integer and for other Kirkman problems with $n = 6k+1$. The problem of calculating the widths of the resulting matrices (in the sense of Fulkerson and Ryser) will also be discussed.

SB29 Modeling Price Formation & Market Power in Competitive Electricity Markets I

Sponsor: ENRE

Sponsored Session

Chair: Yves Smeers, Universite Catholique de Louvain, CORE, 34 Voie du Roman Pays, Louvain la Neuve, 1348, Belgium, smeers@core.ucl.ac.be

1) A Focal Point Model of Tacit Collusion in Electricity Markets, ***John Bower***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, England, UK, jbower@london.edu, ***Derek W. Bunn***

A common characteristic of many electricity markets is that an oligopoly of generating firms who regularly compete to supply power has ample opportunities for tacit collusion. An agent-based simulation model is presented where competing generating firms endogenously coordinate upon, and enforce, a collusive equilibrium using feedback from the capital market to select a focal point based on plant utilization rates.

2) Simulation of Price Behavior in Electricity Markets, ***Ezra Hausman***, Tabors Caramanis & Associates, 50 Church St., Cambridge, MA 02138, ***Aleksandr Rudkevich***, ***Assef Zobian***

We present the results and analyses of simulating hour-to-hour behavior of locational electricity prices. Our algorithms combine a 2-stage commitment-dispatch SFE game, LP-driven secured dispatch with ramping constraints and adaptive learning based on market observation. The results are compared to observed price spikes in US electricity markets.

3) Supply Function vs. Cournot Equilibrium Models in Electricity Markets, ***Ross Baldick***, University of Texas, Dept. of Elect. & Comp. Eng., Austin, TX 78712-1084, baldick@ece.utexas.edu

We investigate the properties of supply function and Cournot equilibria in transmission constrained electricity markets. Several examples suggest that although supply function equilibria fit typical electricity pool rules, from a computational point of view, Cournot equilibria may be provide a better estimate of the "focal equilibrium."

4) Experiments with Market Power Models, ***Cecile Cordier***, ELECTRABEL RD Energy Markets, 34 Voie du Roman Pays, Louvain-la-Neuve, 1348, Belgium, ***Olivier Daxhelet***, ***Yves Smeers***

We consider different stylized situations of restructured electric systems constructed on the basis of real data. Using these models, we test the impact of different assumptions of market organization, transmission pricing and system sizes and parameters on various economic performances of the system, i.e, welfare, price levels, congestion rents, etc.

SB30 Carl Harris Memorial Session: Optimization in Computational Biology

Sponsor: Computing Society

Sponsored Session

Chair: Harvey J. Greenberg, University of Colorado, Mathematics Dept., CB 170, PO Box 173364, Denver, CO 80217-3364, hgreenbe@carbon.cudenver.edu

1) Opportunities for Optimization in Computational Biology, ***Harvey J. Greenberg***, University of Colorado, Mathematics Dept., CB 170, PO Box 173364, Denver, CO 80217-3364, hgreenbe@carbon.cudenver.edu

There has been tremendous growth in this dynamic field of computational biology, creating new challenges in combinatorial and global optimization. We will describe some of these problems from an OR perspective.

2) Using Global Optimization to Predict Molecular Structure, ***Richard Byrd***, University of Colorado, Comp. Science Dept., Boulder, CO 80302, richard@cs.colorado.edu, ***Betty Eskow***, ***Bobby Schnabel***

Finding the minimum energy configuration of a protein is an important tool for understanding them and is a structured but very difficult global optimization problem. We describe a global optimization method involving random sampling, structured perturbation and a pool of candidate minimizers that is effective on such problems.

3) Combinatorial Protein Structure Problems, ***William E. Hart***, Sandia National Laboratories, MS 1110, Albuquerque, NM 87185-1110, wehart@cs.sandia.gov, ***Sorin Istrail***

Although protein structures can be naturally described with continuous parameters, combinatorial descriptions of protein structures naturally arise in many contexts. We describe performance-guaranteed approximation algorithms for protein structure prediction in a variety of combinatorial models and illustrate how the analysis of these algorithms can be extended to provide off-lattice performance guarantees.

SB31 Recent Advances in Nonlinear Mixed Integer Optimization

Sponsor: Computing Society

Sponsored Session

Chair: Arne S. Drud, ARKI Consulting & Development A/S, Bagsvaerdvej 246A, Bagsvaerd, DK2880, Denmark, adrud@arki.dk

1) Recent Developments in Disjunctive 0/1 Programming, ***Ignacio E. Grossmann***, Carnegie Mellon University, Chemical Eng. Dept., Pittsburgh, PA 15213-3890, grossmann@cmu.edu, ***Aldo Vecchietti***

In recent years, disjunctive programming has shown several advantages at the levels of modeling and solving discrete/continuous optimization problems. We will present recent developments on nonlinear disjunctive 0/1 models. We will also introduce several issues about language implementation for posing a problem and also the algorithms and techniques to reach the solution.

2) SBB: A New Solver for Mixed Integer Nonlinear Programming, ***Michael R. Bussieck***, GAMS Development Corp., 1217 Potomac St. NW, Washington, DC 20007, mbussieck@gams.com, ***Arne S. Drud***

We describe SBB, a new GAMS solver for mixed integer nonlinear programming. The solver uses existing NLP solvers in a B&B scheme. To improve reliability, solver failures or infeasibilities are overcome by changing solver or options dynamically. Results and comparisons with other methods will be presented.

3) Global Optimization of Mixed Integer Nonlinear Programs, ***Mohit Tawarmalani***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, tawarmal@uiuc.edu, http://archimedes.scs.uiuc.edu/tawarmal/, ***Nikolaos V. Sahinidis***

Towards the global optimization of MINLPs we develop: convex extensions, the only available systematic means of convexification of LSC functions; a linear outer-approximation scheme for factorable programs; a framework for domain reduction which produces existing and new range-reduction techniques. We present computational results with our BARON software.

SB32 The Institutional Foundations of Markets

Sponsor: Organization Science Section
Sponsored Session

Chair: Andrew Spicer, 347 Cold Sold Rd., Princeton, NJ 08540, andrew.spicer@ucr.edu

1) Markets as Social Institutions: Implications for Firm Strategy & Economic Development, ***Andrew Spicer***, 347 Cold Sold Rd., Princeton, NJ 08540, andrew.spicer@ucr.edu, ***William Pyle***

We examine the formation of impersonal markets of exchange in the Russian banking industry during the 1990s. The challenges in forming mechanisms of exchange based on price represent a major issue for firm strategy in Russia as well as for governmental attempts to jumpstart economic growth.

2) Investments in Pricing Capital, ***Mark J. Zbaracki***, University of Pennsylvania, Mgmt. Dept., The Wharton Sch., 2000 SH-DH, Philadelphia, PA 19104-6370, zbaracki@wharton.upenn.edu

We argue that pricing is an output of organizational production processes, making both the costs and benefits of pricing endogenous choices. We discuss how firms choose pricing rules and heuristics, thereby linking organizational processes to economic variables. We support our argument with evidence from a 2-year, cross-disciplinary, ethnographic study.

3) The Institutional Construction of the US Mutual Fund, ***Michael Lounsbury***, Cornell University, NYSSILR, 367 Ives Hall, Ithaca, NY 14853-3901, mdl18@cornell.edu

As sociologists have increasingly turned their attention to the study of economic institutions over the past couple of decades, we have gained a great deal of knowledge about how markets are comprised of a complex infrastructure of rules, relationships and resources that enable stable patterns of exchange. Much less attention has been paid to market dynamics...

4) Unpacking Affiliation Markets: Partner Search & Selection in Airline, ***M. Tina Dacin***, Texas A&M University, Dept. of Mgmt., Grad. Sch. of Bus., College Station, TX 77843, tdacin@tamu.edu

I study the selection and competition for exchange partners in airline alliance networks. Drawing upon the literature on networks and economic sociology, I show how attributes such as reputation, status, prior ties and alliance histories serve as important mechanisms of stratification and contribute to the creation of markets of affiliation.

SB33 Production Planning I

Contributed Session

Chair: Raf Jans, Katholieke Universiteit Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, 3000, Belgium, raf.jans@econ.kuleuven.ac.be

1) An Approximate Dynamic Programming Technique for Production, ***Meko M. C. So***, University of Hong Kong, Dept. of Math., Pokfulam Rd., Hong Kong, Hong Kong, h9622462@hkusua.hku.hk, ***Michael K. P. Ng***

We develop a dynamic programming model for the production planning. An approximate solution is determined by searching for a lower bound via LP and reducing the complexity of the search space by a priority products scheme. Numerical results are reported on a set of illustrative data.

2) Job Sequencing in CONWIP Production Lines, ***Wen Zhang***, Concordia University, Dept. of Mech. Eng., 1455 de Maisonneuve West, Montreal, Quebec, H3G 1M8, Canada, zhang_1@me.concordia.ca, ***Mingyuan M. Chen***

We discuss some issues in using CONWIP control policies to manufacturing production lines. A mathematical programming model is proposed to simultaneously determine the most concerned essential parameters in CONWIP controlled manufacturing system. Some related issues such as bottleneck production smoothness and line production smoothness are also discussed.

3) Service Level Relationships in Multi-Stage Production Systems under Base Stock Policy, ***Subrata Mitra***, Indian Institute of Management, Fellow Programme Office, PO 16757, Alipore PO, Calcutta West Bengal, 700 027, India, subratamitra@hotmail.com, ***Ashis K. Chatterjee***

In integrated production-distribution systems, the customer service level is a function of service levels at different stages. We address the problem of determining the stage-specific service levels to achieve a desired customer service level in multi-stage production systems under base stock policy. Both optimal and heuristic procedures have been considered.

4) A Production Planning Problem in the Tire Industry, ***Raf Jans***, Katholieke Universiteit Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, 3000, Belgium, raf.jans@econ.kuleuven.ac.be, ***Zeger Degraeve***

We present an industrial production planning problem with start up times at a tire manufacturer. We solve problems with up to 30 products and 30 periods by a column generation scheme. The master is solved using Lagrange relaxation. We further discuss the impact of our planning program.

SB34 Decision Analysis II

Contributed Session

Chair: Robert F. Nau, Duke University, Fuqua Sch. of Bus., Durham, NC 27514, robert.nau@duke.edu, www.duke.edu/~rnau

1) withdrawn - author request of 10/9, ***Wenlong Weng***, Stanford University, 108G Escondido Village, Stanford, CA 94305, wxweng@leland.stanford.edu, ***John P. Weyant***

2) Roulette Revisited: Martingales, Risk Attitudes & Rationality, ***John A. Aloysius***, University of Arkansas, CISQA Dept., BADM 204, Fayetteville, AR 72701, aloysius@comp.uark.edu, www.uark.edu/depts/cisqinfo/jaa_dept.html

By considering risk preferences, I rationalize the demonstrated irrationality of playing the well known martingale strategy in the game of roulette. It characterizes necessary and sufficient conditions under which a utility maximizing decision maker would play the martingale. These conditions suggest that many such utility maximizing gamblers may choose to play the strategy...

3) A Generalization of Pratt-Arrow Measures to Non-Expected-Utility Preferences, ***Robert F. Nau***, Duke University, Fuqua Sch. of Bus., Durham, NC 27514, robert.nau@duke.edu, www.duke.edu/~rnau

A generalized measure of local risk aversion is developed for choices under uncertainty with non-expected-utility preferences, inseparable subjective probabilities and utilities and unobserved stochastic prior wealth. As illustrations, the Ellsberg & Allais paradoxes are explained using a model of "partitionable" utility that exhibits local uncertainty aversion everywhere, unlike Choquet expected utility.

SB35 Forecasting II

Contributed Session

Chair: Kwang-Soo Lee, Indiana State University, Analytic Dept., Terre Haute, IN 47809, sdkwang@befac.indstate.edu

1) withdrawn - chair request of 9/18, ***Yuhwan Kim***, Korea

University, Sung-Buk Ku, Anam Dong 5-1, Seoul, 136-701, Korea, yuhwan@mail.korea.ac.kr, http://163.152.18.115, ***Youngho Lee***, ***Youngjin Kim***

2) Forecasting for Dual Technology Diffusion, ***So Young Sohn***, Yonsei University, Dept. of ISE, Shinchondong 134, Seoul, Korea, sohns@yonsei.ac.kr, http://isl.yonsei.ac.kr

Many areas of technological development are characterized by distinct generations of technology, where the new generation is more efficient than its predecessor. We consider the case where the new generation is the form of a merged product of dual functions of existing technology. Examples include VOD which combines the function of cable TV and Internet service...

3) Bayesian Analysis of a Discrete Time Poisson Model with Applications to Call Volume Data, ***Refik Soyer***, George Washington University, Monroe Hall 403, MS Dept., 2115 G St. NW, Washington, DC 20052, soyer@gwu.edu, ***Murat Tarimcilar***

We consider a discrete time series model based on Poisson counts where the intensity function includes seasonal as well as covariate effects. Our model can be considered as a discrete version of the modulated Poisson models of Cox (1972). We develop Bayesian analysis for the model using Markov chain Monte Carlo methods and apply it to some real life call volume data.

4) Moving Regression, ***Kwang-Soo Lee***, Indiana State University, Analytic Dept., Terre Haute, IN 47809, sdkwang@befac.indstate.edu, ***Steven W. Lamb***

In parallel with the moving average, a moving regression model is tested. This model generates the centered moving average as an interpolation and provides multi-period forecasts as extrapolations. Using the quarterly consumer credit outstanding data, accuracy of the model fitting and forecast is investigated as compared to the moving average.

SB36 Inventory Management II

Contributed Session

Chair: Margaret K. Schaefer, College of William & Mary, 125 Jones Hall, Dept. of Math, Williamsburg, VA 23187-7895, mkscha@math.wm.edu

1) An Inventory Model with Two Vendors & Random Yield, ***Asli Erdem***, Bogazici University, Hisar Campus, Dept. of MIS, Istanbul, Bebek, 80815, Turkey, erdemas@boun.edu.tr, http://www.mis.boun., ***Suleyman Ozekici***

We consider a single item inventory system with 2 vendors in single period. Yields are random, due to random capacity at vendor. A model is proposed to find the optimal order quantity for each vendor that will minimize the total expected costs of purchasing, inventory holding and shortage.

2) Exact Evaluation of Service Performance for a Periodic Review, Two-Echelon Inventory System, ***Zhihao Song***, National University of Singapore, Sch. of Computing, Lower Kent Ridge Rd., Singapore, 119260, Singapore, songzhih@comp.nus.edu.sg, ***Youyi Feng***

We consider analyzing service performance for a stochastic, periodic review, 2-echelon inventory system. The system consists of a supplier and a group of downstream retailers who independently replenish their inventory according to respective periodic review, lot-size reorder point policies. The supplier orders from an exogenous source and supplies the retailers which in turn meets customers...

3) Order Coordination in a Two-Echelon Distribution System with Random Demand at Retailers, ***Joong Y. Son***, University of Washington, MS Dept., Box 353200, Seattle, WA 98195, sonjy@u.washington.edu, ***Ted D. Klastorin***, ***Kamran Moinzadeh***

We analyze an order coordination scheme in a 2-echelon decentralized supply chain with random demands at retailers where coordination is achieved through a pricing and order timing mechanism. We propose an extended (R,T) policy for the retailers and demonstrate the effectiveness of the coordination policies throughout the supply chain.

4) The Multi-Location Inventory Centralization Problem with First-Come, First-Served Allocation, ***Amit Eynan***, Washington University, 1 Brookings Dr., CB 1133, St. Louis, MO 63130, eynan@olin.wustl.edu

Each location may be characterized by a unique selling price and unique consequences of stockouts, reflecting its market economic structure. Although inventory allocation (and revenue) is contingent upon customers arrival processes generated in various locations, a single location equivalent can be used. The impact on profit and service level is presented.

5) Video Inventory Systems: The Blockbuster Scenario, ***Margaret K. Schaefer***, College of William & Mary, 125 Jones Hall, Dept. of Math, Williamsburg, VA 23187-7895, mkscha@math.wm.edu, ***Keith E. Laba***

Recently, Blockbuster Videos has entered into agreements with major movie studios, under which Blockbuster purchases videos at deeply discounted prices in return for rebating part of their rental revenues. Thus Blockbuster purchases many copies of new releases and reduces stockout probabilities. We modify our video inventory model for the Blockbuster scenario.

SB37 Optimization Techniques II

Contributed Session

Chair: Renyou Wang, Carnegie Mellon University, Porter Hall, Dept. of EPP, 5000 Forbes Ave., Pittsburgh, PA 15213, renyou@andrew.cmu.edu

1) An Integrated Approach for Railway Crew Planning, ***Paolo Toth***, University of Bologna, DEIS, Viale Risorgimento 2, Bologna, 40136, Italy, ptoth@deis.unibo.it, ***Alberto Caprara***, ***Michele Monaci***

Given a set of daily train services, find a min-cost set of crew rosters covering them. Generally the problem is solved through 3 phases: pairing generation, pairing optimization and rostering optimization. We describe an effective technique integrating pairing and rostering optimizations. Computational results on real-world Italian Railways instances are presented.

2) Optimization with Neural Networks Trained by Genetic Algorithms, ***Marta I. Velazco Fontova***, UNICAMP, Sch. Elect. Eng. /Comp. Sci., Av. A. Einstein 400, CxP 6101, Campinas SP, 13083-970, Brazil, velazco@densis.fee.unicamp.br, ***Christiano Lyra***

Multi-layer neural networks are trained to approach optimization problems. GAs are adopted to "evolve" weights, unveiling new points in the definition domain. As evolution goes on, better points are found, driving the process to optimality. Case studies compare the new method with other neural network approaches to optimization.

3) On the Convergence of the Weiszfeld Algorithm, ***Halit Uster***, Texas A&M University, Dept. of Info. & Op. Mgmt., MS 4217, College Station, TX 77843-4217, uster@tamu.edu, ***Robert F. Love***

We investigate the convergence properties of the Weiszfeld procedure when it is applied to the approximated Lp-norm single-facility location problem where $p > 2$. We show that convergence for $p > 2$ can be obtained by introducing a step size factor to the iterative procedure. Some numerical test results are also given.

4) Latin Hypercube Hammersley Sequence Sampling: A New & Efficient Sampling Technique for Optimization under Uncertainty, ***Renyou Wang***, Carnegie Mellon University, Porter Hall, Dept. of EPP, 5000 Forbes Ave., Pittsburgh, PA 15213, renyou@andrew.cmu.edu, ***Urmila Diwekar***

We will present a new and efficient sampling technique, the Latin Hypercube-Hammersley sequence sampling technique, by coupling Latin hypercube sampling and Hammersley sequence sampling techniques. The distribution-free approach to inducing correlation of uncertainties will also be presented. This sampling technique will be a great help for optimization under uncertainties.

SB38 NLP II

Contributed Session

Chair: Michael M. Kostreva, Clemson University, Dept. of Math. Sci., Clemson, SC 29634, flstgla@clemson.edu, www.math.clemson.edu/faculty/Kostreva/mfd.html

1) Nonlinear Optimization without Derivatives, ***Marcelo Marazzi***, Northwestern University, IEMS Dept., 2145 Sheridan Rd., Evanston, IL 60208-3119, marazzi@iems.northwestern.edu, www.ece.northwestern.edu/~marazzi, ***Jorge Nocedal***

We are interested in the problem of minimizing an objective function of several variables whose derivatives are unavailable. Instances of this problem occur in engineering, and typically the number of variables is moderate and the objective is very expensive to compute. We present a numerical algorithm for solving this problem.

2) Cutting Plane Techniques for Mixed 0-1 Semidefinite Programs, ***Mehmet Tolga Cezik***, Columbia University, Mudd Bldg., Rm. 318, 500 West 120th St., New York, NY 10027, cezik@ieor.columbia.edu, ***Garud Iyengar***

We present cutting plane methods for mixed 0-1 semidefinite programs. These methods are extensions of the Chvatal-Gomory cutting planes and lift-and-project cutting planes developed in the context of mixed 0-1 linear programming. We show that several of the important properties of these cutting plane methods, i.e., rank of cuts, cut-lifting, cut-strengthening etc., extend to this more general setting...

3) Exact Solution of the Subproblem in the Cutting Angle Method for Optimization of Abstract Convex Functions, ***Djangir Babayev***, Qwest Advanced Technologies, 4001 Discovery Dr., Boulder, CO 80303, dbabayev@advtech.uswest.com

The cutting angle method for optimization of some classes of abstract convex functions is a version of the bundle method or can be considered as an extension of the cutting plane method of convex optimization. It is an iterative method. At each iteration, a nonconvex optimization subproblem is solved. Computational complexity of the method is essentially defined by the complexity of this subproblem...

4) A Probabilistic Method of Feasible Directions, ***Michael M. Kostreva***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634, flstgla@clemson.edu, www.math.clemson.edu/faculty/Kostreva/mfd.html, ***Artur J. Gorka***

A probabilistic version of the MFD for solving NLP problems with inequality constraints is presented. Randomization is applied to modify the multiple direction MFD algorithm. Some numerical experiments on problems with known solutions serve to compare this method with the traditional deterministic versions of MFD.

SB39 Marketing II

Contributed Session

Chair: Imran S. Currim, University of California, Grad. Sch. of Mgmt., Irvine, CA 92697-3125, iscurrim@uci.edu

1) withdrawn - author request of 10/16, ***Archan Misra***, Telcordia Technologies, 445 South St., Rm. 1G-234B, Morristown, NJ 07960, archan@research.telcordia.com, ***Reetika Gupta***

2) A Study for an Allocation of Sales Promotion Costs, ***Tabata Tomoaki***, Waseda University, Sch. of Science & Eng., 3-4-1 Okubo, Shinjuku, Tokyo, 169-8555, Japan, tabata@mgmt.waseda.ac.jp, ***Namatame Takashi, Takahiro Ohno***

It is an important subject for a retail store to get and maintain profitable prime customers. Therefore, promotions for customers need to be differentiated in terms of contribution rate to retail store. We propose the optimal promotion allocations that maximize the long-term profit of retail store by analyzing ID-POS data.

3) Noisy Equilibrium & Neologism-Proofness in Experimental Signaling Games, ***Amy Kallianpur***, Michigan State University, Dept. of Mktg., Broad Grad. Sch. of Mgmt., East Lansing, MI 48824, amy.kallianpur.wp99@wharton.upenn.edu

The vexing problem of multiplicity of equilibria in cheap-talk games has spurred research on refinements and equilibrium selection remains an as yet unresolved theoretical issue. We test neologism-proofness, a refinement of perfect Bayesian equilibrium in experimental sender-receiver games with costless messages.

4) Segment Retention in Finite Mixture Models, ***Imran S. Currim***, University of California, Grad. Sch. of Mgmt., Irvine, CA 92697-3125, iscurrim@uci.edu, ***Rick L. Andrews***

We determine how well commonly used criteria such as AIC, BIC and CAIC retain the correct number of latent segments in the context of finite mixture logit models applied to scanner panel data. We also assess parameter bias, customer assignment and predictive accuracy.

SB40 Reliability

Contributed Session

Chair: Jorge Valenzuela, Auburn University, 211Dunstan Hall, Auburn, AL 36849, jvalenz@eng.auburn.edu, www.eng.auburn.edu/~jvalenz

1) A Tabu Search Application to the Redundancy Allocation Problem, ***Sadan Kulturel-Konak***, Auburn University, Dept. of ISE, 207 Dunstan Hall, Auburn, AL 36849, sadan@eng.auburn.edu, ***Alice E. Smith, David W. Coit***

A tabu search method is introduced to effectively solve the redundancy allocation problem. An adaptive penalty approach that exploits the short term memory structure of the tabu list along with the long term memory of the search results is used and is shown to be effective on a well-known test problem from the literature.

2) Threshold Graphs & the Reliability Polynomial, ***Manoj K. Chari***, Louisiana State University, Dept. of Math., Baton Rouge, LA 70803, chari@math.lsu.edu

We discuss a new graph theoretic interpretation of the coefficients of the connectedness reliability polynomial of undirected graphs. We apply this to the class of threshold graphs this gives some partial results on a conjecture of Boesch et.al on the existence of uniformly least reliable graphs.

3) Maximum Reliability at Minimum Cost, ***Richard M. Soland***, George Washington University, Dept. of EMSE, School of Eng., Washington, DC 20052, soland@seas.gwu.edu

We treat the problem of making choices for the various subsystems of a given system in order to achieve high system reliability at low total cost. Preliminary results are presented for the case of a system consisting of indpendently failing subsystems in series.

4) The Effect of Power Generation Reliability on the Spot Price of Electricity, ***Jorge Valenzuela***, Auburn University, 211Dunstan Hall, Auburn, AL 36849, jvalenz@eng.auburn.edu, www.eng.auburn.edu/~jvalenz

The electricity market is undergoing deregulation. Short- and long-term economic decisions will be based on the spot price of electricity. We present results of a Monte Carlo simulation used to study the effect of generating unit availabilities on the price at which electricity is traded.

SB41 Forecasting Accounting Numbers

Sponsor: **Accounting, Auditing & Tax Section**
Sponsored Session

Chair: Shiva K. Sivaramakrishnan, Texas A&M University, Dept. of Acct., Grad. Sch. of Bus., College Station, TX 77843-4353, shiva@cgsb.tamu.edu

1) Are Selling, General & Administrative Costs Sticky?, ***Mark C. Anderson***, University of Texas, Sch. of Mgmt., PO Box 830688, MS J043, Richardson, TX 75083-0688, andersmc@utdallas.edu, ***Rajiv Banker, Surya Janakiraman***

Costs are commonly assumed to vary symmetrically with changes in activity. We develop and test a hypothesis that costs are sticky - increase more with increases in activity than they decrease with decreases in activity. We document that SG&A costs exhibit sticky cost behavior.

2) Service Capacity Decision & Incentive Compatible Cost Allocation for Reporting Usage Forecasts, ***Suresh Radhakrishnan***, University of Texas at Dallas, Sch. of Mgmt., MS JO43, Richardson, TX 75083-0688, sradhakr@utdallas.edu, ***Kashi R. Balachandran***

We consider an M/G/1 queue with multiple users. Service capacity can be improved at a cost by reducing the mean and variance of service time. The expected usage is private information of each user. We develop a simple cost allocation scheme that induces truthful reports of expected usage forecasts, maximizes the expected net benefit of each user...

3) Valuation Implications of Meeting or Beating Analysts' Earnings Forecasts, ***Gia Chevis***, Texas A&M University, Dept. of Acct., College Station, TX 77843-4353, gchevis@cgsb.tamu.edu, ***Somnath Das, Shiva K. Sivaramakrishnan***

Casual evidence suggests that many firms seem to be attaching importance to meeting or beating analysts' earnings expectations consistently. We use Ohlson's framework to examine whether the capital market values such firms differently. Results indicate that valuations of these firms are significantly higher relative to firms not adopting this strategy even after controlling for size, financial risk, etc...

SB42 Dantzig Dissertation Award Finalist Presentations

Invited Session

Chair: Zelda B. Zabinsky, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195-2650, zelda@u.washington.edu

1) Strategic Planning under Uncertainty: Stochastic Integer Programming Approaches, ***Shabbir Ahmed***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, s-ahmed1@uiuc.edu

No abstract supplied.

2) A Threshhold Inventory Rationing Policy for Service Differentiated Demand Classes, ***Vinayak V. Deshpande***, Purdue University, 562 Krannert Bldg., West Lafayette, IN 47907, deshpandev@mgmt.purdue.edu

No abstract supplied.

3) Operational & Incentive Issues in Health Care Systems, ***Prashant Fuloria***, Stanford University, 1555 West Middlefield Rd., #73, Mountain View, CA 94043, prashant_fuloria@stanfordalumni.org

No abstract supplied.

4) Channel Policies & Supply Chain Coordination, ***Terry A.***

Taylor, Stanford University, Dept. of MS & Eng., Stanford, CA 94305, terry.taylor@stanford.edu

No abstract supplied.

5) Solution of Large-Scale Allocation Problems with Partially Observable Outcomes, *Kirk Yost*, Naval Postgraduate School, Code OR/WS, Monterey, CA 93943, kirk.yost@js.pentagon.mil

No abstract supplied.

SB43 Risk Management II

Contributed Session

Chair: Lyn C. Thomas, University of Southampton, Mgmt. School, Highfield, Southampton, Hants, SO17 1BJ, UK, l.thomas@ed.ac.uk

1) withdrawn - author request of 9/15, *Yesim Tokat*, University of California at Santa Barbara, 795 Juniper Walk #D, Goleta, CA 93117, yesim@econ.ucsb.edu, ***Svetozar T. Rachev***, ***Eduardo Schwartz***

2) A Comparison of Credit Scoring Model Building Techniques, *Claudia C. Barcenas*, Monterrey Tech., Av. Eugenio Garza Sada S/N, Leon, Gto, 37320, Mexico, cbarcena@campus.leo.itesm.mx

We analyze the effects of continuous vs. discrete variables and the use of several statistical techniques for credit scoring models. A comparison of these models predictive power is also presented.

3) Resetting of Segregated Fund Maturity Guarantees, *Michael J. Armstrong*, Royal Military College, Dept. of Bus. Admin., Box 17000 Station Forces, Kingston, Ontario, K7K 7B4, Canada, armstrong-m@rmc.ca, www.rmc.ca/academic/busadm/staff/homearme.htm

We model the reset decision for the maturity guarantee of a segregated fund using a discrete time Markov chain. We characterize the optimal value for the minimum return threshold and show that the simple strategy of resetting whenever the fund's value has increased is sub-optimal but can perform well.

4) PHab Scoring: Survival Analysis for Personal Loans, *Lyn C. Thomas*, University of Southampton, Mgmt. School, Highfield, Southampton, Hants, SO17 1BJ, UK, l.thomas@ed.ac.uk, ***Maria Stepanova***

Credit scoring has proved very successful in managing the default risk in consumer lending by assessing who is likely to default. To move to profit scoring, one needs to estimate when someone will default. Survival analysis is an ideal way of modeling this. We discuss how proportional hazards models are modified to develop proportional hazards applications to behavioral scores and proportional hazard applications to credit scores.

SB46 COIN Installfest for Linux: A Hands-On Workshop using Open Source Software for OR

Chair: Laszlo Ladanyi, IBM Research, TJ Watson Research Ctr., PO Box 218, Rte. 134, Yorktown Heights, NY 10598, ladanyi@us.ibm.com

1) Installation & Use of Common Optimization INterface (COIN): Linux, *Laszlo Ladanyi*, IBM Research, TJ Watson Research Ctr., PO Box 218, Rte. 134, Yorktown Heights, NY 10598, ladanyi@us.ibm.com, ***J. P. Fasano***, ***Robin Lougee-Heimer***, ***Matthew J. Saltzman***

COIN is an initiative to promote open source software for OR. Bring your Linux laptop and network card to participate in this hands-on workshop using open source components in the COIN repository. No Linux-laptop? Come observe and learn more about COIN. Visit http://oss.software.ibm.com/developerworks/opensource/coin for details and prerequisites.

Sunday 13:15-14:45

SC01 Medical Decision Making

Sponsor: Decision Analysis Society

Sponsored Session

Chair: Scott B. Cantor, University of Texas M. D. Anderson Cancer Center, 1515 Holcombe Blvd., Box 40, Houston, TX 77030-4095, sbcantor@mdanderson.org

1) Impact of Patient & Provider Preferences on the Cost-Effectiveness of Therapy for Recurrent Rectal Carcinomas, *Alexander R. Miller*, University of Texas Health Science Center, Dept. of Surgery, 7703 Floyd Curl Dr., San Antonio, TX 78289, millerar@uthscsa.edu, ***Scott B. Cantor***, ***George E. Peoples***, ***David B. Pearlstone***, ***John M. Skibber***

We performed a cost-effectiveness analysis of therapeutic options for patients with locally recurrent rectal carcinoma. We created a decision-analytic model that incorporated outcomes of survival, quality of life and costs. Utilities were elicited from convenience samples of 24 health care providers and 24 patients using the standard gamble technique.

2) Time-Tradeoff Utility Assessment with Equal Horizons: Would You Prefer "Good then Bad" or "Moderate"?, *Robert M. Hamm*, University of Oklahoma Health Sciences Center, Family & Preventive Med. Dept., 900 NE 10th St., Oklahoma City, OK 73104, robert-hamm@ouhsc.edu

I propose a variation of the time trade-off method for utility assessment. Patients are asked to choose between a moderately unhappy life or a life of the same length that is first happy, then unhappy. Adjustments for temporal discounting can be made. Data from 50 patients will be presented.

3) Decision Making for the Treatment of Early Stage Prostate Cancer, *Brian J. Miles*, Baylor College of Medicine, Scott Dept. of Urology, 1 Baylor Plaza, Houston, TX 77030, bmiles@bcm.tmc.edu

Predictive modeling is commonly used in business decisions, occasionally in clinical research and rarely in the clinic. The use of modeling is highly sensitive to probabilities, utilities and assumptions, often supporting contradictory positions. Nonetheless, decision analysis for treatment of early stage prostate cancer could be promising for selective patients.

4) Prostate Cancer Screening Recommendations based on Couple's Utilities, *Scott B. Cantor*, University of Texas M. D. Anderson Cancer Center, 1515 Holcombe Blvd., Box 40, Houston, TX 77030-4095, sbcantor@mdanderson.org, ***Robert J. Volk***, ***Murray D. Krahn***, ***Alvah R. Cass***, ***Stephen J. Spann***

We incorporated patient ages and husbands', wive's and couples' utilities into a decision-analytic model of prostate cancer screening. Subjects were 168 couples from 3 family pracice centers. Screening was recommended for 48 husbands, 89 wives and 58 couples. The recommendations showed greatest concordance for men's and couple's utilities.

SC02 Decision Analysis Arcade

Sponsor: Decision Analysis Society

Sponsored Session

Chair: Dana R. Clyman, University of Virginia, Darden Grad Sch. of Bus. Adm., PO Box 6550, Charlottesville, VA 22906-6550, clymand@darden.virginia.edu

1) Recent Decision Analysis Applications in Operations Research Literature, *Donald L. Keefer*, Arizona State University, Dept. of Supply Chain Mgmt., Tempe, AZ 85287-4706, don.keefer@asu.edu, ***Craig W. Kirkwood***, ***James L. Corner***

We survey applications of decision analysis that appeared in major English language OR journals and other closely related journals from 1990 through 1999. This is an update to the earlier survey of decision analysis applications from 1970 through 1989 by Corner & Kirkwood.

2) What's Cooking at the Lab?: Resource Allocation Decisions in Basic Science, *David Reiter*, Stanford University, Dept. of MS/Eng., Sch. of Eng., Terman Eng. Ctr. 324, Stanford, CA 94305-4023

The federal government will spend over $20 billion on basic science research in 2001. These resources are typically allocated via informal processes that allow emotion, politics and personal biases to play large roles. A decision analytic approach adds structure, insight and clarity to the process.

3) A Measure of Relevance, *Roberto Ley-Borras*, Instituto Tecnologico de Orizaba, Oriente 13 A No. 1122, Entre Norte 28 y 28 A, Orizaba, Veracruz, 94380, Mexico, ley@stanfordalumni.org

We introduce a single real number measure of relevance (probabilistic dependence) between discrete uncertain variables. The measure is easy to compute, is consistent with our intuitive assessment of relevance, can enhance the representation of relevance in influence diagrams and can improve communication between participants in the decision process.

4) (Most) Disagreements among Experts are Illusory, *Itzhak Ravid*, Stanford University/CEMA Israel, CISAC, Ancina Hall C-240, Stanford, CA 94305-6165, iravid@leland.stanford.edu, iravid@netvision.net.il

What seems to be a disagreement among experts about the state of the world is often just a result of vague language, reference to different questions or partial information. A more interesting source of apparent disagreement is a common

methodological failure with regard to the role of experts in the evaluation of uncertain situations.

SC03 Supply Contracts & Information

Sponsor: MSOM
Sponsored Session
Chair: Alexander O. Brown, Vanderbilt University, Owen Grad. Sch. of Mgmt., 401 21st Ave. South, Nashville, TN 37203, alex.brown@owen.vanderbilt.edu

1) Channel Conflict & Supply Chain Coordination, ***Andy A. Tsay***, Santa Clara University, Leavey Sch. of Bus., Dept. of OMIS, Santa Clara, CA 95053-0382, atsay@scu.edu, ***Narendra Agrawal***

Recent developments in Internet-based commerce have led many companies to consider direct sales. Such a company may at once be both a supplier to and a direct competitor of existing reseller partners, resulting in "channel conflict". We model key attributes of this setting, and examine ways to improve channel relationships.

2) A Bayesian Inventory Problem with Price-Dependent Demand & Lost Sales, ***Martin A. Lariviere***, Duke University, Fuqua Sch. of Business, Box 90120, Durham, NC 27705, larivier@mail.duke.edu

Consider a setting with stochastic, price-dependent demand and lost sales. Some parameter of the distribution is unknown, and beliefs about the parameter are updated in a Bayesian fashion. Pricing and stocking decisions consequently affect both profits and learning. We examine how decisions are adjusted to gather information.

3) Theory & Practice of Shared Savings Contracts in Supply Chains, ***Gregory A. DeCroix***, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27705, ***Charles J. Corbett***

In a "shared savings" contract, supplier and customer are both given incentives to reduce consumption of the material involved. Such shared savings contracts are becoming increasingly common in some sectors, notably (but not exclusively) in chemical management services for the automotive industry. In this paper we provide an overview of current state of the art of the practice of such contracts and their effects, and show how these effects can be modeled.

4) Pricing Supply Flexibility, ***Alexander O. Brown***, Vanderbilt University, Owen Grad. Sch. of Mgmt., 401 21st Ave. South, Nashville, TN 37203, alex.brown@owen.vanderbilt.edu

We consider a model of a manufacturer and a supplier of a long lead time, expensive product. The supplier currently offers its product at a single price with 0 supply flexibility. We consider how the supplier should price additional supply flexibility when the manufacturer has private information about demand.

SC04 Inventory Policies with Demand Curves

Sponsor: MSOM
Sponsored Session
Chair: Apostolos N. Burnetas, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, atb4@po.cwru.edu

1) Newsvendor Policies for Demand-Stimulating Inventories, ***Euthemia Stavrulaki***, Pennsylvania State University, 303 Beam Bldg., MSIS Dept., Smeal Coll. of Bus., University Park, PA 16802-1913, exs37@psu.edu, ***Anantaram Balakrishnan***, ***Michael Pangburn***

For certain products (e.g., fashion goods), larger inventories stimulate greater retail demand. We model the influence of stocking levels on demand distribution, and show that the profit-maximizing quantity, obtained using a modified critical fractile relationship, exceeds the equilibrium quantity ordered by a newsvendor who does not explicitly recognize demand stimulation.

2) Global Production Planning under Exchange-Rate Uncertainty & Price Sensitivity, ***Burak Kazaz***, Loyola University, IS & Op. Mgmt. Dept., 25 East Pearson, Ste. 1400, Chicago, IL 60611, bkazaz@luc.edu

We study a multinational company producing both at home and abroad. The firm dynamically adjusts the prices for its products as the exchange rates fluctuate - this alters the demand for its products as well. We provide all the potentially optimal production policies and the conditions that lead to them.

3) Pricing Policies to Influence the Ordering Decisions of Downstream Retailers, ***Viswanath Cvsa***, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106, vxc10@po.cwru.edu

We analyze the flexibility in pricing for a monopolist manufacturer who approaches the market through a network of competing retailers. We identify policies that permit the manufacturer to influence the timing of the retailers' orders. We also examine the consequences of these policies for the performance of the supply chain.

4) Option Contracts in Supply Chains, ***Peter Ritchken***, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106, phr@po.cwru.edu, ***Apostolos N. Burnetas***

We investigate the pricing of option contracts when the demand curve is downward sloping. A manufacturer offers the retailer reorder and/or return options. We examine the consequences of these contracts on the wholesale price and the volatility of the retail price and their impact on both agents' profits.

SC05 Analysis & Control of Queueing Systems

Sponsor: Applied Probability Society
Sponsored Session
Chair: Hayriye Ayhan, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, hayhan@isye.gatech.edu

1) A Diffusion Approximation for Queues with Reneging, ***Amy L. Ward***, Stanford University, Dept. of MS & Eng., Terman Engineering Ctr., Stanford, CA 94305-4026, award@leland.stanford.edu, ***Peter W. Glynn***

We develop a diffusion approximation for a queueing system that includes job deadlines. We propose a nonstandard approximation: an Ornstein-Uhlenbeck process with additional downwards drift and reflection at the origin. We further provide explicit formulas for estimating important system performance measures and compare these estimations with exact results.

2) Increasing Flexibility, ***Mark E. Lewis***, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, melewis@engin.umich.edu

Consider a controlled M/M/1/K system where customers may be subject to 2 assessments. The first occurs upon arrival and the second, which occurs with some probability p, occurs when the customer reaches the front of the queue. The initial decision-maker has limited knowledge of the customer's work requirements.

3) Exact Asymptotics for Rare Events in a Queueing System with Multiple Customer Types, ***Jerome D. Coombs-Reyes***, Georgia Institute of Technology, School of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, jerome@isye.gatech.edu, ***Robert D. Foley***

Consider 2 queues and 4 customer types. Two are dedicated, the third joins the shorter queue and the fourth, the queue with the shorter expected waiting time. We obtain exact asymptotic expressions for the stationary probability of and the expected time until some large level of customers.

4) Laplace Transform & Moments of Waiting Times in Poisson Driven (max, +)-Linear Systems, ***Hayriye Ayhan***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, hayhan@isye.gatech.edu, ***Dong-Won Seo***

(Max,+) linear systems can be used to model a class of queueing networks. We provide explicit expressions for the moments and the Laplace transform of transient waiting times in Poisson driven (max,+) linear systems. Furthermore, starting with these closed form expressions, we also derive explicit expressions for the moments and the Laplace transform of stationary waiting times...

SC06 Enhancing Travel Forecasting Models

Sponsor: Transportation Science Section
Sponsored Session
Chair: Hani S. Mahmassani, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712-1076, masmah@mail.utexas.edu

1) A Planning Model for Urban Intermodal Transportation Networks, ***Khaled F. Abdelghany***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712, kfaissal@mail.utexas.edu, ***Hani S. Mahmassani***

We present a planning and operation decision tool for urban intermodal transportation networks. The modeling framework includes multi-objective dynamic traffic assignment with discrete stochastic route-mode choice capabilities. Various modeling issues together with a set of experiments that illustrate the functionality of the model are presented.

2) Household Level Commute Travel Mode Choice & Allocation of Activity Stops, ***Chandra Bhat***, University of Texas, Dept. of Civil Eng., ECJ 6.810, Austin, TX 78712, bhat@mail.utexas.edu, ***Kerry McConnell***

Effects of allocation of activity stops within a household on travel mode choice

for the work commute is investigated using the 1996 Bay Area Travel Survey. Past research on commute stops has focused on individual mode choice, not on joint decisions of travel mode choice and activity stop-making at the household level.

3) A Simplicial Decomposition Method for the Dynamic Network Equilibrium Problem, ***Jose M. Rubio-Ardanaz***, University of Montreal, CRT, CP 6128, Succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, jose@crt.umontreal.ca, ***Jia Hao Wu***, ***Michael A. Florian***

In our iterative method for solving the analytical dynamic network equilibrium problem, at each iteration, we solve the dynamic network equilibrium problem over a simplicial space and then find the time-dependent shortest route in order to increase the simplicial space. The FIFO condition is needed and we show that it is satisfied in our model. Numerical results are given.

4) Enhancements of the Gradient Projection Algorithm for the Traffic Assignment Problem, ***Der-Horng Lee***, Naational University of Singapore, Dept. of Civil Eng., Singapore, 117576, Singapore, dhl@nus.edu.sg, ***Yu Nie***, ***Anthony Chen***

We computationally show the weakness of the GP algorithm with regard to its accuracy and stability. Possible improving strategies such as step size optimization, application of conjugate gradient and cyclic flow update are considered to enhance the performance of GP. Numerical results are reported.

SC07 Helping Handicapped Students Overcome the Unique Challenges they Face in OR/MS Courses

Sponsor: INFORM-ED
Sponsored Session
Chair: James J. Cochran, Louisiana Tech. University, Dept. of Comp. IS & Anlysis, Coll. of Admin. & Bus., Ruston, LA 71272, cochran@cab.latech.edu

1) Academic Support Services for the Disabled at Wright State University, ***George G. Polak***, Wright State University, MSIS Dept., 271 Rike Hall, Dayton, OH 45435, george.polak@wright.edu

Extending educational opportunities to people with disabilities has been a high priority at Wright State University since its 1967 founding. We discuss the mission of Academic Support Services, especially the Technology Center, which provides classroom materials in alternative formats that include audio cassette tapes, computer disks, braille and image enhancement.

2) Teaching OR/MS to Visually Impaired Students, ***Ana I. Aviles***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., MEAS C210, Evanston, IL 60208, ivelisse@iens.nwu.edu

The challenges that professors face when teaching a technical subject to a blind or low vision student are incredible. This presentation involves methods of teaching OR/MS to visually impaired students, the attitudes about the potential of people with disabilities, some legal aspects and funding opportunities.

SC08 Financial Management II

Contributed Session
Chair: Ngome Ntoko, SUNY, Sch. of Bus., Oswego, NY 13126, ntoko@oswego.edu

1) Do Stocks Perform Better in the Second Half of a US Presidential Administration?, ***Donald N. Stengel***, California State University, 5245 North Backer Ave., MS PB07, Fresno, CA 93740-8001, don_stengel@csufresno.edu

An article in the AAII journal observed that the average annual return for the S&P 500 in the third and fourth year of an administration exceeded the average return in the first 2 years, based on 1946-1998 data. We apply standard hypothesis tests to these data, with surprising results.

2) Pricing Treasury Inflation Protected Securities & Related Derivatives using an HJM Model, ***Yildiray Yildirim***, Cornell University, Dept. of Statistical Sci., 116 Malott Hall, Ithaca, NY 14853, yy39@cornell.edu, http://www.people.cornell.edu/pages/yy39, ***Robert A. Jarrow***

We use an HJM model to price TIPS and related derivative securities. This is a 4-step process. First, using the market prices of TIPS and ordinary US Treasury securities, both the TIPS and nominal 0-coupon bond price curves are obtained using standard coupon-bond price stripping procedures. Real 0-coupon bond price curves are then computed from the TIPS 0-coupon bond prices...

3) Selection of Stocks using Value Criteria: Can Neural Network Models Yield Superior Risk Adjusted Returns?, ***Stanley R. Stansell***, East Carolina University, Sch. of Business, Greenville, NC 27858, stansells@mail.ecu.edu, ***Stanley Eakins***

We seek to determine whether superior risk adjusted investment returns can be obtained using neural network forecasting models. We cover a 20-year period. The results indicate that, using commonly accepted measures of value, the selected stock portfolios yield risk adjusted returns superior to the DJIA, the SP500 and a group of randomly selected stocks.

4) Optimal Execution of Block Trading using Stochastic Programming, ***Mehrdad Tamiz***, University of Portsmouth, Sch. of Comp. Sci. & Math., Mercantile House, Portsmouth, PO1 2EG, UK, mehrdad.tamiz@port.ac.uk

We consider the execution of a large number of shares in a finite time horizon where transactions can impact share prices both permanently and temporarily. Optimal trading strategies are considered in the context of expected execution costs and the variability of the expected cost. Trading requires a compromise between expected cost and the associated risk...

5) A Dynamic Pricing Model of Optimal Pricing & Investment with Market & Finance Constraints, ***Ngome Ntoko***, SUNY, Sch. of Bus., Oswego, NY 13126, ntoko@oswego.edu, ***Ding Zhang***, ***June Dong***

We investigate dynamic pricing by a firm that needs to price competitively to secure market share as well as high enough to generate profits required for future cost-reducing investment. A model is developed that reconciles these seemingly contradictory strategies while maximizing the long-run dividends to shareholders.

SC09 Pricing & Revenue Management

Sponsor: Revenue Management Section/Aviation Applications Section
Sponsored Session
Chair: Georgia Perakis, MIT, Sloan Sch. of Bus., OR Ctr., 50 Memorial Dr., Rm. E53-359, Cambridge, MA 02139, georgiap@mit.edu

1) Single-Leg Yield Management under a Discrete Choice Model of Demand, ***Garrett J. van Ryzin***, Columbia University, 412 Uris Hall, Grad. School of Bus., New York, NY 10027, gjv1@columbia.edu, ***Kalyan Talluri***

We analyze a single leg yield management problem in which customer demand is modeled using discrete choice theory. We show a nested allocation structure is optimal. We also propose an estimation procedure based on the EM method. Numerical results are presented.

2) A Bi-Level Programming Model of Revenue Mangaement in the Airline Industry, ***Patrice Marcotte***, University of Montreal, DIRO, CP 6128, Succ. Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, marcotte@diro.umontreal.ca, ***Gilles Savard***

We propose a bi-level model for determining jointly optimal pricing and seat allotment policies for an airline. The main feature of our approach is that customers optimize their own 3-criterion objective over a set of alternatives provided by both the optimizing company and its competitors. Numerical approaches are presented.

3) Simulation-Based Optimization for Airline Network Revenue Management, ***Sanne de Boer***, MIT, OR Ctr., E40-130, 1 Amherst St., Cambridge, MA 02139, sanne@mit.edu, ***Dimitris Bertsimas***

The predominant methods to airline network RM utilize deterministic mathematical programming formulations. We combine approximate dynamic programming ideas and simulation based optimization to explicitly address the stochastic and dynamic character of demand. In computational experiments this approach leads to significant and practically feasible improvements over current practice.

4) A Dynamic Pricing Approach in Revenue Management, ***Georgia Perakis***, MIT, Sloan Sch. of Bus., OR Ctr., 50 Memorial Dr., Rm. E53-359, Cambridge, MA 02139, georgiap@mit.edu, ***Dimitris Bertsimas***

We take an optimization approach to pricing in a dynamic environment. We present results in a noncompetitive as well as competitive environment. Our approach does not assume the demand as known but rather as part of the model. Our results apply in a number of application areas including the airline, service and retail industries.

SC10 Optimization & Scheduling I

Cluster: Scheduling
Invited Session
Chair: Lei Lei, Rutgers University, Dept. of MS/IS, Sch. of Mgmt., 180 University Ave., Newark, NJ 07102, llei@andromeda.rutgers.edu

1) Set-Up Coordination between Two Stages of a Supply Chain, ***Alessandro Agnetis***, Universita di Siena, Dipt. di Ingegneria & Info.,

via Roma 56, Siena, 53100, Italy, agnetis@dii.unisi.it, http://www.dii.unisi.it/~agnetis, ***Paolo Detti, Carlo Meloni, Dario Pacciarelli***

Part batches, of different shapes and colors, flow through a plant. In the first (second) department, a set-up occurs every time the shape (color) of the batch changes. The problem is to sequence the batches to minimize the total number of set-ups. An efficient heuristic approach is presented.

2) On the Lampshade Packing Problem, ***Thomas Davoine***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, davoine@rutcor.rutgers.edu, ***Gabriela Alexe, Sorin Alexe, Endre Boros, Peter L. Hammer, Chawalit Jeenanunta, Lei Lei, Albert Williams***

We present a problem of optimal packing coming from industrial context and requiring the partitioning of sets of objects of unusual geometric shape into a minimum number of subsets, each of which can be packed into a single box. A heuristic method is presented along with computational results.

3) On the Full-Stream Demand & Service Planning Problem, ***Turgut Aykin***, Bell Laboratories, PO Box 900, Princeton, NJ 08542

We examine the full-stream demand and service planning problem at call centers and the solutions currently available. The topics include inbound call forecasting, outbound call scheduling, call/service priorities, scheduled activities, manpower scheduling and performance metrics.

4) Assessing Web Site Impact on Companies: A DEA Approach, ***Shanling Li***, McGill University, Faculty of Mgmt., 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, Canada, li@management.mcgill.ca, ***Zhili Ouyang***

We use DEA to study the efficiency of e-commerce by studying numerous web sites of companies. Given that most websites are characterized by qualitative features, we develop an approach to synthesize the media richness in websites. We will discuss methodologies and computational results.

SC11 Boolean Methods in Discrete Optimization

Cluster: **Integer Programming**
Invited Session

Chair: Endre Boros, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, boros@mozart.rutgers.edu

Co-Chair: Peter L. Hammer, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu

1) A Linear Time Algorithm for the Recognition of a Modular Set, ***Jan C. Bioch***, Erasmus University Rotterdam, Dept. of Comp. Sci., FEW H9-30, Rotterdam, 3000 DR, The Netherlands, bioch@few.eur.nl

Modular sets have been studied by researchers in reliability theory, game theory (committees) and Boolean function theory (Ashenhurst decomposition). Ramamurthy has shown that recognition of a modular set of a positive Boolean function with n variables and m prime implicants can be done in time O(n m*2) and that the modular closure of a set can be found in time O(n*2 m*2)...

2) Finding all Minimal Feasible Solutions, ***Endre Boros***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, boros@mozart.rutgers.edu, ***Vladimir Gurvich, Leo Khachiyan, Kaz Makino***

We show that the number of maximal infeasible integer solutions to a monotone system of inequalities is linearly bounded by the number of minimal feasible solutions, implying that checking the completeness of a set of minimal feasible solutions is equivalent with dualization, and hence it is unlikely to be NP-hard.

3) Dynamic Branch & Bound & Resolution Search, ***Fred W. Glover***, University of Mississippi, Hearin Ctr. for Enterprise Sci, Sch. of Bus. Admin., University, MS 38677, fglover@bus.olemiss.edu, ***Said Hanafi***

Resolution search, an innovative approach to pure 0-1 IP problems recently proposed by Chvatal, provides a novel alternative to implicit enumeration. Surprisingly, an overlooked general MIP method, dynamic B&B, yields the same branching strategies as resolution search and other strategies in addition. We suggest refinements to both.

4) Maximal Bi-Cliques & Pseudo-Boolean Optimization, ***Peter L. Hammer***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, hammer@rutcor.rutgers.edu, ***Gabriela Alexe, Sorin Alexe***

After showing how maximal (not necessarily induced) complete bipartite subgraphs of a graph can be used for simplifying pseudo-Boolean optimization problems, we will show how all these subgraphs can be generated in total polynomial time and conclude with results of computational experiments illustrating the simplifying power of the proposed method.

SC12 Research & Industry Reviews: SCM Best Practices

Cluster: **Logistics & Supply Chain Management**
Invited Session

Chair: Yasemin Aksoy, Tulane University, Cnsrtm. for Supply Chain Mgmt., Freeman Sch. of Bus., New Orleans, LA 70118, yasemin.aksoy@tulane.edu

1) International Taxonomic Review of Supply Chain Management Research: A German & Scandanavian Answer to Ganeshan et al. (1999), ***Herbert Kotzab***, Copenhagen Business School, Dept. of Op. Mgmt., Solbjerg Plads 3, Frederiksberg, DK-2000, Denmark, hk.om@cbs.dk

The paper refers to the research review of supply chain management presented by Ganeshan et al. (1999). We broaden their view using a German and Scandinavian research perspective. Integrating these schools of SCM-thinking to the general discussions should help to identify a global valid understanding of SCM.

2) Selected Best Practices in Global Supply Chain Operations, ***Richard Dawe***, Fritz Institute of Global Logistics, 4415 Cowell Rd., Ste. 200C, Concord, CA 94518-1945, rick.dawe@fritz.com

The Fritz Institute has been studying best practices in global operations management since 1994. This research documents and measures the value added by leading best practices such as make-to-order, vendor managed inventory, merge-in-transit, and web- based collaborative planning, forecasting and planning. We cover evolution of operations management best practice developments systems developments organizational developments in contract service providers and future issues.

3) Transformation of Third Party Logistics Services, ***Anu H. Bask***, Helsinki School of Economics & Business Administration, Dept. of Logistics, Runeberginkatu 22-24, Helsinki, 00100, Finland, abask@hkkk.fi

Emerging e-commerce and networked markets call for new structures of outsourcing and coordination of logistics services. We discuss the transforming roles of third party logistics providers and services they offer to support different buyer-seller relationships, in particular, the need for logistics integrator.

4) How OR Contributes to the Third Party Logistics Industry, ***Yasemin Aksoy***, Tulane University, Cnsrtm. for Supply Chain Mgmt., Freeman Sch. of Bus., New Orleans, LA 70118, yasemin.aksoy@tulane.edu

We review the strategic role of the third party logistics (3PL) industry in globalization of firms and discuss how operations research contributes to the 3PL industry.

SC13 Implementations of Supply Chain Design

Cluster: **Manufacturing & Logistics**
Invited Session

Chair: Marc Goetschalckx, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205

1) The Logistics of Offshore Manufacturing, ***Russell D. Meller***, Virginia Tech., Dept. of ISE, 250 New Engineering Bldg., Blacksburg, VA 24061, rmeller@vt.edu, ***Pamela H. Vance***

Offshore manufacturing can change the logistics system within your company. A stochastic program is presented that indicates how the manufacturing and logistics system should be configured for an offshore manufacturing option. The impact on the logistics system is presented for a company that moved part of its its manufacturing operations offshore.

2) Production-Distribution System Design: Insights from an Implementation, ***Vedat Verter***, McGill University, Faculty of Mgmt., 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, Canada, verter@management.mcgill.ca, ***Abdullah Dasci***

We will present a model for simultaneous optimization of the plant location, sizing and technology decisions. The focus will be on the insights we obtained via the implementation of our formulation on a realistic production-distribution system design problem.

3) Designing Supply Chain Systems for International Manufacturing Operations under Fixed Markup, ***Marc Goetschalckx***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, ***Carlos J. Vidal***

We will present a model capable of designing an optimal global supply chain for

manufacturing operations, when the local country operations sell goods to each other on a cost plus a fixed profit margin principle. We will discuss iterative solution algorithm and report our computational experience from an industrial implementation.

SC14 EPD Mini-Cluster: Web/IT Driven Product Development II

Cluster: Product Development
Sponsor: Technology Management Section
Invite/Sponsor Session
Chair: Nitin Joglekar, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, joglekar@bu.edu

1) Benefitting from Task-Redefining Process Technology: The Influence of an Organizational Process on the Introduction of 3D-CAD, ***Yaichi Aoshima***, Hitotsubashi University, Inst. of Innovation Research, ***Kentaro Nobeoka***, ***Yoko Takeda***

By using questionnaire data obtained from 169 Japanese machinery-related manufacturing companies, we examined a hypothesis of the means by which organizations adapt to, and benefit from, the 3D-CAD technology which we characterized as "task-redefining process technology" depends largely upon the organizational processes by which it is introduced.

2) How does Information Technology Impact Product Development Performance?, ***Vish V. Krishnan***, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, krishnan@mail.utexas.edu, ***Viswanthan Veerkar***

We consider the impact of IT on development productivity. We present data from a major computer manufacturer that shows how a web-based software helps the company manage risk and cycle time. The potential of the technology to personalize development approach and integrate with suppliers is also discussed.

3) PIM Enablers for Product Development Collaboration across the Extended Enterprise, ***Manu Vedapudi***, The Alpha Building, 15303 South Commerce Park, Ste. 100, Dearborn, MI 48120

The rapidly changing business environment, particularly in the automotive industry, is causing a shift in business models between partner organizations from one where the emphasis is on data exchange, to one where it will be on product data collaboration. We propose PIM enablers to support this paradigm shift.

SC15 Panel: Supply Chain Management - Everything Including the Kitchen Sink

Cluster: Quantitative Models in Supply Chain Management
Invited Session
Chair: Michael Magazine, University of Cincinnati, QAOM Dept., PO Box 210130, Cincinnati, OH 45221-0130, mike.magazine@uc.edu

1) Panel: Supply Chain Management - Everything, Including the Kitchen Sink, ***Nikhil Jain***, University of Cincinnati, Coll. of Bus. Admin., PO Box 210230, Cincinnati, OH 45221, nikhil.jain@uc.edu, ***Steven Nahmias***, Santa Clara University, Dept. of OMIS, Leavey Sch. of Bus., Santa Clara, CA 95053, ***Jayashankar Swaminathan***, University of California, Berkeley, msj@haas.berkeley.edu, ***Sridhar Tayur***, Carnegie Mellon University, Grad. Sch. of Indust. Admin., Pittsburgh, PA 15213, stayur@cyrus.andrew.cmu.edu, stayur@andrew.cmu.edu, ***Paul Zipkin***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120

Supply chain management is no longer simply multi-echelon inventory, logistics and location models. It includes outsourcing, coping with product variety, e-commerce and many things that are as much pop culture as SCM. One wonders if this will have a detrimental effect on this field and it will become the TQM of the 00s.

SC16 Weighting & Ranking Decision Methods

Cluster: MCDM
Invited Session
Chair: Stelios H. Zanakis, Florida International University, Coll. of Business Admin., Dept. of DS/IS, Miami, FL 33199

1) An Analysis of Similarity of Some Consensus Ranking Methods, ***Stelios H. Zanakis***, Florida International University, Coll. of Business Admin., Dept. of DS/IS, Miami, FL 33199, ***Solomon Antony***

We examine the behavior of 12 methods for aggregating an ordinal decision matrix. The rows may be alternative proposals or candidates, and the columns may represent different voters or criteria. This type of problem arises in several MCDA methods, in voting situations or when constraints force an ordinal scale in rating (ranking) alternatives.

2) New Attribute-Weighting Techniques for Multi-Attribute Decision Making, ***F. Fred Choobineh***, University of Nebraska, Dept. of IE, Lincoln, NE 68588-0518, fchoobineh@unl.edu, ***Patrick J. McKenna***

In a typical MADM situation, decision makers identify feasible alternatives, select the relevant attributes, determine attributes values and assign weights to attributes. We present 4 new attribute-weighting techniques that are based on rough set theory and compare them with existing techniques. Numerical examples will demonstrate techniques use.

3) Selecting an E-Commerce Strategy using Multi-Attribute Utility Analysis, ***Gary L. Stading***, Texas A&M University, ETID Dept., College Station, TX 77843-3367, stading@entc.tamu.edu, ***Daniel F. Jennings***, ***F. Barry Lawrence***, ***Robert J. Vokurka***, ***Gail M. Zank***

The processes by which senior managers formulate strategies developing a competitive advantage are not well understood. We investigate the process which a diversified major electrical-electronics firm formulated an e-commerce strategy to attain a competitive advantage. MAUT was chosen as the method to arrive at an encompassing view of developing e-commerce strategies.

SC17 Network Flows: Applications in Transportation

Cluster: Network Flows
Sponsor: Optimization Section
Sponsored Session
Chair: Ravindra K. Ahuja, University of Florida, Dept. of ISE, 303 Weil Hall, Gainesville, FL 32611, ahuja@ise.ufl.edu, ahuja@ufl.edu

1) Solving Weighted-Constrained Network Design Problems, ***Anantaram Balakrishnan***, Pennsylvania State University, 303 Beam Bldg., MSIS Dept., Smeal Coll. of Bus., University Park, PA 16802-1913, anantb@psu.edu, ***Esra Ozaygen***

We investigate modeling and solution approaches to the weight-constrained network design problem. This problem, a generalization of hop-constrained network design, seeks the minimum cost network configuration and multi-commodity routes subject to upper limits on the total weight or length of the path used for each commodity. The model has applications in location, transportation and telecommunications.

2) Optimization of Goods Flows in Supply Chains, ***H. Edwin Romeijn***, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, romeijn@ise.ufl.edu, ***Dolores Romero Morales***, ***Richard Freling***, ***Albert P. M. Wagelmans***

We consider the problem of minimizing total costs in a supply chain network consisting of plants, warehouses and customers. In an environment where demand is not constant over time, we obtain a dynamic model where both transportation and inventory decisions are integrated. Heuristic and exact approaches are compared.

3) Solving the Airline Combined Through & Fleet Assignment Problem using Very Large-Scale Neighborhood Search, ***James B. Orlin***, MIT, Sloan Sch. of Mgmt., OR Ctr., Cambridge, MA 02139, jorlin@mit.edu, ***Ravindra K. Ahuja***, ***Dushyant Sharma***

In airline scheduling, the fleet assignment model is an integer program in which the objective is to optimally assigning a fleet of planes to flight legs. The ctFAM is the fleet assignment problem that also takes into account increased revenues from through flights. We solve ctFAM using very large-scale neighborhood search techniques.

4) Solving Large-Scale Locomotive Scheduling Problems, ***Ravindra K. Ahuja***, University of Florida, Dept. of ISE, 303 Weil Hall, Gainesville, FL 32611, ahuja@ise.ufl.edu, ahuja@ufl.edu, ***Anurag Chandra***, ***Ozlem Ergun***, ***Liu Jian***, ***Niklas Johansson***, ***Carl D. Martland***, ***James B. Orlin***, ***Dushyant Sharma***

This presentation stems from an OR application at CSX Transportation, one of the major railroads in the US. The problem considered consists of assigning locomotives to trains so as to minimize the total cost of assignment while satisfying a variety of practical constraints and business rules. We will discuss our progress-to-date in solving this problem.

SC18 Issues in Internet Marketing

Cluster: E-Commerce
Invited Session
Chair: P. K. Kannan, University of Maryland, Smith School of Bus., Dept. of Mktg., College Park, MD 20742-1815, pkannan@rhsmith.umd.edu

1) The Impact of the Internet on the Search for Automobiles, ***Brian T. Ratchford***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, ***Myung-Soo Lee***, ***Debebrata Talukdar***

We study the impact of the Internet on consumers' for automobiles based on survey data from consumers in the Northeast. We compare the results with our previous findings that focused on consumers' general search behavior to highlight the impact of the Internet.

2) "Name-Your-Own-Price" as a Segmentation Strategy, ***S. Balachander***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742

We analyze name-your-own-price strategies such as that of priceline.com as a segmentation and price discrimination tool. We use a mechanism design and game-theoretic framework to determine the optimal policy that incorporates a name-your-own-price Baruch College strategy. We compare the profit and welfare implications of such a policy with a pricing policy that does not incorporate such a pricing strategy...

3) Pricing of Internet Security Products: The Implication of Network Effects, ***P. K. Kannan***, University of Maryland, Smith School of Bus., Dept. of Mktg., College Park, MD 20742-1815, pkannan@rhsmith.umd.edu, ***Judy Frels***

We present a model for pricing software-based products to provide security for Internet-based transactions. We present a discussion of the factors that need to be considered in developing such a model including network effects which increases the effectiveness of the product in providing security and privacy.

SC19 Electronic Business: Issues & Trends

Cluster: Technology Innovations & Operations
Invited Session
Chair: Henry C. Co, California Polytechnic & State University, Coll. of Bus., Pomona, CA 91768, hco@csupomona.edu

1) The New E-Business Rules are the Old Direct Marketing Rules, ***Robert Schaffer***

The recent tumult on the NASDAQ and other exchanges has focused attention on the reasons why some e-businesses are successful and the reasons why so many others seem to fail. We look at some basic direct marketing theories and apply that theory to e-business. In particular, we examine 3 concepts: customer acquisition, customer retention and customer life-time value...

2) E-Business & Enterprise Resource Planning: Their Relationship in the Marketplace & in the Curriculum, ***Lynn Turner***

Enterprise-wide information systems such as SAP, PeopleSoft and Oracle have had to make major adjustments to meet the expectations of the movement toward e-business. We review current trends in e-business and the role that ERP systems are likely to play in this new business model. We assess the relationship of academic initiatives in enterprise computing and in e-business.

3) The Use of Enterprise System Software in Undergraduate Curriculums: An Empirical Study, ***Randy Guthrie***

In the past 2 years, the 3 major ES software vendors, SAP, PeopleSoft and Oracle have initiated special university alliance programs which are intended to affordably bring ES software learning into the business and/or IT curriculum of undergraduate universities. More than 100 universities are currently participating or are planning to adopt one of the 3 packages in the near future...

4) Current Research Topics in Business-to-Business, ***Mei Qi***

Orbitz, Covisint, Transora are just a few examples of the new fast emerging e-marketplaces for business purchasing transactions among buyers and suppliers. Buyers and suppliers are jumping in to initiate, adopt, joint venture this new emerging capable B2B technology. The emerging e-marketplaces promises to increase competition through cost reduction; yet they also brought the attention of the FTC and the DOJ...

SC20 Metaheuristics for Vehicle Routing

Cluster: Tabu & Scatter Search
Invited Session
Chair: Michel Gendreau, DIRO/Universite de Montreal, CRT, CP 6128, succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, michelg@crt.umontreal.ca

1) A Unified Tabu Search Heuristic for Vehicle Routing Problems with Time Windows, ***Jean-Francois Cordeau***, University of Montreal, Ecole des HEC, 3000 Chemin Cote-Ste-Catherine, Montreal, Quebec, H3C 3J7, Canada, ***Gilbert Laporte***, ***Anne Mercier***

We present a unified tabu search heuristic for the VRPTW, the periodic VRPTW and the multi-depot VRPTW. The method is quick, simple and flexible. Computational results on benchmark and random instances confirm the quality of the approach.

2) Cooperative Parallel Strategies for the Vehicle Routing Problem with Time Windows, ***Alexandre le Bouthillier***, University of Montreal, DIRO & CRT, CP 6128, Succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, ***Teodor Gabriel Crainic***

The VRPTW is both of significant practical importance and difficult to solve from a mathematical programming point of view. We present a cooperative parallel metaheuristic strategy for the VRPTW built around a common memory (or pool or blackboard) that is fed by several constructive and improving heuristics, including several well-known tabu search approaches.

3) Using Constraint-Based Operators to Solve the Vehicle Routing Problem with Time Windows, ***Michel Gendreau***, DIRO/ Universite de Montreal, CRT, CP 6128, succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, michelg@crt.umontreal.ca, ***Gilles Pesant***, ***Louis-Martin Rousseau***

We present operators searching large neighborhoods in order to solve the VRPTW. They make use of the pruning and propagation techniques of constraint programming which allow an efficient search of such neighborhoods. These operators are combined using a variable neighborhood descent search strategy. New best solutions are obtained on benchmarks.

4) An Ant Colony System Heuristic for the Traveling Salesman Problem, ***Michel Gendreau***, DIRO/Universite de Montreal, CRT, CP 6128, succ. Centre-ville, Montreal, Quebec, H3C 3J7, Canada, michelg@crt.umontreal.ca, ***F.-X. LeLouarn***, ***Jean-Yves Potvin***

The ACS is an optimization meta-heuristic based on the observation of ant colonies cooperation schemes. We present an application of ACS to the TSP in which the ants' action selection algorithm is the GENI procedure of Gendreau, Hertz & Laporte. Preliminary results reveal that the pheromone cues left by GENI ants do help other GENI ants to construct better TSP tours.

SC21 Session III

Cluster: SICUP
Invited Session
Chair: Robert Haessler, University of Michigan, Business Sch., Ann Arbor, MI 48109-1234, robert_haessler@ccmail.bus.umich.edu

1) An Advanced Approach to the 2-Stage Cutting Stock Problem, ***Eugene J. Zak***, Majiq Inc., 8343 154th Ave. NE, Redmond, WA 98052, eugene_zak@majiq.com

We propose a row and column generation technique for solving a 2-stage CSP. The technique is a generalization of the column generation method suggested by Gilmore & Gomory for solving a classic CSP. The procedure generates only those intermediate rolls and cutting patterns that are needed.

2) The Cutting Stage in the Multi-Item Multi-Level Lot-Sizing Problem, ***Marcos Arenales***, Universidade de Sao Paulo, Inst. de Ciencias Math. & Comp, Campus de Sao Carlos, CP 668, Sao Carlos, 13560-970, Brazil, arenales@icmc.sc.usp.br, ***Maria Christina Nogueira Gramani***, ***Paulo M. Franca***

The combined cutting stock and lot sizing problem consists of modeling a multistage production planning where the cutting stock problem is imbedded as the most important stage. In practice, usually these problems are heuristically solved separately. We formulated a mathematical model that solves both problems in

3) Cutting Stock Problems: How to Select Stock Sizes, ***Helmut Schreck***, MAS GmbH, Bahnhofstrasse 39, Oberhaching, D-82041, Germany, helmut.schreck@masgmbH.com

Practical cutting stock situations both deal with short-term planning of orders with constant stock sizes as well as with long-term planning of stock sizes. Some typical situations are discussed. Some cases show how simple methods of stock size planning can reduce the losses of short term planning.

4) Locally Optimal Packing Circles of Various Radii into the Given Rectangle with Inhibition Domains, ***Yu Stoyan***, Ukrainian National Academy of Science, Math Modeling & Optimal Design, Mech. Eng. Problems Inst., Kharkov, 610046, Ukraine, stoyan@ipmach.kharkov.ua, ***G. Yaskov***

There are circles of various radii and a rectangle. Into the rectangle are given inhibited domains. All circles are ordered. It is necessary to place the circles in accordance with the given order into the rectangle so that a number of circles placed are maximal.

SC22 Roundtable: E-Commerce in Health Care

Sponsor: Health Applications Section
Sponsored Session

Chair: William P. Pierskalla, UCLA, The Anderson Sch., 110 Westwood Plaza, Ste. B411, Los Angeles, CA 90095-1481, william.pierskalla@anderson.ucla.edu

1) Roundtable: E-Commerce in Health Care, ***Don Chenoweth***, health2health.com, 650 South Cherry, Ste. 420, Denver, CO 80246-1806, dchenoweth@shs-denver.com, ***Liam O'Neill***, ***Douglas A. Samuelson***

We examine the past, present, and future of e-commerce in health care. Special emphasis will be on business-to-business, HIPAA and network security.

SC23 Simulation & Optimization using Spreadsheets

Sponsor: Simulation Section
Sponsored Session

Chair: John M. Charnes, University of Kansas, Sch. of Business, 345 Summerfield Hall, Lawrence, KS 66045-2003, jmc@ukans.edu

1) Introduction to Simulation & Optimization using Spreadsheets, ***Dave Fredericks***, Decisioneering, Inc., 1515 Arapahoe St., Ste. 1311, Denver, CO 80202, dfredericks@decisioneering.com

We will introduce the fundamentals of uncertainty analysis, Monte Carlo simulation and optimization modeling techniques using Crystal Ball 2000. An introductory model will be explored covering methodology for stochastic optimization of a budget constrained project selection.

2) Simulation Models in the Classroom, ***Kenneth Baker***, Dartmouth College, Tuck School of Bus. Admin., Hanover, NH 03755-9000, ken.baker@dartmouth.edu

Crystal Ball has been used effectively in an introductory modeling course for MBA students. We discuss the cases, homework and classroom examples that illustrate how MBA student can be introduced to Monte Carlo simulation using Crystal Ball.

3) Pricing American Put Options using Simulation & Optimization, ***John M. Charnes***, University of Kansas, Sch. of Business, 345 Summerfield Hall, Lawrence, KS 66045-2003, jmc@ukans.edu

Crystal Ball 2000 and OptQuest can be used to compute values for American put options. We will demonstrate the modeling technique and weigh its advantages and disadvantages.

SC24 Virtual Environments for Manufacturing Systems Design

Cluster: Material Handling
Invited Session

Chair: Pat Banerjee, University of Illinois, Ind. Virtual Reality Inst., Dept. of Mech. Eng., Chicago, IL

1) An Intelligent Human-Object Interaction Environment for Rapid Manufacturing Systems Design, ***A. Banerjee***, University of Texas, ***Pat Banerjee***

A collaborative virtual environment is interfaced to a simulation engine for driving the system and a force feedback control system for effective interaction of humans with the environment. Some aspects of optimal object data encapsulation for reducing data latency are addressed here.

2) Simulation of a Software Architecture for a Mobile Robotic-Based Shop Floor Design, ***T. Kesavadas***, University of Buffalo, Virtual Reality Lab., Buffalo, NY 14260, ***Yuri Menezes***

We will present a new software architecture for a proposed factory layout scheme based on continuously self rearranging robotic cells. A simulation-based interface will be used to create and analyze such an environment. Initial results will be presented.

3) Tele-Collaborative Simulation between Existing Manufacturing Systems & Virtual Reality Replicas, ***Ali Akgunduz***, University of Illinois, Ind. Virtual Reality Inst., Chicago, IL, ***Pat Banerjee***

We describe a real-time system simulation model for replacing equipment in existing manufacturing facilities using tele-collaborative VR models. For equipment selection during the replacement process, a number of criteria, i.e., size, compatibility with existing machineries, compatibility with existing products, energy usage, etc., are investigated.

SC25 Nonlinear Programming & Applications

Cluster: Nonlinear Programming
Sponsor: Optimization Section
Sponsored Session

Chair: Mihai Anitescu, University of Pittsburgh, Dept. of Math, Thackery 301, Pittsburgh, PA 15260, anitescu@math.pitt.edu

1) Quasi-Newton Interior Algorithms for Nonlinear Programming, ***Michael Wagner***, Old Dominion University, Dept. of Math & Stats., 500 Batten Arts & Letters, Norfolk, VA 23529-0077, wagner@orie.cornell.edu

Quasi-Newton methods for unconstrained problems have been around for over 40 years now and more recently they have been applied to equality-constrained problems. We investigate ways to extend some of these approaches to the more general case with inequality constraints.

2) Degenerate Nonlinear Programming, ***Mihai Anitescu***, University of Pittsburgh, Dept. of Math, Thackery 301, Pittsburgh, PA 15260, anitescu@math.pitt.edu

We investigate nonlinear programming problems for which the gradients of the active constraints are linearly or nearly linearly independent. We discuss the behavior of sequential quadratic programming algorithms when applied to such problems.

3) Solving Optimal Control Problems using SNOPT & Collocation, ***Michael Gertz***, Argonne National Laboratory, MCS Bldg. 221, Argonne, IL 60439, gertz@ncs.anl.gov, ***Philip E. Gill***, ***Julia Muetherig***, ***J. Ben Rosen***

Collocation techniques provide a set of rules for transforming an optimal control problem to an NLP. In practice, coding these problems correctly is difficult and time consuming. We present software that we have developed for automating the transformation and solving the problem using SNOPT.

4) COOPT: A Software Package for Optimal Control of Large-Scale Differential-Algebraic Equation Systems, ***Radu Serban***, University of California, Dept. of Mech. & Environ. Eng., Santa Barbara, CA 93106, radu@engineering.ucsb.edu, ***Linda R. Petzold***, ***Shengtai Li***

This package implements a direct method with modified multiple shooting type techniques for solving optimal control problems of large-scale DAE systems. The resulting optimization problem is solved by sparse SQP methods. COOPT has been used in chemical vapor deposition of superconducting thin films, spacecraft trajectory design and contingency/recovery problems and computation of cell traction forces in tissue engineering.

SC26 Telecommunication Systems

Cluster: Stochastic Models & Applications
Invited Session

Chair: Emmanuel Fernandez, University of Arizona, SIE Dept., Tucson, AZ 85721-0020, emmanuel@sie.arizona.edu

1) Information Technology & Telecommunications in the University of Texas System, ***Rob Robinson***, University of Texas System, Office of IT & Distance Ed., rrobinson@utsystem.edu

The University of Texas System has embarked in a far reaching plan to develop and enhance the telecommunication infrastructure and information technology throughout the system. We present an overview of objectives and programs, e.g., the UT Telecampus.

2) A Markov Decision Model for Intruder Location in IP Networks, ***Mark A. Shayman***, University of Maryland, ECE Dept., College Park, MD 20742, shayman@eng.umd.edu, ***T. Darling***

The problem of locating an intruder or misuser in an autonomous system in the Internet can be formulated as a Markov decision problem whose state evolves on a set of trees. For networks of realistic size, exact calculation of optimal policies by dynamic programming is not feasible. Approximation techniques such as neurodynamic programming are investigated.

3) Fault Management in Communication Networks: Test Scheduling with a Risk-Sensitive Criterion & Precedence Constraints, ***Emmanuel Fernandez***, University of Arizona, SIE Dept., Tucson, AZ 85721-0020, emmanuel@sie.arizona.edu, ***Mark A. Shayman***

We consider the problem of determining the optimal sequence of tests for the discovery of a faulty component in a telecommunications network, where there is a random cost associated with testing a component. A risk-sensitive performance criterion is used in order to rank different competing schedules.

SC27 Tutorial: Breaking the Mold: Using Commercial Software & Experiential Learning to Teach the First MS Course

Invited Session

Chair: Matthew J. Liberatore, Villanova University, Dept. of Decision & IT, Villanova, PA 19085, matthew.liberatore@villanova.edu

Co-Chair: Robert L. Nydick, Villanova University, Dept. of Decision & It, Villanova, PA 19085, robert.nydick@villanova.edu

1) Tutorial: Breaking the Mold: Using Commercial Software & Experiential Learning to Teach the First MS Course, *Matthew J. Liberatore*, Villanova University, Dept. of Decision & IT, Villanova, PA 19085, matthew.liberatore@villanova.edu, ***Robert L. Nydick***

Our approach to teaching the first course in MS is predicated upon 2 beliefs: MS is more important to business education than ever and students can implement MS more easily than ever. What is required is a radical change in the way the first MS course is conducted. Spreadsheets offer important advantages in teaching MS. However, we offer a proven alternative to spreadsheets...

SC28 What Defines the Success of OR Applications in the Railroad Industry I

Sponsor: RASIG

Sponsored Session

Chair: Ingrid Schultze, Reebie Associates, ischultze@reebie.com

1) What Defines the Success of OR Applications in the Railroad Industry I, *Carl D. Martland*, MIT, Dept. of Civil & Environ. Eng., Rm. 1-153, Cambridge, MA 02139, ***Bengt Muten***, ***Jason Kuehn***, ***Roger W. Baugher***, ***Chip Kraft***, ***Howard A. Rosen***, ***Steve Ditmeyer***

Overview & Introduction: Carl Martland A - Network & Strategic Planning Applications Ingrid Schultze: Moderator Consultant Perspective - Bengt Muten: Successes/failures of network planning & diversion models. Industry Perspective - Jason Kuehn: Contributions of OR to industry-wide restructuring efforts such as M&A, mixing centers, etc., where OR has worked, where it "needs work." Systems Perspective - Roger Baugher: The system perspective - how technology advances are shaping the application of OR in the rail industry. B - Corridor-Level Planning Applications Chip Kraft: Moderator - Overview of How We Measure Consultant Perspective - Howard Rosen: Successes and failures of corridor planning models from a systems and consulting perspective. Industry - Steve Ditmeyer Systems Perspective - Roger Baugher: Contributions of OR to corridor planning efforts - where OR has worked, where it needs work.

SC29 Modeling Price Formation & Market Power in Competitive Electricity Markets II

Sponsor: ENRE

Sponsored Session

Chair: James B. Bushnell, University of California, Energy Inst., 2539 Channing Way, Berkeley, CA 94720-5180, jimb@ieor.berkeley.edu

1) Competition in Markets for Electricity: A Conjectured Supply Function Approach, *Christopher J. Day*, Enron, London, England, UK, christopher.j.day@enron.com, ***Benjamin F. Hobbs***

Competition between electricity suppliers who form conjectures about opponents' supply functions is formulated as a linear complementarity problem. Transmission is constrained by a DC network. The model has the advantage of being able to obtain equilibria even when demand is perfectly inelastic. The model is applied to the UK system.

2) The Effects of Technology Segmentation Market Power in Wholesale Electricity Markets, *John Bower*, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, England, UK, jbower@london.edu, ***Derek W. Bunn***

Traditional analysis of market power in deregulated electricity markets concentrates on the impact of industry concentration and market mechanisms. Using an agent-based simulation model, we show that the allocation of generating technology between firms in a national electricity industry can also have significant impact. Simulation results are compared with empirical observations from the German and UK power markets.

3) The Extent of the Electricity Market, *Thomas J. Overbye*, University of Illinois, Urbana, IL, overbye@powerworld.com, ***Douglas Hale***, ***Thomas Leckey***

A model of the Eastern Interconnect was constructed using (FERC) Form 715 filings to provide a detailed representation of the transmission system and FERC Form 1 data with information from the EIA National Energy Modeling System to represent generator costs. An optimal power flow was then used to optimally dispatch the East both under administered and free trade conditions...

4) Price Convergence in California's Wholesale Electricity Markets, *Severin Borenstein*, University of California, Energy Inst., 2359 Channing Way, Berkeley, CA 94720, borenste@haas.berkeley.edu, ***James B. Bushnell***, ***Chris Knittel***, ***Catherine Wolfram***

We study the relationships among prices in different markets within the California electricity industry during the last year. In the absence of institutional impediments, economic forces will lead to the convergence of prices in different markets for delivery of power at the same time. Many institutional impediments did exist, however.

SC30 Web-Based Tactical Applications of OR I

Sponsor: Computing Society

Sponsored Session

Chair: Radhika Kulkarni, SAS Institute Inc., SAS Campus Dr., Cary, NC 27513, radhika.kulkarni@sas.com

1) Web Technologies for Decision Support, *Robert Fourer*, Northwestern University, Dept. of IEMS, 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, 4er@iems.nwu.edu

Software developers of all kinds are becoming "application service providers" by converting their conventional software packages to web-based services. We survey web technologies that are (or will soon be) available to support the choice or use of decision support software, with examples from diverse optimization services and systems.

2) Web-Enabled Inventory Replenishment Planning, *Chuck Kelly*, SAS Institute Inc., SAS Campus Dr., Cary, NC 27513, chuck.kelly@sas.com, ***Tugrul Sanli***

We discuss development of a Web-enabled software application for inventory replenishment planning. Using a distributed architecture, we access historical demand data to calculate continuous review (s, S) policies with service level constraints for different classes of products. Policy results, performance analysis and data statistics are made available via a Web browser. E-mail transmission of product orders is supported.

3) Using Optimization for Smart Internet Marketing Decisions, *Harlan Crowder*, Hewlett-Packard Laboratories, 1501 Page Mill Rd., Palo Alto, CA 94304, harlan_crowder@hp.com

Building, executing and evaluating marketing campaigns was once a leisurely process that unfolded over weeks or months. The intrinsic response time associated with television and direct mail campaigns allowed marketers the liberty of unhurried decisions. Then came the Internet. We will describe an experimental system for quickly designing, testing and optimizing on-line marketing campaigns.

SC31 Tutorial: XPRESS-MP: A Fully Integrated Optimization System

Sponsor: Computing Society

Sponsored Session

Chair: Alkis Vazacopoulos, Dash Optimization, Inc., 135 West 27th St., 7th Fl., New York, NY 10001, alkis@dashopt.com

1) Tutorial: XPRESS-MP: A Fully Integrated Optimization System, *Alkis Vazacopoulos*, Dash Optimization, Inc., 135 West 27th St., 7th Fl., New York, NY 10001, alkis@dashopt.com

XPRESS-MP is a state-of-the-art software solution for modeling and optimization. We will show how XPRESS-MP can be used to model and solve complex problems arising in a wide variety of applications. We will introduce our new product XBSL which enables you to build up models dynamically within a high level programming language...

SC32 Evolutionary Perspectives on Firm Strategy

Sponsor: Organization Science Section

Sponsored Session

Chair: Peter W. Roberts, Carnegie Mellon University, GSIA, 5000 Forbes Ave., Pittsburgh, PA 15213-3890, proberts@andrew.cmu.edu

1) Incumbent Resurgence: Strategies for Surviving Competence-Destroying Environmental Shocks, ***Raja Roy***, University of Pittsburgh, Katx. Grad. Sch. of Bus., 247 Mervis Hall, Pittsburgh, PA 15260, ***Susan K. McEvily***

Following radical technological change, incumbents pursue strategies that either enhance their survival prospects or their odds of regaining competitive advantage. Data from the machine tool industry supports this proposition, but suggests firms manage the tradeoff by acquiring rather than developing new capabilities. Implications for the evolution of competence are discussed.

2) Choice Interaction & Organizational Structure, ***Jan Rivkin***, Harvard Business School, 239 Morgan Hall, Boston, MA 02163, jrivkin@hbs.edu, ***Nicolaj Siggelkow***

We use an agent-based simulation to examine how organizations should allocate interdependent decisions to independent managers. We explore, inter alia, the importance of assigning related decisions to a single manager, the robustness of organizational designs to management mistakes and the evolution of organizational structures to mimic underlying interactions among choices.

3) Firms as Portfolios of Strategic Attributes: An Austrian Economic Approach to Financial Performance Heterogeneity, ***Peter W. Roberts***, Carnegie Mellon University, GSIA, 5000 Forbes Ave., Pittsburgh, PA 15213-3890, proberts@andrew.cmu.edu

We develop an Austrian explanation of the dynamic heterogeneity in profitability from 3 premises: firms are systems of strategic attributes, attributes have direct and interactive effects on profitability and managers always strive to improve profitability. Our explanation highlights Kirzner's opportunity-driven discovery, Lachmann's heterogeneous capital resources and Hayek's emergent, decentralized knowledge.

4) Making E-Commerce Strategies in Established Firms, ***Gabriel Szulanski***, University of Pennsylvania, The Wharton Sch., 2033 SH-DH, Philadelphia, PA 19104-6370, szulanski@wharton.upenn.edu

I explore the process of creation of e-commerce strategy in established firms. While some attention has been devoted to e-commerce strategy, the organizational processes that lead to those strategies have not been studied closely. I use an evolutionary framework to compare and contrast strategy-making processes within 3 established companies.

SC33 Production Planning

Contributed Session

Chair: Funda Sahin, Texas A&M University, Grad. Sch. of Bus., Dept. of IOM, College Station, TX 77843-4217, fsahin@cgsb.tamu.edu

1) Analyzing the Effects of Distillate Fuel Oil Production on the Heating Oil Futures Contract, ***James R. Porter***, Cornell University, Dept. of OR/IE, Rhodes Hall, 2nd Fl., Ithaca, NY 14853, porter@orie.cornell.edu, ***Robin Roundy***

Our research is concerned with analyzing the effects of production decisions on the price of the heating oil futures contract. A stochastic dynamic programming problem is formulated to minimize refinery cost while matching past production decisions. The solution is then perturbed in an effort to value future units of inventory.

2) A Cyclic Scheduling Problem with Tool Transportation Times, ***Cindy Kuijpers***, University of Twente, Faculty of Math. Sci., PO Box 217, Enschede, 7500 AE, The Netherlands, c.m.h.kuijpers@math.utwente.nl, www.math.utwente.nl/dos/kuijpers.htm, ***Johann Hurink***, ***Wim Nawijn***

We consider a cyclic 2-machine scheduling problem with tool-sharing and positive tool transportation times. For finding an optimal schedule, only schedules of a few different structures need to be taken into account. With this knowledge, a fast algorithm is obtained.

3) Simulation of Unbalanced Non-Steady State Production Lines, ***Laoucine Kerbache***, HEC School of Management, Jouy-en-Josas, Paris, France, kerbache@hec.fr, ***Sabry Shaaban***

We present the simulation results for unbalanced non-steady state unpaced production lines. We discuss the results of various configurations of design parameters, i.e., line length, buffer capacity, degree and pattern of unbalance. The study deals with both one source and two sources of unbalance in terms of mean operation times, coefficients of variation and buffer capacities.

4) Economic Production Lot-Size with Periodic Fixed Costs & Overtime, ***Funda Sahin***, Texas A&M University, Grad. Sch. of Bus., Dept. of IOM, College Station, TX 77843-4217, fsahin@cgsb.tamu.edu, ***Powell Robinson***

We propose mathematical formulations and algorithms that consider equipment setup, periodic fixed costs, regular and overtime production constraints. We documented the performance of the algorithms on a set of simulated and actual test problems. The potential economic benefit of the procedures is promising.

SC34 Decision Analysis III

Contributed Session

Chair: David Taylor, Capital One, 5600 Cox Rd., MS 12011-0330, Glen Allen, VA 23060, dave.taylor@capitalone.com

1) Practical Decision Analysis Tools, ***David Taylor***, Capital One, 5600 Cox Rd., MS 12011-0330, Glen Allen, VA 23060, dave.taylor@capitalone.com

IT project selection and resource allocation was painfully inefficient until the IT analysis team introduced practical DA into the corporate culture. This team introduced value focused thinking in all of Capital One's strategic business unit, demonstrating the ability to quantify the value of ideas in other than economic terms.

2) Process Change to Enable a Decision Analysis Culture, ***Clay Arey***, Capital One, 5600 Cox Rd., MS 12011-0330, Glen Allen, VA 23060, clay.arey@capitalone.com

In the entrepreneurial environment that defines Capital One's culture, introducing quantitative decision analysis techniques required a robust, yet flexible process. We describe how the IT analysis team adeptly melded value focused thinking and linear programming into a transparent and efficient process.

3) Adapting Off-the-Shelf Decision Analysis Software, ***Ashley A. Sigrest***, Capital One, 4801 Cox Rd., MS 12035-0215, Glen Allen, VA 23060, ashley.sigrest@capitalone.com

Although off-the-shelf DA tools are invaluable for decision analysts, they are rarely suitable for business users. We discuss customizations made to existing software to enable Capital One business users to utilize value focused thinking through an interactive web-based GUI to build business cases and make rational decisions.

4) Client & Toolmaker Partnerships, ***Philip J. Murphy***, InfoHarvest, Inc., 4511 Shilshole Ave., 2nd Fl., Seattle, WA 98107-4714, philipmurphy@infoharvest.com, www.InfoHarvest.com

Two trends are changing how DA vendors work with clients: growth of DA expertise within corporations and use of internet/intranet to strategically fuse DA methodologies into the corporation's backbone. InfoHarvest and Capital One are collaborating to realize Capital One's vision of making value focused thinking a pervasive IT service.

SC35 Information Systems I

Contributed Session

Chair: Parviz Ghandforoush, Virginia Tech., 7054 Haycock Rd., Falls Church, VA 22043, pghandfo@vt.edu

1) Business Process Reengineering/Information Systems & Competitive Advantages, ***Nouri M. A. Beyrouti***, Lebanese American University, Koreitem, Mme. Curie St., Beirut, 13-5053, Lebanon, nbeyruti@lau.edu.lb, www.lau.edu.lb

Today, globalization is inevitable and organizations must cope with this new business environment which requires a new form of organization. Management attention has moved from competitive advantage to strategic competitive survival. Quality, innovation and customer service are now more important to survival than cost, growth and control...

2) The Influence of Software Process Maturity & IS Management Maturity on the Attitude Adopted in the IS Requirements Definition Activity, ***Joao A. Carvalho***, Universidade do Minho, Dept. de Sistemas/Informacao, Guimaraes, 4800-058, Portugal, jac@dsi.uminho.pt, www.dsi.uminho.pt/~jac, ***Alvaro M. Rocha***

A set of case studies brings confidence to the belief that organizations with a higher level of maturity, i.e., software process maturity and information systems management function maturity, tend to treat the definition of IS requirements as an organizational activity and not just as a technical (information technology related) activity.

3) Infusion of Enterprise Resource Planning Systems, ***Paul D. Brown***, Georgia State University, 35 Broad St., Atlanta, GA 30303, brownpries@aol.com

An important new technology of the 1990s has been ERP systems. ERP systems have been a key factor in process reengineering, supply-chain partnering, management restructuring and other strategic initiatives. Our objective is to derive a model that explains the level of infusion of ERP systems within

organizations.

4) Design of an E-Business Portal for Transportation Planning, ***Parviz Ghandforoush***, Virginia Tech., 7054 Haycock Rd., Falls Church, VA 22043, pghandfo@vt.edu, ***Tarun Sen***

We describe a prototype of a portal for transportation businesses that incorporates routing and planning algorithms. Among the primary objectives of an e-business portal is to attract customers to the portal to induce revenue generation. There are several revenue generation models. A particular revenue generation model will be adopted for this study, i.e., a fee for service...

SC36 Logistics Management I

Contributed Session

Chair: Atsuo Suzuki, Nanzan University, Dept. of Math. Sci., 27 Seirei-cho, Seto-shi, Aichi, 489-0863, Japan, atsuo@ms.nanzan-u.ac.jp

1) The Two-Carousel Storage Location Problem, ***Elkafi Hassini***, University of Waterloo, Dept. of MS, Waterloo, Ontario, N2L 3G1, Canada, ehassini@uwaterloo.ca, http://mansci2.uwaterloo.ca/~ehassini, ***Raymond G. Vickson***

We describe a storage location problem in a 2-carousel storage and retrieval system. We present an analytical model for the problem and discuss some heuristic solution procedures.

2) A Hierarchical Fleet Planning Framework for the Car Rental Industry, ***Julian E. Pachon***, Caleb Technologies Corp., 9130 Jollyville Rd., Ste. 100, Austin, TX 78759, jpachon@coeds.eng.miami.edu, ***Lefteris T. Iakovou***, ***Chi M. Ip***

We present the development of a novel hierarchical fleet planning framework that synthesizes all 3 major phases of the decision-making process that car rental companies utilize to maximize their yield. We develop appropriate solution methodologies and exhibit their application via a real case study for the state of Florida.

3) withdrawn - author request of 10/13, ***Knut Alicke***, Gotthard-Franz-Str. 8, Karlsruhe, 76131, Germany, knut.alicke@mach.uni-karlsruhe.de, ***Michael Keppler***

4) A Rental Fleet Sizing Model & a Two-Phase Algorithm, ***Peiling Wu***, Lehigh University, IMSE Dept., Mohler Lab, 200 West Packer Ave., Bethlehem, PA 18015, grw3@lehigh.edu, ***Joseph C. Hartman***, ***George R. Wilson***

An integrated rental fleet sizing model is formulated. A demand-shifting feasibility algorithm is developed for solving Benders subproblems and for obtaining Lagrangean feasible solutions efficiently. A 2-phase algorithm and an end-effect correction of infinite horizon are further discussed with numerical experiments.

5) A Continuous Hub Location Problem on the Sphere, ***Atsuo Suzuki***, Nanzan University, Dept. of Math. Sci., 27 Seirei-cho, Seto-shi, Aichi, 489-0863, Japan, atsuo@ms.nanzan-u.ac.jp

We formulate a hub location problem on the sphere using the sphere Voronoi diagram. Assume that the airports are spread continuously on the sphere, the airports connect to the nearest hub airport and the route of travelers has 2 hub stops. Then, the territory of the hubs are their Voronoi region on the sphere. We show the optimal layout of hubs when the number of hubs n is small, and suboptimal layouts when n is large.

SC37 Optimization Techniques III

Contributed Session

Chair: Michael R. Pouy, Defense Logistics Agency, 8725 Kingman Rd., Rm. 4146, Ft. Belvoir, VA 22060, mathcoach5@yahoo.com

1) Applying Real Option Theory to Engineering Problems, ***Vicente Rico-Ramirez***, Instituto Tecnologico de Celaya, Av. Tecnologico y Garcia Cubas, Celaya, Guanajuato, 38010, Mexico, rv2a@andrew.cmu.edu, www.cs.cmu.edu/~rv2a, ***Urmila Diwekar***, ***Benoit Morel***

We apply Merton's optimality conditions and Ito's Lemma (Dixit, 1994) for developing the mathematical tools needed to solve optimal control problems in batch distillation columns operating under uncertainty. A qualitative analysis is presented and some numerical experiments are used to show the scope and usefulness of such an analysis.

2) Interior Point Methods for Active Optimal Power Flow & Predispatch Problems by a Network Flow Approach, ***Aurelio R. Oliveira***, State University of Campinas, UNICAMP FEEC DENSIS, Av Albert Einstein 400 CP 6101, Campinas, SP, 13083-970, Brazil, aurelio@densis.fee.unicamp.br, ***Secundino Soares***

Interior point methods for the active power pre-dispatch problem are developed. The network matrix structure is exploited leading to factorizations whose dimension is the plant's number, even considering additional constraints for hydro-electrical and thermo-electrical plants. The iteration effort increases linearly with the time interval's number. Numerical experiments support these results.

3) Java Constrainer: A Constraint Satisfaction Environment for Web Applications, ***Stanislav Shor***, IntelEngine, Inc., 320 Amboy Ave., Metuchen, NJ 08840, shor@intelengine.com, www.intelengine.com, ***Jacob Feldman***

Java Constrainer is a generic constraint solver for Java developed by IntelEngine, Inc. It demonstrates the efficiency and expressiveness comparable with C++ ILOG Solver. We will describe the major functionality, implementation issues and the comparison results using well-known benchmark problems.

4) withdrawn - author request of 9/28, ***Michael R. Pouy***, Defense Logistics Agency, 8725 Kingman Rd., Rm. 4146, Ft. Belvoir, VA 22060, mathcoach5@yahoo.com

5) Inspection Schedules & Minimal Repairs for Optimal Profit per Cycle of Deteriorating Production Systems, ***Dipak Chaudhuri***, Tulane University, Freeman Sch. of Bus., 7 McAlister Dr., New Orleans, LA 70118, dipak.chaudhuri@tulane.edu, http://www.tulane.edu/~dipak_c/dipak.html

Production systems need to be inspected at predetermined intervals to detect presence of any non self-announcing failure of components. If such failures are detected at any inspection point, a minimal repair is performed on the system by replacing the failed components and the system is restarted after scrapping the entire production during the interval since the last inspection...

SC38 Industry Applications II

Contributed Session

Chair: K. Jo Min, Iowa State University, Dept. of IMSE, 2019 Black, Ames, IA 50011, jomin@iastate.edu

1) SAP Implementation in a Major Steel Plant in India, ***Rajiv R. Singh***, K. M. Gupta & Co., Ispat Industries Ltd., A-10/1 MIDC Industrial Area, Kalmeshwar, 441501, India, rajiv_online@yahoo.com

We present lessons from SAP implementation in a major steel processing plant in central India. Real-time information about enterprise resources and constraints have presented unprecedented opportunities for operational improvements. Yet, management culture, more than technology, seems to determine the outcome.

2) An Optimization Model for the Strategic & Economic Development of a Petrochemical Industry, ***Ali Elkamel***, University of Kuwait, Dept. of Chemical Eng., PO Box 5969, Safat, 13060, Kuwait, alielkamel@hotmail.com, ***Ghanima Al-Sharrah***, ***Imad Al-Atiqui***

Today, there is a shift in strategic thinking arising from the increasing importance of technology and innovation to the overall strategy of the industry. These 2 aspects of the industry's activity can no longer be treated as a tactical issue. The resource development and environmental interactions are increasingly dependent on the availability of innovative products, processes and services...

3) No Title Supplied, ***Boo-Sik Kang***, Korea Telecom, Telecom Network Lab., 463-1 Junmin-dong Yusong-gu, Taejon, 305-300, Korea, richgang@kt.co.kr, ***Byoong-Wook Lee***, ***Young-Jin Sim***

Troubles of data communications services must be handled by interconnection tests among various systems. We propose a model used machine learning techniques to search site and causes of the troubles by setting intitial test strategy with the trouble type and using prior test results to determine posterior test methods.

4) A Real Options Model for Multiple Inter-Related Generation Projects, ***K. Jo Min***, Iowa State University, Dept. of IMSE, 2019 Black, Ames, IA 50011, jomin@iastate.edu, ***Chung-Hsiao Wang***

The electric power generation business is moving toward uncertain and competitive environments. We design and analyze a multi-unit generation planning model based on the real options theory. Under the assumption of inter-related generation unit values, we derive various managerial insights and economic implications via a numerical example.

SC39 Marketing III

Contributed Session

Chair: Timothy L. Urban, University of Tulsa, 600 South College Ave., Tulsa, OK 74012, urbantl@utulsa.edu, www.cba.utulsa.edu/qm_tlu/

1) Price Dispersions on the Internet, ***Qin Zhang***, Washington University, 7290 Zephyr Pl., Apt. 9, St. Louis, MO 63143, zhangq@olin.wustl.edu

I investigate how differences in consumer awareness for firms and differences in consumer search costs affect the price dispersion in an Internet setting. I find price dispersion increases with the differences of search costs and its changing pattern with sizes of consumer segments is an inverse-U shape.

2) A Market Structure Model in Consumer Durable, ***Geonha Kim***, Waseda University, Ohno Lab. 3-4-1, Okubo Shinjuku, Tokyo, 169-8555, Japan, 699b5031@mn.waseda.ac.jp, ***Takahiro Ohno***

We focus on the identification of competitive market structure using brand-switching data in consumer durable. We propose a new approach that generates switching constants and asymmetric proximity data. Pictorial representations will be drawn using MDS and hierarchical clustering analysis. Finally, we compare our results with those of previous researches.

3) Shelf Management & Product Placement, ***Timothy L. Urban***, University of Tulsa, 600 South College Ave., Tulsa, OK 74012, urbantl@utulsa.edu, www.cba.utulsa.edu/qm_tlu/, ***RobertA. Russell***, ***David A. Sowards***

It is a well-known and empirically-verified fact that a product's shelf location (its vertical and horizontal positioning) has a significant impact on sales for many retail items. Motivated by the operations of a retailer in the highly-competitive beverage market, we present a comprehensive shelf-management model that incorporates product placement, with consideration given to maintaining the grouping of product families.

4) A Scoring Model to Optimize Direct-Mail Marketing Promotions for a Pharmacy Benefit Manager, ***Edward S. Binkowski***, Data Analysis Services, New York, NY, ***Moshe B. Rosenwein***

We describe a scoring model that supports direct mail promotions, targeting potential e-commerce customers for a major pharmacy benefit manager (PBM). Advanced data mining methods are applied across critical PBM data marts to determine attributes that influence customer behavior. The model may potentially reduce direct mailing costs by 40%.

5) withdrawn - author request of 10/6, ***Eric C. Jackson***, Michigan State University, Eli Broad Coll. of Bus., East Lansing, MI 48824, jacks351@pilot.msu.edu, ***Ram Narasimhan***, ***David Mendez***

SC40 Statistics & Quality Control

Contributed Session

Chair: M. Jeya Chandra, Pennsylvania State University, 310 Leonhard Bldg., University Park, PA 16802, mjc3@psu.edu

1) Multivariate Capability Indices using Process-Oriented Basis Representations, ***Earnest J. Foster***, Pennsylvania State University, 905-F West Aaron Dr., State College, PA 16803, ejf131@psu.edu, http://www.personal.psu.edu/faculty/e/j/ejf131/, ***Russell R. Barton***

Negotiations between a manufacturer and a parts supplier often involve the length of time the manufacturer is contractually held to its order quantity. We find conditions under which the manufacturer is better off with a contract that requires an early commitment to its order quantity, before the supplier commits resources.

2) SPC for Multivariate Batch Processes with Mid-Bath Intervention, ***Robin C. Wurl***, Rutgers University, 96 Frelinghuysen Rd., Piscataway, NJ 08854, wurl@rci.rutgers.edu, ***Susan L. Albin***

Consider multivariate batch processes where one can intervene during each batch and there is significant time between batches. We construct control charts to monitor within-batch and the batch-to-batch variation, taking into account autocorrelations within a batch. We use PLS models and bootstrap techniques and apply the method to filament extrusion.

3) A Weibull Regression Model using Nomimal-the-Best Quality Characteristics as Covariates, ***M. Jeya Chandra***, Pennsylvania State University, 310 Leonhard Bldg., University Park, PA 16802, mjc3@psu.edu, ***Murray M. Smith***

A model to capture the effects of quality characteristics on the lifetime of a product is formulated. The lifetime distribution of an individual item, conditional on the values of certain quality characteristics, is Weibull. The rate parameter is a function of the capability indices of the quality characteristics.

4) Constructing a Double Sampling X-Bar Control Chart for Agile Manufacturing using a Genetic Algorithm, ***David W. He***, University of Illinois, Dept. of Mech. Eng., MC 251, 842 West Taylor St., Rm. 3049, Chicago, IL 60607-7022, davidhe@uic.edu

Double sampling (DD) x-bar control chart is designed to allow quick detection of a small shift of process mean and provides a quick response in an agile manufacturing environment. A new formulation for constructing an optimal DD x-bar control chart is developed and solved with a GA.

5) Process Investment & Loss Functions: Models & Analysis, ***Shailesh S. Kulkarni***, University of North Texas, BCIS Dept., Box 305249, Denton, TX 76203-5249, kulkarni@unt.edu, ***Victor R. Prybutok***

Recent studies have looked at process variance reduction from a non-traditional Taguchi quality cost perspective. We propose an alternative to Taguchi variance reduction models. We develop analytical models and investigate structural properties. We derive optimal investment levels for reduction in process variance and provide several practical insights.

SC41 Tutorial: The Roundtable Presents - Small Business Innovative Research Grants & How to Win Them

Sponsor: INFORMS Roundtable

Sponsored Session

Chair: Joseph H. Discenza, SmartCrane, Inc., a Daniel H. Wagner Associates Company, 2 Eaton St., Ste. 500, Hampton, VA 23669, joeh@discenza.com

1) Tutorial: The Roundtable Presents Small Business Innovative Research Grants & How to Win Them, ***Joseph H. Discenza***, SmartCrane, Inc., a Daniel H. Wagner Associates Company, 2 Eaton St., Ste. 500, Hampton, VA 23669, joeh@discenza.com

Small business innovative research programs provide opportunities for practitioners, new graduates and university departments to obtain seed funding for investigation of new methods and development of new commercial products. This tutorial will cover topic selection, proposal writing and strategies for commercialization.

SC42 No Title Supplied

Sponsor: Technology Management Section

Sponsored Session

Chair: Victoria L. Mitchell, Ohio State University, Acct. & MIS, Fisher Coll. Bus., 2100 Neil Ave., Columbus, OH 43210, mitchell@cob.ohio-state.edu

1) Technology Business Incubation in North America: Prospects for Cooperation in Regional Business Development, ***Sarfraz A. Mian***, SUNY, Sch. of Business, Oswego, NY 13126, ***Leonel Corona***, ***Jerome Doutriaux***

We present preliminary results of our recent survey of selected technology business incubation facilities from the NAFTA region. Focusing on tenant entrepreneurs from these facilities, the data was collected from multiple university, private sector and government stakeholders. The study reveals some unique characteristics of the incubated firms and their nurturing environment, providing insights for the existing and new entrepreneurs...

2) Architectural Competence & Business Platform Change: A Knowledge Perspective, ***Victoria L. Mitchell***, Ohio State University, Acct. & MIS, Fisher Coll. Bus., 2100 Neil Ave., Columbus, OH 43210, mitchell@cob.ohio-state.edu

Architectural knowledge refers to an understanding of how the components of a system are integrated. Architectural competence refers to an organization's ability to manage architectural knowledge. We refine the measure for architectural competence and measure its impact on evolving business platforms.

SC43 Risk Management III

Contributed Session

Chair: Reinhart Schmidt, University of Halle, Dept. of Finance & Banking, Universitatsplatz 8, Halle, D-06099, Germany, reinhart.schmidt@wiwi.uni-halle.de

1) An Application of Dynamic Programming on Investments Involving Risk, ***Silvio R. B. de Gouvea***, Billiton Metais SA, Praia de Botafogo 228, 4th Fl., Rio de Janeiro, 22359-900, Brazil, silvio@billiton.com.br, ***David Benarroch***

We suggest an application of dynamic programming in resource allocation on investment funds in the presence of risk. The degree of risk and the adjusted net worth of 34 financial institutions are analyzed, taking into account legal and market constraints (in Brazil).

2) Managing Electricity Reliability Risk through the Futures

Markets, ***Afzal S. Siddiqui***, University of California, 2299 Piedmont Ave., Apt. 744, Berkeley, CA 94720, afzal@ieor.berkeley.edu, http://www.ieor.berkeley.edu/~afzal

In order to characterize the behavior of market participants in a competitive electricity market with reliability requirements, we model spot and futures markets for both electricity and ancillary services. We evaluate the optimal level of trading as well as the equilibrium prices in each market.

3) Shareholder Value-at-Risk: Valuation of Corporate Strategies under Chance-Constraints, ***Reinhart Schmidt***, University of Halle, Dept. of Finance & Banking, Universitatsplatz 8, Halle, D-06099, Germany, reinhart.schmidt@wiwi.uni-halle.de, ***Lars Schiefner***

A multiperiod corporate planning model under risk is developed for the evaluation of a firm's value for alternative sets of strategies. Using stochastic simulation, the probability distribution of the firm value and other probabilities are derived. Individual investors' preferences are used to compute shareholder values.

SC45 Software Demonstration I

Software Demo Session

Chair: Sam L. Savage, Stanford University, Dept. of MSE, 417 Terman Eng. Ctr., Stanford, CA 94305-4023, savage@stanford.edu

Co-Chair: James Fitzsimmons, Mcgraw-Hill/Irwin, jfitz@mail.utexas.edu

1) INSIGHT.xla: Business Analysis Software, ***Sam L. Savage***, Stanford University, Dept. of MSE, 417 Terman Eng. Ctr., Stanford, CA 94305-4023, savage@stanford.edu

INSIGHT.xla: Business Analysis Software for Microsoft Excel is a suite of Excel add-ins for simulation, decision analysis, forecasting, queueing and optimization. Sam Savage will demonstrate how easy it is to use INSIGHT with practical illustrative examples and discuss how INSIGHT with its accompanying textbook can be used in the classroom.

2) Effective Use of Simulations in Teaching Service Operations Management, ***James Fitzsimmons***, McGraw-Hill/Irwin, jfitz@mail.utexas.edu

The attributes and advantages of ServiceModel, the professional simulation software from the ProModel Corporation, will be addressed along with how Professor Fitzsimmons has integrated its use into his course on service management. As time permits, we will also demonstrate various electronic solutions, available from McGraw-Hill, to implement online courses.

SC46 COIN Installfest for Windows: A Hands-On Workshop using Open Source Software for OR

Chair: Laszlo Ladanyi, IBM Research, TJ Watson Research Ctr., PO Box 218, Rte. 134, Yorktown Heights, NY 10598, ladanyi@us.ibm.com

1) Installation & Use of Common Optimization INterface (COIN): Windows, ***J. P. Fasano***, IBM Research, TJ Watson Research Ctr., Rte. 134, Yorktown Heights, NY 10598, jpfasano@us.ibm.com, ***Laszlo Ladanyi***, ***Robin Lougee-Heimer***, ***Matthew J. Saltzman***

COIN is an initiative to promote open source software for OR. Bring your Windows laptop and network card to participate in this hands-on workshop using open source components in the COIN repository. No Windows-laptop? Come observe and learn more about COIN. Visit http://oss.software.ibm.com/developerworks/opensource/coin for details and prerequisites.

Sunday 15:00-16:30

SD01 Marketing & Decision Making

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Jianmin Jia, Chinese University of Hong Kong, Dept. of Mktg., Shatin, NT, Hong Kong, jjia@cuhk.edu.hk

1) Retail Loyalty Programs, ***David Bell***, Harvard Business School, Morgan Hall 171, Soldiers Field, Boston, MA 02163, dbell@hbs.edu

The latest retail fashion: e-commerce, has eclipsed the last one: loyalty programs. Are they working? How are they supposed to work? The first half of the presentation will be ruminations on the issue, the second half will be results from a simple model of the situation.

2) Learning-Based Theories of Reputation-Building in Repeated Games: Scaring Competitors & Building Trust, ***Colin Camerer***, Caltech, Div. Humanities & Social Sci., Pasadena, CA 91125, camerer@hss.caltech.edu, ***Teck-Hua Ho***, ***Juin Kuan Chong***

We extend adaptive theories of learning in repeated one-shot games to games in which one "teacher" plays with a series of learner students, so the teacher has an economic incentive to sacrifice short-run payoffs to teach what strategies do not pay. We use 2 examples: building a reputation for toughness by fighting entry attempts and building a reputation for trust by repaying loans.

3) Consumer Regret Following Switch vs. Repeat Deicsions in Outcome Sequences, ***J. Jeffrey Inman***, University of Pittsburgh, Katz. Grad. Sch. of Bus., Pittsburgh, PA 15260, jinman@bus.wisc.edu, ***Marcel Zeelenberg***

Decision-making literature has consistently reported that decisions to maintain the status quo tend to be regretted less than decisions to switch. We examine the consequences of repeat purchases (maintaining the status quo) vs. switching in the context of information about prior consumption experiences, arguing that there are also situations where regret may be greater in the case of repeat purchases.

4) Consumer Preference Uncertainty: Measures of Attribute Conflict & Extremity, ***Jianmin Jia***, Chinese University of Hong Kong, Dept. of Mktg., Shatin, NT, Hong Kong, jjia@cuhk.edu.hk, ***Mary Frances Luce***, ***Gregory W. Fischer***

We investigate preference uncertainty as a function of stimulus characteristics such as attribute conflict (discrepancy among the attributes of an alternative) and attribute extremity (very high or low attribute values). Based on a random additive multi-attribute utility model, we derive formal measures of attribute conflict and attribute extremity and test our measures empirically using consumer purchase contexts...

SD02 Computation & Graphic Layout

Sponsor: Decision Analysis Society
Sponsored Session

Chair: Ross D. Shachter, Stanford University, Dept. of MS & Eng., Serra House, Stern Hall, Stanford, CA 94305-4026, shachter@stanford.edu

1) A Qualitative Linear Utility Theory for Spohn's Theory of Epistemic Beliefs, ***Phan Giang***, University of Kansas, Sch. of Bus., Summerfield Hall, Lawrence, KS 66045-2003, pgiang@ukans.edu, ***Prakash P. Shenoy***

We formulate a qualitative "linear" utility theory for lotteries in which uncertainty is expressed qualitatively using a Spohnian disbelief function. We argue that a rational decision maker facing an uncertain decision problem in which the uncertainty is expressed qualitatively should behave so as to maximize "qualitative expected utility..."

2) Micro-Dynamic Simulataion for Information Gathering, ***Kazuo J. Ezawa***, Mondex International Ltd., Atlantic Tech. Ctr., Ste. 109, 100 Campus Dr., PO Box 972, Florham Park, NJ 07932-0972, kazuo.ezawa.mondex@worldnet.att.net

One of the critical parts of the decision analysis is information gathering. In the world of new products and services development, there is information even beyond the expert judgement/opinion, or the situations where the expert opinions cannot be easily substantiated. We discuss micro-dynamic simulation for information gathering for decision making and the evaluation/quantification of expert opinions...

3) An Influence Diagram Model for Breast Cancer Screening, ***Ross D. Shachter***, Stanford University, Dept. of MS & Eng., Serra House, Stern Hall, Stanford, CA 94305-4026, shachter@stanford.edu, ***Elizabeth Burnside***, ***Daniel Rubin***

Mammography is the best diagnostic technology currently available to decrease the mortality and morbidity of breast cancer, but mammographic interpretations and subsequent decisions vary widely among radiologists. We are developing influence diagram tools based on the standardized BI-RADS lexicon for mammography reports to improve medical decision-making.

SD03 Pricing, Incentives & Channel Policies

Sponsor: MSOM
Sponsored Session

Chair: M. Eric Johnson, Dartmouth College, Tuck Sch. of Bus., Hanover, NH 03768, m.eric.johnson@dartmouth.edu

1) Channel Rebates, Promotional Effort & Coordination, ***Terry***

A. Taylor, Stanford University, Dept. of MS & Eng., Stanford, CA 94305, terry.taylor@stanford.edu, *Hau Lee*

A channel rebate is a payment from a manufacturer to a retailer based on retailer sales to consumers. We explore prospects for two commonly used forms of channel rebates, linear rebates and target rebates, to achieve channel coordination both when promotional effort influences stochastic demand and when it does not.

2) Supply Chain Structures on the Internet: Marketing-Operations Coordination, *Serguei Netessine*, University of Rochester, Simon Sch. of Bus., Rochester, NY 14627, netessinse@ssb.rochester.edu, *Nils Rudi*

The development of the Internet resulted in the possibility of disintermediation of information flow and physical goods flow. As a result, alternative supply chain structures arise where the retailer is primarily concerned with the customer acquisition and the wholesaler takes care of inventory and fulfillment. We introduce and analyze such supply chains.

3) Rolling Mix Strategies, *M. Eric Johnson*, Dartmouth College, Tuck Sch. of Bus., Hanover, NH 03768, m.eric.johnson@dartmouth.edu

Rolling mix schemes where retailers receive an assortment of ever-changing products is a popular marketing strategy for toys and collectibles. We examine this strategy from a supply chain perspective and consider its applicability to other products.

SD04 MSOM Fellows

Sponsor: MSOM
Sponsored Session
Chair: Ronald G. Askin, University of Arizona, Dept. of SIE, PO Box 210020, Tucson, AZ 85721-0020, ron@sie.arizona.edu

1) Designing & Delivering a University Course: A Process Management Perspective, *Edward A. Silver*, University of Calgary, Fac. of Mgmt., 2500 University Dr. NW, Calgary, Alberta, T2N 1N4, Canada, silver@mgmt.ucalgary.ca

Based on his extensive teaching experience, the speaker believes that it can be very useful for an instructor to carefully consider the processes that are used to design and deliver a university course. This presentation will emphasize a process management perspective of the design and delivery...

2) Project Work & Operations Management: Challenges & Implications, *Stephen C. Graves*, MIT, 77 Massachusetts Ave., Rm. E40-439, Cambridge, MA 02139-4307, sgraves@mit.edu

Much of my teaching and research over the last decade involves project work. This presentation will highlight some observations and learning from these experiences. I will also discuss some implications for both how we conduct model-based research in operations management and how we teach operations management.

SD05 Computational Finance

Sponsor: Applied Probability Society
Sponsored Session
Chair: Benjamin Van Roy, Stanford University, Terman 427, Stanford, CA 94307, bvr@stanford.edu

1) Calibration in Interest Rate Markets, *Yaser S. Abu-Mostafa*, Caltech., 136-93, Pasadena, CA 92115, yaser@caltech.edu, *Malik Magdon-Ismail*

We discuss the problem of calibrating multifactor Vasicek models to interest rate data; in particular, to swaps data. Of particular importance is the ability to extract the correct volatility term structure for the purposes of pricing interest rate options. We will demonstrate how conventionally used techniques are not successful, especially as the number of factors increases beyond two...

2) Tax-Aware Multi-Period Portfolio Optimization, *Dimitris Bertsimas*, MIT, Sloan Sch. of Mgmt., E53-359, OR Ctr., 50 Memorial Dr., Cambridge, MA 02139, dbertsim@mit.edu, *Georgia Mourtzinou*

We formulate the problem of optimally trading a taxable portfolio as a stochastic dynamic programming problem. Because of its dimensionality, we develop an approximation algorithm that can solve large scale problems involving thousands of assets over several periods. We show that optimal multi-period strategies outperform single period and buy-and-hold strategies.

3) Pricing American Options: A Comparison of Monte Carlo Simulation Approaches, *Michael C. Fu*, University of Maryland, Smith School of Bus., Van Munching Hall, College Park, MD 20742-1815, mfu@rhsmith.umd.edu, *Scott B. Laprise*, *Dilip B. Madan*, *Yi Su*, *Rongwen Wu*

We compare various Monte Carlo simulation-based approaches for pricing American-style derivatives on a common set of numerical problems. We also introduce another simulation-based approach that employs a simultaneous perturbation stochastic approximation algorithm.

4) Regression Methods for Pricing Complex American-Style Options, *Benjamin Van Roy*, Stanford University, Terman 427, Stanford, CA 94307, bvr@stanford.edu

A number of researchers have proposed methods for approximating pricing functions of high-dimensional American-style options. We discuss characteristics common to these methods and a key ingredient possessed by some that reduces approximation error dramatically. We also propose extensions to the methodology that should lead to further computational advantages.

SD06 Travel Models for Planning & Evaluation

Sponsor: Transportation Science Section
Sponsored Session
Chair: Chandra Bhat, University of Texas, Dept. of Civil Eng., ECJ 6.810, Austin, TX 78712, bhat@mail.utexas.edu

1) A Joint Model of Departure Time & Destination Choice for Non-Work Trips, *Michael Pozsgay*, University of Texas, 2425 Cromwell Cr. #1523, Austin, TX 78741, pozsgay@mail.utexas.edu, *Chandra Bhat*

Estimation of a joint model of destination choice and departure time choice is addressed for 4 home-based non-work trip purposes: social, recreational, non-grocery shopping and grocery shopping. Several variables, including individual socio-demographic attributes, transportation system characteristics and geographic location variables, are considered. Implications for transportation policy and travel forecasting are discussed.

2) A Hierarchical Approach for Performance & Institutional Evaluation, *Stephen P. Mattingly*, University of Alaska, Dept. of Civil & Environ. Eng., PO Box 755900, Fairbanks, AK 99775-5900, ffspm@aurora.uaf.edu, *R. Jayakrishnan*, *Michael G. McNally*

We offer a new hierarchical approach for transportation evaluation. Decision-theory can be adapted through this approach to properly assess qualitative and institutional issues as well as technical factors. The technique simplifies the process and creates an overall framework that allows for comparisons typically not considered in cost-benefit analysis.

3) Emerging Dynamic Traffic Assignment Methods for Planning & Evaluating Transportation Network Operational Strategies, *Hani S. Mahmassani*, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712-1076, masmah@mail.utexas.edu, *Yi-Chang Chiu*, *Ahmded F. Abdelghany*, *Khaled F. Abdelghany*, *Nhan Huynh*, *Xuesong Zhou*

We present an overview of DYNASMART-P, a new generation of tools, based on dynamic traffic assignment methodologies to support transportation network planning and operations decisions. Different aspects of DYNASMART-P including methodological issues, modeling framework and model features and capabilities are presented.

4) A Freight Distribution Model for County-to-County Commodity Flows, *Aruna Sivakumar*, University of Texas, 109 West 39th St., Apt. 111, Austin, TX 78751, arunas@mail.utexas.edu, *Chandra Bhat*

A quasi-likelihood approach is formulated for modeling the fraction of freight produced at an origin node that is destined to each of several consumption nodes. The approach is applied to analyze county-to-county freight commodity flows within Texas and between Texas counties and neighboring states/Mexico. The Reebie freight database is used in the analysis.

SD07 Improving Intuition through Interactive Models

Sponsor: INFORM-ED
Sponsored Session
Chair: Sam L. Savage, Stanford University, Dept. of MSE, 417 Terman Eng. Ctr., Stanford, CA 94305-4023, savage@stanford.edu

1) OR in Pictures, *Jeffrey D. Camm*, University of Cincinnati, QAOM Dept., ML 0103, Cincinnati, OH 45221-0130, jeff.camm@uc.edu

Through a portfolio of examples, we illustrate how to easily use the visualization capabilities in Microsoft Excel to enhance student understanding of basic MS/OR concepts.

2) Integrated Excel Text & Demonstrations, *David W. Ashley*, University of Missouri, Bloch Sch. of Bus./Pub. Admin., 5100

Rockhill Rd., Kansas City, MO 64110-2499, ashleyd@umkc.edu

Text, text boxes, comments, visual basic, formulas and graphics can all be used within Excel to create pedagogical documents that enhance student learning. We address instructional materials dealing with queueing, simulation, optimization and mathematics review, as well as pros and cons relative to other formats.

3) Blitzograms: Interactive Histograms, *Sam L. Savage*, Stanford University, Dept. of MSE, 417 Terman Eng. Ctr., Stanford, CA 94305-4023, savage@stanford.edu

By interacting with probability distributions, can we learn more about them?

SD08 Business Applications

Contributed Session

Chair: Hernan Wurgaft, Industria Technologies LLC, 5116 Simpson Lake Rd., West Bloomfield, MI 48323, hernanw@industriatechnologies.com, www.industriatechnologies.com

1) Cadet Summer Research Program: A Lesson in how Forecasting is Really Done, *Carlin R. Bevan*, US Air Force, 2354 Fairchild Dr., Ste. 6D2A, USAFA, CO 80904, c01carlin.bevan@usafa.af.mil, ***Robert N. Gilchrist***

The USAFA provides Cadets the opportunity to apply OR techniques with both military and non-military organizations. My recent experience in business shows the random guessing game that one corporation uses to predict future sales and the strides they are taking to incorporate formal forecasting and modeling techniques into their decision making.

2) A Decision-Analytic Framework for Evaluating Natural Gas Storage Value, *L. James Valverde*, Lukens Consulting Group, Inc., 2100 West Loop South, Ste. 1300, Houston, TX 77027, jvalverde@lukensgroup.com, www.lukensgroup.com

Strategic valuation of natural gas storage presents decision-makers charged with managing such assets with a host of challenges. In systematically managing gas storage, decision-makers must consider current market prices, as well as the possibility of favorable price movements during the valuation period. The stochastic nature of gas prices, however, makes reliable inferences about market dynamics inherently difficult...

3) Determining Optimal Daily Staffing Levels for the Whistler/ Blackcomb Ski School, *Martin L. Puterman*, University of British Columbia, Ctr. for Op. Excellence, 2053 Main Hall, Vancouver, BC, V6T 1Z2, Canada, marty@coe.ubc.ca, ***David W. Glenn*, *Stanley Tse*, *Isabelle Smith***

The daily variability of lesson volume makes it difficult and time consuming for management to determine the number of instructors to schedule. We describe models developed to set daily staffing levels based on demand forecasting and newsvendor inventory models and a computer-based tool developed for use in the 2000/2001 season.

4) Formulating Corporate Strategy with Collaborative Scenarios, *Hernan Wurgaft*, Industria Technologies LLC, 5116 Simpson Lake Rd., West Bloomfield, MI 48323, hernanw@industriatechnologies.com, www.industriatechnologies.com

A common problem in using mathematical models to formulate corporate strategy is how to supply the models with meaningful information consistently. This information is contributed by executives in different functional and geographical areas. We discuss software architecure and business processes that are required to collectively build scenarios and formulate strategy.

SD09 Applications of Revenue Management II

Sponsor: Revenue Management Section
Sponsored Session

Chair: Ying Kang, PROS Revenue Management, 3223 Smith St., Ste. 100, Houston, TX 77006, ykang@prosrm.com

1) Revenue Management for Tourism Small- & Medium-Sized Enterprises, *Michael Mulvey*, Dublin Institute of Technology, Dublin 1, Ireland, www.dit.ie

The tourism industry in the European Union is dominated by SMEs that make up 95% of the sector. RM is one area where SMEs are endeavoring to deploy in a way which is meaningful and feasible for small-scale operators. We propose a model of how RM can be used in the context of e-commerce and tourism destination management systems.

2) Extensions of Dynamic Pricing in Manufacturing & Retail Industries, *Julie L. Swann*, Northwestern University, IE/MS Dept., 2145 Sheridan Rd., Evanston, IL 60208-3119, jls751@merle.acns.nuw.edu, ***Lap Mui Chan*, *David Simchi-Levi***

Dynamic pricing has become a popular tool in manufacturing and retail industries to increase profits and decrease demand variability. We extend dynamic pricing models to include considerations such as lead time and multiple products and present new computational analysis regarding the impact of dynamic pricing on the supply chain.

3) Price-Directed Coordination of Replenishments, *Dan Adelman*, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637, dan.adelman@gsb.uchicago.edu

The idea of price-directed control is to use a policy that exploits optimal dual prices from a mathematical programming relaxation of the underlying control problem. In the context of industrial gas distribution, we use prices to coordinate inventory replenishments over time and across items/locations so as to minimize replenishment costs.

4) PROS Capacity Management System: A Real Revenue Management Application & Implementation, *Ying Kang*, PROS Revenue Management, 3223 Smith St., Ste. 100, Houston, TX 77006, ykang@prosrm.com, ***Viroj Buraparate***

We will describe and introduce the first successful application and implementation of RM system for energy industry by PROS Revenue Management Inc. Some interesting discussions and findings of modeling research and business development efforts are also included.

SD10 Optimization & Scheduling II

Cluster: Scheduling
Invited Session

Chair: Qing Liu, AT&T Bell Laboratories, 379 Campus Dr., Rm. 2B212, Somerset, NJ 08873, qliu@att.com

1) A Partnership Selection Model for Supply Chains, *Shuguang Liu*, Rutgers University, Dept. of MS & IS, Newark, NJ 07102, shuguang@pegasus.rutgers.edu, ***Lei Lei***

We present a mathematical model for strategic selection of both upstream and downstream partners for supply chains with an objective to improve the supply chain performance. The model can be used to estimate the tradeoffs between overall cost savings along the supply chain and the lead-time from raw materials to end product to customers.

2) An Effective Algorithm for the Robotic Cell Cyclic Scheduling Problem with Two Machines & Time Window Constraints, *Qing Liu*, AT&T Bell Laboratories, 379 Campus Dr., Rm. 2B212, Somerset, NJ 08873, qliu@att.com

We propose a strong polynomial algorithm to solve the robotic cell cyclic scheduling problem with 2 machines and time window constraints. A 2-step procedure is presented to search for the optimal solution. An extension of the algorithm to solve the general robotic cyclic scheduling problem is discussed.

3) Scheduling the Workforce to Maximize Employee Satisfaction, *Anna Olecka*, Rutgers University, RUTCOR, 640 Bartholomew Rd., New Brunswick, NJ 08901

Improved retention is an important business goal in an environment with part -time workforce. High turnover increases training cost and decreases productivity. We present a 2-phase approach to a problem of optimal workforce scheduling. Phase 1 determines shift size, phase 2 assigns workers to shifts while optimizing their preferences.

4) Scheduling in Lean Manufacturing Environments, *Shrikant S. Panwalkar*, Purdue University, Krannert Sch. of Mgmt., 1310 Krannert Bldg., West Lafayette, IN 47907-1310, panwalkars@mgmt.purdue.edu

Lean manufacturing makes use of pull systems as opposed to push systems used in conventional manufacturing. An essential component of a lean manufacturing system is JIT; this in turn makes transportation and logistics different from the conventional system. Is scheduling done differently in lean manufacturing? We attempt to look at this question and find new areas for scheduling research.

SD11 Combinatorial (Bundle) Auctions

Cluster: Integer Programming
Invited Session

Chair: Steef L. van de Velde, Erasmus University, Rotterdam Sch. of Mgmt., PO Box 1738, Rotterdam, 3000 DR, The Netherlands, svelde@fac.fbk.eur.nl

1) Combinatorial Auctions from a Primal-Dual Perspective, *Andreas S. Schulz*, MIT, Sloan Sch. of Mgmt. & OR, BLdg. E53-361, 30 Acorn St., Cambridge, MA 02142-1320, schulz@mit.edu, ***Rudolf Muller***

An important aspect of the design of combinatorial auctions is the winner

determination problem. We take a look at primal-dual algorithms, which share 3 favorable properties: computed solutions are supported by individual item prices, corresponding payment schemes may enforce truth revelation and certificates of optimality of assignments are immediately available.

2) Complexity & Algorithms for Winner Assignment in Combinatorial Auctions, ***Rudolf Muller***, University of Maastricht, Dept. of Quantitative Econ., Maastricht, 6200 MD, The Netherlands, r.muller@ke.unimaas.nl, ***Stan van Hoesel***

We present an analysis of the complexity of the problem to assign bids to bidders in combinatorial auctions. We show that the case of identical assets can be solved in polynomial time. We give some computational results using integer linear programming formulations and heuristics

3) The Winners Determination Problem in Tendering Transportation Services, ***Steef L. van de Velde***, Erasmus University, Rotterdam Sch. of Mgmt., PO Box 1738, Rotterdam, 3000 DR, The Netherlands, svelde@fac.fbk.eur.nl, ***Roelof Kuik***, ***Linda van Norden***

The tendering process for outsourcing transportation of bulk chemicals can be seen as a combinatorial auction. We present an algorithm for the solution of the winners determination problem.

SD12 SCM: Innovative Solutions, Global Decisions

Cluster: **Logistics & Supply Chain Management**
Invited Session
Chair: Lisa A. Ferguson, Hofstra University, Dept. of Mgmt. & General Bus., 228 Weller Hall, Hempstead, NY 11549

1) A Model for Supply Chain Performance Measurement, ***Abby Ghobadian***, Middlesex University, The Business Sch., The Burroughs, London, NW4 4BT, UK, a.ghobadian@mdx.ac.uk, ***David Gallear***, ***Rose Li***

Increased global competition and the perceived advantage in purchasing enjoyed by Japanese companies have heightened focus on SCM. A review of the literature suggests that there is no agreement as to the boundary of SCM. We have used Thomas & Griffin's (1996) stages of SCM: procurement, production and distribution. Each stage normally consists of several sub-activities...

2) Demand Side Performance Measures for the Supply Chain, ***Savas Ozatalay***, Widener University, 1 University Place, Sch. of Bus. Admin., Chester, PA 19013-5792

Most of the research in supply chain is contained in the supply side. Many companies that excel in producing their products experience financial difficulties. Many of these difficulties come from the mismanagement of the demand side. This study develops a series of performance measurements that companies can use in synchronizing demand and supply sides of the supply chain.

3) Breakthrough Business Models & their Creative Supply Chain Solutions, ***John H. Springer***, Dell Computer Corporation, One Dell Way, Round Rock, TX 78682, john_springer@dell.com

The emergence of new operating business models specifically direct to business/consumer distribution channels, mass customization, and high velocity supply chains, call for innovative process and internet supply chain solutions. During this presentation the speaker will provide both the challenges of managing in a direct environment along with leading edge supply chain management practices to ensure a positive customer experience while achieving balanced financial results.

4) Structuring Global Supply Chain Management Decisions, ***Lisa A. Ferguson***, Hofstra University, Dept. of Mgmt. & General Bus., 228 Weller Hall, Hempstead, NY 11549

This research provides guidelines for making global SCM decisions. The decisions are divided into the categories of strategic, tactical and operational decisions. We also present a comprehensive list of factors to consider when making global SCM decisions.

SD13 Recent Advances in Manufacturing Scheduling

Cluster: **Manufacturing & Logistics**
Invited Session
Chair: Philippe Baptiste, University of Technology of Compiegne, HeuDiaSyC, Ctr. Recherches de Royallieu, Compiegne Cedex, 60205, France, philippe.baptiste@hds.utc.fr

1) Scheduling Identical Jobs on a Multi-Purpose Machine with Uniform Speed, ***Emmanuel Neron***, Universite de Tours, Laboratoire d'Info., 64 av. Jean Portalis, Tours, F-37200, France, ***Alain Eloundou***

The problem we study deals with a real-life farming problem. For each parcels of a field, 3 operations have to be processed. These operations are submitted to precedence constraints and 2 types of machines are available. Our goal is to minimize the makespan. Heuristics and exact models will be presented.

2) Scheduling & Work-in-Process Control: An On-Line Approach, ***Fabrice Chauvet***, Bouygues Telecom, Europa L, 30 av. de l'Europe, Velizy, 78944, France

We propose to analyze a no-wait controllable processing times production systems. In such a system, the processing times can be selected in given time intervals. The proposed methodology allows one to control the WIP and production cycle time. The system productivity is optimized through original on-line algorithms.

3) Slack-Based Techniques for Robust Scheduling, ***Andrew J. Davenport***, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598

We present a number of techniques for generating robust schedules in the presence of stochastic machine breakdowns. These techniques make use of statistical characterizations of breakdowns to determine how much slack time to incorporate into a schedule. We present results of a simulation study of these techniques.

4) Exploiting Activity Interactions in Constraint-Based Scheduling, ***Philippe Laborie***, ILOG, 9 rue de Verdun, Gentilly Cedex, France

The properties that are sufficient to characterize a solution to a finite capacity scheduling problem fall into 2 categories: the ones based on the absolute positions of activities along the time axis (resource usage profile) and the ones that rely on the interactions between activities competing for the same resource (precedences between activities start/end times). We discuss, classify and compare the constraint programming techniques built on this second category of properties.

SD14 Airline Schedule Planning

Sponsor: **Aviation Applications Section/Transportation Science Section**
Sponsored Session
Chair: Diego Klabjan, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, klabjan@uiuc.edu

1) Robust Crew Scheduling: Move-Up Crews, ***Diego Klabjan***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, klabjan@uiuc.edu, ***Ellis L. Johnson***, ***Ladislav Lettovsky***

Due to the flight disruptions in operations, the crew scheduling cost at the end of a month is substantially higher than the projected cost in planning. We present a model and solution methodologies that produce more robust crew schedules in planning. We propose an objective function that captures the number of move-up crews, i.e. the crews that can be swapped in operations...

2) Scheduling Strategies for Improving Operational Robustness, ***Yanna Ageeva***, MIT International Center for Air Transportation, 77 Massachusetts Ave., Cambridge, MA 02139, yana99@mit.edu, ***John-Paul Clarke***

Lack of robust real-time decision-making tools in airline operations control centers has resulted in poor operational performance when faced with operational delays from severe weather and unexpected aircraft and personnel failures. Presently, airlines create "optimal" schedules that don't take into consideration possible weather and air traffic control delays, except through the addition of increased time buffers in block times and turn times...

3) Airline Fleet Assignment: An Alternative Model & Solution Approach, ***Amr Farahat***, MIT, OR Ctr., E40-130, Cambridge, MA 02139, afarahat@mit.edu, ***Cynthia Barnhart***, ***Manoj Lohatepanont***

We consider the airline fleet assignment problem where the objective is to determine a profit-maximizing assignment of fleet types to flight legs. We present and analyze a new formulation that more accurately models passenger spill and recapture, without some of the common associated computational difficulties. We discuss our new approach and provide preliminary results using data from a major airline.

4) Parc AirPlanner: Revenue ReTimer Module, ***Tom Richard***, Parc Technologies, Ltd., The Tower Bldg., 2nd Fl., 11 York Rd., London, SE1 7NX, UK, tom.richards@parc-technologies.com

Revenue ReTimer, the next generation of optimisers, focuses on refining flight timings with a view to maximising revenue. It is capable of handling slot holdings and risk, fleet availability and the main schedule feasibility issues. It has passed the first development milestone in June 2000 and testing on real data, involving up to 2500 flights in a standard week view, has shown revenue improvements of up to 20% using the tool.

SD15 Collaboration & Competition in Supply Chain Management

Cluster: Quantitative Models in Supply Chain Management
Invited Session

Chair: Greys Sosic, University of British Columbia, Fac. of Commerce & Bus. Admin., Operations & Logistics Div., Vancouver, BC, V6T 1Z2, Canada, greys.sosic@commerce.ubc.ca

1) Coordination Buyback & Competition, ***Mahesh Nagarajan***, University of Southern California, Dept. of Info. & Op. Mgmt., Marshall Sch. of Bus., Los Angeles, CA 90089, ***Yehuda Bassok***

We study "buyback" policies as a tool for channel coordination. We study a system with 1 manufacturer and 1 retailer. Using the Nash-bargaining concept, we show that buybacks are likely to be used when the retailer is "weak". We then study a system with 2 competing manufacturers. We show that when competition is intense at equilibrium, buybacks are not likely to be used.

2) A Three-Stage Model of a Decentralized Distribution System of Retailers, ***Greys Sosic***, University of British Columbia, Fac. of Commerce & Bus. Admin., Operations & Logistics Div., Vancouver, BC, V6T 1Z2, Canada, greys.sosic@commerce.ubc.ca, ***Daniel Granot***

We study the challenges involved in achieving both collaboration and truthful revelation of information about residual inventories in a 3-stage model of a decentralized distribution system. The distribution system consists of n retailers, each of whom faces a stochastic demand for an identical product and whom are willing to share residual inventories in order to increase profit.

3) The Value of Information Sharing in a Two-Stage Supply Chain with Production Capacity Constraints, ***David Simchi-Levi***, MIT, Dept. of Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1171, Cambridge, MA 02139, dslevi@mit.edu, ***Yao Zhao***

We consider a simple 2-stage supply chain with a single retailer facing iid demand and a single manufacturer with finite production capacity. We study the impact of information sharing on cost and service level as a function of the production capacity, and the frequency and timing in which demand information is transferred to the manufacturer.

4) Price & Delivery Frequency Competition in a Supply Chain, ***Albert Y. Ha***, Yale University, ***Lode Li***, ***Shu-Ming Ng***

We consider a system in which 2 suppliers compete for supplies to a manufacturer and analyze horizontal and vertical competition under different assumptions on how pricing and delivery frequency decisions are made. Our analysis sheds light on the strategic role of delivery frequency and the practice of JIT delivery.

SD16 Topics in Multicriteria Decision Making

Cluster: MCDM
Invited Session

Chair: Anne Davey, Northeastern State University, Coll. of Bus. & Industry, Tahlequah, OK 74464, davey@cherokee.nsuok.edu

1) The Elimination of Tradeoffs in Modern Business & Economics, ***Milan Zeleny***, Fordham University, GBA 626E, 113 West 60th St., New York, NY 10023-7484, zeleny@mary.fordham.edu

Tradeoff analysis is becoming one of the most important parts of modern business and economic decision making. We describe the global network economy and its need for tradeoff elimination on the part of producers and service providers. We then offer some conceptual and analytical tools of De novo programming for dealing with this goal.

2) Does the Choice of a Multiple Criteria Method Really Matter? , ***Adel Guitouni***, Defense Research Establishment Valcartier, Decision Support Tech. Section, 2459 Pie-XI Nord, Val-Belair, Quebec, G3J 1X5, Canada, adel.guitouni@drev.dnd.ca

Multi-criteria decision aid literature includes a panoply of discrete methods. Does the choice of a method for a specific decision really matter? We propose a framework based on MCDA methods and decision making situations. Since MCDA methods differ primarily at the level of aggregation, we consider multi-criteria aggregation procedures (MCAP).

3) Preference Issues in Group Decision Making, ***David L. Olson***, Texas A&M University, IOM Dept., 4217 TAMUS, College Station, TX 77843-4217, dolson@tamu.edu

4) Do Multiple Criteria Need to be Independent?, ***Larry Jenkins***, Royal Military College of Canada, Dept. of Bus. Admin., PO Box 17000 Stn Forces, Kingston, Ontario, K7K 7B4, Canada, jenkins-l@rmc.ca

In multi-criteria decision analysis, one aims to define the criteria to be as independent as possible. However, often the criteria that are most obvious, definable and measurable are not independent. We use a number of examples to explore where this lack of independence may be a problem.

SD17 Network Flows: Freight Applications

Cluster: Network Flows
Sponsor: Optimization Section
Sponsored Session

Chair: Tassio Carvalho, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, tassio@us.ibm.com

1) An Inverse Optimization Algorithm for Calibrating Railroad Block Impedances, ***Jeff D. Day***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, ***George L. Nemhauser***, ***Joel S. Sokol***

To calculate railroad block impedances so that each commodity routes on its unique shortest path, we consider a variation of the inverse multicommodity flow problem. We approximate a blocking plan with several aggregated networks. Because a given block may be shared between multiple networks, the joint optimization

2) Composite Variable Formulations for Express Shipment Service Network Design, ***Cynthia Barnhart***, MIT, OR Ctr., Rm. 1-229, 77 Massachusetts Ave., Cambridge, MA 02139, cbarnhar@mit.edu, ***Andrew P. Armacost***

We consider the problem of simultaneously determining aircraft routes, fleetings and packages flows for an overnight package carrier. We derive a composite variable formulation that implicitly captures package flows, detail the relationship between this strategy and traditional network design approaches and present computational results for real-world problem instances.

3) A Decomposition Algorithm for the Deterministic Dynamic Multicommodity Allocation of Empty Containers, ***Jawad Abrache***, DIRO/Universite de Montreal, CRT, CP 7128 Succ Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, ***Teodor Gabriel Crainic***, ***Michel Gendreau***

The allocation of empty containers to customer requests is an important problem encountered by container shipping companies in the management of their transportation operations. The problem addresses the short-term planning of empty container movements intended to satisfy customers requests and the need to reposition empties for future demand. We consider a dynamic model proposed for the deterministic formulation of the problem...

4) A Strategic Planning Model for River Barge Businesses, ***Richard C. Larson***, MIT, Ctr. for Advanced Ed. Services, Bldg. 9, Rm. 215, Cambridge, MA 02139, rclarson@mit.edu

A circulation flow linear program is developed to select optimal markets for river barges. The solution that maximizes net revenue routes the fleet of barges strategically over all alternative routes and product loads and includes deadheading. Computational results are included.

SD18 The Web: Consumers, Sites & Marketing Strategies

Cluster: E-Commerce
Invited Session

Chair: Patrali Chatterjee, Rutgers University, Dept. of Mktg., 180 University Ave., Newark, NJ 07102-1897, patrali@andromeda.rutgers.edu

1) Optimizing Web Sites using Randomized Experiments, ***Charles F. Hofacker***, Coll. of Bus.

Two important features of the WWW are it's dynamic nature and that visitors or consumers leave a digital record on the server. In combination, these characteristics allow marketing scientists to create elegant randomized experiments that can yield rapid and actionable results. We summarize the methodology and some early empirical findings.

2) No Title Supplied, ***Lisa R. Klein***, Rice University, Jones Grad. Sch., 225 Herring, 6100 Main St., Houston, TX 77005, ***Tracy B. Dennis***, ***Tenley O'Shaughnessy***, ***Deb Paul***

Most current research exploring consumer privacy concerns on the Web relies upon surveys. The research presented here examines consumer behavioral response to web site privacy claims through a controlled experiment. Results suggest that consumers do not rely heavily on Web site privacy claims when evaluating the trustworthiness of a Web site.

SD19 Forecast-Facilitated Operations in Supply Chains

Cluster: Technology Innovations & Operations
Invited Session

Chair: Layth C. Alwan, University of Wisconsin, School of Bus., Milwaukee, WI 53201, alwan@uwm.edu

1) Inventory Strategies of Online Retailers, ***Frank Y. Chen***, National University of Singapore, Dept. of Dec. Sciences, 10 Kent Ridge Crescent, Singapore, 119260, Singapore, fbachen@nus.edu.sg, ***S. H. Hum, C. H. Sim***

We consider inventory strategies of Internet retailers. The retailer faces options of holding her own inventory or outsourcing through the third party(ies). We evaluate these inventory strategies through mathematical modeling and numerical experiments. Built upon simple OR models, the numerical experiments reveal patterns consistent with those being practiced in the industry.

2) Supply Channel Design Based on Projected Market Diffusion, ***Dong-Qing Yao***, University of Wisconsin, Milwaukee, WI 53201, dyao@uwm.edu, ***John J. Liu***

The manufacturer's decision to sell directly to end-users has been the most controversial issue in supply chain reengineering. Some suggest the e-channel be the only choice, while just view it as one additional choice. We characterize the projected diffusion under e-channel and analyze whether the company can benefit from keeping both options. If yes, then how.

3) Forecast-Based Order Policies & Bullwhip Effect under AR(1) Demand, ***Layth C. Alwan***, University of Wisconsin, School of Bus., Milwaukee, WI 53201, alwan@uwm.edu, ***John J. Liu, Dong-Qing Yao***

We examine the relationship of forecast-based order policies and bullwhip effect in a simple supply chain under an AR(1) market demand. We show that under a direct-forecast ordering policy, the bullwhip effect can be subdued over time. We also demonstrate that the underlying inventory follows a non-stationary ARIMA process. Examples and comparisons with other common forecast-based order policies are presented.

4) Statistical Quality Methods to Reduce the Bullwhip Effect, ***Hancong Liu***, HKUST, Dept. of IEEM, Clear Water Bay, Kowloon, Hong Kong, hcliu@ust.hk, http://home.ust.hk/~hcliu, ***Kwok Tsui, Fugee Tsung***

An important supply chain research problem is the bullwhip effect caused by information distortion and variation amplification along a supply chain, which can lead to tremendous inefficiencies such as excessive inventory investment and lost revenues. Motivated by statistical quality methods, we propose a class of order-up-to policies and develop a nearly optimal policy to reduce the bullwhip effect.

SD20 Tabu Search in Design Problems

Cluster: Tabu & Scatter Search
Invited Session

Chair: Jose-Luis Gonzalez-Velarde, Monterrey Tech., Garza Sada 2501, Monterrey NL, 64849, Mexico, lugonzal@campus.mty.itesm.mx

1) Robust Capacitated Network Design, ***Ada M. Alvarez***, Universidad Autonoma de Nuevo Leon, Pedro de Alba s/n, Cuidad Universitaria, San Nicolas de Garza, CP 66450, Mexico

Designing a minimum cost network is a fundamental combinatorial optimization problem that arises in a wide variety applications; this is known to be NP-hard. The problem addresses how to configure a network and accounts for the fixed costs of arcs chosen to be in the network as well as the cost of routing goods through the network defined by the arcs...

2) Optimization of a Two-Dimensional Structure with Tabu Search, ***Edmundo T. Zavala***, Universidad de Sonora, Dept. Ing. Civil y Minas, Av. Rosales S/N Col. Centro, Hermosillo, Sonora, CP 83000, Mexico, ***Pedro Flores Perez, Angel Kuri Morales, Jose-Luis Gonzalez-Velarde***

Given a collection of joints and a corresponding collection of members connecting pairs of joints, find the cross sectional area of each member so the resulting structure has minimal weight and can accommodate a given load at each joint. We consider the case where the members are selected from a catalogue; this constraint makes this problem a discrete optimization problem... catalogue; this constraint makes this problem a discrete optimization problem...

3) Tabu Search for Wavelength Assignment Planning in WEM Optical Networks, ***Ramon Rodriguez-Dagnino***, Monterrey Tech., Garza Sada 2501, Monterrey NL, 64849, Mexico, ***Jose-Luis Gonzalez-Velarde***

We study a TS heuristic procedure for wavelength assignment is WDM multihop optical networks. The selection of the route with minimum delay is stated as a discrete optimization problem by several authors in the literature; however, most of the studies have focused on small number of nodes and TS has been barely considered for these applications. We report several experiments.

SD21 Session IV

Cluster: SICUP
Invited Session

Chair: Elita A. Mukhacheva, Ufa State Aviation Technical University, Karl Marx Str. 12, Ufa, Bashkortostan, 450000, Russia, elita@vmk.ugatu.ac.ru

1) Densest Translational Polygon Lattice Packing using Full Dimensional Cutting Planes, ***Victor J. Milenkovic***, University of Miami, Dept. of Math & Comp. Sci., PO Box 249085, Coral Gables, FL 33124, vjm@cs.miami.edu, http://www.cs.miami.edu

An algorithm and implementation is given for densest translation lattice packing of non-convex polygons: a layout which can be replicated without overlap at each point of a planar lattice. This algorithm is the first to use full dimensional cutting planes. It has useful applications in industry, particularly clothing manufacturing.

2) Optimal Double Lattice Placement of Polygons on a Plane, ***Yu Stoyan***, Ukrainian National Academy of Science, Math Modeling & Optimal Design, Mech. Eng. Problems Inst., Kharkov, 610046, Ukraine, stoyan@ipmach.kharkov.ua, ***V. N. Patsuk***

Considering translates of the polygons S and M by linear combinations of basis vectors a, b, g with coefficients no more than 1 ensure non-overlapping. The density maximum belongs to a 1-dimensional set (polygons being are congruent to 2 different polygons). In a special case simultaneous touching of S and S(a), M and M(b) can describe the solution.

3) Placement of Rectangles & Regular Polygons into a Strip taking into Account Errors of the Initial Data Problem, ***Yu Stoyan***, Ukrainian National Academy of Science, Math Modeling & Optimal Design, Mech. Eng. Problems Inst., Kharkov, 610046, Ukraine, stoyan@ipmach.kharkov.ua, ***T. Romanova***

It is necessary to place a set of objects (regular polygons or rectangles) into a strip taking into account size errors so that a length of the occupied part of the strip is minimal. On the basis of geometric design and interval analysis theory, solution methods are developed.

4) Exact Algorithms for Solving N-Dimensional Bin-Packing Problems, ***Elita A. Mukhacheva***, Ufa State Aviation Technical University, Karl Marx Str. 12, Ufa, Bashkortostan, 450000, Russia, elita@vmk.ugatu.ac.ru, ***Vadim M. Kartak, Lidiya I. Vasilyeva***

The N-dimensional parallel piped bin-packing problem is presented. The exact algorithm based on transforming ND bin-packing to N-binary matrices of a certain type have been developed. The method was then applied to figures consisting of set ND rectangles (gofr). Numerical experiments results are shown.

SD22 Health Care Quality & Long-Term Care

Sponsor: Health Applications Section
Sponsored Session

Chair: Sandra Potthoff, University of Minnesota, Carlson Sch. of Mgmt., Rm. 3-140, 321 19th Ave. South, Minneapolis, MN 55455-9940, potth001@tc.umn.edu

1) Home Web Use to Support Traumatic Brain Injury Family Caregivers & Patients, ***Armando James Rotondi***, University of Pittsburgh, 646C Scaife Hall, CCM Division, 200 Lothrop St., Pittsburgh, PA 15213, rotondi+@pitt.edu

We will present data from a randomized evaluation of WE CARE (Web Enabled Caregiver Access to Information and Education) which is an interactive Web site designed to support those who are providing home care to a family member with a severe traumatic brain injury.

2) withdrawn - author request of 10/10, ***Sharon Schweikhart***, Ohio State University, Hlth. Svcs. Mgmt. & Policy Div, Sch. of Pub. Hlth., 1583 Perry, Columbus, OH 43210-1234, schweikhart.1@osu.edu, ***Susan Meyer***

3) Preventing Human Immunodeficiency Virus Infections in Injection Drug Users: Allocationg Resources among Interventions & IDUs, ***Amy R. Wilson***, University of California, Dept. of IE&OR, 4135 Etcheverry Hall, Berkeley, CA 94720, amy@ieor.berkeley.edu,

James G. Kahn, Shmuel S. Oren

We discuss costs and benefits of targeting HIV prevention programs to IDU sub-populations, e.g., high-risk. Benefits depend on the definition of the sub-population. We develop a cost function that increases as the target population size decreases. We show how the optimal targeting and intervention policies vary with targeting costs.

4) The Relationship between Quality Management Practices & Performance in Long-Term Care Facilities, ***Sandra Potthoff***, University of Minnesota, Carlson Sch. of Mgmt., Rm. 3-140, 321 19th Ave. South, Minneapolis, MN 55455-9940, potth001@tc.umn.edu, ***Douglas Olson, John C. Anderson, Robert L. Kane, April Todd-Malmlov***

SEM is used to analyze survey data from 75 Minnesota nursing facilities to assess the relationship between quality management practices and resident satisfaction, employee satisfaction and financial performance.

SD23 Tutorial: Statistical Analysis of Simulation Output

Invited Session

Chair: David Goldsman, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, sman@isye.gatech.edu

1) Tutorial: Statistical Analysis of Simulation Output, ***David Goldsman***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, sman@isye.gatech.edu

The analysis of simulation output data is difficult - such output rarely satisfies the independence and normality assumptions one finds in standard statistics texts. We outline a number of ways around these problems. We also demonstrate these techniques on a number of real-world examples.

SD24 Application of Simulation in Material Handling Systems Design

Cluster: **Material Handling**

Invited Session

Chair: Douglas D. Gemmill, Iowa State University, Dept. of IMSE, Ames, IA 50011

1) Simulation of a Shop Floor Logistics System, ***Michael H. Cole***, University of Arkansas, 4207 Bell Eng. Ctr., Dept. of IE, Fayetteville, AR 72701, ***Terry R. Collins***

We will utilize simulation programming to further refine a multi-period model for the design and analysis of focused storage systems. The multi-period model will improve on past research in focused storage system designs by considering the dynamic nature of component demand. The new model will allow for multiple material handling modes, each with associated costs...

2) Development of a Simulation Module for Controlled Spacing Induction of Packages from Multiple Conveyor Lines, ***Taimour El-Cheikh***, University of Louisville, Dept. of IE, Louisville, KY 40292, ***M. R. Wilhelm***

We address the issue of designing induction conveyor systems by presenting the results of a study to design an induction sub-system simulator module. The characteristic events and variables of a typical induction conveyor control system are presented, as are the features of the simulation module developed.

3) Closed-Loop Overhead Conveyors in Two-Stage Automated Production Flow Lines, ***William E. Biles***, University of Louisville, Dept. of IE, Louisville, KY 40292-0001, webile01@gwise.louisville.edu

We discuss the application of computer simulation to the design of a closed-loop overhead monorail conveyor, which serves as buffer storage in a 2-stage automatic transfer line. We describe models to be used in predicting the various factors contributing to the inefficiency of the production flow line.

4) Container Handling Physical Process Reengineering in Maritime Terminals, ***Ardavan Asef-Vaziri***, Marquette University, Coll. of Bus. Admin., Milwaukee, ***Behrokh Khoshnevis***

We analyze the impact of instituting AS/RS, AGVS, a loop-based yard transportation network and a JIT inventory philosophy on the operations of maritime container terminals.

SD25 Sensitivity Analysis in Convex Optimization

Cluster: **Nonlinear Programming**

Sponsor: **Optimization Section**

Sponsored Session

Chair: Katya Scheinberg, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598

1) Perturbations of a Convex-Conic Program & Applications, ***Miguel S. Lobo***, Stanford University

We consider how changes in the parameters of a convex-conic program translate into changes in the optimal value of the program objective. If the optimal value is convex with respect to the parameters of interest, we obtain a subgradient that is a bi-linear function of the optimal primal and dual variables...

2) On the Sensitivity of Central Solutions in SDP, ***Shuzhong Zhang***, Chinese University of Hong Kong, Dept. of SEEM, Shatin NT, Hong Kong, zhang@se.cuhk.edu.hk, ***Jos F. Sturm***

We will discuss properties of the analytic central path of an SDP problem under the perturbation of the problem data. Various results are proven under the strictly complementary condition.

3) An Interior-Point Approach to Sensitivity Analysis, ***A. Emre Yildirim***, Cornell University, 288 Rhodes Hall, Ithaca, NY 14853-3801, yildirim@orie.cornell.edu, ***Michael J. Todd***

We present our ideas on incorporating interior-point methods into sensitivity analysis in LP and SDP. We propose an interior-point approach and show that it bears a nice relationship with the approach based on maintaining the optimal partition in LP and SDP, which seems to be a natural way of performing sensitivity analysis.

4) Classification of Self-Scaled Barrier Functions, ***Stefan Schmieta***, Columbia University, Comp. Opt. Research Ctr., Dept. of IE/OR, New York, NY 10027, schmieta@corc.ieor.columbia.edu, schmieta@firulete.ieor.columbia.edu

Self-scaled barrier functions are an important tool in the study of conic linear programming problems over symmetric cones. They are also closely related to Euclidean Jordan algebras. First we show that every self-scaled barrier function defines a Euclidean Jordan algebra. Then we use this algebra to obtain a complete classification of self-scaled barrier functions...

SD26 Stochastic Decision Processes

Cluster: **Stochastic Models & Applications**

Invited Session

Chair: Emmanuel Fernandez, University of Arizona, SIE Dept., Tucson, AZ 85721-0020, emmanuel@sie.arizona.edu

1) Risk-Sensitive Inventory Control Problems, ***Guadalupe Avila-Godoy***, University of Sonora, Dept. of Math., Hermosillo, Sonora, Mexico, avila@math.arizona.edu, ***Emmanuel Fernandez***

Motivated by the risk and variability introduced in the supply chain by short-term demand and market dynamics forecasts, we study an inventory control problem, under a stochastic demand process and with a risk (i.e., variance) sensitive optimality criterion.

2) Modularity & Monotone Solutions in Risk-Sensitive Stochastic Decision Processes, ***Emmanuel Fernandez***, University of Arizona, SIE Dept., Tucson, AZ 85721-0020, emmanuel@sie.arizona.edu, ***Guadalupe Avila-Godoy***

We consider controlled Markov chains models with a countable state space, under (exponential) total and discounted risk-sensitive cost criteria. A set of general conditions is presented to obtain monotonicity properties of value functions and optimal policies, based on submodularity arguments

3) Partially Observable Markov Decision Processes with Average Cost, ***Aristotle Arapostahis***, University of Texas, Electric. & Comp. Eng. Dept., Austin, TX 78712-1084, ari@mail.utexas.edu

We present a new set of sufficient conditions for the existence of optimal stationary policies for the ergodic control problem in partially observed Markovian systems. Results are applicable to risk-free and risk-sensitive controlled Markov chains as well as 0-sum stochastic games. A comparative review of existing results in the literature and how this work improves on them is also presented...

4) Inventory Allocation at a Semiconductor Company: Modeling & Optimization, ***Alexander O. Brown***, Vanderbilt University, Owen Grad. Sch. of Mgmt., 401 21st Ave. South, Nashville, TN 37203, alex.brown@owen.vanderbilt.edu, ***Grace Lin, Markus Ettl, David D. Yao***

We develop a multi-echelon, multi-item inventory allocation model for the use in the semiconductor industry. The problem is formulated as a constrained nonlinear program, so as to find the safety stock targets that optimizes a system-wide service measure subject to constraints on allowable inventory holding cost by echelon. We develop an efficient algorithm that finds the optimal solution...

SD27 Negotiation to Win-Win

Sponsor: **Women in OR/MS**

Sponsored Session

Chair: Robin Lougee-Heimer, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598-0218, robinlh@us.ibm.com

1) Negotiating Win-Win, ***Barbara A. F. Greene***, Greene & Associates, 1100 NW Loop 410, Ste. 700, San Antonio, TX 78213, barbara.greene@greeneandassociates.net, ***Megan Kromer***

Everything is negotiable. This interactive talk will focus on creating win-win solutions to everyday workplace challenges using the PIA method of negotiating. The presentation material is based on feedback from a pre-conference, internet survey of INFORMS members. Join us for a fun and skill-enhancing presentation.

SD28 What Defines the Success of OR Applications in the Railroad Industry II

Sponsor: RASIG
Sponsored Session
Chair: Ingrid Schultze, Reebie Associates, ischultze@reebie.com

1) What Defines the Success of OR Applications in the Railroad Industry II, ***Carl D. Martland***, MIT, Dept. of Civil & Environ. Eng., Rm. 1-153, Cambridge, MA 02139, ***Joe Bryan***, ***Martha Lawrence***, ***Richard Gray***

Carl Martland: Preliminary Remarks C - Railroad Costing - Moderator to be announced Consultant Perspective - Joe Bryan Industry Perspective - To be announced International Railroad Perspective - Martha Lawrence D - Terminal Capacity & Planning Carl Martland, Moderator: Overview of How We Measure Modeling Perspective - Carl Martland, MIT Industry Perspective - Richard Gray, Union Pacific

SD29 Modeling Generation & Transmission Planning in Electricity Markets

Sponsor: ENRE
Sponsored Session
Chair: Scott Rogers, University of Toronto, Dept. of MIE, 5 Kings College Rd., Toronto, Ontario, M5S 3G8, Canada, rogers@mie.utoronto.ca

1) Coalition Formation Methods in Transmission Expansion Planning: Bilateral Shapley Value & Kernel Approaches, ***J. Contreras***, Universidad de Castilla La Mancha, 13071 Ciudad Real, La Mancha, Spain, javier@ind-cr.uclm.es

We present a multi-agent-based system that provides a cooperation plan and its associated cost allocation scheme to assist transmission expansion planners in their decision making process. Among several coalition formation and cost allocation criteria, we have selected the bilateral Shapley value and the kernel approaches as theoretical foundations.

2) Modeling Inflow Uncertainty in Electricity Markets using Dynamic Programming & Complementarity Problem Techniques, ***Mariano Ventosa***, Universidad Pontificia Comillas, Inst. de Investigacion Tec., Alberto Aguilera 23, Madrid, 28015, Spain, mariano.ventosa@iit.upco.es,***AntonioGarcia-Alcalde***,***MichelRivier***, ***Andres Ramos***

We propose a new approach for addressing the long-term hydro-thermal coordination of an electricity generation company operating in a competitive market and inflow uncertainty context. The methodology employs the traditional SDP techniques, being the sub-models at each SDP stage stated in terms of a mixed complementarity problem in order to represent the electricity market equilibrium.

3) Private & Public Transmission Ownership & Investment, ***Amy B. Craft***, US Department of Justice, Antitrust Division, 600 East St. NW, Ste. 10-011, Washington, DC 20530, amy.craft@usdoj.gov

We discuss the long-run efficiency of various transmission ownership scenarios. Market power among energy service providers distorts nodal prices as a measure of transmission capacity's social value. Conversely, establishing optimal transmission ownership policy may curb this strategic behavior. This has particular implications for the design of regional transmission organizations.

4) GENCOMP 3.0: A Model of Competition among Generating Firms, ***Scott Rogers***, University of Toronto, Dept. of MIE, 5 Kings College Rd., Toronto, Ontario, M5S 3G8, Canada, rogers@mie.utoronto.ca

We describe a model of competition among electric generating firms. It allows different types of firms: strategic, traditional and supply curve and various classes of demand. It solves for a Nash equilibrium. Applications to real systems are described.

SD30 Web-Based Tactical Applications of OR II

Sponsor: Computing Society
Sponsored Session
Chair: Radhika Kulkarni, SAS Institute Inc., SAS Campus Dr., Cary, NC 27513, radhika.kulkarni@sas.com

1) Improving the Effectiveness of Testing in the Manufacture of Computers in a Make-to-Order System, ***Suheil Nassar***, Personal Systems Group, IBM, RTP, NC, nassar@us.ibm.com, ***Mike Newton***, ***Linda Hunke***, ***Vidyadhar G. Kulkarni***, ***Michelle Opp***, ***J. Scott Provan***, ***Shaler Stidham, Jr.***

We consider a computer manufacturing operation that includes a significant performance-testing component. We develop an integer programming formulation to decide the optimal set of tests to conduct so that the out-of-box quality level is maximized subject to a lower bound on the throughput. A detailed simulation model is developed to validate the optimal testing policies produced by the integer program.

2) Web-Basesd Collaborative Forecasting, ***Farah Marasigan***, Supply Chain Consultants, Inc., 5460 Fairmont Dr., Linden Green Ctr., Wilmington, DE 19808, fmarasigan@supplychain.com, ***Greg Werker***

Collaborative forecasting involves collecting and reconciling information from diverse sources to produce a unified statement of demand. The major technical challenge is reconciling different views of market demand. Most businesses have 2 organizations dealing with marketplace demand - sales views demand by customer and marketing views by product. Each group has several individuals managing the demand of their customers or products...

3) Cycle Time Reduction on the Web at Lockheed Martin, ***Dave S. Jennings***, Lockheed Martin, MS 5507, PO Box 179, Denver, CO 80201-0179, dave.s.jennings@lmco.com, ***Radhika Kulkarni***

Lockheed Martin's Astronautics Division has been using OR tools for several web-based applications to monitor the performance of the production systems used for building the Titan and Atlas missiles. We present a brief overview of these applications and describe some of the methods used in the Cycle Time Reduction project.

SD31 OR Modeling in Engineering Designs: Lectures in Honor of Carl M. Harris

Sponsor: Computing Society
Sponsored Session
Chair: Karla Hoffman, George Mason University, Systems Eng. & OR Dept., 4400 University Dr., MS 4A6, Fairfax, VA 22030, khoffman@gmu.edu, iris.gmu.edu/~khoffman

1) Optimal Reliability Allocation, ***Nozer D. Singpurwalla***, George Washington University, Sch. of Eng. & Applied Sci., 707 22nd St. NW, Washington, DC 20052, ***Jim Falk***, ***Yefim Vladimirsk***

An important issue in engineering design is reliability allocation leading to an interesting interplay between distribution theory and optimization. Each optimization problem boils down to finding the fixed points of a function within a unit hypercube. Crossing properties of star-ordered distribution functions are used to establish the existence of the fixed points.

2) Applying Predictive Dialing Methods to Real-Time Adaptive Control of Telecommunications Systems, ***Douglas A. Samuelson***, InfoLogix, Inc., 8711 Chippendale Ct., Annandale, VA 22003

Predictive dialing, used in outbound telephone call centers, is a special case of controlling queuing systems that initiate attempts to acquire customers. The real-time version of the solution offers considerable promise for controlling telecommunications systems for which conventional steady-state queueing models are intractable.

3) Time Critical Targeting using Bayesian Network Analysis, ***Mark Frymire***, Science Applications International Corp., Analysis & Support Div., 1710 SAIC Dr., MS 3-6-1, McLean, VA 22102

We present a complicated probability estimation problem coupled with Bayesian decision analysis in order to determine whether to attack a given mobile, high-value enemy ground target, based on the timing of intelligence obtained and the weapon's capabilities. The model is used to improve the efficiency of the difficult task of attacking transient targets.

SD32 Political Institutions & Firm Strategy

Sponsor: Organization Science Section
Sponsored Session

Chair: Brian Silverman, Harvard Business School, 243 Morgan Hall, Soldiers Field, Boston, MA 02163, bsilverman@hbs.edu

1) Organizational, Imitative & Network Learning of Political Hazards: Market Entry Strategies of Japanese Multinational Corps., 1990-97, ***Witold Henisz***, University of Pennsylvania, The Wharton Sch., 2021 Steinberg Hall, Philadelphia, PA 19104-6370, henisz@wharton.upenn.edu, ***Andrew Delios***

We perform a longitudinal examination of the relationship between political hazards in a prospective host country and the market-entry mode chosen by multinational corporations. We demonstrate that political hazards are an important determinant of entry mode but also that this relationship is moderated by the information possessed by the firm.

2) Modular Governance: Explaining the Effect of Information Technology on the Boundaries of the Firm, ***Jack A. Nickerson***, Washington University, Olin Sch. of Bus., 1 Brookings Dr., CB 1133, St. Louis, MO 63130-4538, ***Sergio G. Lazzarini***

Since new ITs reduce both external and internal transaction costs, their effect on firm boundaries is ambiguous. We propose a mechanism that explains unambiguously trends in vertical disintegration: increases in governance modularity due to new modular ITs. Modularity facilitates participation of multiple firms in a transaction through standardized interfaces, reducing expropriation problems even when asset-specificity is present.

3) A Positive Political Theory of Internet Corporate for Assigned Names & Numbers, ***Emerson Tiller***, University of Texas, Ctr. Bus., Technology & Law, MSIS Dept., CBA 5.202, Austin, TX 78712, emerson.tiller@bus.utexas.edu

We present a positive policy theory of the creation of ICANN and its policy for resolving domain names disputes. We suggest that while certain interests failed in advancing their interests regarding creation of domain name policy, they succeeded in designing ICANN to secure their policy interests in the execution of the disputed policy.

4) Business Groups & Risk Sharing around the World, ***Tarun Khanna***, Harvard Business School, Morgan Hall 243, Soldiers Field, Boston, MA 02163, ***Yishay Yafeh***

We investigate risk sharing by diversified business groups in 16 economies. We find that groups smooth members' income, but this effects magnitude is small. We find no correlation between extent of income smoothing and capital market development. This suggests that risk sharing is not the primary reason for ubiquity of business groups. We do, however, find evidence of substantial "liquidity smoothing" in one country.

SD33 Production Planning III

Contributed Session

Chair: Timothy J. Flynn, University of Alabama, Commerce & Bus. Admin. Coll., Box 870223, Hoover, AL 35487-0023, timjflynn99@aol.com, flynnt@proctr.cba.ua.edu

1) withdrawn - author requet of 9/18, ***Inneke Van Nieuwenhuyse***, University of Antwerp, Prinsstraat 13, Antwerp, 2000, Belgium, inneke.vannieuwenhuyse@ufsia.ac.be, ***An Dupon***, ***Nico J. Vandaele***, ***Marc R. Lambrecht***

2) Developing a Line Balancing Model of Product Costing for Manufacturing Industries, ***Massimo de Falco***, University of Lecce, Via Arnesano, Lecce, 73100, Italy, defalco@unina.it, ***Maria Elena Nenni***

We illustrate an evolutionary model of "product costing" focused on short- and medium-term control of idle capacity and line balancing. The model is subsequently analyzed in terms of its impact on production planning and on overall management. The model is validated with an application in a chemical industry.

3) Sequencing Jobs to Balance the Workforce in Paced Assembly Lines, ***Janice K. Winch***, Pace University, Lubin Sch. of Bus., One Pace Plaza, New York, NY 10038-1598, jwinch@pace.edu, http://webpage.pace.edu/jwinch, ***George L. Vairaktarakis***

An important objective in paced assembly lines is to smooth the workforce fluctuations from one production cycle to the next. Sequencing jobs to minimize such fluctuations is strongly NP-complete even in the case of 2 stations. For this case, we present heuristic algorithms.

4) Simulated Annealing for Mixed-Model Assembly Line Sequencing, ***Timothy J. Flynn***, University of Alabama, Commerce & Bus. Admin. Coll., Box 870223, Hoover, AL 35487-0023, timjflynn99@aol.com, flynnt@proctr.cba.ua.edu, ***John Mittenthal***

Mixed-model assembly implies workstations with variable processing times. In some lean environments, the processing times are also sequence dependent. A characteristic of dominant sequences for such a case is used to construct an efficient neighborhood structure. A simulated annealing algorithm and experimental results are presented.

SD34 Decision Analysis IV

Contributed Session

Chair: Robert W. Lawler, Boeing, 17513 155th Ave. SE, Renton, WA 98058, robert.w.lawler@boeing.com

1) Supply Contracts & Quality Choice in Food Chains, ***Severine Gaucher***, INRA ESR/CIRAD TERA, 65 Bd de Brandebourg, Ivry Sur Seine, 94205, France, gaucher@ivry.inra.fr, ***Louis Georges Soler***

We discuss ordering policies and their impact at the level of product quality in agro food chains. We show that without an early buyer's commitment, high quality production may be impossible. We then compare several flexibe contracts and their impact on the profits of the buyer and the supplier.

2) Subjectivity in Human Decision-Making, ***T. S. Chidambaram***, The Analytic Team, 6196 Oxon Hill Rd., Ste. 220, Oxon Hill, MD 20745, rajuateam@aol.com

Human decision-making is not merely an intellectual activity but also involves subjective layers of personality. Further, it has an element of unpredictability that is conceptually similar to the notion of superposition in quantum mechanics. Against this background, we discuss the role of objective DSSs such as OR/MS in decision-making.

3) A Decision-Analytic Approach for Prioritizing Second-Generation Molecules, ***Phillip Beccue***, Amgen, 1 Amgen Center Dr., MS 27-5-B, Thousand Oaks, CA 91320, phil@beccue.com

Prioritizing R&D projects often requires difficult tradeoffs among competing objectives. I will discuss a real application illustrating a rigorous, quantitative approach to selecting a preferred second-generation drug candidate. The project team used multi-attribute utility analysis to clarify the appropriate balance between safety, efficacy, convenience and cost.

4) An E-Business Frame for Decision Analysis, ***Robert W. Lawler***, Boeing, 17513 155th Ave. SE, Renton, WA 98058, robert.w.lawler@boeing.com

The transition from traditional business models to the business-to-business paradigm provides opportunities for improved financial returns, but introduces new legal and technical risks. Decision-makers often ignore these risks or delay decisions. We discuss issues that need incorporation into the frame and decision model.

SD35 Information Systems II

Contributed Session

Chair: Pedro R. Kanof, George Washington University, Sch. of Eng. & Applied Sci., 1669 32nd St. NW, Washington, DC 20007, pkanof@aol.com

1) Information Technology Infrastructure as a Strategic upon in Top Container Ports, ***Rafael M. Oliveira***, Fundacao Universidade Federal do Rio Grande, Gomes Freire 769, Rio Grande, RS 96200-470, Brazil, rmelloo@rgd.terra.com.br, ***Antonio G. Macada***

The IS literature shows the information technology infrastructure as a strategic upon. We investigate issues related to how IT is being used in top container ports and if the infrastructure differences among them result in competitive advantage.

2) Evaluating the Impact of Large-Scale Information Systems, ***Zeynep Onay***, Middle East Technical University, Dept. of Bus. Admin., Inonu Bulvari, Ankara, 06531, Turkey, onay@ba.metu.edu.tr, ***Cemal Akyel***

We present a 3-dimensional framework for assessing the effectiveness of the National Health Information System developed by the Ministry of Health of the Republic of Turkey. The framework constitutes a foundation for developing a comprehensive model for evaluating large-scale public information systems.

3) Reusable Software Patterns for E-Business Applications, ***June S. Park***, University of Iowa, Dept. of MS, 108 Pappajohn Bldg., Iowa City, IA 52242-1000, june-park@uiowa.edu, www.biz.uiowa.edu/faculty/jpark/jpark.html

A software pattern is a parameterized collaboration of classes. It can capture a repeatably usable design of a component of a business model. We present some patterns developed for e-business applications and discuss research issues in this field.

4) Planning E-Business Projects, ***Pedro R. Kanof***, George Washington University, Sch. of Eng. & Applied Sci., 1669 32nd St. NW, Washington, DC 20007, pkanof@aol.com

I focus on the modules that are required in an E-business project and defined their functions and interelationships. I discuss ways to access the market by exploring alternatives for each module and conclude by describing the process for planning and controlling the implementation phases of the solution.

SD36 Logistics Management II

Contributed Session

Chair: Chulung Lee, University of Waterloo, 200 University Ave. West, CPH4347-200, Waterloo, Ontario, N2L 3G1, Canada, chulung@engmail.uwaterloo.ca

1) Solving the Production-Distribution System Design Problem using an Interior-Point-Cutting-Plane Method, ***Samir Elhedhli***, McGill University, Fac. of Mgmt., 1001 Sherbrooke West, Montreal, Quebec, H3A 1G5, Canada, elhedhls@management.mcgill.ca, www.crt.umontreal.ca/~samir, ***Jean-Louis Goffin***

We propose a 2-level Lagrangean relaxation approach for the production-distribution system design problem, where master problems are solved using the analytic-center cutting-plane method (ACCPM). At the first level, ACCPM is used to solve the dual Lagrangean problem, while feasible solutions are generated using a primal heuristic. At the second level, ACCPM is incorporated into a B&P scheme.

2) Hierarchical Logistics & Manufacturing Frameworks, ***Tan Miller***, Warner-Lambert Co., 201 Tabor Rd., Morris Plains, NJ 07950, tan.miller@wl.com

We illustrate how standard OR methodologies such as optimization and simulation can be combined with qualitative information and spreadsheet-typed quantitative analyses to evaluate manufacturing and distribution network problems. We reviewed a sample of hierarchical manufacturing, distribution and transportation network design approaches used in real world applications.

3) A Simple Heuristic for Dynamic Order Sizing & Supplier Selection with Time-Varying Data, ***Horst Tempelmeier***, University of Cologne, Albertus-Magnus-Platz, Cologne, D-50923, Germany, tempelmeier@wiso.uni-koeln.de, www.uni-koeln.de/wiso-fak/spw/

We consider the problem of supplier selection and purchase order sizing for a single item under dynamic demand conditions. Suppliers offer quantity discounts which may vary over time. A new model formulation for this problem is developed and a simple but easily extendible heuristic procedure is presented and tested.

4) An Empty Trailer Repositioning Model, ***Ryan Orchard***, Schneider National Inc., PO Box 2666, Green Bay, WI 54306, orchardr@schneider.com, ***Bruce A. Gamble***

Intermodal freight movements often result in the accumulation of trailers in some markets while others experience shortages. An LP model with user-friendly interface is used at Schneider National to determine daily repositioning of trailers from surplus markets to deficit markets with the objective of maximizing net "value" while satisfying customer service requirements.

5) A Study on Product Locations for a One-Dimensional Storage Rack, ***Chulung Lee***, University of Waterloo, 200 University Ave. West, CPH4347-200, Waterloo, Ontario, N2L 3G1, Canada, chulung@engmail.uwaterloo.ca, ***Raymond G. Vickson***, ***Elizabeth M. Jewkes***

Order picking is probably the most important at distribution centers. Increasing throughput, pick accuracy and customer service is important while reducing the cost. Among factors that affect the system performance, storage locations are the most critical. We solve several problems of determining storage locations in a one-dimensional storage rack.

SD37 Optimization Techniques IV

Contributed Session

Chair: Jaya P. Moily, University of Baltimore, 1420 North Charles St., Merrick Sch. of Bus., Baltimore, MD 21201-5779, jmoily@ubmail.ubalt.edu

1) A Support Vector Machine for Regression & Applications to Financial Forecasting, ***Huseyin Ince***, University of Oklahoma, Sch. of IE, 202 West Boyd., Rm. 124, Norman, OK 73019-0631, ince@ou.edu, ***Theodore B. Trafalis***

We compare the SVM developed by Vapnik with other techniques such as back propagation and radial basis function networks for financial forecasting applications. The theory of the SVM algorithm is based on statistical learning theory. Training of SVMs leads to a quadratic programming problem. Preliminary computational results for stock price prediction are also presented.

2) Experimental Optimization in Flat Hot & Cold Rolling, ***Mohamed H. Gadallah***, Cairo University, Statistical Studies & Research, Giza, Cairo, 12613, Egypt, m_gadallah@hotmail.com

We offer a design methodology to integrate robust and experimental techniques with the flat hot and cold rolling process. Three major control parameters are considered: geometric, frictional and material parameters. The methodology is applied to process spread and out-of-straightness tolerances. An equivalent table showing maximum deviation range vs. process conditions is also produced.

3) A Network-Based Approach to the General Equal Flow Problem, ***Herminia I. Calvete***, Universidad de Zaragoza, Dept. de Metodos Estadisticos, Pedro Cerbuna 12, Zaragoza, 50009, Spain, herminia@posta.unizar.es

A simplex algorithm is developed for the general equal flow problem, a MCNF problem with additional side constraints requiring that the flow of arcs in some given sets of arcs takes on the same value. It exploits the network structure and requires only slight modifications of the network simplex algorithm.

4) A Direct Solution Approach for Linear Programs: Prior Identification of Binding Constraints, ***Jaya P. Moily***, University of Baltimore, 1420 North Charles St., Merrick Sch. of Bus., Baltimore, MD 21201-5779, jmoily@ubmail.ubalt.edu

Many problems in economics, business and management can be formulated as LPs. However, in the simplex and non-simplex methods for solving LPs, binding constraints are identified as a consequence, not as a means for obtaining the optimal solution(s). A measure for prior identification of a binding constraint is developed. Through successive problem reduction, all binding constraints are identified.

SD38 Industry Applications II

Contributed Session

Chair: David S. Kim, Oregon State University, Dept. of IME, Corvell Hall, Corvallis, OR 97331-2407, odomreggie@aol.com

1) Analysis of Maximum Flow Algorithms for the Optimal Contours of a Mine, ***Michel Gamache***, Ecole Polytechnique de Montreal, CP 6079 succ. Center-Ville, Montreal, Quebec, H3C 3A7, Canada, michel.gamache@courriel.polymtl.ca, ***Genevieve Auger***

The operating schedule problem in an open pit mine can be associated with the problem of maximal closure on a graph with resource constraints. The Lagrangian relaxation represents the most interesting approach to solve this problem. The subproblem resulting from the relaxation of the resources constraints is the classic maximal closure problem, which is solved by a maximal flow algorithm...

2) Overcoming Technical Challenges in Customized Enterprise Resource Planning/Advances Planning & Scheduling Data Integration, ***Udesh Jha***, PricewaterhouseCoopers LLP, 13201 South Wakial Loop 2082, Phoenix, AZ 85044, udesh.jha@us.pwcglobal.com, http://www.pwcglobal.com

We will highlight the technical challenges faced in developing customized interfaces between ERP (e.g. SAP RL/3) and APS systems (e.g. i2 SCP). One of the most critical elements of integrating the 2 systems is an early development of routines and processes to measure and improve data quality in the ERP database. We will discuss how prevalent designs rate in their robustness...

3) Effective Heuristics for Multi-Product Partial Shipment Models, ***Milind W. Dawande***, University of Texas at Dallas, PO BOx 830688, JO 4.7, Office 5.104, Richardson, TX 75082, milind@utdallas.edu, ***Nagesh Gavirneni***, ***Sridhar Tayur***

We consider 3 shipment models, motivated by real applications where multiple customers that ask for sets of products are satisfied from inventory in the best manner possible. The restrictions posed by the customers are that the first shipment be at least a minimum fraction of the total demand, that the second shipment (if any) should not be too small nor be further split...

4) Operations Research in an Engineering & Development Organization, ***David S. Kim***, Oregon State University, Dept. of IME, Corvell Hall, Corvallis, OR 97331-2407, odomreggie@aol.com

Applications of OR to decisions in the operation of an engineering & development organization is relatively new. We give an overview of various IE/OR problems/opportunities encountered at a large engineering organization.

SD39 Quality Management & Statistics I

Contributed Session

Chair: Danny I. Cho, Brock University, 500 Glenridge Ave., St. Catharines, ON, L2S 3A1, Canada, dcho@taro.bus.brocku.ca

1) Economic Design of QC Charts for a Production Line, ***Emre Berk***, Bilkent University, Isletme Fakultesi, Faculty of Bus. Admin., Ankara, 06533, Turkey, eberk@bilkent.edu.tr, www.bilkent.edu.tr/~eberk, ***Ozgur Toy***

We consider the economic design of QC charts for a group of machines (on a production line) facing random opportunities of inspection line stoppages). A single machine case is developed exactly. An approximate scheme is suggested for grouping machines as opportunity-takers and nontakers. Comparison with classic methods is presented.

2) Maximum Entropy Dirichlet Modeling of the Choice of a Long Distance Provider, ***Ehsan S. Soofi***, University of Wisconsin, Sch. of Bus. Admin., PO Box 742, Milwaukee, WI 53201, esoofi@uwm.edu, www.umw.edu/~esoofi/, ***Thomas A. Mazzuchi, Refik Soyer, Joseph J. Retzer***

We use MED procedure to model consumer choice of the long distance provider. The MED is a computer-intensive method that uses Dirichlet prior and various attribute constraints and produces loglinear and logit models, prior and posterior distributions for the model parameters and for the Kullback-Leibler information of the model fit.

3) Information Technology, Reengineering & TQM: Three Competitive Strategies for Success in Today's Business, ***Danny I. Cho***, Brock University, 500 Glenridge Ave., St. Catharines, ON, L2S 3A1, Canada, dcho@taro.bus.brocku.ca

IT, reengineering and TQM have changed our ways of doing business in this competitive, global business world. We study the strategic implications of using each of these fundamental but important business strategies. Secondly, we examine any synergies that an organization might foresee when applying any combination of these strategies. Finally, we identify several challenges that business managers might face in implementing these strategies.

SD40 Stochastic Processes

Contributed Session

Chair: Debra A. Elkins, General Motors R&D Center, 30500 Mound Rd., MC 480-106-359, Box 9055, Warren, MI 48090-9055, debra.elkins@gm.com

1) On the Asynchronous Convergence of Stochastic Approximation Dynamic Programming Schemes, ***Abhijit Gosavi***, University of Southern Colorado, 2200 Bonforte Blvd., Technology 261, Pueblo, CO 81001, gosavi@uscolo.edu, http://faculty.uscolo.edu/gosavi

We present results on the error of asynchronism in stochastic approximation based dynamic programming. In the same context, we also present a result on the diminishing error of 2 time scale effects. Finally, we establish bounds on some iterates, which are useful in their convergence analysis using ODE methods.

2) Bayesian Analyses of Nonhomogeneous Markov Chains, ***Minje Sung***, George Washington University, 4508-B Hazeltine Ct., Alexandria, VA 22312, sungmj@gwu.edu, http://gwu.edu/~sungmj, ***Refik Soyer***

We present a hierarchical Bayesian approach for analyses of time non-homogeneous Markov chains. The Markov chain model is used for describing transition behavior of emotionally disturbed children in a treatment program. We consider extensions of the model where the transition probabilities are functions of covariates as well as time. The developed methodology is applied to some real data.

3) Scheduling & Sequencing Customers in an Appointment System, ***Peter M. Vanden Bosch***, US Air Force, 15 East Cliff St., Alexandria, VA 22301-1936, pete.vandenbosch@pentagon.af.mil

An effective algorithm for optimizing the schedule of customers in an appointment system is presented. Service distributions are general and distinct. Cost is defined as a convex combination of customer waiting times and server idle time. Heuristics for sequencing customers are also discussed. Applications include JIT and medical appointment systems.

4) A Parallel Algorithm for Computing the Markov Renewal Kernel, ***Debra A. Elkins***, General Motors R&D Center, 30500 Mound Rd., MC 480-106-359, Box 9055, Warren, MI 48090-9055, debra.elkins@gm.com, ***M. A. Wortman***

We introduce a parallel algorithm for computing tight upper and lower bounds on the Markov renewal kernel. Our numerical results allow study of transient behavior of Markov renewal and semi-regenerative processes. Complexity analysis shows the algorithm to be of order O(k/2) speedup, when k processors are used.

SD41 The Daniel H. Wagner Prize for Excellence in OR

Sponsor: CPMS

Sponsored Session

Chair: Joseph H. Discenza, SmartCrane, Inc., a Daniel H. Wagner Associates Company, 2 Eaton St., Ste. 500, Hampton, VA 23669, joeh@discenza.com

1) Saving Tax Dollars for the Federal Government: Offsite Federal Employee Site Selection Software, ***Jeffrey L. Huisingh***, US Army, 34th Education Squadron, USAFA, CO, jeff.huisingh@usafa.af.mil, ***Harold M. Yamauchi, Randal J. Zimmerman***

2) Rebuilding the Coal Model in the Energy Information Administration's National Energy Modeling System, ***Melinda Hobbs***, Energy Information Administration, 1000 Independence Ave. SW, Washington, DC 20585, ***Michael Mellish, Frederic H. Murphy, Richard Newcombe, Reginald C. Sanders, Peter C. Whitman***

3) Optimal Design of a Data Offload Network, ***John Shortle***, Qwest Advanced Technologies, 4001 Discovery Dr., Boulder, CO 80303, jshortle@gmu.edu, ***Dennis C. Dietz, Paul A. Katz, Craig Williamson, Jim Koehler, Amie Elcan***

SD42 Journal of Quality Technology Papers Presentations

Cluster: Reliability & Quality Control

Sponsor: Quality, Statistics & Reliability Section

Sponsor/Invite Session

Chair: Robert L. Mason, Southwest Research Institute, 6220 Culebra Rd., San Antonio, TX 78228-0510, rmason@swri.edu

1) Non-Parametric Control Charts: An Overview & Some Results, ***Subha Chakraborti***, University of Alabama, schakrab@cba.ua.edu, ***Van der Laan, S. T. Bakir***

No abstract supplied.

2) Some Properties of EWMA Feedback Quality Adjustment Schemes for Drifting Disturbances, ***Enrique Del Castillo***, Pennsylvania State University, Dept. of IME, 310 Leonhard Bldg., University Park, PA 16802, exd13@psu.edu

No abstract supplied.

SD43 Research & Educational Issues in Management of Technology

Sponsor: Technology Management Section

Sponsored Session

Chair: Michael K. Badawy, Virginia Polytechnic Institute & State University, PO Box 2931, Merrifield, VA 22116-2931, mbadawy@vt.edu

1) Integrating Distance Learning Technology in an M.S. MOT Program, ***William T. Flannery***, University of Texas, Div. of Mgmt. & Mktg., 6900 North Loop, 1604 West, San Antonio, TX 78249, flannery@lonestar.utsa.edu, ***W. Austin Spivey***

The M.S. in Management of Technology program at UTSA offers "on-line" courses to meet the varying needs of its graduate students. We discuss our experiences in applying and integrating distance learning technologies to the task of developing and delivering the on-line program for remote students.

2) Some Educational Issues in Engineering & Technology Management Programs, ***Dundar F. Kocaoglu***, Portland State University, Engineering Mgmt. Program, Portland, OR 97207-0751, kocaoglu@emp.pdx.edu

We explore some of the issues involved in the design, development and delivery of educational programs in the field of engineering and technology management.

3) Managing Virtual Teams: An Educational Perspective, ***Margaret F. Shipley***, University of Houston, 1 Main St., Houston, TX 77002, shipley@dt.uh.edu, ***Shohreh Hashemi***

In a distance learning environment, managing virtual teams must address the issues of: communication, team leadership, inclusion or isolation of members, team building, process flow and deliverables and technical and emotional support. Results of student surveys are presented evaluating these and other challenges to virtual team membership.

4) Some Future Research Directions in Technology & Innovation Management, ***Michael K. Badawy***, Virginia Polytechnic Institute & State University, PO Box 2931, Merrifield, VA 22116-2931, mbadawy@vt.edu

We will assess the current status of technology and innovation management research and identify some paths for advancing the scholarly research in this field.

SD45 Software Demonstration II

Software Demo Session

Chair: Alkis Vazacopoulos, Dash Optimization, Inc., 135 West 27th St., 7th Fl., New York, NY 10001, alkis@dashopt.com

Co-Chair: Barry MacKichan, Mackichan Software, Inc., barry@mackichan.com

1) XPRESS-MP Version 12, ***Alkis Vazacopoulos***, Dash Optimization, Inc., 135 West 27th St., 7th Fl., New York, NY 10001, alkis@dashopt.com

We report on recent progress on XPRESS-MP, Dash's state-of-the-art software solution for modeling and optimization. Special attention will be given to the highlights of the new release 12, including model cuts, cut directives, quadratic programming, parallel barrier and parallel IP optimizers.

2) Increasing Your Productivity with Scientific Workplace 3.5, ***Barry MacKichan***, MacKichan Software, Inc., barry@mackichan.com

This presentation will cover the basic uses of Scientific WorkPlace 3.5 to write for publication, to compute and plot using the included computer algebra system (either MuPAD or Maple) and to publish mathematics on the Web. We will show a large number of examples.

Monday 08:15-09:45

MA01 The Balanced Scorecard

Sponsor: Decision Analysis Society

Sponsored Session

Chair: James L. Ritchie-Dunham, University of Texas, Dept. of MSIS, 3615 Aspen Creek Parkway, Austin, TX 78749, jimrd@sdsg.com

1) The Theory behind the Balanced Scorecard, ***James L. Ritchie-Dunham***, University of Texas, Dept. of MSIS, 3615 Aspen Creek Parkway, Austin, TX 78749, jimrd@sdsg.com

The BSC presents an attractive concept for measuring and managing organizational performance. We present current theoretically ungrounded BSC "best practice," as well as relevant theories that could strengthen it, such as multiple criteria decision making, means-ends analysis, statistical cause-effect methods, system dynamics and ERP systems.

2) Designing a Balanced Scorecard, ***Ralph L. Keeney***, University of Southern California, Ctr. for Telecomm. Mgmt., 101 Lombard St., Ste. 704W, San Francisco, CA 94111, keeneyr@aol.com

A BSC requires both a scorecard and balancing. Creating a scorecard requires selecting elements to score and measures to describe performance on elements. Balancing requires evaluating different performance levels on an element and equating levels across different elements. Value-focused thinking and multi-attribute utility provide conceptual foundations for these requirements.

3) Influence Diagram Models for the Balanced Scorecard, ***Ross D. Shachter***, Stanford University, Dept. of MS & Eng., Serra House, Stern Hall, Stanford, CA 94305-4026, shachter@stanford.edu

The BSC approach to measuring and managing corporate strategy lacks a specific methodology for implementation. Influence diagrams bring a solid theoretic foundation to the representation of the structure and numbers that capture the causal relationships and dependencies needed to implement the BSC. capture the causal relationships and dependencies needed to implement the BSC.

4) The Dynamic Scorecard: Objectives, Policies & Resources, ***Hal Rabbino***, SDSG LLC, 11915 Stone Hollow Rd. #1527, Austin, TX 78757, halr@sdsg.com, ***James L. Ritchie-Dunham***

The BSC "operationalizes strategy," suggesting a balanced policy set for achieving organizational goals over time. Developing policies about the accumulation and utilization of strategic resources over time requires dynamic thinking. This presents a forum for integrating periodic, value-focused decision making with policies about making decisions - DA meets SD.

MA02 Tutorial: Applying Advanced Integrated Real-Time DSSs to Help Airlines Move to the Next Level of Efficiency

Invited Session

Chair: Gang Yu, University of Texas, Dept. of MSIS, Gras. Sch. of Bus. Admin., Austin, TX 78712-1175, yu@uts.cc.utexas.edu

1) Tutorial: Applying Advanced Integrated Real-Time Decision Support Systems to Help Airlines Move to the Next Level of Efficiency, ***Gang Yu***, University of Texas, Dept. of MSIS, Gras. Sch. of Bus. Admin., Austin, TX 78712-1175, yu@uts.cc.utexas.edu

The airline's product is measured by price, flexible schedules, on-time performance, safety, satisfactory in-flight services, proper baggage handling and convenient ticket purchases. To meet these demands and to provide a high-quality and low-cost product, airlines spend a tremendous amount of resources, time and effort to generate profitable and cost-effective fare classes, flight schedules, fleet plans, aircraft routes, crew pairings, gate assignments, etc...

MA03 Models of Supply Chain Coordination

Sponsor: MSOM

Sponsored Session

Chair: Yunzeng Wang, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, yxw36@po.cwru.edu

1) Supply Chain Contracting to Encourage Downstream Investment in Cost Reduction, ***Stephen M. Gilbert***, University of Texas, CBA 4.202, B6300, Austin, TX 78712, steve.gilbert@bus.utexas.edu, ***Viswanath Cvsa***

Firms in supply chains tend to benefit from investments in cost reduction that are made by their downstream partners. By making advance commitments to wholesale prices, an upstream firm can encourage such downstream investments by eliminating a "hold-up" problem. We adopt the perspective of the upstream firm...

2) Models of Channel Coordination with Asymmetric Demand Information, ***Apostolos N. Burnetas***, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, atb4@po.cwru.edu, ***Stephen M. Gilbert***, ***Craig E. Smith***

A wholesaler sells a product to a retailer. The distribution of the end customer demand is known to the retailer but partially known to the wholesaler. We develop quantity discount pricing policies that guarantee retailer incentive compatibility and maximize expected wholesaler or channel profits and discuss the benefits of coordination.

3) Adverse Effects of Overreaction to Demand Changes & Improper Demand Forecasting in a Supply Chain, ***Noel Watson***, University of Pennsylvania, The Wharton Sch., Philadelphia, PA 19104, nhwatson@wharton.upenn.edu, ***Yu-Sheng Zheng***

Inventory managers tend to overreact to demand changes. Using a serially correlated demand model, we show that this overreaction leads to sub-optimal replenishment policies internally and causes an undue bullwhip effect externally. We also show that using an improper forecasting approach may cause similar adverse effects.

4) Dynamic Competition with Inventory-Dependent-Demands, ***Yunzeng Wang***, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, yxw36@po.cwru.edu

We model the multi-period competition between 2 retailers where demand is inventory-dependent and customers may switch between retailers in case of a stock-out. We derive the equilibrium optimal inventory-policies and show that such a policy is myopic in nature and can be found by solving a static game.

MA04 Manufacturing-Marketing Interface

Sponsor: MSOM

Sponsored Session

Chair: Alysse R. Morton, University of Utah, Eccles Sch. of Bus., 1645 East Campus Center Dr., Salt Lake City, UT 84112-9304, mgtarm@business.utah.edu

1) Quality & Time-to-Market Trade-Offs when There are Multiple Product Generations, ***Leslie Olin Morgan***, University of Utah, Eccles Sch. of Bus., 1645 East Campus Center Dr., Salt Lake City, UT 84112-9403, mgtlm@business.utah.edu, ***Ruskin Morgan***,

William L. Moore

This research considers the quality versus time-to-market trade-off in the context of multiple product generations, extending previous work that focused on a single new product generation. We examine the factors affecting optimal time-to-market, and note differences from findings generated in research on the single-generation problem.

2) The Impact of Design & Process Capabilities on Time-to-Market Performance, ***Janice Carrillo***, Washington University, Olin Sch. of Bus., CB 1133, 1 Brookings Dr., St. Louis, MO 63130-4899, carrillo@suolin.wustl.edu, ***Richard M. Franza***

Firms must develop appropriate design and production capabilities to bring valuable new products to market in an efficient manner. We present a model that examines the relationship between a firm's design and production capabilities and its time-to-market performance. Specifically, we analyze factors influencing a firm's ramp-up time and ultimate profitability.

3) Product Line Expansion, Supply Chain Choice & Firm Survival, ***Taylor R. Randall***, University of Utah, Eccles Sch. of Bus., 1645 East Campus Center Dr., Salt Lake City, UT 84112-9403, acttr@business.utah.edu

We examine the path-dependent effect of sourcing decisions on the strategies companies use to expand their product lines. Empirical evidence which links coherent decisions about supply chain choice and product line strategy to firm survival is presented.

MA05 Probabilistic Models in Networks

Sponsor: Applied Probability Society
Sponsored Session

Chair: Harold Mortazavian, UCLA, Computer Sci. Dept., Los Angeles, CA, mor@cs.ucla.edu

1) Traffic & Mobility Modeling in Wireless Networks, ***Brian Mark***, George Mason University, Dept. of Elect. & Comp. Eng., 4400 University Dr., Fairfax, VA 22030-4444, bmark@gmu.edu, ***Shun-Zheng Yu, Hisashi Kobayashi***

Most previous work on traffic modeling and service provisioning has not thoroughly considered the impact of mobility in wireless networks. We develop an integrated set of probabilistic models for traffic and mobility in wireless networks. We discuss applications of these models to quality-of-service provisioning and fast web access at the wireless/wired network interface.

2) A Unified Approach to the Analysis of Teletraffic Models & their Computational Solution, ***Khosrow Sohraby***, University of Missouri, Comp. Sci. Telecom. Dept., 5100 Rockhill Rd., Kansas City, MO 64110-2499, sohraby@cstp.umkc.edu

We present a system-theoretic approach to the solution of a large class of tele-traffic problems. Under the assumption of rationality of the generating functions of input processes and having obtained a state-space realization of the system, we derive an efficient matrix-geometric solution for the state probability vector of the system.

3) An Approach to Distributed Probabilistic Routing & Congestion Control in Networks, ***Harold Mortazavian***, UCLA, Computer Sci. Dept., Los Angeles, CA, mor@cs.ucla.edu

We present a new approach to distributed probabilistic routing and congestion control in networks in which routers are viewed as local controllers. The concepts of probabilistic controllability and observability with specified parameters and a differential equation, depending on these parameters, whose solution provides that the probability distribution of routing is introduced at each node.

4) Continuous Flow Models: Modeling, Simulation, IPA & Telecommunications Approaches, ***Benjamin Melamed***, Rutgers University, Faculty of Mgmt., 265 Levin Bldg. Rockafeller Rd, New Brunswick, NJ 08903, melamed@rutcor.rutgers.edu

We introduce a simple class of fluid-flow models, CFMs, reporting on joint work with Yorai Wardi. We will discuss problems of modeling propagation delays, loss-related performance measures, real-time computation and other pertinent issues. Also, the relation with infinitesimal perturbation analysis will be discussed.

MA06 Transit Applications of Operations Research

Sponsor: Transportation Science Section
Sponsored Session

Chair: Mark Hickman, University of Arizona, Civil Eng. & Eng. Mechanics, PO Box 210072, Tucson, AZ 85721-0072, mhickman@engr.arizona.edu

1) Hybrid Paratransit Delivery Methods, ***Majid Aldaihani***, University of Southern California, Dept. of ISE, Los Angeles, CA 90089-0193, ***Maged Dessouky, Randolph W. Hall***

There is renewed interest in developing efficient paratransit methods for the elderly and disabled. Due to their convenience, most passengers prefer an on-demand service delivery method. This type of service may not be the most cost-effective method of transporting people. We present a hybrid delivery method consisting of both on-demand and fixed route services...

2) Optimal Dispatching Strategies for Demand Responsive Systems, ***Guntram Noeth***, University of Southern California, Bremenweg, Wuerzburg, Barvaria, 97084, Germany, guntram_noeth@hotmail.com, ***Maged Dessouky, Randolph W. Hall***

New communication technologies allow transit agencies to dispatch new requests in real time. For simple environments, we present some rules how transit systems are dispatched optimally to serve incoming customers. We also show how these strategies could be applied to more complex real-world environments.

3) Rethinking Holding as a Transit Operations Control Strategy, ***Mark Hickman***, University of Arizona, Civil Eng. & Eng. Mechanics, PO Box 210072, Tucson, AZ 85721-0072, mhickman@engr.arizona.edu

Many public transit agencies use holding as a real-time control strategy to improve operations. Past studies have shown that these holding decisions are very sensitive to several critical assumptions about transit service. Using a broad sensitivity analysis, we examine the conditions under which holding is and is not advantageous.

MA07 Models For & About Education

Contributed Session

Chair: Mona Whitley Howard, Paul Quinn College, 3837 Simpson Stuart Rd., Dallas, TX 75241, pqcmhoward@hotmail.com

1) Resource Allocation in Academia, ***Jay B. Ghosh***, SQU, PO Box 20, Al-Khod, Muscat, 123, Oman, jghosh@squ.edu.om, ***Parakrama S. Dharmapala, Hussein M. Saber***

Resource allocation issues arise frequently in academic settings. Examples include recruiting, salary adjustments and research proposal funding. The problems, as well as the solution approach, vary from situation to situation. The objective, however, is generally to find solutions that are fair. We focus on stronger formulations and more efficient solutions.

2) Logarithmic Transformations in Regression: Some Issues, ***Ismael G. Dambolena***, Babson College, Babson Park, Wellesley, MA 02157-0901, dambolena@babson.edu, ***Steven E. Eriksen***

You decide to use logarithmic transformations on the variables of a regression model. The scatter after transforming looks linear, r-squared has increased, the t-test for the slope has improved; therefore, you expect narrower prediction intervals for the same level of confidence. Well ... not necessarily. We also discuss other related issues.

3) Process Simulation in Excel with SimQuick, ***David B. Hartvigsen***, University of Notre Dame, 354 Mendoza Coll. of Bus., Notre Dame, IN 46556, hartvigsen.1@nd.edu, www.nd.edu/~dhartvig/

We introduce SimQuick, an Excel add-in that allows the user to simulate a variety of simple processes, e.g., queues, inventory, manufacturing, projects, etc. It's designed to be easy to learn for students in classes not devoted to simulation, e.g., operations management, MS, supply chain management, etc.

4) Academic Decision Making using Two Forms of Conjoint Analysis, ***Mona Whitley Howard***, Paul Quinn College, 3837 Simpson Stuart Rd., Dallas, TX 75241, pqcmhoward@hotmail.com, ***Marion G. Sobol***

Six attributes of service for non-traditional academic programs are evaluated using focus studies and two different forms of cohort analysis. Despite somewhat divergent outcomes, the results provide meaningful, customer-centered information that is useful for executive-level decision makers to improve services at an educational institution.

MA08 Panel: E-Business Strategy & Technology Developments in Practice

Sponsor: E-Business Section
Sponsored Session

Chair: Christopher L. Huntley, Fairfield University, Sch. of Bus., Fairfield, CT 06430, chuntley@fair1.fairfield.edu

Co-Chair: Aaron Seymour, Fairfield University, Sch. of Bus., Fairfield, CT 06430, seymour@fair1.fairfield.edu

1) Panel: E-Business Strategy & Technology Developments in Practice, ***Bill Christie***, iContact.com, Fairfield, CT 06430, bchristie@icontact.com, ***Hugh Davis***, Greenfield Online, Wilton, CT 06897, hdavis@greenfield.com, ***Randy Blasio***, iSolve.com, Stamford, CT 06901

Following a presentation on e-business strategy and technological development theory, our distinguished panel of e-business executives will address their respective view on e-business in practice. They will discuss their online firm's evolutionary process required to maintain competitiveness in their respective markets. In addition, they will speak to current opportunities and challenges faced by online firms in the Connecticut Corridor.

MA09 Uncertainty & Forecasting Techniques in Revenue Management

Sponsor: Revenue Management Section
Sponsored Session
Chair: Ahmet Kuyumcu, Talus Solutions, Inc., 4751 Best Rd., Waterstone, Ste. 300, Atlanta, GA 30337-5609, akuyumcu@talussolutions.com

1) Winning in a Competitive Bidding Environment, ***Thomas Qi***, Talus Solutions, Inc., 4751 Best Rd., Waterstone, Ste. 300, Atlanta, GA 30337, tqi@talussolutions.com

Uncertainty is the nature of any bidding games. Understanding yourself and your competitors is the key to winning in a competitive bidding environment. We discuss a multi-regression approach that forecasts win probabilities based on forecasts of own and competitor prices

2) Forecasting Demand for the Natural Gas Pipeline Industry, ***Doug Harvey***, PROS Revenue Management, 3223 Smith St., Ste. 100, Houston, TX 77006, dharvey@prosrm.com, ***Nicola Secomandi***

We will discuss the problem formulation and techniques of forecasting demand for firm transportation contracts on natural gas pipelines. We especially focus on mapping the demand for historical contracts to demand for a group of representative contracts expected to be in high demand in the future.

3) A Gaming Twist in Hotel Revenue Management, ***Ahmet Kuyumcu***, Talus Solutions, Inc., 4751 Best Rd., Waterstone, Ste. 300, Atlanta, GA 30337-5609, akuyumcu@talussolutions.com

Similar RM concepts are applied differently across different industries. While leveraging much of the technology developed for the hotel industry, the extension of RM to manage room revenues for the gaming industry presents many new technical challenges. Some of these challenges, which include customer segmentation, special events and promotions, are explored.

MA10 Real-Life Scheduling Models

Cluster: Scheduling
Invited Session
Chair: Alessandro Agnetis, Universita di Siena, Dipt. di Ingegneria & Info., via Roma 56, Siena, 53100, Italy, agnetis@dii.unisi.it, http://www.dii.unisi.it/~agnetis

1) Practical Scheduling Solutions, ***Anand Iyer***, i2 Technologies, Inc., 909 East Las Colinas Blvd., Ste. 16, Irving, TX 75039, iyer@i2.com

We will discuss the solution of scheduling problems that arise in the context of an integrated supply chain. The links between master planning, factory planning and scheduling will also be explored.

2) Open Issues on Cyclic Scheduling, ***Walter Ukovich***, Universita di Trieste, Via Valerio 10, Trieste, 34127, Italy, ***Piero Persi***, ***Raffaele Pesenti***

Cyclic scheduling is an open field of research, involving different applications: manufacturing, robotic cells, flow lines, hoist scheduling, loop scheduling on parallel processors and timetabling. Besides providing an extensive survey, we analyze open issues not yet covered in the cyclic scheduling literature.

3) Scheduling in Dual Gripper Robotic Cells for Productivity Gains, ***Chelliah Sriskandarajah***, University of Texas at Dallas, Sch. of Mgmt., Box 830688, MS JO4.7, Richardson, TX 75083-0688, ***Suresh P. Sethi***, ***Jeffrey B. Sidney***

We study the problem of scheduling robot moves in dual gripper robot cells in a bufferless environment. The objective is steady-state throughput maximization. We show that an m-machine dual gripper robot cell may have at most twice the productivity of its single gripper counterpart.

4) Resource Scheduling by Column Generation: A Real-Life Application, ***Claudio Arbib***, Universita degli Studi di L'Aquila, Dipt. Matematica Pure e Appl., via Vetoio, Coppito, 67010, Italy, ***Gianfranco Ciaschetti***, ***Fabrizio Rossi***, ***Stefano Smriglio***

A manufacturing plant employs a number of parallel workstations to produce semifinite plastic parts by moulding. We analyse the problem of finding a schedule of workers and orders under several optimization criteria, propose a solution approach based on column generation and describe a simulation study. solution approach based on column generation and describe a simulation study.

MA11 Algorithm Design for Discrete Optimization Problems

Cluster: Integer Programming
Invited Session
Chair: Sheldon H. Jacobson, University of Illinois, 1206 West Green St., MEB 226, MC 244, Urbana, IL 61801-2906, shj@uiuc.edu, http://www.staff.uiuc.edu/~shj/shj.html

1) Managerial Insights into the Team-Building Problem from a Combinatorial Optimization Model, ***Daniel Solow***, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106, dxs8@po.cwru.edu, ***George L. Vairaktarakis***, ***Sandy Kristin Piderit***, ***Ming-Chi Tsai***

A combinatorial optimization model is presented for building a team in which interactions between individuals can be controlled. Certain versions are shown to be polynomially solvable while others are strongly NP-complete. Heuristics are developed to study the effect of replacing an individual on the team. Analysis and simulations provide managerial insights into factors that affect the average performance of the best team...

2) A Modifid Benders' Partitioning Approach for Stochastic Programs with Mixed-Integer Recourse, ***Hanif D. Sherali***, Virginia Polytechnic Institute & State University, Dept. of ISE, 0118, Blacksburg, VA 24061-0118, hanifs@vt.edu, ***Barbara M. P. Fraticelli***

A modified Benders' decomposition approach is proposed for discrete optimization problems, including stochastic IPs, using the reformulation-linearization technique or lift-and-project cuts to construct a suitable partial convex hull representation as needed. The cutting planes are derived as functions of the first-stage variables to be globally valid and re-usable for all subproblems.

3) Computational Analysis of a Flexible Assembly System Design Problem, ***Edward C. Sewell***, Southern Illinois University, Dept. of Math. & Stats., Edwardsville, IL 62026-1653, esewell@siue.edu, ***Ashok Kumar***, ***Sheldon H. Jacobson***

We present a heuristic, the pick and rule (PAR) heuristic, for designing flexible assembly systems. A lower bound algorithm and a direct B&B algorithm are formulated to assess the effectiveness of the PAR heuristic. Computational results with the PAR heuristic and these 2 algorithms are reported.

MA12 Purchasing & Supplier Selection

Cluster: Logistics & Supply Chain Management
Invited Session
Chair: Linda L. Stanley, Our Lady of the Lake University, Sch. of Business, 411 Southwest 24th St., San Antonio, TX 78207, stanl@lake.ollusa.edu

1) The Impact of NAFTA on Purchasing & the Supply Chain: A Longitudinal Study, ***Julie J. Gentry***, University of Arkansas, Dept. of Mktg. & Transport, 302 BA

Academicians and industry experts originally forecast the NAFTA to dramatically alter the purchasing and supply chain management functions of US-based organizations. We will provide the research results from data collected in 2 surveys (1996 & 2000) investigating purchasing implications for US-based firms as a result of the NAFTA.

2) A Review of the Product-Related Characteristics affecting a Manufacturing Firm's Decision to Select Source Suppliers, ***Mohammad Z. Bsat***, Jackson State University, Dept. of Mgmt. & Mktg., ***Astrid M. Beckers***

We examine the topic of supplier selection from a product-related characteristics standpoint. The different characteristics that lend importance to the process of supplier selection are reviewed. This research emphasizes the importance of such characteristics in the supplier selection decision.

3) An Examination of Supply Chain Management Practices in

the Mexican Automotive Parts Industry: An Empirical Approach, ***Daniel A. Glaser-Segura***, Our Lady of the Lake University, Sch. of Business, 411 SW 24th St., San Antonio, TX 78207, glasd@lake.ollusa.edu

In a survey of Mexican automotive parts industry, managers reported the status of various supply chain management practices at their firms. The pattern of implementation is inconsistent with theoretical propositions established in industrialized nations and warrants review of practice and research in less developed countries.

4) Relationship Management in the Supply Chain: A Comparative Analysis, ***Linda L. Stanley***, Our Lady of the Lake University, Sch. of Business, 411 Southwest 24th St., San Antonio, TX 78207, stanl@lake.ollusa.edu

We will provide a comparative analysis between the food processing and electronics industries regarding supplier management issues from a purchasing perspective. The research will focus on important criteria in a successful relationship and practices most commonly utilized today to manage the relationship.

MA13 Manufacturing Logistics Scheduling & Routing

Cluster: Manufacturing & Logistics
Invited Session

Chair: Zhi-Long Chen, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu

1) Magazine Configurations for a Single Machine with Finite Tool Capacity, ***Moshe Dror***, University of Arizona, Coll. of Bus. & Public Admin., Dept. of MIS, Tucson, AZ 85721, mdror@mail.bpa.uarizona.edu, ***Andre Langevin***, ***Francois Soumis***, ***Pontien Mbaraga***

We examine the problem of scheduling composite items on a single multipurpose machine with a finite capacity tool magazine. We present a novel shortest path with side constraints solution approach and compare it with solutions based on a TSP formulation.

2) The Effectiveness of Zero Inventory Ordering Policies for a One-Warehouse Multi-Retailer Problem with Piecewise Linear Costs, ***Lap Mui Chan***, University of Toronto, Rotman Sch. of Mgmt., 105 Saint George St., Rm. 408, Toronto, Ontario, M5S 3E6, Canada, achan@fmgmt.mgmt.utoronto.edu, achan@mgmt.utoronto.ca, ***Zuo-Jun Shen***, ***Ana Muriel***, ***David Simchi-Levi***, ***Chung Piaw Teo***

We consider a problem faced by companies that rely on truckload and carriers for the distribution of products across their supply chain. We analyze the effectiveness of the ZIO policies and develop approximation algorithms in this class.

3) Dynamic Crane Deployment at Container Terminals, ***Raymond K. Cheung***, HKUST, Dept. of IE/EM, Clear Water Bay, Kowloon, Hong Kong, PR China, rcheung@ust.hk, ***Chung Lun Li***, ***Jeff Lin***

We formulate the problem of deploying cranes among container blocks at a container terminal to minimize the workload unfinished on time as an integer program. We propose a relaxation-based method and a nonlinear approximation procedure to solve the problem. Experimental results will be discussed.

4) Solving Practical Vehicle Routing Problems, ***Henry Xu***, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Philadelphia, PA 19104-6315, hxu@seas.upenn.edu, ***Zhi-Long Chen***, ***Srinivas Rajagopal***, ***Sundar Arunapuram***

We investigate real-world vehicle routing problems that involve complex cost structures and complex business constraints such as DOT rules, multiple time windows, nested precedence, and compatibility issues. We propose several optimization based algorithms to tackle such problems.

MA14 Airline Marketing & Planning

Sponsor: Aviation Applications Section
Sponsored Session

Chair: Milind G. Sohoni, Delta Airlines, Atlanta, GA, milind.sohoni@delta-air.com

1) Revenue Management with Passenger Choice, ***Mihnea Stan***, Delta Airlines, Atlanta, GA, mihnea.stan@delta-air.com

The assumption of itinerary-fare class level passenger demands in traditional OD revenue management models is unrealistic in that a booking request will normally come in the OD level, i.e., a passenger will specify his OD but seldom his itinerary and fare class. However, the passenger will have a choice of several itineraries and fare classes whenever an OD is specified...

2) Revenue Management with Overbooking, ***Alvin Lim***, Delta Airlines, Atlanta, GA, alvin.lim@delta-air.com

The bid-price revenue management model assumes as an input a set of adjusted flight leg capacities. These adjusted flight leg capacities are derived from physical available capacities by solving an overbooking optimization problem to handle cancellations and no-shows. We propose a bilevel optimization model for overbooking with the bid-price revenue management problem (a linear program) as a constraint.

3) Bayesian Approaches to Forecasting & Seat Allocation, ***Chris K. Anderson***, University of Western Ontario, Ivey Sch. of Bus., 1151 Richmond St., London, Ontario, N6A 3K7, Canada, canderson@ivey.uwo.ca, www.ivey.uwo.ca, ***Peter C. Bell***, ***John G. Wilson***

A Bayesian model for the dynamic allocation of airline seats to various fare classes is developed. Seats sold, time to departure and historical information are all incorporated. The Bayesian framework allows for the explicit consideration of constrained demand and dependency across time periods and fare classes.

4) Full vs. Partial Information about Customer Requests in Single-Leg Revenue Management, ***Darius Walczak***, ***Shelby Brummelle***

A customer requests multiple seats at one of the fares, may not show up, can cancel and be overbooked. Customer fare and request size are not known but their joint probability distribution is available. We model this situation as a semi-Markov control problem with general state space and provide conditions for a structured optimal policy...

MA15 Service Parts Reengineering at IBM

Cluster: Quantitative Models in Supply Chain Management
Invited Session

Chair: George R. Wilson, Lehigh University, IMSE Dept., Mohler Lab., 200 West Packer Ave., Bethlehem, PA 18015, grw3@lehigh.edu

1) Customer Delivery Time Sensitive Inventory Network Design, ***Mark C. Booth***, IBM, Service Parts Solutions, 5267 East Simpson Ferry Rd., Mechanicsburg, PA 17050, boothm@us.ibm.com, ***Erhan Kutanoglu***, ***Terry Hammaker***

IBM's service parts stocking policy has been based on fill rates but has migrated to on-time delivery to customers. A time-based service criterion will drive not only stocking levels but relative stocking locations, as well. The presentation emphasizes the impact of an on-time delivery policy on inventory network design.

2) Inventory Neighborhoods: A Time Sensitive Service Parts Stocking Approach, ***George R. Wilson***, Lehigh University, IMSE Dept., Mohler Lab., 200 West Packer Ave., Bethlehem, PA 18015, grw3@lehigh.edu, ***Selcuk Avci***, ***Francisco Barahona***, ***Yesim Erke***, ***Matthew Galati***, ***Christina Ma***

IBM has migrated to a stocking policy that incorporates least cost lateral movement of parts from neighboring stocking points to meet time-based performance goals. Parts are clustered into serviceable machine groups across geographies and delivery within a parts grouping must be on time a prescribed proportion of the time.

3) Dynamic Work-Force Scheduling, ***Brenda Dietrich***, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, dietric@us.ibm.com, ***Baruch M. Schieber***

IBM Global Services employs about 6,000 customer service representatives (CSRs) responding to more than 20,000 service calls per day. IBM developed an assignment engine that assigns calls to CSRs, striving to optimize several business objectives: maximize customer satisfaction, minimize CSR idle and travel times, minimize cost of parts shipment.

MA16 Applications of Multicriteria Tools in Single & Multiple Decision Maker Environments

Cluster: MCDM
Invited Session

Chair: Peri H. Iz, Health Care Finance Administration, Strategic Plng. & Evaluation, 7500 Security Blvd, MS C31926, Baltimore, MD 21244, piz@hcfa.gov, izperi@iamdigex.net

1) Employee Selection under Anti-Discrimination Law: Implications for Multicriteria Group Decision Support, ***Lorraine R. Gardiner***, Auburn University, Dept. of Mgmt., Coll. of Bus., 415 West Magnolia Ave., Auburn, AL 36849, gardilr@auburn.edu, ***Debra Armstrong-Wright***

Multicriteria group decision support offers methodology to committees involved in hiring decisions that can improve the chances for nondiscriminatory selection processes. The legal requirements for nondiscriminatory hiring decisions raise new challenges for both multicriteria decision aid methodology and the way it is applied in a group setting.

2) Applying Multicriteria Analysis to the Upgrading of Instructional Computing Laboratories, ***Abe Feinberg***, California State University, MS Dept., Northridge, CA 91330-8245, abe.feinberg@csun.edu

Universities are faced with periodically upgrading their instructional computing laboratories in response to increased user expectations and many enhanced hardware and software capabilities. Using student and faculty responses, multicriteria decision analysis can be used to assist in making more effective and acceptable choices from the wide variety of available alternatives.

3) Benchmarking Supply Chain Management: The Use of Judgmental Models, ***Gerd Islei***, University of Oxford, Templeton Coll., Oxford, OX1 5NY, UK, gerd.islei@templeton.ox.ac.uk, ***Richard Cuthbertson***

We examine the decision making process in supply chain management. We describe qualitative and quantitative approaches to support effective decision-making and explores metrics and mapping tools to compare supply chain performance. Some specific examples will be discussed to highlight critical issues

MA17 Tutorial: Integrated Supply Chain Planning for Semiconductor Industries

Cluster: Performance of Supply Networks
Invited Session
Chair: Mahesh Rajasekharan, i2 Technologies, Inc., High Tech. Industry Bus. Unit

Co-Chair: Ben Mathias, I2 Technologies, Inc., High Tech. Industry Bus. Unit

1) Tutorial: Integrated Supply Chain Planning for Semiconductor Industries, ***Mahesh Rajasekharan***, i2 Technologies, Inc., High Tech. Industry Bus. Unit, ***Ben Mathias***

Semiconductor companies are characterized by complex supply chains involving many different in-house fabrication and assembly facilities, foundries and subcontractors. The business environment is characterized by long manufacturing cycle times and short product life cycles. Hence, accurate forecasting, enterprise wide supply chain planning, strategic fulfillment and delayed product differentiation are critical for success...

MA18 E-Business: Strategy & Policy

Cluster: E-Commerce
Invited Session
Chair: Sirkka Jarvenpaa, University of Texas, Ctr. Bus., Technology & Law, MSIS Dept, CBA 5.202, Austin, TX 78712-1175, sjarvenpaa@mail.utexas.edu

1) Open- vs. Closed-E-Business Models, ***Sirkka Jarvenpaa***, University of Texas, Ctr. Bus., Technology & Law, MSIS Dept, CBA 5.202, Austin, TX 78712-1175, sjarvenpaa@mail.utexas.edu, ***Emerson Tiller***

The closed-Internet vs. open-Internet debate is not just a philosophical debate, but one that has profound ramifications to the viability of different business plans on the Internet. We provide a framework for managers to think about their business strategies in the light of this open- and closed-Internet debate.

2) Internet Consumer Deception, ***Stefano Grazioli***, University of Texas, Business Sch., Austin, TX 78712, ***Sirkka Jarvenpaa***

Selling defective goods at an on-line auction and touting under-performing securities are specific examples of the broad phenomenon of Internet consumer deception. We report on the creation of a database of cases of Internet consumer deception as a first step towards a broader investigation of this form of business misconduct.

MA19 Innovative Management of Manufacturing Capacity

Cluster: Technology Innovations & Operations
Invited Session
Chair: James R. Bradley, Cornell University, Johnson Grad. Sch. of Mgmt., 321 Sage Hall, Ithaca, NY 14853-6201, jrb28@cornell.edu

1) Safety-Capacity Allocation in Lean Manufacturing, ***John J. Liu***, University of Wisconsin, Sch. of Bus., Milwaukee, WI 53201, jjl@uwm.edu

Lean manufacturing, one of the most fast-spreading manufacturing innovations, is centered on the elimination of wastes. A major source of wastes is in safety capacity, which refers to precautionary production capacity against uncertainty. How to allocate safety-capacity is of great importance and difficulty especially when the system is "lean"...

2) Increasing Product Mix Flexibility on the Assembly Line, ***James R. Bradley***, Cornell University, Johnson Grad. Sch. of Mgmt., 321 Sage Hall, Ithaca, NY 14853-6201, jrb28@cornell.edu, ***A. P. Blossom***

Assembly lines are typically managed with the goal of attaining high labor utilization, which makes the assembly line inflexible to product variety. We discuss how slack capacity can be used in order to increase product mix flexibility. The divergent approaches toward slack capacity in this paper and the previous paper demonstrate that "different approaches are appropriate for different goals."

3) Managing Capacity when Demand Fluctuates in Mix & Volume: Field Data from Toyota Systems Managing Settings, ***Steven Spear***

We present field-data that show that Toyota Production. System-managed organizations address fluctuations in demand and capacity, both mix and volume, in ways that are counter-intuitive. Inventory is not pooled, machines and people are dedicated to particular production pathways rather than letting jobs get done on a first-available basis and the span of managerial control is relatively narrow and steep, not broad and flat.

MA20 New Advances & Applications of Scatter & Tabu Search

Cluster: Tabu & Scatter Search
Invited Session
Chair: Manuel Laguna, University of Colorado, School of Bus., CB 419, Boulder, CO 80309-0419, manuel.laguna@colorado.edu

1) A Tabu Search Algorithm for Multi-Objective Optimization: An Application to Flowshop Scheduling, ***Vinicius A. Armentano***, Universidade Estadual de Campinas, FEEC-UNICAMP, CP 6101, Campinas Sao Paulo, 13083-970, Brazil, ***Jose Elias C. Arroyo***

We present a tabu search algorithm for finding a set of approximately nondominated solutions for multi-objective combinatorial optimization problems. The algorithm is applied to flowshop scheduling problems to minimize the makespan and the maximum tardiness. Its performance is compared with an exact method and a tabu search algorithm from the literature. compared with an exact method and a tabu search algorithm from the literature.

2) Diversification with Multiple Neighborhoods, ***Ed Mooney***, Montana State University, MIE Dept., Bozeman, MT 59717-3800

We will describe a search approach that simultaneously explores several neighborhoods at once and discuss the relationship to and integration with traditional tabu search methods. An example will be presented demonstrating application of the approach to a multiple resource scheduling problem.

3) OQGRG: A Scatter Search Approach for Solving Constrained Non-Linear Global Optimization Problems, ***Zsolt Ugray***, University of Texas, MSIS Dept., CBA 5.202, Austin, TX 78712-1175, ***Leon S. Lasdon***, ***John C. Plummer***

We present a method of solving large-scale, constrained non-linear problems with integer variables. We show computational results of the algorithm that uses the combination of Optquest, a scatter search algorithm and LSGRG, a local solver.

MA21 Session V

Cluster: SICUP
Invited Session
Chair: Jose Fernando Oliveira, University of Porto, Dept. de Eng. Electro e Comp., Rua dos Bragas, Porto, 4050-123, Portugal, jfo@fe.up.pt, jfo@inescn.pt

1) Meta-Heuristics for Calculating 2- & 3-Dimensional Bin-Packing Problems, ***Elita A. Mukhacheva***, Ufa State Aviation Technical University, Karl Marx Str. 12, Ufa, Bashkortostan, 450000, Russia, elita@vmk.ugatu.ac.ru, ***Aida F. Valeeva***, ***Anna S. Mukhacheva***

Two- and 3-dimensional bin-packing problems are considered. These problems are known to belong to the class of NP-hard. GA and dynamic sorting stochastic algorithms are applied to solve 2- and 3-BPP. The results of numerical

experiment on Waescher's method

2) Genetic Algorithms for 2-Dimensional Packing & Floor Planning, ***Christine L. Valenzuela***, Cardiff University, Dept. of Comp. Sci., PO Box 916, Cardiff, CF2 3XF, UK, christine@cs.cf.ac.uk, ***Pearl Y. Wang***

We present a GA that breeds normalized postfix expressions for packing rectangles. Experiments confirm that the approach is very effective and produces excellent results on a range of 2-dimensional packing and floor planning problems. Furthermore, the slicing construction process scales favorably when compared with existing procedures.

3) Research of Heuristics Efficiency for 2-Dimensional Bin-Packing Problems, ***Anna S. Mukhacheva***, Ufa State Aviation Technical University, Karl Marx Str. 12, Ufa, Bashkortostan, 450000, Russia, anna@vmk.ugatu.ac.ru, ***Artem V. Chiglintsev***

Problems of guillotine stock-cutting and rectangular packing in a semi-endless strip. Guillotine and block GAs are applied. In guillotine GAs, the genes are rectangles with suitable bin correlation strategy, the allels differ in block element rearrangement. The results of numerical experiment are presented.

4) A Two-Exchange Nesting Heuristic for Nesting Problems, ***Jose Fernando Oliveira***, University of Porto, Dept. de Eng. Electro e Comp., Rua dos Bragas, Porto, 4050-123, Portugal, jfo@fe.up.pt, jfo@inescn.pt, ***Antonio Miguel Gomes***

We describe a new heuristic for the nesting problem based on a 2-exchange neighborhood generation strategy. This mechanism guides the search through the solution space, constituted by the sequences of pieces, relying on a low-level placement heuristic to actually convert one sequence in a feasible layout...

MA22 Clinical Applications of MS/OR

Sponsor: Health Applications Section
Sponsored Session
Chair: Stefanos Zenios, Stanford University, Grad. Sch. of Business, Stanford, CA 94305-5015, stefzen@leland.stanford.edu

1) The Use of Virtual Worlds & Animated Personas to Improve Health Care Knowledge & Self-Care Behavior: The HEART-SENSE Game, ***Barry G. Silverman***, University of Pennsylvania, Systems Eng. Dept., 229C Towne Bldg., Philadelphia, PA 19104-6315, barryg@seas.upenn.edu, ***John Holmes***

Our goal is to determine whether a computer based training game, HEART-SENSE, can improve recognition of heart attack symptoms and shift behavioral issues so as to reduce pre-hospitalization delay in seeking treatment thereby reduce myocardial infarction mortality and morbidity. Innovations are: a design for a generic simulator package for promoting health behavior shifts and equations for animated pedagogical agents...

2) Designing Radiotherapy Plans with Elastic Constraints & Interior Point Methods, ***Allen Holder***, Trinity University, Math Dept., 715 Stadium Dr., San Antonio, TX 78212, aholder@trinity.edu

A new LP model used to aid in the design of radiotherapy plans is introduced. This model incorporates elastic constraints, and when solved with a path following interior point method, produces favorable plans. A sound mathematical analysis shows how to interpret the solution; hence, the treatment planner receives meaningful knowledge about the radiotherapy plan being developed. Preliminary experiments are conducted.

3) Nonrandom Mixing in Network Epidemic Models, ***Gregory S. Zaric***, University of Western Ontario, Ivey Sch. of Business, London, Ontario, N6A 3K7, Canada, gzaric@ivey.uwo.ca

A common assumption of epidemic models is that mixing occurs randomly among all members of the population. Observations of networks of IDUs reveal that this is not always the case. We use a network epidemic model to compare random mixing with mixing models that account for some social structure.

4) Outcomes-Adjusted Reimbursement in a Health Care Delivery System, ***Prashant C. Fuloria***, Closed Loop Solutions, 615 Old County Rd., San Carlos, CA 94070, pfuloria@cloop.com, ***Stefanos Zenios***

We consider a health care delivery system with 2 non-cooperative parties: a purchaser of medical services and a specialized provider. We develop a dynamic principal-agent model that captures the interaction between the 2 parties. The optimal payment system is identified and an application in Medicare's ESRD program is discussed.

MA23 Simulation Input & Output Analysis

Sponsor: Simulation Section
Invite/Sponsor Session
TRACK: *Simulation*
Chair: James R. Wilson, North Carolina State University, Dept. of IE, Raleigh, NC 27695-7906

1) Generating "Dependent" Quasi-Random Numbers, ***Shane Henderson***, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, shane.henderson@umich.edu, ***B. A. Chiera, R. M. Cooke***

Quasi-Monte Carlo methods for estimating expectations (integrals) converge faster (asymptotically) than Monte Carlo methods. Motivated by this result and the method of importance sampling, we consider the generation of quasi-random vectors with given marginals and given correlation matrix. We extend the "normal to anything" method, introduced by Cario & Nelson, to this context and discuss applications to stochastic LP.

2) A Discussion of Multivariate Ranking & Selection Procedures, ***Douglas J. Morrice***, University of Texas, Dept. of MSIS, Grad. Sch. of Bus., Austin, TX 78712-1175, morrice@mail.utexas.edu, douglas.morrice@bus.utexas.edu, ***John E. Butler***

We begin with a discussion of the methods for multivariate ranking and selection found in the literature. We compare these methods with our current research that combines multiple attribute utility theory with scalar ranking and selection procedures. Finally, we discuss some future research directions.

3) Improved Batching for Confidence Interval Construction in Steady-State Simulation, ***Natalie Steiger***, University of North Carolina, Greensboro, NC, ***James R. Wilson***

We describe the automated simulation analysis procedure (ASAP), which generates confidence intervals for steady-state simulation that satisfy a user-specified absolute or relative precision requirement. An experimental performance evaluation demonstrates the advantages of ASAP vs. other widely used batch-means procedures.

4) Excel-Based Macros for Teaching Output Analysis Techniques & Concepts, ***M. C. Court***, University of Oklahoma, Sch. of IE, 202 West Boyd, Rm. 124, Norman, OK 73072, mcourt@ou.edu

Macros were developed for performing parameter estimation of average queue time and system time for M/M/1 queuing systems. The macros were deployed in 2 undergraduate IE courses. The result in the undergraduate simulation course was an improvement in student grades on assignments and test questions concerning simulation output analysis.

MA24 Warehousing & Distribution

Cluster: Warehousing & Distribution
Invited Session
Chair: Kevin R. Gue, Naval Postgraduate School, Dept. of Systems Mgmt., Monterey, CA 93943

1) Facility Shapes for Crossdocks, ***Kevin R. Gue***, Naval Postgraduate School, Dept. of Systems Mgmt., Monterey, CA 93943, ***John Bartholdi, III***

In addition to the popular rectangular shape for crossdocks, we have seen docks in the shape of an L, T, H and U. We show which shapes are best for different sizes of crossdocks and argue that for large docks, the best shape is none of the above.

2) Container Sequencing to Facilitate Downstream Effectiveness, ***Michael J. Racer***, University of Memphis, Dept. of ISE, Memphis, TN 38152, mracer@memphis.edu, ***Syed Usman***

We review the development of a technique for sequencing containers for offload in an express mail environment. Because the destination mix of items in containers is variable, the ordering of containers could affect temporal system performance downstream. We consider a technique for sequencing and evaluating conditions tools.

3) An Integrated Warehouse Management System at YCH Logistics, Singapore, ***K. V. Ramani***, Indian Institute of Management, Ahmedabad, India, ramani@iimahd.ernet.in

YCH logistics, Singapore, manages a group of central distribution centers with storage systems tailored for each of its 15 clients operating in the South East Asia Pacific region. We discuss a warehouse management system that connects all the players in the supply chain via an EDI network.

4) Keys to Successful Implementation of a Warehouse Management System, ***Lon Cross***, Manhattan Associates, 2300 Windy Ridge Rd., 7th Floor, Atlanta, GA 30339, lcross@manh.com

We present several examples of both successful and unsuccessful

implementations and discuss key principles for success. In addition, we will describe our new "e-fulfillment" methodology which allows us to fast-track implementations for e-commerce clients.

MA25 On the Efficient Solution of Mathematical Programming Problem Classes

Cluster: Linear Programming & Complementarity
Sponsor: Optimization Section
Sponsored Session
Chair: Georgia Perakis, MIT, Sloan Sch. of Bus., OR Ctr., 50 Memorial Dr., Rm. E53-359, Cambridge, MA 02139, georgiap@mit.edu

1) An Implementable Trust Region Method for Bi-Level Programming, ***Patrice Marcotte***, University of Montreal, DIRO, CP 6128, Succ. Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, marcotte@diro.umontreal.ca, ***Gilles Savard***, ***Benoit Colson***

We consider the approximation of mathematical programs with variational inequality constraints by solvable programs of the same type, viz. bilevel programs involving linear approximations of the upper level objective and the lower level mapping. Based on these approximations, a trust region approach with convergence towards a "strong" stationary point is presented.

2) Solving Nonconvex Programs by the Successive Convex Relation Method, ***Mituhiro Fukuda***, Tokyo Institute of Technology, Dept. of Math. & Comp. Sci., 2-12-1 Oh-Okayama, Meguro-ku, Tokyo, 152-8552, Japan, mituhiro@is.titech.ac.jp, http://www.is.titech.ac.jp/~mituhiro, ***Masakazu Kojima***

The SCRM proposed by Kojima & Tuncel (1998) gives theoretical algorithms to solve nonconvex (quadratic) programs through successive LP, SDP or convex program relaxations. We propose some heuristic procedures for this method which work positively in practice for small-sized NCPs.

3) Cutting Plane & Interior Point Methods for Solving Variational Inequalities, ***Marina Zaretsky***, MIT, OR Ctr., 1 Amherst St., Rm. E40-130, Cambridge, MA 02139, mzar@mit.edu, ***Georgia Perakis***

We considers methods for solving variational inequalities efficiently. Our approach incorporates cuts as well as long- and short-step line searches and as a result, allows us to solve a larger class of problems. Preliminary computational results are also encouraging.

MA26 Stochastic Models in Supply Chain Applications

Cluster: Stochastic Models & Applications
Invited Session
Chair: Jeannette Song, University of California, Grad. Sch. of Mgmt., Irvine, CA 92697, jssong@uci.edu

1) Creating an Inventory Hedge for Markov-Modulated Poisson Demand: An Application & Model, ***Hari S. Abhyankar***, PricewaterhouseCoopers, 144 Middlesex Turnpike, Burlington, MA 01803, hsabhyan@aol.com, ***Stephen C. Graves***

Many firms have long lead times, great product variety and uncertain, non-stationary demand. Based on an implementation of an inventory hedge to protect against cyclic demand, we model an inventory system for a single aggregate product with Markov-modulated Poisson demand to understand better the efficacy of this hedging policy.

2) Optimal Replenishment Policies for Multi-Echelon Inventory Problems under Advance Demand Information, ***Ozalp Ozer***, Columbia University, 500 West 120th St., MC 4704, New York, NY 10027-6699, ozalp@ieor.columbia.edu, ***Guillermo Gallego***

Customers and downstream supply chain partners often place, or can be induced to place, orders in advance of future requirements. We show how to optimally incorporate advance demand information into periodic review multi-stage inventory systems in series. We also show that optimal policies are easy to compute when costs and demands are stationary.

3) A Markovian Dual-Source Production-Inventory Model with Order Bands, ***Alan Scheller-Wolf***, Carnegie Mellon University, GSIA 319, Pittsburgh, PA 15213, awolf@andrew.cmu.edu, ***Sridhar Tayur***

Motivated by applications in manufacturing and blood-supply industries, we generalize and unify various inventory models. Our model includes dual suppliers with differing lead-times, as well as state-dependent order size prescriptions, unit costs, inventory/penalty costs and demand distributions. We provide optimal policies under certain conditions; otherwise we validate heuristic methods.

4) A Multi-Product Assemble-to-Order System with Random Lead Times: Performance Analysis, Approximations & Optimization, ***Yingdong Lu***, University of California, Grad. Sch. of Mgmt., Irvine, CA 92697, lyd@gsm.uci.edu, ***Jeannette Song***, ***David D. Yao***

We study a mulit-product assemble-to-order system. Customer demand for each product follows an independent Poisson process and replenishment lead times for each component are i.i.d. random variables. For any given base-stock policy, we conduct performance analysis to gain insights. We also develop easy-to-compute performance bounds and approximations and study optimization problems.

MA27 Project Management I

Contributed Session
Chair: Ted D. Klastorin, University of Washington, Dept. of MS, Box 353200, Seattle, WA 98195-3200, tedk@u.washington.edu

1) withdrawn - author request of 9/22, ***Lou Copertari***, McMaster University, 1280 Main St. West, MGD 219, Hamilton, Ontario, L8S 4M4,Canada,copertlf@mcmaster.ca,http://www.business.mcmaster.ca/msis/copertlf/

2) A Flexible Model for the Time/Cost Trade-Off Problem, ***John Moussourakis***, Rider University, 2083 Lawrenceville Rd., Lawrenceville, NJ 08648, moussourakis@rider.edu, ***Cengiz Haksever***

We present a flexible MIP model for the solution of the time/cost trade-off problem encountered in project management. Whereas it is commonly assumed that the time/cost function is linear, the model presented makes minimal assumptions and accommodates any type of cost function that is linear, piecewise linear or discrete.

3) Four Payment Models for the Multi-Mode Resource-Constrained Project Scheduling Problem with Discounted Cash Flows, ***Gunduz Ulusoy***, Sabanci University, Sch. of Eng. & Natural Sci., Orhanli, Tuzla, Istanbul, 81474, Turkey, gunduz@sabanciuniv.edu, ***Funda Serifoglu***, ***Sule Sahin***

A multi-mode resource constrained project scheduling problem with discounted cash flows for 4 different payment models is considered. Renewable, nonrenewable and doubly constrained resources are considered. A set of 93 problems are solved under the 4 payment models using the GA approach presented.

4) Project Planning under the Threat of a Potential Catastrophe, ***Ted D. Klastorin***, University of Washington, Dept. of MS, Box 353200, Seattle, WA 98195-3200, tedk@u.washington.edu, ***Prabhu K. Aggarwal***

We consider a project planning problem when there is a threat of a catastrophic event, e.g., strike, occurring sometime during the project. Should the project manager try to build excess slack into the project (in case the event occurs) or wait to see if the event actually occurs? We develop a model to analyze this situation and demonstrate some non-intuitive results.

MA28 Freight Applications

Sponsor: RASIG/Optimization Section
Sponsored Session
TRACK: *Network Flows*
Chair: Dharma R. Acharya, CSX Transportation, 500 Water St., J-300, Jacksonville, FL 32082, dharma_acharya@csx.com

1) A Network Model for Crew Scheduling within Railroads, ***Pooja Dewan***, BNSF Railway, 2500 Lou Menk Dr., Ft. Worth, TX 76131, pooja.dewan@bnsf.com

Currently, railroad crews do not get any scheduled time off. They can be called to work at any time as long as they are rested and on the active board. We present a model that can be used to analyze the operating effects of providing crews with structured time off.

2) Application of Network Flow Models in Traffic Data Estimation & Passenger Rail Revenue Management, ***Marc S. Meketon***, MultiModal Applied Systems, Inc., 125 Village Blvd., Ste. 270, Princeton, NJ 08540, marc@multimodalinc.com

We demonstrate estimation of coal traffic flows from high quality mine and customer data and low quality OD flow data using matrix balancing and network flow algorithms. We demonstrate a network flow model to estimate "bid prices" in a passenger rail revenue management and compare it to more complex models.

3) Shan's Block Assignment Model, ***Yen S. Shan***, Perseco, 3075

Highland Parkway, Downers Grove, IL 60515, yshan@perseco.com

Shan's block assignment model solves the block-to-train assignment problem for railroad operations. It is the first model that takes train capacity into account when assigning blocks to trains. CSX Transportation utilized this model as a key tool in developing blocking plan for its combined network.

4) Applying the Inverse Optimization Technique to Railway Traffic Flow Networks, ***Natasha Lukiantseva***, CSX Transportation, 500 Water St., J-300, Jacksonville, FL 32082, natasha_lukiantseva@csx.com, ***Ravindra K. Ahuja***, ***Caroline Prawira***

We describe the application of the inverse optimization technique to optimally adjust link cost factors to closely match the historical multi-commodity traffic flow. When using various tools to simulate railway traffic flow, network link cost factors (impedances) are introduced to reflect preferred routes, which are often different from shortest paths.

MA29 Market Mechanisms for Competitive Electricity

Sponsor: ENRE
Sponsored Session
Chair: Hung Po Chao, Electric Power Research Institute, 3412 Hillview Ave., PO Box 10412, Palo Alto, CA 94303, hchao@epri.com

1) Pricing Ramping & Spinning Reserves in Competitive Electricity Markets, ***Ross Baldick***, University of Texas, Dept. of Elect. & Comp. Eng., Austin, TX 78712-1084, baldick@ece.utexas.edu

We formulate the pool problem of dispatching energy and spinning reserves. Unlike previous formulations, we also consider a bid price for ramping contribution, together with a maximum ramping capacity. Explicit pricing for "ramping contribution" by a generator provides a bridging between the time-scales of hourly energy and the time-scales of ancillary services. We explore the implications for energy and reserve markets.

2) The Next Generation of Unit Commitment Models, ***Benjamin F. Hobbs***, JHU, 313 Ames Hall, DOGEE, 3400 North Charles St., Baltimore, MD 21218, bhobbs@jhu.edu, ***Michael H. Rothkopf***, ***Richard P. O'Neill***, ***Hung Po Chao***

An EPRI-NSF workshop recently addressed the needs for improved formulations and solution algorithms for the unit commitment problem in a competitive environment. Recent developments concerning computational capabilities and roles for unit commitment models are summarized, as are the participants' recommendations for future R&D.

3) Flow-Based Transmission Rights & Congestion Mangaement in Competitive Electricity Markets, ***Hung Po Chao***, Electric Power Research Institute, 3412 Hillview Ave., PO Box 10412, Palo Alto, CA 94303, hchao@epri.com, ***Stephen C. Peck***, ***Shmuel S. Oren***, ***Robert B. Wilson***

We describe a design for electricity markets and RTOs based on a flow-based paradigm that unbundles energy and transmission service. Tradable rights to the transmission grid are characterized in terms of financial rights with scheduling priority to power flow on congestion prone flowgates. We discuss the advantages of this approach and implementation issues.

4) Value of Reserves in Electricity Market Design, ***Hung Po Chao***, Electric Power Research Institute, 3412 Hillview Ave., PO Box 10412, Palo Alto, CA 94303, hchao@epri.com

In many reserve markets, reserves are not properly priced in the current single-settlement system resulting in capacity shortages, gaming and subsequent price spikes. I sketch an incentive-compatible approach to forward reserve pricing that incorporates the reliability-enhancing value of reserves. This design can be readily implemented in NEPOOL and is consistent with the market design principles for reserve markets in a multiple settlement system.

MA30 Tutorial: INFORMS Computing Society Spring 2000 Prize

Sponsor: Computing Society
Sponsored Session
Chair: Richard S. Barr, SMU, Science Info. Ctr. 306, Dallas, TX 75275-0122, barr@seas.smu.edu

1) Tutorial: Global Optimization in Action, ***Janos D. Pinter***, Pinter Consulting Services/Dalhousie University, 129 Glenforest Dr., Halifax, Nova Scotia, B3M 1J2, Canada, jdpinter@is.dal.ca

Continuous GO is aimed at finding the global solution in general nonlinear models. We highlight the most important GO models, discuss adaptive partition strategies to solve (Lipschitz-) continuous GO problems, present the essential convergence results and key algorithm implementation aspects, describe the LGO software and review several interesting GO applications.

MA31 Computer Science & Internet Applications

Contributed Session
Chair: John S. Hollywood, RAND Corporation, 1200 South Hayes St., Arlington, VA 22202, johnsh@rand.org

1) Visualizing Data with Adjacency Measures, ***S. Raghavan***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742-1815, raghavan@wam.umd.edu, ***Edward Condon***, ***Bruce L. Golden***, ***Shreevardhan Lele***, ***Edward A. Wasil, Jr.***

Adjacency measures are frequently available for data. For example, retailers track sets of the most similar (adjacent) items sold, e.g., CDs, books, etc. We discuss a simple technique to obtain distance measures between data points and thus visualize them using adjacency measures. An application to undergraduate colleges using Fiske's guide is discussed.

2) A Model of Small Business Web Use & Benefits, ***Masoud Yasai-Ardekani***, University of Wisconsin, Sch. of Bus. Admin., PO Box 742, Milwaukee, WI 53201-0742, yasai@uwm.edu, ***Ram Ramamurthy***, ***Fatemeh Mariam Zahedi***, ***Kurt Pflughoeft***

Our model describes the relationships between organizational context, IT infrastructure, web use and web benefits for small businesses. Results indicate that market pressure and scope of operations are related to web use and its associated benefits through a responsive IT infrastructure. Implications for managers and web providers are discussed.

3) Scheduling Issues in Layer 3 Protocol Processing, ***Soo Y. Chang***, Pohang University of Science & Technology, Dept. of IE, Hyoja San 31, Pohang, Kyungbuk, 790-784, South Korea, syc@postech.edu, ***Jaeyoung Choi***

The layer 3 protocols are processed by the routers and layer 3 or higher switching equipment. We present the various scheduling issues that rise in the development of layer 3 protocol processing systems. We present our experience with the development of a managed switch with 24 fast ethernet and 2 giga ports.

4) Scheduling Heuristics for Large, Heterogeneous Computing Networks, ***John S. Hollywood***, RAND Corporation, 1200 South Hayes St., Arlington, VA 22202, johnsh@rand.org, ***Mary R. Eubanks***

We present and provide simulation results for a set of scheduling heuristics tailored for large, heterogeneous computer networks with high job arrival rates (several per second). These heuristics combine elements of elementary computer science algorithms with more sophisticated heuristics seen in the scheduling literature.

MA32 Telecommunication Systems I

Contributed Session
Chair: Abdullah Konak, Auburn University, Dept. of ISE, 207 Dunstan Hall, Auburn, AL 36849, akonak@eng.auburn.edu, http://www.eng.auburn.edu/~akonak

1) Provisioning Multi-Layer Escalation, ***Joseph B. Kroculick***, Illinois Institute of Technology, 22 White Oak Dr., Jim Thorpe, PA 18229, krocjoe@acm.org, ***Cynthia S. Hood***

We solve the multi-layer escalation problem, which defines how protection switching protocols in wide-area networks inter-operate with each other to restore traffic. Restoration agents at different layers will interfere if not provisioned consistently. To solve the escalation problem, they must be willing to negotiate about and revise repair policies.

2) A New Techno-Economic Modeling of High Speed Networks for the Internet, ***Inhyung Lim***, Korea University, Sung-Buk Ku, Anam Dong 5-1, Seoul, Korea, ihlim@mail.korea.ac.kr, ***Youngho Lee***, ***Jeongheon Kim***

We present a techno-economic analysis of high speed network technologies for the internet service. We develop a new modeling and analysis methodology to help network planner deploy high speed network. We present a preliminary result to show the robustness of the proposed modeling.

3) Multiperiod Capacity Planning for the Telecommunication Network Design Problem, ***Ali Amiri***, Oklahoma State University, 210 Coll. of Business, Stillwater, OK 74078, amiri@okstate.edu

We study the multi-period capacity planning for the telecommunication network design problem that involves deciding where, when and how much transmission capacity needs to be installed, over a multi-period planning horizon, to meet increasing traffic requirements at minimum total discounted cost. A solution

procedure is proposed and computational results are reported.

4) A Multi-Objective Genetic Algorithm Approach for the Communication Network Design Problem Considering Reliability, ***Abdullah Konak***, Auburn University, Dept. of ISE, 207 Dunstan Hall, Auburn, AL 36849, akonak@eng.auburn.edu, http://www.eng.auburn.edu/~akonak, ***Alice E. Smith***

A multi-objective GA approach is proposed for the communication network design problem considering reliability. While GA guides the main search, heuristics and exact methods are employed to solve sub problems such as the capacity and route assignment problems. Efficient methods are used to evaluate network reliability.

MA33 Production & Scheduling I

Contributed Session

Chair: Viput Ongsakul, Texas Technical University, 201 Indiana Ave., #321G, Lubbock, TX 79415, vongsaku@ttacs.ttu.edu

1) Scheduling a Batch Processing Machine with Incompatible Job Families, ***Meral Azizoglu***, Middle East Technical University, Dept. of IE, Ankara, Bilkent, 06531, Turkey, meral@ie.metu.edu.tr, www.ie.metu.edu.tr/~meral, ***Scott T. Webster***

The problem of scheduling batch processors is important in some industries and, at a more fundamental level, captures an element of complexity common to many practical situations. We describe a B&B procedure applicable to a batch processor model with incompatible job families. The objective is to minimize total weighted flowtime...

2) A Nonlinear Programming Formulation of Real-Time Scheduling Problems, ***Richard M. Bradford***, Rockwell Collins, Inc., 400 Collins Rd. NE, Cedar Rapids, IA 52498, rmbradfo@collins.rockwell.com

We examine a class of scheduling problems familiar in the design of real-time computer operating systems, but relatively unexplored in the OR literature. We formulate one of these problems as an NLP problem and show that its solution corresponds to the results given in the computer science literature.

3) The Mixed Batch Scheduling Problem, ***Viput Ongsakul***, Texas Technical University, 201 Indiana Ave., #321G, Lubbock, TX 79415, vongsaku@ttacs.ttu.edu, ***Surya D. Liman***

The problem of mixed batch scheduling arise from leather processing, where the special characteristic is that leathers are processed in a flow shop manner but consisting of a mix of batch and individual processes. Our objective is to find a schedule that minimizes makespan.

MA34 Decision Support Systems I

Contributed Session

Chair: Tanu S. Bhatnagar, George Washington University, 403 Monroe Hall, 2115 G St. NW, Washington, DC 20052, tsb@gwu.edu

1) Assessing Army C4ISR, ***Kenneth A. Lenig***, US Army, TRADOC Analysis Ctr., 14 Hancock Ave., Ft. Leavenworth, KS 66027, lenigk@trac.army.mil, ***John M. Harwig***

The Army, faced with a changing strategic environment and declining budgets, is forced to make difficult procurement decisions in regards to C4ISR systems. We explore an analytic methodology that was employed to effectively assess Army command, control, communications, computer, intelligence, surveillance and reconnaissance (C4ISR) systems. This presentation includes emerging and interim results.

2) GeoRedes: A Spatial Decision Support System for Vehicle Routing & Facility Location Problems, ***Roberto D. Galvao***, Federal University of Rio de Janeiro, Prog. de Eng. de Producao, COPPE Caixa Postal 68507, Rio de Janeiro, 21945-970, Brazil, galvao@pep.ufrj.br, http://www.po.ufrj.br/projeto/, ***Julio F. Barros Neto***, ***Rogerio Pesse***

GEOREDES is an SDSS that integrates GISs with techniques for solving VRPs and facility location problems. The system was built using the MapObjects library. Tabu search and simulated annealing heuristics are available for solving VRPs; an exact algorithm solves uncapacitated location problems.

3) A Decision Support System for the Course Scheduling Problem, ***Cemal Akyel***, Middle East Technical University, Dept. of Bus. Admin., Inonu Bulvari, Ankara, 06531, Turkey, akyel@ba.metu.edu.tr

We present a DSS for attaining a feasible solution to the course scheduling problem using a heuristic algorithm. The interactive system offers tools to identify different combinations of constraints and objectives and allows the user to select or remove them for a semester or a course.

4) A Decision Support System for Fund Pricing Accountant Assignments, ***Steven E. Eriksen***, Babson College, Babson Park, MA 02457-0310, eriksen@babson.edu

A Boston-based mutual funds firm will soon be relocated to a facility with desk capacity substantially below the current staff level. A binary programming model will assist management with scheduling fund pricing accountants, each working 4-day weeks, optimally convering fund pricing assignments over the 5-day investment week.

5) No Title Supplied, ***Tanu S. Bhatnagar***, George Washington University, 403 Monroe Hall, 2115 G St. NW, Washington, DC 20052, tsb@gwu.edu, ***Srinivas Y. Prasad***

We address some issues in the design of web-based DSSs. Specifically, an XML-based architecture for distributed decision support is developed. The different types of interactive analyses that such an architecture would enable are illustrated through prototypical examples.

MA35 Information Systems III

Contributed Session

Chair: Gerardine Desanctis, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708-0120, gd@mail.duke.edu

1) Managing the Emergence of E-Commerce in Russia, ***Elia V. Chepaitis***, Fairfield University, North Benson Rd., Fairfield, CT 06430, echepaitis@fair1.fairfield.edu

We assess the prospects for successful e-commerce in Russia's emergent market economy. We explore re-engineering and paradigm shifts in industries, processes, relationships, services and products. Russia lacks mature telecommunications and information infrastructures. However, leaders who overcome some or all of these obstacles enjoy strategic advantages.

2) "Soft" Risks in IS Projects during Planning Stages, ***Halia M. Senu***, University of South Australia, 1 Landscape Crescent Highbury, Adelaide SA, 5089, Australia, halis_senu@cobweb.com.au, ***Tricia Vilkinas***

Technical or "hard" aspects can account for a poor 10% of project failure. Over 90% of the cause attributed to IS project failures are due to "soft" factors. Humans are a risk, and this is often absent from any risk analysis. We propose to define the value of including humans as an identified risk factor when undertaking a risk analysis for the IS project.

3) Sharing Knowledge in Computer-Supported Groups: Some Findings from Real-World Interventions, ***Duncan A. Shaw***, University of Strathclyde, MS Dept., 50 George St., Glasgow, Scotland, ML9 2HQ, UK, duncan@mansci.strath.ac.uk

We explore the application of a new format for sharing knowledge in real-world computer-supported groups. It provides support, in the form of facilitator observations and quantitative data analyses, for a claim that this format actually benefits the group members in them being able to share more knowledge.

4) Managing Information Technology-Related Communication: Transactional vs. Relational Approaches, ***Gerardine Desanctis***, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708-0120, gd@mail.duke.edu, ***Izak Benbasat***

Three types of communication are important to management of IT in future enterprises: communication between technology and people using technology communication between technology designers and technology users and communication between IT units and business units. Using a transactional vs. relational dichotomy, we argue that IT professionals and general managers can and should take active steps to design relationship-based communication...

MA36 Operations Management I

Contributed Session

Chair: Jack C. Hayya, Pennsylvania State University, 303 Beam Bldg., University Park, PA 16802, jch@psu.edu

1) Process Management with Uncertain Environmental Limits, ***Chialin Chen***, Wilfrid Laurier University, Sch. of Bus. & Economics, Waterloo, Ontario, N2L 3C5, Canada, cchen@wlu.ca, ***George E. Monahan***

Based on a stochastic model of production planning and inventory control, we develop a DSS for process management with both demand and environmental uncertainties. A major finding shows that standards on production wastes may result in transferring environmental risks from one stage of a product's life cycle to another.

2) A Business to Business Bargaining Model with Supply Uncertainty, ***Haresh B. Gurnani***, HKUST, Dept. of ISMT, Clear

Water Bay, Kowloon, Hong Kong, mnharesh@ust.hk, ***Mengze Shi***

A buyer enters into a contract with an unreliable supplier but they have different beliefs on the level of uncertainty in the channel. We first derive the Nash-bargaining solution. Next, we discuss the role of down payments in the contract and analyze incentive-compatibility issues. Finally, we consider a non-symmetric contract that maximizes channel profits under certain conditions. non-symmetric contract that maximizes channel profits under certain conditions.

3) When Does Cross-Training Servers Pay Off?, ***Sal R. Agnihothri***, SUNY, School of Mgmt., Binghamton, NY 13902-6015, agni@binghamton.edu, ***Donald E. Simmons***, ***Ajay K. Mishra***

We consider a service system with 2 types of customers and flexible and dedicated servers. Using simulation, we investigate the impact of various system parameters on server mix of flexible and dedicated servers. For a variety of situations, we show that when there is a need for flexibility, a small fraction of flexible servers is sufficient in most situations to minimize the total service and delay costs.

4) Research Issues in Supply Chain Design: Analytic Modeling Approaches, ***Jack C. Hayya***, Pennsylvania State University, 303 Beam Bldg., University Park, PA 16802, jch@psu.edu, ***Chao-Hsien Chu***, ***Xin X. He***

We examine the various modeling approaches in supply chain design from traditional mathematical programming to emerging information technologies, such as GAs. These would be compared to simulation and other more practical approaches. Advantages and disadvantages would be outlined and commented upon.

MA37 Optimization Techniques V

Contributed Session

Chair: Rex K. Kincaid, College of William & Mary, Dept. of Mathematics, Williamsburg, VA 23187-8795, rrkinc@math.wm.edu

1) The Multi-Commodity Network Flow Problem: A New Formulation, ***Eswar Sivaraman***, Oklahoma State University, 322 Engineering North, Stillwater, OK 74078, seswar@okstate.edu, http://www.okstate.edu/cocim/members/eswar

We present a new integer programming formulation for solving the multi-commodity network flow problem on an undirected graph allowing for bi-directional flows. This effort was motivated by the need for fast provisioning of SONET/SDH connections in the fiber-optic industry. Implementation results and performance comparison against standard flow in=flow out models are also discussed.

2) Performance Measures for Aviation Security Systems, ***Jon M. Bowman***, University of Illinois, 1206 West Green St., MEB 226, MC 244, Urbana, IL 61801-2906, jmbowman@uiuc.edu, ***Sheldon H. Jacobson***, ***John E. Kobza***

Aviation security is an important problem of national interest. We introduce performance measures to assess the effectiveness of airport baggage screening security device systems. These measures are then used to formulate optimization problems for identifying optimal airport baggage screening security device deployments.

3) An Atypical Evolutionary Algorithm for Structural Optimization, ***Rex K. Kincaid***, College of William & Mary, Dept. of Mathematics, Williamsburg, VA 23187-8795, rrkinc@math.wm.edu, ***Shelley Griffith***, ***Jaroslaw Sobieski***

An evolutionary based strategy, BCB, utilizing 2 normal distributions to generate children is presented. A 2-phase approach coupling a local search (either pattern search or a quasi-Newton search) with BCB to improve performance is also examined. Test cases include a hub design problem.

4) Local Search: Are Search Intensity & Diversity Mutually Exclusive?, ***Alexandre Linhares***, National Sp Research Institute of Brazil, Av Astronautas 1758, SJ Campos, SP 12227-010, Brazil, linhares@crt.umontreal.ca, www.pgrad.inpe.br/~linhares, ***Horacio H. Yanasse***

One implicit tenet of local search metaheuristics is that there is a mutually exclusive balance between 2 desirable goals: search exploration, i.e., diversity of areas, and search exploitation, i.e., intensity in a specific area. We suggest that these goals are not mutually exclusive and can indeed be obtained simultaneously.

MA38 Industry Applications III

Contributed Session

Chair: Bruce R. Feiring, Suffolk University, 8 Ashburton Pl., Boston, MA 02108, bfeiring@suffolk.edu, saywer.suffolk.edu

1) "The Workbox": Sequencing Final Assembly for Hybrid Pull-ATO Manufacturing at Lucent Technologies, ***Kedar S. Naphade***, Lucent Technologies, PO Box 900, Princeton, NJ 08542-0900, knaphade@lucent.com, ***Xavier Gurrola-gal***, ***Michael Hargroder***

We describe a new final assembly sequencing system developed for Lucent Technologies, Shreveport. The system will enable transitioning from a build-to-stock to a near-assemble-to-order paradigm. While many factors affect the feasibility of a pure ATO mode, the workbox is designed to operate in any possible pull/ATO hybrid.

2) Operations Strategy: Convenience Store Location, ***Hisashi X. Kurata***, University of Wisconsin, Sch. of Bus., Milwaukee, WI 53201, ***John J. Liu***, ***Jack C. Hayya***

We discuss the operations strategy for locating convenience stores. We present a case study of the Unimart convenience stores, State College, Pennsylvania. We apply regression, location analysis and a minimum-distance integer programming to verify the optimality of existing locations. We explain why the results depart from theory in some important aspects.

3) Simulation of a Pull-Push System in an Assembly Line, ***Mehmet Savsar***, Kuwait University, College of Eng. & Petroleum, MIE Dept., PO Box 5969, Safat, 13060, Kuwait, mehmet@kuc01.kuniv.edu.kw

This study deals with simulation modeling and analysis of an electronic assembly line. Weekly demands, which are met from the final inventory of circuit boards, trigger the assembly operations. The objective of simulation is to determine the minimum number of batches in the system, including the WIP and finished circuit board inventory, to assure that a certain percentage of demand is met on time.

4) The Cost of Quality for a Mexican Manufacturer, ***Bruce R. Feiring***, Suffolk University, 8 Ashburton Pl., Boston, MA 02108, bfeiring@suffolk.edu, saywer.suffolk.edu

A stochastic modeling procedure is used to obtain the cost of quality for a Mexican subcontractor. This enabled management to analyze costs of internal and external failure costs based upon Juran's cost of quality concept.

MA39 AI in Health Care

Cluster: Computational Intelligence
Invited Session

Chair: Murali S. Shanker, Kent State University, Dept. of MIS, Coll. of Bus., Kent, OH 44242-0001, mshanker@kent.edu

1) Machine Learning for Object Detection & Segmentation, ***W. Nick Street***, University of Iowa, MS Dept., 108 Pappajohn Bldg., Iowa City, IA 52242, ***Kyoung-Mi Lee***

Medical decision making relies increasingly on precise and repeatable image analysis. We present a new approach that uses unsupervised learning on deformable shape models to locate and outline objects, improving its performance with continued use. The system then learns to classify the objects based on user feedback.

2) Improving Accuracy of Neural-Network Predictors for Medical Diagnosis, ***Murali S. Shanker***, Kent State University, Dept. of MIS, Coll. of Bus., Kent, OH 44242-0001, mshanker@kent.edu, ***Michael Y. Hu***, ***Ming S. Hung***

We present results of using several techniques such as bootstrapping and cross-validation to improving the prediction of neural networks applied to medical diagnosis. Applications to breast-cancer prediction, diabetes diagnosis and discrimination of remote complex tones on pitch perception are presented.

MA40 Applied Probability I

Contributed Session

Chair: Michael H. Veatch, Gordon College, Dept. of Math., Wenham, MA 01984, veatch@gordon.edu

1) Warranty Reserve for 2-Dimensional Warranty Policies, ***Shau-Shiang Ja***, SABRE, Inc., 1 East Kirkwood Blvd., MD 7300, Southlake, TX 76092, shau-shiang.ja@sabre.com, ***Vidyadhar G. Kulkarni***, ***Amitava Mitra***, ***Jay Patankar***

Warranty reserve analysis is used by producers to decide on the amount of money they need to cover the warranty cost. We consider 3 2-D warranty policies: 2-D renewable free-replacement, 2-D non-renewable free-replacement and 2-D pro rata warranty policies.

2) A Fluid Model for a Processor Sharing Queue, ***Amber L.***

Puha, California State University, Dept. of Mathematics, San Marcos, CA 92096, apuha@csusm.edu

Formally, a fluid model is a first order, or law of large numbers, approximation of a stochastic system. We propose and analyze a fluid model for the processor sharing queue. It turns out that an appropriate state descriptor for the processor sharing queue is a measure valued process that at each fixed time puts a unit of mass on the residual service time of each job...

3) Nonatomic Total Rewards Markov Decision Processes with Multiple Criteria, ***Eugene A. Feinberg***, SUNY, Dept. of Applied. Math, Stony Brook, NY 11794-3775, eugene.feinberg@sunysb.edu, www.ams.sunysb.edu/~feinberg, ***Aleksey Piunovskiy***

We consider a Markov decision process with an uncountable state space for which the vector performance functional has the form of expected total rewards. Under the single condition that initial distribution and transition probabilities are nonatomic, we prove that the performance space coincides with that generated by nonrandomized Markov policies. We provide applications of these results to investment and inventory control problems.

4) Explicit Fluid Limits for Multiclass Queueing Networks, ***Michael H. Veatch***, Gordon College, Dept. of Math., Wenham, MA 01984, veatch@gordon.edu

Consider the fluid limit of a MQNET with exponential service and inter-arrival times and policies that have a threshold form. Dai showed that these limits exist. We give a method for computing the resulting fluid trajectories and show the connection with the second vector field of Malyshev.

MA41 Operational Issues in Global Supply Chain Execution

Sponsor: CPMS
Sponsored Session
Chair: Susan Rothberg, IBM Integrated Supply Chain Group, 3039 Cornwallis Rd., PO Box 12195, RTP, NC 27709, seroth@us.ibm.com

1) Complexity & Commonality Issues at the End of a Product Life Cycle for Workstation Manufacturing & Supply Chains, ***John Konopka***, IBM Integrated Supply Chain Group, 3039 Cornwallis Rd., PO Box 12195, RTP, NC 27709-2195, konopka@us.ibm.com

We study complexity and commonality issues from a project that looked at the root causes of the end of life manufacturing overage for workstations. We also discuss the results that provide insights into the effects of commonality and complexity on the overage as well as its effect on the product supply chain.

2) Identify the Optimal Machine Attach Rate of Features (Feature Ratio) in BAU Environments & for Special Bids using Statistical Forecasting, ***Mamnoon Jamil***, IBM Integrated Supply Chain, 1000 Atrium Way, Atrium 1, Mt. Laurel, NJ 08054, mamnoon@us.ibm.com

In the workstation manufacturing environment, very few statistical studies have been performed to identify the optimal horizons and weights of actual and order backlogs for the automatic feature attach rate (ratio) calculation. We performed a statistical analysis to identify optimal parameters, which produce the most accurate feature ratio in BAU environment...

3) Leveraging Supply Chains over the Internet, ***Jay Krishnamurthy***, IBM Microelectronics Division, 1000 River Rd., Bldg. 964, Essex Junction, VT 05452, jaykrish@us.ibm.com

Business to business applications over the Internet provide a powerful mechanism to extend the range of vision across the supply chain partners. At the same time, this also poses newer challenges to the planning and fulfillment engines. We illustrate how companies can use web-based B2B applications to integrate the supply chain and the associated technical and process challenges.

4) Management Issues in Global Supply Chain Execution, ***Susan Rothberg***, IBM Integrated Supply Chain Group, 3039 Cornwallis Rd., PO Box 12195, RTP, NC 27709, seroth@us.ibm.com

This discussion will focus on manufacturing methodology and its impact to supply chain execution. We will explore the trade-off between design for logistics and cost of serviceability, with specific emphasis on the management decision making process.

MA42 Six Sigma Methods Development & Applications to Manufacturing Processes

Cluster: Reliability & Quality Control
Sponsor: Quality, Statistics & Reliability Section
Sponsor/Invite Session
Chair: Theodore T. Allen, Ohio State University, Dept. of ISE, 1971 Neil Ave., Columbus, OH 43210-1271, allen.515@osu.edu, www-iwse.eng.ohio-state.edu/facultyp/allen.htm

1) Desirability-Based Methods that Address Process Variability & Methods Comparison for Arc Welding Parameter Optimization, ***Charlie Ribardo***, Stewart & Stevenson Inc. Tactical Vehicle Systems, 5000 I-10 West, Sealy, TX 77474, charlie_ribardo@ewi.org

We use desirability functions to compare alternative statistical process design methods based on a single relevant arc welding application. The comparison takes into account an expanded set of criteria that include experimental cost, derived model accuracies, complexity of the procedure and final solution quality. The results from this comparison are used to suggest objectives for future methods and comparisons...

2) Roles for Simulation Optimization & Methods Development within the Six Sigma Framework, ***Theodore T. Allen***, Ohio State University, Dept. of ISE, 1971 Neil Ave., Columbus, OH 43210-1271, allen.515@osu.edu, www-iwse.eng.ohio-state.edu/facultyp/allen.htm

The 6 sigma methodology can be viewed as a broad framework for the deployment of statistical and optimization techniques for manufacturing process improvement. Inside this framework are roles for design of experiments, modeling and optimization. Simulation optimization heuristics that we have developed permit the creation of design of experiments techniques requiring substantially reduced numbers of experimental runs...

3) Supersaturated Designs that Directly Maximize the Probability of Identifying Active Factors, ***Mikhail Bernshteyn***, Ohio State University, Dept. of ISE, 1971 Neil Ave., Columbus, OH 43210-1271

Supersaturated designs and associated analysis methods have been proposed by several authors to identify active factors in situations in which only a very limited number of experimental runs are available. The availability of the proposed designs depends on the existence of certain factorial designs and these designs are not, in general, optimal with respect to the objectives that they were proposed to address...

4) Robust Optimization to Achieve the Appropriate Sigma Level, ***Waraporn Ittiwattana***, The Edison Welding Institute, Columbus, OH 43210

Robust machine design seeks to maximize the performance of a machine, taking into account uncertainty in the "noise" factors that cannot be controlled. Surprisingly, methodologies that use design of experiments to create approximate models of relevant quality characteristics and simulation optimization to directly minimize the expected loss have received relatively little attention. The advantages of these approaches are obvious...

MA43 Linking Technology Transfer & Enterprise Equity

Sponsor: Technology Management Section
Sponsored Session
Chair: W. Austin Spivey, University of Texas, Div. of Mgmt. & Mktg., 6900 North Loop, 1604 West, San Antonio, TX 78249, wspivey@utsa.edu

1) A Meta-Review of Tech Transfer across Academic Disciplines from 1989, ***W. Austin Spivey***, University of Texas, Div. of Mgmt. & Mktg., 6900 North Loop, 1604 West, San Antonio, TX 78249, wspivey@utsa.edu, ***J. Michael Munson***, ***William T. Flannery***

Interest in technology transfer across academic disciplines highlights this paper. A computerized search focuses on 1989-2000. The intent is to identify articles cited most often in order to discover propositions that define the core of this area of MOT. Findings imply the need for a multidisciplinary perspective.

2) The Kyoto Protocol: An Analysis of the Costs & Technologies Available for a Municipal Utility, ***William C. Gunst***, University of Texas, MSMOT Program, San Antonio, TX

We research the financial and physical constraints that could impact a utility if federal or state statutes impose additional emission restrictions as a result of the Kyoto and subsequent treaties.

3) Digital Audio Broadcasting, ***John W. Kosub***, University of Texas, MSMOT Program, San Antonio, TX

We provide comprehensive information about the IBOC DAB technology, the barriers to its adoption and its potential rate of adoption.

4) The Semiconductor Industry Enters the Specific Phase, ***Andrew Black***, University of Texas, MSMOT Program, San Antonio, TX

We use Utterback's framework to posit the transition of the semiconductor industry into the specific phase of industrial innovation.

MA45 Software Demonstration III

Software Demo Session

Chair: Katie Odem, Applied Decision Analysis LLC, katie.odem@us.pwcglobal.com

1) Introducing DPL 5.0: Decision Analysis Software, ***Katie Odem***, Applied Decision Analysis LLC, katie.odem@us.pwcglobal.com

DPL is professional decision analysis software using influence diagrams, decision trees and spreadsheets. Graphical outputs include rainbow diagrams, risk profiles, policy trees and policy summaries. New in DPL 5.0: time-series percentiles, 2-way rainbow diagrams and much more!

MA46 Transportation

Contributed Session

Chair: Ismail Chabini, MIT, Dept. of Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1263, Cambridge, MA 02139-4307, chabini@mit.edu

1) A Continuous Linear Programming Model for Air Cargo Revenue Management, ***Itir Karaesmen***, Carnegie Mellon University, 360 Posner Hall, GSIA, Pittsburgh, PA 15213, itir@andrew.cmu.edu

We propose a continuous linear programming model for revenue management in the air cargo industry. Because of the demand and inventories, even a simplified air cargo problem is challenging. We focus on optimization, prove duality for the continuous LP, provide approximations and discuss numerical results.

2) On Cost Allocation in Networks with Threshold-Based Discounting, ***Darko Skorin-Kapov***, Adelphi University, School of Bus., Garden City, NY 11530, skorin@adelphi.edu, http://www.adelphi.edu/~skorind

We consider networks in which every 2 nodes can communicate directly but there is a monetary incentive to combine flows from different sources. Namely, the cost of flow through a particular link is discounted if it exceeds a prescribed threshold. We discuss how to allocate the cost of such networks in a manner that stimulates cooperation of users.

3) Algorithms for Route Guidance Generation, ***Jon Bottom***, MIT, Dept. of Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1263, Cambridge, MA 02139-4307, jbottom@mit.edu, ***Moshe E. Ben-Akiva***, ***Ismail Chabini***

Route guidance is a key component of intelligent transportation systems applications. Guidance generation can be posed in a number of ways, such as fixed point problems, with typically noisy function evaluations. We examine a number of algorithms for solving such fixed point problems, including the classic method of successive averages and a method proposed by Polyak...

4) Shortest Path Algorithms in Continuous-Time Dynamic Networks with Applications to Transportation Networks with Traffic Lights, ***Ismail Chabini***, MIT, Dept. of Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1263, Cambridge, MA 02139-4307, chabini@mit.edu

We present efficient algorithms for variants of shortest path problems in continuous-time dynamic networks. We model the minimum-time shortest path problem in networks with traffic lights as a special case of continuous-time dynamic networks. We show numerical results that demonstrate the efficiency of the developed algorithms for these classes of continuous-time shortest path problems.

Monday 10:00-11:00

MP44 Plenary: The Integrated Supply Chain as an Enabler of E-Business Transformation

Plenary Session

Chair: Way Kuo, Texas A&M University, Dept. of IE, College Station, TX 77843, way@tamu.edu

1) Plenary: The Integrated Supply Chain as an Enabler of E-Business Transformation, ***Frank Jones***, IBM Corporation, PO Box 100, Rte. 100, Somers, NY 10589, frankjon@us.ibm.com

E-business clearly has become "the next big thing." As the rate and pace of the e-business phenomenon continue to accelerate - and as projections for business and consumer spending via e-commerce continue to inflate - designing and deploying an end-to-end supply chain model becomes increasingly important for companies large and small. Mr. Jones will discuss the continuing e-business/e-commerce transformation, with a particular emphasis on the supply chain and value chain integration. He will also discuss practical considerations that companies face in developing their e-business strategies.

Monday 13:15-14:45

MC01 Integrating Real Options & Decision Analysis

Sponsor: Decision Analysis Society

Sponsored Session

Chair: Ronald A. Howard, Stanford University, Dept. of MS & Eng., Terman Eng. Ctr., Sch. of Eng., Stanford, CA 94305-4023, rhoward@stanford.edu

1) Real Options & the Black Scholes Formula: What's Wrong with this Picture?, ***Udi Meirav***, Navigant Consulting Inc., 1 Boston Pl., Boston, MA 02108, udi_meirav@navigantconsulting.com

We aim to reinforce the significance and value of real options by weeding out the most pernicious misconception associated with them, which is the presumed connection between real options and the Black Scholes formula, and point towards preferred alternatives for evaluating real options on solid quantitative and intuitive grounds.

2) Development Options, ***James E. Matheson***, Navigant Consulting Inc., 2440 Sand Hill Rd., Menlo Park, CA 94025, jmatheson@sdg.com

Most real options situations consist of a period of development of an opportunity leading to a launch event followed by a period of exploitation. Examples range from classic R&D, to creating new businesses, to making movies, to exploring for natural resources. I will present a general paradigm for characterizing development situations and several modeling and solution methods for evaluating them.

3) Real Options in Negotiation & Agreement Design, ***Mazen A. Skaf***, Global Trading, Rapt, Inc., 81 Bluxome St., San Francisco, CA 94107, mazen.skaf@rapt.com

I present a framework for uncovering, structuring and evaluating real options in the course of a negotiation and in the life of an eventual agreement. Using a case on technology licensing agreements, I discuss the buyer's reservation line for negotiating contractual real options and the option value of negotiation.

MC02 Tutorial: Dynamic Resource Management - Problems, Models & Algorithms

Invited Session

Chair: Warren B. Powell, Princeton University, Dept. of OR & Financial Eng., CASTLE Lab., Princeton, NJ 08544, powell@princeton.edu

1) Tutorial: Dynamic Resource Management - Problems, Models & Algorithms, ***Warren B. Powell***, Princeton University, Dept. of OR & Financial Eng., CASTLE Lab., Princeton, NJ 08544, powell@princeton.edu

In an era where the rapid interchange of information is growing, the challenge of managing resources efficiently in a dynamic setting is becoming increasingly important. We motivate this area real applications from freight transportation, military operations, vehicle routing, logistics and distribution and management of agricultural commodities. We then provide a modeling vocabulary that merges concepts from optimization, simulation, dynamic programming and control theory...

MC03 Retail Inventory

Sponsor: MSOM

Sponsored Session

Chair: Richard D. Metters, SMU, Cox School of Bus., PO Box 750333, Dallas, TX 75275-0333, rmetters@mail.cox.smu.edu

1) Managing Inventory with Multiple Products, Lags in Delivery, Resource Constraints & Lost Sales: A Mathematical Programming Approach, ***John H. Semple***, SMU, Cox Sch. of Bus., PO Box 750333, Dallas, TX 72575-0333, jsemple@mail.cox.smu.edu, ***Brian T. Downs***, ***Richard D. Metters***

We develop an order-up-to S inventory model that is designed to handle

multiple items, resource constraints, lags in delivery and lost sales without sacrificing computational simplicity. We develop nonparametric estimates of these costs and use them in conjunction with linear programming to produce LP policy.

2) Using Information to Improve Retail Product Freshness of Perishables, ***Michael E. Ketzenberg***, University of North Carolina, 1019 Laurel Hill Rd., Chapel Hill, NC 27514, mketz@aol.com

We explore the value of information sharing to improve supply chain management of perishables. In a multi-echelon setting, simulation is used to analyze the relative performance of facilities that utilize downstream supply and demand information in replenishment with facilities that only utilize their own demand and inventory information.

3) Breaking Bulk to Improve Retail Space Management, ***Richard D. Metters***, SMU, Cox School of Bus., PO Box 750333, Dallas, TX 75275-0333, rmetters@mail.cox.smu.edu, ***Michael E. Ketzenberg, Vicente A. Vargas***

The benefits of breaking bulk in retail operations are explored. The focus is on the benefits to space management, rather than the reduction in inventory costs. Using data from the grocery industry, results indicate that profitability can be increased substantially - but only if current inventory replenishment practices are changed.

MC04 Queueing Applications in Manufacturing

Sponsor: MSOM
Sponsored Session
Chair: Nico J. Vandaele, University of Antwerp, Prinsstraat 13, Antwerp, 2000, Belgium, nico.vandaele@ufsia.ac.be

1) Lot-Sizing & Inventory Decisions: An Integrated Approach, ***Mark L. Spearman***, University of Alabama, Coll. of Commerce & Bus. Admin, 366 Alston Hall, Box 870226, Tuscaloosa, AL 35487-0226, mspearman@cba.ua.edu, ***Silke Kroeckel***

We consider a make to stock system which is replenished with a system having a bottleneck operation that requires significant changeover times whenever we go from one product to another. Our goal is to minimize inventory subject to a service constraint. The problem is very hard as it is not everywhere convex. We provide a practical solution procedure and discuss computational experience.

2) Models for Comparison of Push, Pull & Hybrid Control Strategies for Manufacturing, ***Ananth Krishnamurthy***, University of Wisconsin, Ctr. for Quick Response Mfg., 1513 University Ave., Madison, WI 53706, akrishna@cae.wisc.edu, ***Rajan Suri***

Kanban or "pull" strategies are popular today and considered to be superior to traditional push methods. Using both queueing and simulation models we compare various pull, push, and hybrid control strategies and show that in certain situations the push or hybrid strategies have better performance than kanban/pull.

3) Complex Product Structures in Multi-Stage Capacitated Manufacturing Systems, ***W. H. M. Zijm***, Eindhoven University of Technology, PO Box 513, Paviljoen F18, Eindhoven, 5600 MB, The Netherlands, w.h.m.zijm@tm.tue.nl, ***Zeynep M. Avsar, A. G. de Kok***

We analyze the performance of multi-product multi-cell manufacturing systems. Each cell is modeled as a queueing network, possibly subject to a workload limit. For each product, a Bill of Material specifies the parts and/or subassemblies to be manufactured or purchased. Commonality of parts may occur, leading to divergent parts routings. We develop integrated stochastic models for these complex systems and use them to investigate the performance of base stock control policies...

MC05 Tutorial: Traffic Modeling for Queues & its Impact on Performance Analysis

Sponsor: Applied Probability Society
Sponsored Session
Chair: Peter W. Glynn, Stanford University, Dept. of MS & Eng., Terman Engineering Ctr., Stanford, CA 94305-4026, glynn@leland.stanford.edu

1) Tutorial: Traffic Modeling for Queues & its Impact on Performance Analysis, ***Peter W. Glynn***, Stanford University, Dept. of MS & Eng., Terman Engineering Ctr., Stanford, CA 94305-4026, glynn@leland.stanford.edu

We discuss 3 different types of traffic environments: short-range dependent with light (marginal) tails, short-range dependent with heavy tails and long-range dependent with light tails. Specifically, we describe the qualitative behavior of a queue fed by such traffic, i.e., heavy-traffic scaling, most likely path to buffer overflow, relaxation time, etc.

MC06 Sustainable Transportation Networks

Sponsor: Transportation Science Section
Sponsored Session
Chair: Anna Nagurney, University of Massachusetts, Isenberg Sch. of Mgmt., Dept. of Finance & Op. Mgmt., Amherst, MA 01003, nagurney@gbfin.umass.edu

1) A Methodology for the Disaggregate, Multi-Dimensional Measurement of Neighborhood Type, ***Michael N. Bagley***, South Texas Community College, 109 East Kiwi Ave., McAllen, TX 78504, michael.bagley@eudoramail.com, ***Patricia L. Mokhtarian***

It is common in land-use/travel studies to classify neighborhoods as "traditional" vs. "suburban." We develop a methodology for creating continuous scales along which to measure a neighborhood's type - as experienced by an individual resident. The empirical approach offers graphic illustration that the usual binary approach is deficient.

2) The Sequential Travel Forecasting Paradigm was a Counter-Productive Concept, ***David E. Boyce***, University of Illinois, Dept. Civil & Materials Eng., 3073 ERF, 842 West Taylor St., Chicago, IL 60607-7023, dboyce@uic.edu

Making intelligent long-term transportation investment choices requires a capability to forecast urban travel. We explore some of the reasons that urban travel forecasting has been relatively unsuccessful during its 50-year history and offer an alternative forecasting paradigm based on OR methods.

3) Dynamics of a Transportation Pollution Permit System with Stability Analysis & Computations, ***Ding Zhang***, SUNY, Sch. of Business, Oswego, NY 13126, zhang@oswego.edu, ***Anna Nagurney***

We develop a dynamic model of a pollution permit system for congested urban transportation networks, which guarantees that the environmental quality standard is achieved. We establish both local and global stability results and propose a discrete-time algorithm for the approximation of the trajectories. Convergence results and numerical examples are provided.

4) Emission Paradoxes & Policies for Sustainability of Transportation Networks, ***Anna Nagurney***, University of Massachusetts, Isenberg Sch. of Mgmt., Dept. of Finance & Op. Mgmt., Amherst, MA 01003, nagurney@gbfin.umass.edu

We identify emission paradoxes which can arise in congested urban transportation networks. These paradoxes reveal that the network topology, travel behavior, cost and demand structure must all be taken into consideration in the development of any policies aimed at sustainability of the transportation infrastructure.

MC07 INFORMS Case Competition 2000: Finalists 1 & 2

Sponsor: INFORM-ED
Sponsored Session
Chair: James J. Cochran, Louisiana Tech. University, Dept. of Comp. IS & Anlysis, Coll. of Admin. & Bus., Ruston, LA 71272, cochran@cab.latech.edu

1) INFORMS Case Competition 2000: Finalist 1

2) INFORMS Case Competition 2000: Finalist 2

MC08 Marketing Issues in E-Business

Sponsor: E-Business Section
Sponsored Session
Chair: Arvind Rangaswamy, Pennsylvania State University, Smeal College of Bus. Admin., 707G BAB, University Park, PA 16802-3007, arvindr@psu.edu

1) Decomposing the Repeat-Purchase Process into Visiting & Conversion Behavior, ***Wendy W. Moe***, University of Texas, Dept. of Mktg., McCombs Sch. of Bus., Austin, TX 78712, wendy@mktgmail.wharton.upenn.edu, ***Peter S. Fader***

We focus on the multiple roles that browsing behavior plays in assisting our ability to understand and forecast repeat-purchase patterns for an online merchant. Using data from Media Metrix, we decompose buyer behavior into 2 distinct sub-models: the time between repeat visits to a particular website and the conversion process through which certain visits are associated with purchase transactions...

2) Forecasting within a Virtual Supply Chain at Garden.com, ***Jeriad M. Zoghby***, Garden.com, 3301 Steck Ave., Austin, TX 78757, jeriad@garden.com

Garden.com acknowledges that accurate forecasting is essential to success in the

highly competitive e-commerce environment, especially under the conditions of a virtual supply chain. I will describe the flexible forecasting methods that we have developed to provide reliable predictions in the face of high seasonality, diverse product lines and unique seasonal growth patterns.

3) Efficiency, Agency & Customer Satisfaction in Virtual Environments: A Study of Online Investing, ***Sridhar Balasubramanian***, University of Texas, Dept. of Mktg., McCombs Sch. of Bus., Austin, TX 78712, sridhar.balasubramanian@bus.utexas.edu

In virtual marketplaces, the IS function now plays an increasingly important role in managing the interface between the firm and its external customers. While virtual markets are efficient, they also engender problems of agency. We theoretically motivate and empirically validate a model that integrates issues of efficiency and agency in the context of customer satisfaction in virtual settings... efficiency and agency in the context of customer satisfaction in virtual settings...

4) Researching Marketing Strategy using the Net, ***Arvind Rangaswamy***, Pennsylvania State University, Smeal College of Bus. Admin., 707G BAB, University Park, PA 16802-3007, arvindr@psu.edu

I describe a web-based tool that we have developed to conduct longitudinal strategy studies. The tool enables firms to share sensitive strategy data with each other anonymously and also produces automatic reports. The tool is useful for generating data for academic studies as well as for guiding industry practice. I also describe results from ongoing studies to measure the e-intensity of firms in various industries.

MC09 Auction Strategy in Revenue Management

Sponsor: Revenue Management Section
Sponsored Session
Chair: Timothy J. Flynn, University of Alabama, Commerce & Bus. Admin. Coll., Box 870223, Hoover, AL 35487-0023, timjflynn99@aol.com, flynnt@proctr.cba.ua.edu

1) Auction Design for Efficient Must-Run Generation Procurement, ***Alfredo Garcia***, The Brattle Group, 1133 20th St. NW, Ste. 800, Washington, DC 20036-3408, alfredo_garcia@brattle.com

Given the physical constraints of power flow, must-run generation is a pervasive feature of electricity markets. When its pricing is embedded into the spot market, a substantial degree of market power can be exercised and it is usually evidenced through great variability of intraday bids. We propose a pricing rule that provides incentives for truthful cost revelation...

2) Auctions for Procuring Options, ***Rakesh V. Vohra***, Northwestern University, MEDS Dept., Kellogg Mgmt. Sch., 2001 Sheridan Rd., Evanston, IL 60208-2009, r-vohra@nwu.edu, ***James Schummer***

We propose a class of incentive-compatible, efficient auctions for procuring options. Auctions in this class can loosely be described as ex-ante Clark-Groves schemes. We also show that such auctions can be implemented in a computationally efficient way and discuss an application to electricity markets.

3) The English Auction with Differentiated Commodities, ***Ennio Stacchetti***, University of Michigan, Dept. of Economics, Ann Arbor, MI 48109-1220, ennio@econ.lsa.umich.edu

We propose a simultaneous English auction for multiple goods, when buyers have valuations satisfying the gross substitute (GS) condition. Truthful revelation of demand is a perfect Bayesian equilibrium if the smallest Walrasian prices correspond to Vickrey payments. However, no ascending price auction can reveal sufficient information to implement the Vickrey mechanism if all GS preferences are allowed.

MC10 Panel: Research Opportunities in Scheduling Theory & Applications

Cluster: Scheduling
Invited Session
Chair: Nicholas G. Hall, Ohio State University, 301 Hagerty Hall, 1775 South College Rd., Columbus, OH 43210-1144, halln@cob.ohio-state.edu

1) Panel: Research Opportunities in Scheduling Theory & Applications, ***Andreas S. Schulz***, MIT, Sloan Sch. of Mgmt. & OR, BLdg. E53-361, 30 Acorn St., Cambridge, MA 02142-1320, schulz@mit.edu, ***Chelliah Sriskandarajah***, University of Texas at Dallas, Sch. of Mgmt., Box 830688, MS JO4.7, Richardson, TX 75083-0688, ***Steef L. van de Velde***, Erasmus University, Rotterdam Sch. of Mgmt., PO Box 1738, Rotterdam, 3000 DR, The Netherlands, svelde@fac.fbk.eur.nl

Because of its strong theoretical foundations and ability to model a wide variety of important applications, scheduling is among of the most active fields within OR. Emerging research opportunities in scheduling, ranging from theory to applications, will be discussed. Advice about the publication of scheduling work will be provided.

MC11 Computational Integer Programming

Cluster: Integer Programming
Invited Session
Chair: John E. Mitchell, RPI, Dept. of Math Sciences, 110 Eigth St., Troy, NY 12180, mitchj@rpi.edu

1) A Computational Study of Weyl Cuts, ***Garud Iyengar***, Columbia University, Mudd Bldg., Rm. 314, 500 West 120th St., New York, NY 10027, garud@ieor.columbia.edu, ***Mehmet Tolga Cezik***, ***Gabor Pataki***

Weyl cuts were invented by Ramana to enforce semidefiniteness, and rank 1 property of a matrix variable satisfying linear inequality constraints. We present computational results with Weyl cuts on several combinatorial problem classes. computational results with Weyl cuts on several combinatorial problem classes.

2) Progress on a General Mixed Integer Programming Solver, ***Eva K. Lee***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, eva.lee@isye.gatech.edu, http://www.isye.gatech.edu/~evakylee

Issues related to the integration and performance of iterative strengthening of cutting planes, primal heuristics and branching schemes into a general MIPSOL will be described. Computational experience with real MIP instances will be reported.

3) Realignment in the NFL, ***John E. Mitchell***, RPI, Dept. of Math Sciences, 110 Eigth St., Troy, NY 12180, mitchj@rpi.edu

When the National Football League expands to 32 teams in 2002, it may be realigned into eight 4-team divisions. Minimizing the intradivisional travel distances is a k-partitioning problem, where a graph's vertices are divided into k sets of equal size. We describe a B&C algorithm for the k-partitioning problem..

MC12 Global Supply Chain Management

Cluster: Logistics & Supply Chain Management
Invited Session
Chair: Herbert Kotzab, Copenhagen Business School, Dept. of Op. Mgmt., Solbjerg Plads 3, Frederiksberg, DK-2000, Denmark, hk.om@cbs.dk

1) Logistics Integration in the Supply Chain: The Case of Vendor-Managed Inventory, ***Poul Erik Christiansen***, Copenhagen Business School, Dept. of Op. Mgmt., Copenhagen, Denmark, ***Arnold B. Maltz***

Different types of vendor-managed inventory are increasingly applied in Danish trade and industry to achieve better logistics efficiency. We will analyze and give a perspective on vendor-managed purchasing based on literature review and Danish cases. We present thereby a theoretical framework for logistics integration in the supply chain.

2) Data Integrity: A Critical Measure of Retail Operational Performance, ***Nicole DeHoratius***, Harvard Business School, Morgan Hall T10, Boston, MA 02163

Retail operations rely on getting the right product to the right place at the right time. However, select operational data is often inaccurate causing problems in inventory management, particularly warehouse-to-store fulfillment. We identify the importance of measuring data integrity and suggest a process approach to improving data quality leading to improved service quality.

3) Supply Chain Coordination with Priority Scheduling, ***Katariina M. Kemppainen***, Helsinki School of Economics, Runeberginkatu 14-16, POB 1210, Helsinki, 00101, Finland

International supply chains often contain several stages that reach for local objectives without considering the impact on system performance. Our study shows how practical priority index-based scheduling mechanisms can be used to coordinate different functions of supply chains. Some applications are discussed.

4) Controlling the Chain: Measuring Supply Chain Performance using a Network Approach, ***Andreas Otto***, Universitat Erlangen-Nurnberg, Lehrstuhl fur Logistik

Like any form of management, SCM needs to be supported through

accounting/controlling. We inquire how the accounting information system as the "database" for controlling needs to be changed in a supply chain context. It is beneficial to interpret a supply chain as a network in order to develop a

MC13 Issues in Supply Chain Coordination

Cluster: Manufacturing & Logistics
Invited Session
Chair: Stephen M. Gilbert, University of Texas, CBA 4.202, B6300, Austin, TX 78712, steve.gilbert@bus.utexas.edu

1) Incentive Compatible Pricing Mechanisms for Service Differentiated Demand Classes, ***Vinayak V. Deshpande***, Purdue University, 562 Krannert Bldg., West Lafayette, IN 47907, deshpandev@mgmt.purdue.edu, ***Morris A. Cohen***, ***Karen L. Donohue***

We examine pricing mechanisms to coordinate inventory decisions between a supplier and multiple buyers with differentiated service requirements. We develop an incentive compatible pricing scheme which overcomes information asymmetry in the supply chain. We highlight the benefits of this scheme relative to current practice in the service parts industry.

2) Coordination through a Risk-Free Fashionable Item Return Policy, ***Z. Kevin Weng***, University of Wisconsin, Sch. of Bus., Madison, WI 53706, ***Scott T. Webster***

A return policy encourages larger order quantities and can increase manufacturer profit. One downside from a manufacturer's perspective is the possibility of very low profit due to high rebate expense. Taking the viewpoint of a manufacturer selling to a single risk-neutral retailer, we develop a return policy that is risk-free.

3) Intermediate Product Design & Replenishment Policies for Managing Variety in the Steel Industry, ***Diwakar Gupta***, University of Minnesota, 125 Mechanical Eng. Bldg., 111 Church St. SE, Minneapolis, MN 55455, ***Brian T. Denton***, ***Keith Jawahir***

Integrated steel mills need to manage inventories of a large number of intermediate products (slabs) with limited warehouse space. We present a 2-stage stochastic programming model for optimizing slab design and setting replenishment policies. The model captures effects of demand, yield and replenishment time uncertainty.

4) Coordination of Pricing & Multiple-Period Production across Multiple Constant Priced Goods, ***Stephen M. Gilbert***, University of Texas, CBA 4.202, B6300, Austin, TX 78712, steve.gilbert@bus.utexas.edu

We address the problem of jointly determining a production schedule and a vector of prices for a set of products that have seasonal, price-dependent demands. By identifying and exploiting the special structure of the problem, a solution procedure is developed. Through numerical examples, we show the relationship between seasonalities and pricing policies.

MC14 Airline Operations & Infrastructure

Sponsor: Aviation Applications Section/Transportation Science Section
Sponsored Session
Chair: John-Paul Clarke, MIT International Center for Air Transportation, Aeronautics/Astronautics Dept., 77 Massachusetts Ave., Cambridge, MA 02139-4307, johnpaul@mit.edu

1) An Integer Programming Model to Evaluate Uncertainty Reductions Resulting from Collaborative Decision Making, ***Michael O. Ball***, University of Maryland, Smith Sch. of Business, Inst. for Systems Research, College Park, MD 20742-1815, mball@rhsmith.umd.edu, ***Thomas Vossen***

The combination of timely cancellation notices and the use of the compression algorithm have reduced the uncertainty of flight arrival times during ground delay programs. We present an analysis, based on an integer programming model, that relates uncertainty reduction to reduction the airborne queue size needed to maintain close to full utilization of an airport's arrival capacity.

2) A Conceptual Design of a Departure Planner Decision Aid, ***Yiannis Anagnostakis***, MIT International Center for Air Transportation, 77 Massachusetts Ave., Cambridge, MA 02139-4307, yianag@mit.edu, ***John-Paul Clarke***

The development of decision support tools for air traffic controllers calls for a thorough understanding of the links and interactions in ATM operations and requires constant evaluation and assessment. Furthermore, the design of a high-level architecture for airport departure management should be based on a thorough analysis of the airport system and understanding of the needs and constraints in current airport operational procedures...

3) Dynamic Ground Delay Program Models, ***Tasha R. Inniss***, Trinity College, Dept. of Math, Washington, DC 20017, innisst@trinitydc.edu, ***Michael O. Ball***

Existing stochastic ground holding models implicitly assume that the amount of assigned ground delay is not adjusted over time. We present a new approach that takes into account the dynamic adjustments to assigned delay that are typically made when weather conditions and forecasts change. We demonstrate this methodology using recently derived capacity scenario distributions.

4) An Optimization Model for a Real-Time Flight Scheduling Problem, ***Goran Stojkovic***, GERAD, Ecole Polytech, 3000 Cote-Sainte-Catherine, Montreal, Quebec, H3T 2A7, Canada, goran@crt.umontreal.ca, ***Francois Soumis***, ***Jacques Desrosiers***, ***Marius M. Solomon***

When perturbations occur in the day of operation of an airline, the flight schedule may become infeasible and must be updated. We propose an original formulation designed to determine a new flight schedule that fits with the existing aircraft assignment, maintenance schedule, crew schedule and passenger connections.

MC15 Tutorial: Digital Business Community - Supply Chains to Market Places

Invited Session
Chair: Amiya K. Chakravarty, Tulane University, AB Freeman Sch. of Bus., New Orleans, LA 70118, amiya.chakravarty@tulane.edu

1) Tutorial: The Digital Business Community - Supply Chains to Market Places, ***Amiya K. Chakravarty***, Tulane University, AB Freeman Sch. of Bus., New Orleans, LA 70118, amiya.chakravarty@tulane.edu

Companies in a DBC must be integrated seamlessly for quick response to changes in customer preferences, technology and competition. Handoff inefficiencies may creep in among partners from misalignments in information flows, delivery formats and schedules. To ensure knowledge sharing and alignment in business processes, companies may redesign flows of goods, information and funds. How should capabilities, process-alignment, network-flows and system-transparency be determined in such a DBC? ...

MC16 Multi-Dimensional Online Auction Design: A Multiple Criteria Perspective

Cluster: MCDM
Sponsor: Group Decision & Negotiation Section
Invite/Sponsor Session
Chair: Jeffrey E. Teich, New Mexico State University, Las Cruces, NM 88001, jteich@nmsu.edu

1) Multi-Attribute Auctions, ***Martin Bichler***, Vienna University of Economics & Business Administration, Dept. of Info. Systems, Augasse 2-6, Vienna, 1090, Austria, martin.bichler@wu-wien.ac.at

We propose multi-attribute auctions, an economic mechanism to automating multilateral procurement negotiations on multiple attributes of a deal. The buyer reveals a scoring function to the bidders, and the mechanism allocates the goods to the supplier who maximizes the buyer's preferences, i.e. who provides the highest overall utility score.

2) Combinatorial Auctions with Multi-Dimensional Inexact Bids & Constraints, ***Gary J. Koehler***, University of Florida, Dept. of DIS, Box 117169, Coll. of Bus., 351 Stuzin Hall, Gainesville, FL 32611-7169, koehler@ufl.edu, ***Joni L. Jones***

We present a new way of using an auction mechanism to facilitate B2B negotiations by allowing inexact bidding with multiple evaluative criteria while providing for constraints unique to the environment. We present the proposed model and simplifying heuristics for the combinatorial allocation problem.

3) A Hybrid Multi-Attribute Auction Method Combining Elements of Auctions & Negotiations, ***Jeffrey E. Teich***, New Mexico State University, Las Cruces, NM 88001, jteich@nmsu.edu, ***Hannele E. Wallenius***, ***Jyrki Wallenius***, ***Alexander Zaitsev***

Negotiauction is an Internet-based system developed for either forward or reverse auctions. It can handle complex multi-dimensional auctions, involving multiple attributes, and underlying explicit constraints. Bidders are ranked across multiple bidder attributes, then based on the ranking, "bid premiums" can be inserted to discriminate among the bidders.

4) Collaborative Agents for Telecommunications Service Level Management, ***Alex Bordetsky***, California State University, TELCOT Institute, 2420 Camino Ramon, Ste. 205, San Ramon, CA 94853,

bord@csuhayward.edu

Geographically distributed collaboration and adaptation among emerging multimedia satellite-terrestrial services is addressed. An ensemble of cooperating agents are available to help managers to adapt to user and application profiles and consider multiple conflicting QoS criteria. Cooperating agents solve multiple criteria problems of negotiating networking resources through agent committees.

MC17 Pricing, Information & Flexibility in Supply Chain Management

Cluster: Performance of Supply Networks
Invited Session

Chair: Ana Muriel, University of Massachusetts, MIE Dept., Amherst, MA 01089, ollieatassi@worldnet.att.net, muriel@ecs.umass.edu

1) Value of Information in Integrated Supply Chain Management, ***Linda K. Nozick***, Cornell University, Sch. of Civil & Environ. Eng., Ithaca, NY 14853-3501, ***Mark A. Turnquist, Lynn Truss, Ted Costy, Jeff Tew, June Ma***

What information is necessary at what places, and at what times, to optimize the performance of the supply networks. We develop an analytic model that can be used to gain insights into this question. An illustrative example is discussed.

2) An Assemble-to-Order System with Flexible Customers, ***Seyed Iravani***, Northwestern University, Dept. of IEMS, Evanston, IL 60208-3119, ***Louis Luangkesorn, David Simchi-Levi***

We consider an assemble-to-order system in which orders consist of essential and non-essential items. A customer (order) is lost when at least one of the essential items of her order is not available. However, some customers are flexible enough to accept a replacement for their essential items (if those items are not available)...

3) Supplier Management in E-Business: Optimal Mix between Long-Term & Spot-Market Procurement, ***Victor Araman***, Stanford University, Dept. of MS & Eng., Stanford, CA 94305, ***Jochen Kleinknecht, Edison Tse, Ram Akella***

Internet-based marketplaces represent an additional channel for the procurement of material or components. We study the effects of such a spot market on a manufacturer who previously relied on traditional long-term procurement contracts. We propose very general conditions under which a mixed strategy between those 2 supply channels is optimal...

4) Impact of Production Flexibility on Supply Chain Performance, ***Ana Muriel***, University of Massachusetts, MIE Dept., Amherst, MA 01089, ollieatassi@worldnet.att.net, muriel@ecs.umass.edu, ***Ebru Bish***

We analyze the impact that introducing flexible manufacturing plants has on supply chain performance in a make-to-order environment. For this purpose, we analytically determine lost sales, inventory levels and transportation costs in both flexible and dedicated plant settings.

MC18 Consumer Trust in Internet Stores

Cluster: E-Commerce
Invited Session

Chair: Sirkka Jarvenpaa, University of Texas, Ctr. Bus., Technology & Law, MSIS Dept, CBA 5.202, Austin, TX 78712-1175, sjarvenpaa@mail.utexas.edu

1) Transference as a means of Establishing Trust in World Wide Web Sites, ***Katherine J. Stewart***, University of Texas

Trust transfer is examined as a cognitive process. We explore how hypertext links and evidence that a Web site is associated with a physical store may both increase initial trust in a site through transference. The role of security concerns regarding transactions on the Web is also considered.

2) The Evolution of Consumer Trust in Electronic Commerce: An Integrated Model, ***V. Srinivasan Rao***, University of Texas, San Antonio, TX, ***Sirkka Jarvenpaa***

Consumer trust in e-commerce is the aggregation of trust in the Internet environment, the individual stores and third-party guarantors. Trust in each component affects trust in other components. An integrated model of the evolution of trust in electronic commerce is developed based on the interdependencies between the 3 components.

3) Engendering Trust in Web Stores: An Experimental Report of the Effect of Four Mechanisms, ***V. Srinivasan Rao***, University of Texas, San Antonio, TX, ***Noam Tractinsky***

The willingness of consumers to shop on the Internet is dependent on trust in the store. We examine the effectiveness of 4 mechanisms to engender trust in the internet store: the existence of legal assurances, the offer of store guarantees, independent agency reports and reports from others consumers. Preliminary results from a controlled study are discussed.

MC19 Dynamic Models of Product Development

Cluster: Product Development
Sponsor: Technology Management Section
Invite/Sponsor Session

Chair: Edward G. Anderson, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, edward.anderson@bus.utexas.edu

1) Evolution of Performance under a Deadline Constraint, ***David N. Ford***, Texas A&M University, Civil Eng. Dept., College Station, TX 77843-3136, dford@civilmail.tamu.edu, ***Nitin Joglekar***

We model the evolution of product performance for a development project under dead line constraint. Performance is accumulated by working on coupled component design tasks followed by system tests. A variety of resource allocation policies are explored to explain the effects of deadlines on dynamics of a classic rework cycle.

2) Designing the Supply Chain: The Impact of Product & Process Modularity, ***Jovan Grahovac***, Tulane University, Freeman Sch. of Bus., 7 McAlister Dr., New Orleans, LA 70118, jovan.grahovac@tulane.edu, ***Geoffrey G. Parker***

Rapidly changing markets make internal investments in knowledge and capacity assets risky, leading firms to depend more on their suppliers. We model internal knowledge and capacity investment decisions as a function of product and process modularity and we examine their impact on outsourcing decisions and overall industry structure.

3) Learning, Modularity & the Dynamics of the Make/Buy Decision, ***Edward G. Anderson***, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, edward.anderson@bus.utexas.edu, ***Geoffrey G. Parker***

Component outsourcing is a critical supply chain decision for any firm. Through outsourcing, firms can achieve lower unit costs, but may reduce their internal capability for system integration. We present a model that attempts to capture the dynamics of the unit cost vs. learning opportunity trade-offs.

MC20 Ensemble Methods for Data Mining

Cluster: Computational Intelligence
Invited Session

Chair: W. Nick Street, University of Iowa, MS Dept., 108 Pappajohn Bldg., Iowa City, IA 52242

1) Ensemble Techniques for Data Mining in Heterogeneous Environments, ***Joydeep Ghosh***, Dept. of Elect. & Comp. Eng., ENS 516, ***K. Tumer***

In several real-life situations involving large, distributed data sets, it is not possible to centralize data into a single flat file before applying data mining techniques, because of security/privacy concerns, system incompatibilities, etc. We shall present ensemble techniques that are applicable and robust even in such varied and distributed environments.

2) Feature Selection for Ensembles, ***David Opitz***, University of Montana, Comp. Sci. Dept., MT

In several real-life situations involving large, distributed data sets, it is not possible to centralize data into a single flat file before applying data mining techniques, because of security/privacy concerns, system incompatibilities, etc. We shall present ensemble techniques that are applicable and robust even in such varied and distributed environments.

3) Robust Classification for Imprecise Environments, ***Foster Provost***, NYU, Info. Systems Dept., Stern Sch. of Bus., New York, NY 10027

Target misclassification costs and marginal class distributions rarely can be specified precisely. However, one can build a hybrid classifier that performs as well as the best available classifier (sometimes better) for any target conditions, when optimizing accuracy, expected cost, precision, recall, workforce utilization, etc.

4) Ensemble Techniques in Large-Scale Classification, ***W. Nick Street***, University of Iowa, MS Dept., 108 Pappajohn Bldg., Iowa City, IA 52242, ***Changhui Choi***

This study focuses on ensemble techniques such as voting in large-scale classification tasks. Computational results show that even simple combinations of predictors improve overall accuracy. We explore the selection of training set size, and present a new method that provides some of the advantages of

boosting without computational overhead.

MC21 Session VI

Cluster: SICUP
Invited Session
Chair: Victor J. Milenkovic, University of Miami, Dept. of Math & Comp. Sci., PO Box 249085, Coral Gables, FL 33124, vjm@cs.miami.edu, http://www.cs.miami.edu

1) A Tabu Search Approach for the Pallet Loading Problem, ***Vitoria Pureza***, Federal University of Sao Carlos, Dept. de Eng. de Producao, Via Washington Luis km.235, Sao Carlos SP, 13565-905, Brazil, vpureza@power.ufscar.br, http://www.ufscar.br, ***Reinaldo Morabito***

We present a tabu search-based algorithm for the manufacturer's pallet loading problem. The algorithm starts generating layouts up to 5 blocks and then performs moves that change the number of pieces in the blocks. Such moves can cause deletion and creation of blocks and they are selected based on the number of pieces that can be added to the former layout.

2) Parameter Optimization in 3-Dimensional Pallet & Container Loading, ***Georg Wichmann***, Fraunhofer IML, Joseph-von-Fraunhofer-Str. 2-4, Dortmund, D-44227, Germany, wichmann@iml.fhg.de, ***Guenter Dietze***

We consider the behavior of a tree search algorithm for 3-D pallet and container loading including a heuristic for suitable package selection and arrangement. By varying the heuristics parameters, we influence the achieved average filling rates. Rather than setting parameters manually, we investigate several methods to automatically optimize the heuristics.

3) A Tree Search Algorithm for Solving Heterogeneous Single- & Multi-Container Problems, ***Michael Eley***, Institute for Industrial Mathematics, Erwin-Schroedinger-St, Bldg. 49, Kaiserslautern, D-67663, Germany, eley@itwm.uni-kl.de, http://www.itwm.uni-kl.de

In order to solve heterogeneous single- and multi-container loading problems, an algorithm is presented that builds homogeneous blocks where all items have the same orientation. Additional aspects such as load stability and placement restrictions are also taken into account. For benchmarking the test cases of Bischoff & Ratcliff

4) A Lagrangean Relaxation Heuristic for the Manufacturer's Pallet Loading Problem, ***Reinaldo Morabito***, Federal University of Sao Carlos, Dept. de Eng. de Producao, Via Washington Luis km. 235, Sao Carlos SP, 13565-905, Brazil, morabito@power.ufscar.br, http://www.ufscar.br, ***Randal Farago***

We developed a heuristic method, based on Lagrangean and surrogate relaxation, to solve the manufacturer's pallet loading problem. Such a problem consists in arranging the maximum number of boxes by layer on the pallet, thus optimizing the utilization of the pallet's surface. A reduction method and a Lagrangean heuristic are applied in a subgradient optimization procedure.

MC22 Technical & Allocative Efficiency of Health Care Providers using DEA

Sponsor: Health Applications Section
Sponsored Session
Chair: Yasar A. Ozcan, Virginia Commonwealth University, PO Box 980203, 1008 East Clay, Dept. of Health Admin., Richmond, VA 23298-0203, ozcan@hsc.vcu.edu

1) The Impact of HMO Penetration on Hospital Inefficiency, ***Michael D. Rosko***, Widener University, HMSA Dept., One University Pl., Chester, PA 19013, michael.d.rosko@widener.edu

This study examined factors affecting inefficiency in US hospitals during the period 1990-97. A panel, stochastic frontier regression model was used. Estimated inefficiency decreased by 28% during the study period. Inefficiency was negatively associated with HMO penetration and industry concentration and positively related with Medicare share and for-profit ownership status.

2) The Technical Efficiency of Hospitals under a Single Payer System: The Case of Ontario Community Hospitals, ***Thomas S. Gruca***, University of Iowa, Tippie Coll. of Bus., W376 Pappajohn Bus. Bldg., Iowa City, IA 52242-1000, thomas-gruca@uiowa.edu, ***Deepika Nath***

We find no significant differences in efficiency across ownership, size or location. While consistent with Hansmann (1980), our results conflict with prior research. These differences are due to pooling hospitals with and without key outputs in the same sample. Also, hospitals in Ontario are unable to discriminate between payer groups.

3) Determinants of Technical Efficiency of Hospitals: An Application of DEA & SFA, ***Jen-Huei Chen***, Cheng Gung University, 259 Wen-Hwa 1st Rd., Rao-Yuan, Taiwan, ROC, m8740003@stmail.cgu.edu.tw, ***Yu-Chi Tung***, ***I-Chiu Chang***, ***Shih-Jung Hsiao***

Recent implementation of the National Health Insurance has affected the hospital industry profoundly. We combine DEA and SFA to investigate the effects of supply side, demand side and policies on hospital technical efficiency.

4) Technical Efficiency in Renal Dialysis: An Application of Data Envelopment Analysis, ***Yasar A. Ozcan***, Virginia Commonwealth University, PO Box 980203, 1008 East Clay, Dept. of Health Admin., Richmond, VA 23298-0203, ozcan@hsc.vcu.edu, ***Hacer Ozgen***

We examine the issue of technical efficiency in the production of renal dialysis from freestanding providers of dialysis treatments. This is done using an optimization-based method, namely, DEA. We focus on elaborating the sources and levels of inefficiency in dialysis production process. Based on this information, potential cost-savings for the Medicare end-stage renal disease program are illustrated.

MC23 Ranking & Selection for Simulation

Cluster: Simulation
Sponsor: Simulation Section
Invite/Sponsor Session
Chair: W. David Kelton, University of Cincinnati, Dept. of QAOM, PO Box 210130, Cincinnati, OH 45221-0130, david.kelton@uc.edu

1) Novel Combinations of Screening & Indifference-Zone Procedures, ***Justin Boesel***, The MITRE Corporation, 1820 Dolley Madison Blvd., MS W625, McLean, VA 22102, boesel@mitre.org, ***Barry L. Nelson***

We present novel combinations of statistical screening and 2-stage indifference zone procedures to return the best stochastic system with minimal experimental effort. Essentially, second-stage sampling information taken from superior systems is used to screen out inferior systems more efficiently, reducing the need for additional sampling on inferior systems.

2) Beyond Selection: Why is this System Best?, ***Susan M. Sanchez***, Naval Postgraduate School, OR Dept., Monterey, CA 93943, ssanchez@nps.navy.mil

We show how to augment simulation selection experiments with variance attribution analysis, providing insights into why certain systems behave well (or poorly). The results may also highlight modeling assumptions that are critical determinants of system performance, as well as suggest alternative systems worthy of investigation.

3) Comparison of Procedures to Select the Best Bernoulli Population, ***David Goldsman***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, sman@isye.gatech.edu

We compare a number of procedures to select the Bernoulli population having the largest success probability. The comparison is based upon achieved probability of correct selection and expected number of observations until procedure termination. We also give computer-simulation applications.

MC24 Gaining a Competitive Advantage through Distribution

Cluster: Warehousing & Distribution
Invited Session
Chair: Russell D. Meller, Virginia Tech., Dept. of ISE, 250 New Engineering Bldg., Blacksburg, VA 24061, rmeller@vt.edu

1) Distribution at Cross Creek Apparel, ***Russell D. Meller***, Virginia Tech., Dept. of ISE, 250 New Engineering Bldg., Blacksburg, VA 24061, rmeller@vt.edu, ***John Klote***

Through an internship at Cross Creek Apparel, interesting research problems were identified. We present one of the problems and illustrate the impact of its solution on Cross Creek.

2) Use of Dynamic Slotting Policies in Forward Pick Areas, ***Brett Peters***, Texas A&M University, 3131 TAMU, Dept. of IE, College Station, TX 77843-3367, bpeters@tamu.edu, ***Jeffrey S. Smith***

Increasing product customization and diversification is driving distribution centers to provide smaller, more frequent deliveries. This requirement precipitates changes in picking policies. One such change, dynamic slotting, is described. Based on work with JC Penney, an overview of the strategy and

some initial models are presented.

3) Scheduling Methods for a Cross-Docking Distribution Center, ***Dale T. Masel***, Dept. of IMSE, 273 Stocker Ctr., masel@ohiou.edu

We will discuss expressions for estimating the loading times of outbound trucks as a function of the inbound truck schedule and the operating parameters, e.g., unloading rate, conveyor speed, etc., of the facility. Illustrations of applying these formulas to scheduling and optimization of the facility will also be given.

4) Incorporating Optimization into a Warehouse Management System, ***Dan Ockerman***, Manhattan Associates, 2300 Windy Ridge Rd., 7th Floor, Atlanta, GA 30339, dockerman@manh.com

We present several examples of how we help to optimize the operations in various distribution centers. Example applications include advanced 3-D cubing, vehicle routing, wave optimization and decision execution support systems.

MC25 Complementarity & Applications

Cluster: Linear Programming & Complementarity
Sponsor: Optimization Section
Sponsored Session
Chair: Michael C. Ferris, University of Wisconsin, Dept. of Comp. Sci., 1210 West Dayton St., Madison, WI 53706, ferris@cs.wisc.edu, http://www.cs.wisc.edu/~ferris

1) Fracture Propagation using the PATH Algorithm, ***J.-Cl. De Bremaecker***, Rice University, Dept. of Geology/Geophysics, PO Box 1892, Houston, TX 77251-1892, ***Michael C. Ferris***

We use the PATH algorithm to compute the stresses and relative displacements on fractures to find their direction of propagation. This is either the direction which maximizes the normal separation on a virtual extension or the one which maximizes the shear stress thereon.

2) Complementarity Approaches to Support Vector Machines, ***Todd S. Munson***, Argonne National Laboratories, Argonne, IL, ***Michael C. Ferris***

The linear support vector machine can be posed as a complementarity problem in a variety of ways. We look at some reformulations and specialized algorithms for solving these problems based on complementarity. Results on a large 60 million variable problem indicate that these approaches are robust and efficient.

3) Economics & Complementarity, ***Michael C. Ferris***, University of Wisconsin, Dept. of Comp. Sci., 1210 West Dayton St., Madison, WI 53706, ferris@cs.wisc.edu, http://www.cs.wisc.edu/~ferris

We look at some new uses of complementarity in the economics literature and show how to formulate and solve these examples using efficient tools from mathematical programming.

MC26 Analysis of Queueing Systems

Cluster: Stochastic Models & Applications
Invited Session
Chair: Sudha Jain, University of Toronto, Dept. of Stats., 100 Saint George St., Toronto, Ontario, M5S 3G3, Canada, jainsu@utstat.utoronto.ca

1) Transient Analysis of the $M^{X}/M/\infty$ Queue, ***Steve Drekic***, University of Waterloo, Dept. of Stats./Actuarial Sci., Waterloo, Ontario, N2L 3G1, Canada, skrekic@math.uwaterloo.ca, ***Gordon E. Willmot***

We demonstrate that the transient distribution of the number in the system in the $M*{X}/M/\infty$ queue may be computed numerically in a straightforward manner for a wide variety of bulk arrival distributions. In particular, the truncated negative binomial distribution serves as a nice candidate to illustrate the approach.

2) Waiting Times in State-Dependent Loss Systems, ***Jeff Kharoufeh***, Pennsylvania State University, Dept. of IME, 310 Leonhard Bldg., University Park, PA 16802, ***Natarajan Gautam***

We derive an expression for the probability distribution of holding time for a state-dependent loss system. The service-rate dependence structure is special in that changes in service rate may occur during a service cycle for any server. We apply the results in vehicular traffic flow problems.

3) Using Cumulant Functions to Obtain System Characteristics for Tandem Queues, ***Timothy Matis***, Texas A&M University, Zachary Engineering Ctr., College Station, TX 77843-3131, ***Richard M. Feldman***

We consider a population-constrained tandem queueing model in which arrivals and services are Markovian. Obtaining system characteristics for this model via solutions to Kolmogorov equations is often computationally intractable. A technique for approximating these characteristics using cumulant functions is presented.

4) A Bayesian Approach for Point Estimation & Testing Procedures in Queueing Systems, ***Sudha Jain***, University of Toronto, Dept. of Stats., 100 Saint George St., Toronto, Ontario, M5S 3G3, Canada, jainsu@utstat.utoronto.ca

A conjugate exponential prior has been taken into consideration to develop a Bayesian approach for estimating parameters in a queueing system. The posterior probabilities of point estimates and from these probabilities, the Bayes estimates are derived for specific distributions. A general test procedure for an exponential family of distribution is also developed.

5) On the Analysis of M/G/1 Finite Source Queues with Finite Space & State-Dependent Service, ***T. Rao***, Institute for Systems Studies & Analyses, Defence R&D Org., Metcalfe House, Delhi, 110 0054, India, tssr@mailcity.com, ***Sudha Jain***

We derive analytically explicit expressions for the system state probabilities at pre-arrival, arrival and departure epochs of a queueing system. We also compute the performance measures such as blocking probabilities, mean queue length, mean response time, carried load and throughput of the system by using supplementary variable technique.

MC27 Project Management II

Contributed Session
Chair: Willy S. Herroelen, Catholic University of Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, 3000, Belgium, willy.herroelen@econ.kuleuven.ac.be

1) Maximizing the Net Present Value of a Project: A Comparison of Different Solution Procedures, ***Mario Vanhoucke***, Catholic University of Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, 3000, Belgium, mario.vanhoucke@econ.kuleuven.ac.be, ***Erik L. Demeulemeester***

Maximizing the net present value of an unconstrained project has become a well-known objective in project scheduling literature. We compare different solution procedures for this problem where both minimal and maximal time lags are considered. These procedures have been coded in C++ and have been validated on benchmark problem sets.

2) On the Merits & Pitfalls of Critical Chain Scheduling, ***Willy S. Herroelen***, Catholic University of Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, 3000, Belgium, willy.herroelen@econ.kuleuven.ac.be, ***Roel Leus***

Critical chain scheduling and buffer management - the direct application of Goldratt's theory of constraints to project management - has recently emerged as a popular approach to project management. We critically review its project scheduling fundamentals and test its scheduling methodology and assumptions through a full factorial computational experiment.

3) Reactive Project Scheduling: Some Algorithms & a General Framework, ***Roel Leus***, Catholic University of Leuven, Dept. of Applied Econ., Naamsestraat 69, Leuven, 3000, Belgium, roel.leus@econ.kuleuven.ac.be, ***Willy S. Herroelen***, ***Adem Jan***

Some considerations about the value of sequentially using deterministic schedules in the presence of uncertainty are presented. The reactive project scheduling problem is formally described. Some alternatives for full rescheduling and their efficiency are discussed. Computational experiments have been conducted and will be used to illustrate the results.

MC28 Railroad Empty Equipment Distribution Systems

Sponsor: RASIG
Sponsored Session
Chair: Kevin N. Crook, BNSF Railway, 2500 Lou Menk Dr., Ft. Worth, TX 76131, kevin.crook@bnsf.com

1) Car Distribution Optimization at Canadian National Railways, ***Anshu Pathak***, Canadian National Railways, 935 rue de La Gauchetiere W, Montreal, Quebec, H3B 2M9, Canada, anshu.pathak@cn.ca

The current car distribution process is described, followed by a discussion of how optimization can be beneficial. Improving the accuracy of car supply and demand forecasts is seen as the foundation for successful optimization and efforts in this area are discussed.

2) Norfolk Southern Empty Equipment Distribution, ***Roger W. Baugher***, Norfolk Southern Railroad, rwbaughe@nscorp.com

A description of the current empty railcar distribution system at NS followed by a discussion of where OR efforts are being targeted to improve the process.

3) Equipment Distribution Optimization at BNSF Railway, ***Kevin N. Crook***, BNSF Railway, 2500 Lou Menk Dr., Ft. Worth, TX 76131, kevin.crook@bnsf.com

We give an overview of the new EDO system recently implemented at BNSF. The discussion will include an overview of the system, a description of the user training process, preliminary results and possible enhancements.

4) CSX's Dynamic Railcar Planning System, ***David W. Bell***, CSX Transportation, 500 Water St., Jacksonville, FL 32202, david_bell@csx.com

We give an overview of industry's first real-time, continuous optimization process for managing the distribution of empty freight cars. In addition to a system overview, we will describe the interface with order processing, the benefits realized by the system and how the system was used to manage the integration of Conrail.

MC29 Application of Optimization in the Energy Industry

Cluster: OR/MS in the Service Industries
Sponsor: ENRE
Sponsor/Invite Session
Chair: Shmuel S. Oren, University of California, Dept. of IE&OR, 4135 Etcheverry Hall, Berkeley, CA 94720, oren@ieor.berkeley.edu

1) A New Decomposition Methodology Applied to Large-Scale Optimization Problems: Local & Global Behavior, ***F. J. Prieto***, University Carlos III, Madrid, Spain, ***F. J. Nogales***, ***A. J. Conejo***

A decomposition methodology is described and analyzed. The methodology is based on introducing corrections on the iterates generated by the solution process for a related and decomposable problem. Local and global convergence properties of the procedure are discussed. An application to the solution of multi-area optimal power flow problems is described and numerical results are discussed.

2) Gas Turbine Scheduling with Maintenance Contracts, ***Chung-Li Tseng***, University of Maryland, Dept. of Civil Engineering, College Park, MD 20742, chungli@eng.umd.edu, ***Mariam Zarrabi***

We present an optimization problem faced by an owner of gas turbines, who schedules the units to meet long-term power supply contracts and to sell electricity to spot markets for profit. The scheduling is subject to a maintenance contract that restricts total energy (MWh) generated over a year and is based on which the payment of the contract is determined.

3) Bidding & Scheduling Hydroelectric Generation into Energy & Ancillary Service Markets, ***Alva J. Svoboda***, Pacific Gas & Electric Co., 77 Beal St., San Francisco, CA 94105, ajsh@pge.com

Hydroelectric plants are well suited to contribute to ancillary service markets because of their capability to offer capacity backed up by limited energy. However, operations of hydroelectric plants participating in both energy and ancillary service markets requires that uncertainties, such as the amount of energy actually dispatched, be modeled in the bidding and scheduling processes.

4) Numerical Experiments with a Large-Scale Equilibrium Model for the North American Natural Gas System, ***Steven A. Gabriel***, ICF Consulting Group, 9300 Lee Hwy, Fairfax, VA 22031-1207, sgabriel@icfconsulting.com, ***Julio Manik***, ***Shree Vikas***

We present numerical experiments on a large-scale model for the North American natural gas system. This model uses a successive LP approach to solve a nonlinear market equilibrium model. We report the results of several heuristic approaches used to speed up the computations relative to the number of LP subproblems needed.

MC30 Telecommunication & Generalized Network Optimization Algorithms

Sponsor: Computing Society
Sponsored Session
Chair: Jeffery L. Kennington, SMU, Dept. of Comp. Sci. & Eng., Dallas, TX 75275, jlk@seas.smu.edu

1) Optimizing a WDM-Based Optical Network Design, ***Eli V. Olinick***, SMU, Dept. of Comp. Sci. & Eng., Sch. of Eng. & Applied Sci., Dallas, TX 75275-0122, olinick@seas.smu.edu

We address a difficult design problem for WDM-based optical networks. We propose an optimization model for selecting and sizing a minimum-cost set of optical rings with sufficient capacity to satisfy a given demand pattern among sites on the network. We present an empirical analysis of heuristic solution techniques.

2) Modular Spare Capacity Planning for Mesh Restorable Networks: Exact & Heuristic Methods, ***Gheorghe Spiride***, Nortel Networks, 2400 Lakeside Blvd., Richardson, TX 75081, gspiride@nortelnetworks.com

We discuss solution approaches for the problem of allocating spare capacity in a mesh restorable telecommunications network with modularity constraints. Results are presented for a set of realistically-sized test networks.

3) Integral Multi-Commodity Flow Routing in Telecommunication Networks, ***Mark W. Lewis***, TelOptica, 1201 Richardson Dr., Ste. 205, mlewis@teloptica.com

The need to find routes corresponding to network demand bundles that should not be split amongst different routes is a typical problem encountered in network routing. The proposed heuristic attempts to find routes in a capacitated, multi-commodity flow environment where each route is a single, integral flow. The approach has applications to restoration algorithms as well as wavelength routing.

4) Algorithms for Preprocessing Networks: Theory, Implementation & Recommendations, ***Karen R. Lewis***, SMU, PO Box 750122, Dallas, TX 75275-0122, klewis@seas.smu.edu

We provide algorithms for modifying a network in order to solve the associated mathematical programming problem faster. Some methods include adding arcs. We compare our implementation of these algorithms to CPLEX Presolve and Aggregator. Recommendations are made concerning when to preprocess a network problem.

MC31 Open Source Software for Operations Research

Sponsor: Computing Society
Sponsored Session
Chair: Robin Lougee-Heimer, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598-0218, robinlh@us.ibm.com

1) A Primer on Open Source Software, ***Donald K. Rosenberg***, Stomian Technologies, 919 Monmouth Ave., Durham, NC 22701, donr@stromian.com

Don Rosenbeg, the author of "Open Source: The Unauthorized White Papers," will speak on the topic of open source software and its benefits for both researchers and businesses. Don will explain the Open Source Definition, cover how intellectual property and open source co-exist and clarify the difference between open source licenses.

MC32 Telecommunication Systems II

Contributed Session
Chair: Kerem Tomak, University of Texas, CBA 5.202, B6500, Austin, TX 78712, k_tomak@yahoo.com, www.bus.utexas.edu/faculty/msis/tomakk

1) Performance of FFT-EMT Telecommunication Systems, ***Jose R. Coll***, Universidad Central de Venezuela, Apartado 81080, Prados del Este, Caracas, Miranda, 1080 A, Venezuela, jcoll@elecrisc.ing.ucv.ve

Performance of fast Fourier transform discrete multi-tone telecommunication systems, where optimum allocation of bits and spectrum shaping is previously made in order to maximize the data rate, is presented for band-limited channels which can introduce noise, inter-symbol and inter-channel interference. Discrete multi-tone systems achieve higher capacity than single carrier systems.

2) Channel Occupancy Time of Overflow Calls in Hierarchical Cellular Systems, ***Kunmin Yeo***, Pohang University of Science & Technology, Dept. of IE, San 31 Hyoja-dong, Kyungbuk, 790-784, Korea, kunmin@postech.ac.kr, ***Chi-Hyuck Jun***

We focus on the modeling of channel occupancy time of overflow calls in hierarchical cellular systems, which can provide alternate routes for blocked calls. Our model takes into account of the general distribution for cell dwell time. Based on the characterization of call time by an Erlang distribution, the Laplace transform of channel occupancy time distribution is derived...

3) Path-Based Restoration for Logical Networks: Single Node or Link Failures, ***Richard T. Wong***, Telcordia Technologies/AT&T Labs., 33 Knightsbridge Rd., PY4-4N316, Piscataway, NJ 08854, rwong1@telcordia.com, ***Hanan Luss***

We first discuss a heuristic for designing survivable networks subject to a single node failure - augmenting capacities along selected cycles. Next, we discuss how this approach can be adapted to designing survivable networks subject to a single link failure (work performed and released at AT&T Labs).

4) A Genetic Algorithm Approach to a Design of a WEM Optical Network, ***Hrvoje Podnar***, SUNY, Dept. of Applied Math & Stats., Stony Brook, NY 11794-3600, podnar@ams.sunysb.edu,

Jadranka Skorin-Kapov

We apply a GA approach to a virtual topology design of a wide-area WDM optical network. Based on a given physical topology, a virtual topology consisting of a set of optical light paths is constructed. The objective is to minimize the maximal throughput and accommodate on-growing traffic requirements in a timely fashion. Computational results will be presented.

5) Creating Incentives to Join an Electronic Marketplace, ***Kerem Tomak***, University of Texas, CBA 5.202, B6500, Austin, TX 78712, k_tomak@yahoo.com, www.bus.utexas.edu/faculty/msis/tomakk

Digital marketplaces are web sites where a group of companies conduct sales and other transactions. There are obvious advantages to it in the form of increased efficiency but are there any associated risks as well? We adress the problem of creating incentives to join an electronic marketplace.

MC33 Production & Scheduling II

Contributed Session

Chair: Mary E. Kurz, University of Arizona, Dept. of SIE, PO Box 210020, Tucson, AZ 85721-0020, maryk@sie.arizona.edu

1) A General Heuristic for Production Planning Problems, ***Mathieu P. Van Vyve***, Universite Catholique de Louvain, CORE, Voie du Roman Pays 34, Louvain-la-Neuve, 1348, Belgium, vanvyve@core.ucl.ac.be, ***Yves Pochet***

We propose a new general purpose heuristic for solving production planning problems formulated as MIPs and involving capacities, setup costs and times, multiple items, multi-level product structure, etc. This heuristic requires the solution of a sequence of LP and is compared to classic heuristics using standard lot-sizing test problems.

2) withdrawn - author request of 9/29, ***Roberto C. Pontes***, Treic Web & OR Systems, Rua Sao Clemente 185, AP 1705 BL 2, Rio de Janeiro, 22260-001, Brazil, rcvpontes@hotmail.com, www.treic.com.br, ***Lucidio Cabral, Marcone J. Freitas***

3) Flexible Flowline Scheduling with Sequence-Dependent Setup Times, ***Mary E. Kurz***, University of Arizona, Dept. of SIE, PO Box 210020, Tucson, AZ 85721-0020, maryk@sie.arizona.edu, ***Ronald G. Askin***

A mixed integer programming model, lower bounds and heuristics for flexible flow lines to minimize makespan are presented. The problem characteristics considered include the number of stages, asymmetric sequence dependent setup times, constant or non-constant number of machines per stage and jobs which may skip stages. Computational results are presented.

MC34 Multicriteria Decision Making I

Contributed Session

Chair: Marina V. Polyashuk, Northeastern Illinois University, 900 West Rand Rd., Apt. A205, Arlington Heights, IL 60004, mfogpol@aol.com

1) Feasibility Mapping of Non-Linear Systems, ***Yanli Zhao***, University of Massachusetts, 309 ELAB, MIE Dept., Amherst, MA 01003, yazhao@ecs.umass.edu, ***David O. Kazmer, Liang Zhu***

Algorithms have been recently developed for mapping the global feasible space of multi-attribute systems to support decision modeling and selection. We extend the approach to more generalized non-linear systems. Simulations will be presented to show the effectiveness of the method for decision-making problems with unknown preferences between multiple performance attributes.

2) A Multicriteria Optimization with Unknown Functional Forms of Objectives with an Application to the Allocation of TV Commercials to, ***Eiji Takeda***, Osaka University, Grad. School of Econ., 1-7 Machikanayama, Toyonaka, Osaka, 560-0043, Japan, takeda@econ.osaka-u.ac.jp, ***Katsuaki Tanaka***

It is not uncommon that it is difficult to know the functional forms of objectives in a multicriteria optimization. We present a compromise programming approach to the problem, based on a data envelopment approximation of the empirical data. Using the awareness data of TV commercials, an illustrative application is provided.

3) Some Results on Binary Preference Relations in Multiple Criteria Optimization, ***Marina V. Polyashuk***, Northeastern Illinois University, 900 West Rand Rd., Apt. A205, Arlington Heights, IL 60004, mfogpol@aol.com

Some theoretical and methodological aspects of binary preference relations involving several independent criteria will be discussed. Different types of binary relations will be considered, including invariant relations, as well as relations based on relative importance of criteria.

MC35 Information Systems IV

Contributed Session

Chair: Shankar Sundaresan, Pennsylvania State University, 316 Beam Bldg., University Park, PA 16802, shankar-s@psu.edu

1) Examining IT Investment Returns using Weill's Theory of Differing Roles: A Micro & Macro Analysis, ***Melinda K. Cline***, University of North Texas, 24 Skyline Dr., Trophy Club, TX 76262, clinem@unt.edu

We use Weill's theory of differing IT investment roles to investigate returns. We examine more than 5.6 million hours of development on 8,700 projects. Findings confirm and extend the theory by quantitatively and qualitatively demonstrating that IT returns vary in type and magnitude based on managerial objective.

2) Experimental Results on Assessing Web Site Quality, ***William H. Rybolt***, Babson College, MS Dept., Babson Park, MA 02457, rybolt@babson.edu, ***David P. Kopcso, Leo L. Pipino***

The WWW has exacerbated the challenge to organizations of achieving and maintaining high information quality. Using a model of a web-based information system adapted from Mason & Mitroff, we describe an experiment that tests the interactions of the variables in the model and their relationships to quality dimensions.

3) Why Information Systems Projects are Abandoned: A Leadership & Communication Theory & Explatory Study, ***Effy Oz***, Pennsylvania State University, 30 East Swedesford Rd., Malvern, PA 19355, effyoz@psu.edu, ***John J. Sosik***

Data regarding reasons for IS project abandonment were collected from a sample of chief information officers and their immediate subordinates. Factor analysis results provided 5 major factors: lack of corporate leadership, poorly communicated goals/deliveries, inadequate skills and means, poor project management and deviation from timetable/budget. We derived a PLS model showing relationships among these factors...

4) Impact of Information Infrastructure on Supplier Networks in E-Business, ***Shankar Sundaresan***, Pennsylvania State University, 316 Beam Bldg., University Park, PA 16802, shankar-s@psu.edu

The information infrastructure for e-business demands effective integrated inter-organizational information systems. Advances in Internet technologies are changing the reach, range and costs of such information systems. We propose game-theoretic economic models to analyze how these changes in information infrastructure may impact the reconfiguration of suppler networks.

MC36 Operations Management II

Contributed Session

Chair: Hosun Rhim, Hanyang University, College of Bus. & Economics, Seoul, 133-791, Korea, hrhim@netial.com

1) No Title Supplied, ***Rose Li***, Middlesex University, The Business Sch., The Burroughs, London, NW4 4BT, UK, r.li@mdx.ac.uk, ***Abby Ghobadian, David Gallear***

We identify and analyze the factors influencing the remuneration arrangement for knowledge transaction in strategic alliances. We focus on learning how the remuneration arrangement for knowledge transactions are determined from both the supplier and the recipient point of views.

2) Profit Maximization for Complex Industries: A Quantitative Approach, ***Gopala Govinda Rajan***, Kochi Refineries Ltd., Ambalamugal PO, Ernakulam, Kerala, 682302, India, ggr@md2.vsnl.net.in

We cover examples related to complex process industries where multiple feed stocks, products and process mix consume substantial resources. For maximizing profitability of the enterprise, LP/NLP/dynamic models are to be used because of the number of parameters involved. This is based an award winning article, "Cost-Effectiveness in the Refining Sector," that I presented in PII competition.

3) Reengineering Manufacturing Logistics: Sequencing & Merging Operations, ***Xiaohang Yue***, University of Texas at Dallas, Sch. of Mgmt., Richardson, TX 75083, xyue@utdallas.edu, ***Chelliah Sriskandarajah, Houmin Yan***

We investigate the impact of manufacturing and distribution process on the safety stock cost in a supply chain. We use the concept of reengineering the manufacturing and distribution process to minimize the cost of safety stock for a specified service level. Conditions and insights for better supply chain management are developed.

4) Competitive Location, Production & Market Selection, ***Hosun Rhim***, Hanyang University, College of Bus. & Economics, Seoul, 133-791, Korea, hrhim@netial.com, ***Teck-Hua Ho***, ***Uday S. Karmarkar***

We investigate how firms should select their production sites, capacities and quantities under rivalry. The formulation addresses multi-market, oligopolistic spatial competition with heterogeneity in production and logistics costs. We analyze the pure-strategy Nash equilibria of the entry game and provide sufficient conditions for the existence of equilibria in the simultaneous entry game...

MC37 Integer Programming I

Contributed Session

Chair: John K. Karlof, University of North Carolina, Math. & Stats. Dept., Wilmington, NC 28403, karlof@uncwil.edu

1) Condition Measures for Integer Programs, ***Jorge R. Vera***, Catholic University of Chile, Schoo. of Eng., Vicuna Mackenna 4860, Santiago, Chile, jvera@ing.puc.cl

We present some ideas for defining condition measures in integer programming, as an extension of existing concepts in continuous optimization. Some of these measures are based on the notion of distance to ill-posedness. We show connections with complexity analysis of some combinatorial algorithms.

2) Solving Multi-Item Capacitated Lot-Sizing Problems with Setup Times by Branch & Cut, ***Andrew J. Miller***, CORE, 34 Voie du Roman Pays, Louvain-la-Neuve, 1348, Belgium, miller@core.ucl.ac.be, ***George L. Nemhauser***, ***Martin W. P. Savelsbergh***

We study the MCL problem with setup times. By analyzing submodels obtained from a single time period of MCL, we obtain strong valid inequalities for it. Computational results obtained by applying these inequalities within a B&C algorithm suggest that our contributions represent significant progress in solving the MCL problem.

3) Local Algorithms in Discrete Programming, ***Oleg A. Shcherbina***, Crimean Academy of Ecoprotective Building, Dept. of Computer Sci., PB 118, Simferopol, Crimea, 95000, Ukraine, soa@ecopro.crimea

LAs using a special structure of block matrix of constraints in applied DP problems are effective for solving block DP problems. An LA is a decomposition algorithm. Matrices with block-tree structure are of special interest for us. The possibilities how to expand LA to different special classes of DP problems are considered...

4) An Integer Programming Solution to Locating Radioactive Waste Sites, ***John K. Karlof***, University of North Carolina, Math. & Stats. Dept., Wilmington, NC 28403, karlof@uncwil.edu, ***Hongtao Xu***

The 1980 Low-Level Radioactive Waste (LLRW) Policy Act suggests several constraints for choosing LLRW sites. We consider the problem of choosing the sites and optimizing transportation risks. We model this problem as an integer programming problem and develop a B&B algorithm with penalties to solve it.

5) Role of Two-Period Submodels & Continuous 0-1 Knapsack Relaxations in Solving Multi-Item Capacitated Lot-Sizing Problems with Setup Times, ***Yves Pochet***, Universite Catholique de Louvain, CORE, Voie du Roman Pays 34, Louvain-la-Neuve, 1348, Belgium, ypochet@core.ucl.ac.be, ***Andrew J. Miller***

We introduce valid inequalities for the MCL problem with setup times, a standard production planning model, which are derived by considering a 2-period submodel of MCL and constructing specific 0-1 continuous knapsack relaxations of this submodel. Computational experience suggests that these inequalities significantly help to solve instances of MCL.

MC38 Public Programs/Processes

Contributed Session

Chair: Harold Vazquez, US Air Force Research Laboratory, 1864 4th St., Bldg. 15, Ste. 1, WPAFB, OH 45433, harold.vazquez@wpafb.af.mil

1) The Impacts of Privatization on Electric Utilities in the UK, ***Toshio Ariu***, Central Research Institute of Electric Power Industry, 1-6-1 Ohtemachi, Chiyoda-ku, Tokyo, 100-8126, Japan, ariu@criepi.denken.or.jp

We have analyzed the management of electric utility companies in the UK before and after privatization from 3-phase corporate evaluation such as management results, resources and activities. Consequently, we should take a lot of factors into consideration when we discuss privatization or deregulation from management aspects.

2) Pay for Performance in the Federal Government, ***Harold Vazquez***, US Air Force Research Laboratory, 1864 4th St., Bldg. 15, Ste. 1, WPAFB, OH 45433, harold.vazquez@wpafb.af.mil, ***Robert C. Rue***

The Air Force Research Laboratory recently completed its third year under an experimental civilian personnel management system that links pay increases to performance. We include an overview of the system, a summary of results and highlight of the operations research techniques used to support the experiment.

MC39 New Product Development I

Contributed Session

Chair: Chungsuk Ryu, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, gt7091c@prism.gatech.edu

1) Online Customer Communities, Knowledge Co-Creation & New Product Development, ***Satish Nambisan***, RPI, Lally Sch. of Mgmt., Troy, NY 12180, nambis@rpi.edu, ***David Wilemon***

The promise of customers as a resource in product development has not met its potential. One problem is the issue of connectivity, which refers to the communication channels between a firm and its customers. Fortunately, new communication technologies are transforming the relationship between developers and their customers. We provide a framework for examining this potentially powerful tool.

2) Study of an Effective Design Support Model at the Upper Stage of the Product Design, ***Manabu Sawaguchi***, Waseda University, Mgmt. Development Div., 5-6-2 Osaki, Shinagawa-ku, Tokyo, 141-8613, Japan, sawaguchi_manabu@hj.sanno.ac.jp, ***Takahiro Ohno***

We propose the design support model to structure conceptual designs with high stability of design quality at the upper stage of product design rationally. We will organize the model by using reformed AHP, in particular, the basic concept of the model is based on axiomatic design theory.

3) An Integrated Product Planning Model for Developing a Product Family, ***Chungsuk Ryu***, Georgia Institute of Technology, DuPree Coll. of Mgmt., 755 Ferst Dr., Atlanta, GA 30332-0520, gt7091c@prism.gatech.edu, ***Nagesh N. Murthy***

We propose an integrated product planning model that considers marketing, engineering design and manufacturing implications of developing a family of products that offers configurational variety using non-platform components. We identify the set of non-platform components that should be developed to configure a product family that maximizes profits.

MC40 Applied Probability II

Contributed Session

Chair: Assaf J. Zeevi, Stanford University, Info. Systems Lab, Stanford, CA 94305-9510, assaf@isl.stanford.edu, http://www-isl.stanford.edu/~azeevi

1) On the Structure of Decision Rules in Stochastic Reservoir Optimization, ***Bernard F. Lamond***, Universite Laval, Dept. of OSD, Pavillon Palasis-Prince, Quebec, Quebec, G1K 7P4, Canada, bernard.lamond@fsa.ulaval.ca, www.fsa.ulaval.ca/personnel/lamondb

In previous work, we described the structure of optimal policies for hydro-power reservoirs when the natural inflows were assumed unusable until the next planning period. Here, we examine the impact of a more realistic assumption under which the natural inflows are taken into account at a constant rate throughout the current planning period...

2) A Longitudinal Least Squares Analysis of Mortgage Rates, ***John Wang***, Montclair State University, 1 Normal Ave., Upper Montclair, NJ 07043, wangj@mail.montclair.edu, ***Qiyang Chen***, ***Qiang Tu***

Mortgages interest rates have gone up and down more sharply over the past 20 years than they had previously since World War II. Interest rates on capital market instruments can be influenced by monthly changes and the longer-term trend changes of economic indicators. The directly affecting factors will be discussed and analyzed in depth for a better understanding of the analysis.

3) Existence Condition for the Diffusion Approximations of Multiclass Priority Queueing Networks, ***Hengqing Ye***, National University of Singapore, Fac. of Bus. Admin., Dept. of Decision Sci., Singapore, 117591, Singapore, fbayehq@nus.edu.sg, ***Hong Chen***

We extend the work of Chen & Zhang (1999) and establish a new sufficient condition for the existence of the (conventional) diffusion approximation for multiclass queueing networks under priority service disciplines. This sufficient

condition relates to the weak stability of the fluid networks and the stability of the high priority classes of the fluid networks that correspond to the queueing networks under consideration.

4) Dynamic Control & Routing in Large Call Centers: Approximate Analysis via Diffusion Models, *Assaf J. Zeevi*, Stanford University, Info. Systems Lab, Stanford, CA 94305-9510, assaf@isl.stanford.edu, http://www-isl.stanford.edu/~azeevi, ***J. Michael Harrison***

We consider a queueing model of a call center providing service to several customer classes. For large call centers, we analyze the problem of dynamically routing customers to agent pools, using diffusion approximations. The asymptotic control problem gives rise to several insights concerning the optimal assignment policy and cross-training of agents.

MC41 Supply Chain Optimization

Sponsor: CPMS
Sponsored Session
Chair: Mamnoon Jamil, IBM Integrated Supply Chain, 1000 Atrium Way, Atrium 1, Mt. Laurel, NJ 08054, mamnoon@us.ibm.com

1) Mathematical Modeling for Strategic Decision Making: Finally Fulfilling the Promise, *Hernan Wurgaft*, Industria Technologies LLC, 5116 Simpson Lake Rd., West Bloomfield, MI 48323, hernanw@industriatechnologies.com, www.industriatechnologies.com

A half century ago, many predicted that computer technology would have a profound impact on strategic decision making. The impact, however, was on operations and not on the work of top management. We describe how new tools such as Industria Studio TM are finally addressing the needs of modern strategy formulation.

2) Ordering Policies under Uncertain Periodic Supply, ***Ronald S. Tibben-Lembke***, University of Nevada, MGRS/028, Reno, NV 89557, rtl@unr.edu

When a supplier produces on a periodic schedule and the production quantity typically sells out before the next production run, firms must decide carefully how to place their orders. For example, steel plants typically produce on a 6-week rolling schedule. We present theoretical and computational results.

3) A Simulation Study of Customer Order Fulfillment Policies in a Transportation/Inventory System, ***Rajan Batta***, SUNY, Dept. of IE, 342 Bell Hall, North Campus, Buffalo, NY 14260-2050, batta@acsu.buffalo.edu, ***Mayur Vamanan***, ***Qian Wang***, ***Robert J. Szczerba***

We study the effects of different order fulfillment policies on the transportation costs and shortage costs for a manufacturing company with a number of distribution centers to satisfy the demands of geographically dispersed customers. A simulation experiment is used to find the interaction effects between transportation costs, shortage costs and customer order fulfillment policies.

4) An Application of Latin Hypercube Sampling to Replenishment Simulation, ***Daniel D. Wake***, NONSTOP Solutions, Inc., 235 Montgomery St., San Francisco, CA 94104, dan_wake@nonstop.com, ***Yi Wan***, ***Amit Garg***

Replenishment optimization simulations for many tens of thousands of SKUs can be computationally intensive. We have developed a technique utilizing Latin hypercube sampling to allow us to estimate performance for a large population of SKUs based on a small sub-population. We will discuss our business requirements and present results.

MC42 Value Function Approximation in Continuous-State Stochastic Dynamic Programming

Cluster: Reliability & Quality Control
Sponsor: Quality, Statistics & Reliability
Sponsor/Invite Session
Chair: Victoria C. P. Chen, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, vchen@isye.gatech.edu

1) Comparison between MARS & ANN Value Function Approximations in Solving an Inventory Forecasting Stochastic Dynamic Program, *Cristiano Cervellera*, DIST Universita di Genova, Dept. of Communications & CSS, Via Opera Pia 13, Genova, 16145, Italy, blackcat@dist.unige.it, ***Victoria C. P. Chen***

We present numerical solutions to inventory forecasting problems using a statistical perspective of the continuous-state SDP optimization model. The accuracy of the OA/MARS SDP solution method (Chen et al. 1999), which employs orthogonal arrays and multivariate adaptive regression splines, is compared to a method employing ANNs to estimate the value function.

2) Regression Dynamic Programming for Multiple-Reservoir Control, ***K-Y. Fan***, Cornell University, Sch. of Civil & Environ. Eng., 210 Hollister Hall, Ithaca, NY 14853-3501, ***Christine A. Shoemaker***, ***David Ruppert***

In stochastic dynamic programming models of reservoir control problems, the optimal value function is typically computed at grid points of the discretized continuous state space while function values between grid points are approximated. High dimensional problems, e.g. a system of many reservoirs, require prohibitively large computational effort...

3) Kriging Estimation with a Decision-making Framework for Evaluating Process Technologies in a Wastewater Treatment System, ***William J. Welch***, University of Waterloo, Dept. of Stats./ Actuarial Sci., Waterloo, Ontario, N2L 3G1, Canada, wjwelch@uwaterloo.ca, ***Victoria C. P. Chen***, ***Timothy W. Simpson***

Within a wastewater treatment system, there are various technological options that may be chosen at different levels of the process. We consider a system that consists of a liquid process with 11 levels and a solids process with 6 levels. To select among the options, we utilize criteria involving economic cost, size (land area, volume), robustness, odor emissions and global desirability...

MC43 Taking it to the Streets: Health Technology Diffusion

Sponsor: Technology Management Section
Sponsored Session
Chair: Ritalinda D'Andrea, 2193 Grandbury Way, Germantown, TN 38139, rdandrea@ix.netcom.com

1) Beautiful Black Health Coalition: Grass Root Technology Diffusion, ***Robin J. Womeodu***, University of Tennessee, 842 Jefferson, Rm. A607, Memphis, TN 38103

In order to address the disturbing rise of HIV infection among African-American women, health professionals are borrowing methods of technology diffusion and grass roots community organizing to more effectively communicate HIV prevention methods-this paper discusses a program targeted to African-American beauticians, who are trained to HIV "health advisors."

2) Creating Healthy Communities: Technology Businesses of the Future, ***Carol B. Mattick***, 130 East Travis, Ste. 330, San Antonio, TX 78205

Considering "high tech-high touch," we suggest that technology-based businesses, expecting to promote wide acceptance of their products and services, consider societal consequences of these products, especially those related health-promotion and medicine. We add that compliance with product use increases when technology is seen as non-isolating, fostering connection and community.

3) But then Everyone will Know: HIV Rapid Testing & the Social Consequences of Health Technology Diffusion, ***Ritalinda D'Andrea***, 2193 Grandbury Way, Germantown, TN 38139, rdandrea@ix.netcom.com

In heath issues, technology that conforms with "best health practices" may not be accepted because of the personal and societal consequences of its use. We explore research techniques and diffusion methods to better identify and intervene in the barriers to acceptance of medical technologies and suggest practices that foster compliance with use.

MC45 Software Demonstration IV

Software Demo Session
Chair: Mark Wiley, LINDO Systems, Inc., 1415 North Dayton St., Chicago, IL 60622, mwiley@lindo.com

Co-Chair: Bjarni Kristjansson, Maximal Software Inc., 2111 Wilson Blvd., Ste. 700, Arlington, VA 22201, info@maximal-usa.com

1) Modeling with LINDO, LINGO & What'sBest!, ***Mark Wiley***, LINDO Systems, Inc., 1415 North Dayton St., Chicago, IL 60622, mwiley@lindo.com

LINDO Systems will highlight the recent speed enhancements to linear and integer solvers and demonstrate our new Callable Library and line of popular modeling packages: LINDO - our powerful linear and integer programming engine, LINGO - our integrated modeling language with linear/nonlinear solvers and What'sBest! - our large scale linear/ nonlinear spreadsheet solver.

2) Using the MPL OptiMax 2000 Component Library with VBA

for Excel & Visual Basic, *Bjarni Kristjansson*, Maximal Software Inc., 2111 Wilson Blvd., Ste. 700, Arlington, VA 22201, info@maximal-usa.com

The OptiMax 2000 is a highly anticipated Component Library (API) designed to take full advantage of the ActiveX Automation component software technologies from Microsoft. Using step-by-step examples, we will demonstrate how to use the OptiMax 2000 to seamlessly integrate MPL into VBA for Excel/Access, Visual Basic, Visual C++, Delphi, Java and the Web, thus easily creating customized end-user applications to solve real-world optimization problems.

MC46 Tutorial: Mining Spatial Data

Invited Session

Chair: Yupo Chan, University of Arkansas, Systems Eng. Dept., Little Rock, AR, novascorp@dayton.net

1) Tutorial: Mining Spatial Data, *Yupo Chan*, University of Arkansas, Systems Eng. Dept., Little Rock, AR, novascorp@dayton.net

We show people how to extract useful geographic information in real time. While there are other "data mining" tutorials, we focus on extracting information to support such applications as facility location, where a facility can be anything from a depot/warehouse to a military target. We also discern trends and patterns on a map, such as spatial signals/communications, weather and pollution plumes...

Monday 15:00-16:30

MD01 Decision Analysis Society Awards Presentation

Sponsor: Decision Analysis Society

Sponsored Session

Chair: L. Robin Keller, University of California, Grad. Sch. of Mgmt., 350 GSM, Irvine, CA 92697-3125, lrkeller@uci.edu

1) Decision Analysis Society Awards Presentation

Each year, the Decision Analysis Society of INFORMS presents awards for the best publications, the best student paper and the best application of decision analysis. The Society also periodically awards the Ramsey Medal for lifetime contribution; Dr. Detlof von Winterfeldt will be this year's Ramsey award recipient. Current awardees will be honored and will make presentations related to their work.

MD02 Tutorial: Theoretical Foundations of Systems Engineering

Invited Session

Chair: George A. Hazelrigg, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230, ghazelri@nsf.gov

1) Tutorial: Theoretical Foundations of System Engineering, *George A. Hazelrigg*, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230, ghazelri@nsf.gov

Systems engineering involves decision making with respect to all aspects of the system. Good systems engineering demands adequate generation of system alternatives and proper selection of the best alternatives from among this set. Selection is the domain of decision theory. We will discuss the underlying concepts of decision making under uncertainty applied to engineering systems...

MD03 Research Related to Telephone Call Centers

Sponsor: MSOM

Sponsored Session

Chair: Robert Shumsky, University of Rochester, Simon Sch., Rochester, NY 14627, shumsky@simon.rochester.edu

1) Staffing with Employee Learning & Turnover, *Noah F. Gans*, University of Pennsylvania, OPIM Dept., The Wharton School, Philadelphia, PA 19104-6366, gans@wharton.upenn.edu, ***Yongpin Zhou***

What is the value of tracking detailed learning and turnover information when setting staffing levels? We develop and analyze a model to answer the question. Numerical results suggest that how quickly people learn and how much flexible capacity is available are important determinants of the value of more detailed information.

2) Admission Control of a Shared Service Facility, *Lerzan E. Ormeci*, EURANDOM, PO Box 513, Eindhoven, 5600 MB, The Netherlands, ormeci@eurandom.tue.nl, ***Apostolos N. Burnetas***

Many call centers serve different classes of customers distinguished by different profitability, volume of calls, and service expectation. We develop and analyze a queuing model that serves 2 classes of customers using dedicated and shared facilities to develop insight for cross-training of call center operators and dynamic assignment of calls.

3) Optimal Allocation of Tasks to Call Centers, *Reynold E. Byers*, University of California at Irvine, Grad. Sch. of Mgmt., 144 Sea Country Ln., Las Flores, CA 92688, byers@uci.edu, ***Gregory Dobson***, ***Robert Shumsky***

We develop models for allocating tasks to telephone call centers, taking into account queueing effects, wages, training, and the fixed costs associated with each center. The models also consider the benefits of blending a variety of job types, such as inbound service, outbound sales, and responding to email.

MD04 Supply Chain Applications in E-Commerce

Sponsor: MSOM

Sponsored Session

Chair: S. David Wu, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015-1582, david.wu@lehigh.edu

1) Integrating Pricing, Production & Distribution Strategies within the Supply Chain, *Lap Mui Chan*, University of Toronto, Rotman Sch. of Mgmt., 105 Saint George St., Rm. 408, Toronto, Ontario, M5S 3E6, Canada, achan@fmgmt.mgmt.utoronto.edu, achan@mgmt.utoronto.ca, ***David Simchi-Levi***, ***Julie L. Swann***

The increasing popularity of e-commerce is driving businesses to develop new supply chain management strategies that capitalize on the advantages of e-business. We consider the integration of decisions such as pricing, production and distribution within the supply chain, made possible by an e-commerce environment.

2) The Value of Information in the Supply Chain: An Application in the Telecommunications Industry, *Mary J. Meixell*, Bell Labs., Lucent Technologies, 5 Hansel Rd., Newtown, PA 18940, marymeixell@lucent.com

Expanded information availability is only the first step in integrating supply chains - core processes need to be re-engineered to ensure performance improvement. We discuss a case study in the telecommunication equipment manufacturing industry, with special attention to the model used to assess operational improvement along the supply chain.

3) The Stochastic Inventory Routing Problem, *Anton J. Kleywegt*, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, anton.kleywegt@isye.gatech.edu, anton@isye.gatech.edu, ***Vijay S. Nori***, ***Martin W. P. Savelsbergh***

Recently, we presented a computational approach for the stochastic inventory routing problem with direct deliveries. We present an approach for the case with more general routing. Computational results are presented, including results on instances obtained from industry.

4) Transaction Paradigms in the Electronic Market-Driven Supply Chain, *S. David Wu*, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015-1582, david.wu@lehigh.edu

We consider coordination mechanisms in the e-supply chain through the modeling of electronic market transactions. The focus of our explorations is on the following paradigms: auction and electronic intermediaries, negotiation and proactive equilibrium and market coalitions and alliance mechanisms. We will provide an overview of these paradigms.

MD05 Dynamic Control for Stochastic Networks I

Sponsor: Applied Probability Society

Sponsored Session

Chair: Sunil P. Kumar, Stanford University, Grad. School of Business, 518 Memorial Way, Stanford, CA 94305-5015, kumar_sunil@gsb.stanford.edu

Co-Chair: Ruth J. Williams, University of California, Dept. of Math., 9500 Gilman Dr., LA Jolla, CA 92093-0112, williams@russel.ucsd.edu

1) A Multi-Class Queue in Heavy Traffic with Throughput Time Constraints: Asymptotically Optimal Dynamic Controls, *Erica Plambeck*, Stanford University, Dept. of EES & OR, Stanford, CA 94305, elp@leland.stanford.edu

Consider a queueing system with multiple classes of jobs, each having its own renewal input process, service time distribution, revenue contribution and

maximum allowed throughput time. A system manager must decide whether or not to accept new jobs as they arrive and also the order in which to serve jobs that are accepted...

2) Dynamic Scheduling of a Parallel Server System with Complete Resource Pooling, ***Ruth J. Williams***, University of California, Dept. of Math., 9500 Gilman Dr., La Jolla, CA 92093-0112, williams@russel.ucsd.edu, ***Steven L. Bell***

We consider a parallel server queueing system with flexible scheduling capabilities. Under a complete resource pooling condition, a continuous review threshold control policy is proposed and it is shown to be asymptotically optimal in the heavy traffic limit.

3) Dynamic Control for Stochastic Networks: A Comparison of Fluid vs. Brownian Approximations, ***Constantinos Maglaras***, Columbia Business School, 409 Uris Hall, 3022 Broadway, New York, NY 10027-6902, c.maglaras@columbia.edu

A promising approach for designing control policies for stochastic networks is based on analysis of fluid or Brownian approximating models and translation of the corresponding controls through, for example, tracking or discrete-review policies. We contrast the solutions extracted from these 2 model approximations through simple examples.

4) A New Numerical Method for Solving Brownian Control Problems, ***Sunil P. Kumar***, Stanford University, Grad. School of Business, 518 Memorial Way, Stanford, CA 94305-5015, kumar_sunil@gsb.stanford.edu, ***Muthukumar Muthuraman***

We present a new method for numerically solving Brownian control problems. We adapt nonlinear finite element methods to numerically solve the Hamilton-Jacobi-Bellman equation associated with the Brownian control problem. The solution to this partial differential equation is then used to construct an optimal control for the Brownian system.

MD06 Advanced Traffic Control Applications

Sponsor: Transportation Science Section
Sponsored Session
Chair: Pitu B. Mirchandani, University of Arizona, The ATLAS Ctr., SIE Dept., Tucson, AZ 85721, pitu@sie.arizona.edu

1) SMART-RHODES: A Self-Learning Traffic Adaptive Controller, ***Pitu B. Mirchandani***, University of Arizona, The ATLAS Ctr., SIE Dept., Tucson, AZ 85721, pitu@sie.arizona.edu, ***David E. Lucas***, ***Steve Nobe***, ***Wenji Wu***

SMART-RHODES, a self-learning real-time traffic adaptive signal control system, provides dynamic, optimal signal phasing that considers the natural stochastic variations in demand. By incorporating self-tuning algorithms to update demand-dependent parameters, such as turning proportions and queue discharge rates, the system continuously provides adaptive phasing, removing the need for manual tuning/calibration.

2) Computational Aspects of On-Line Traffic Control using Beowulf Clusters, ***Pengcheng Zhang***, Purdue University, Sch. of Civil Eng., West Lafayette, IN 47907-1284, ***Srinivas Peeta***

The computational aspects of implementing various models associated with on-line traffic control in the high-performance Beowulf environment are investigated. Benchmark tests involving shortest path and simulation components are analyzed. Some related issues such as load balancing and data communication are addressed.

3) Real-Time Signal Priority for Transit Vehicles, ***Pitu B. Mirchandani***, University of Arizona, The ATLAS Ctr., SIE Dept., Tucson, AZ 85721, pitu@sie.arizona.edu, ***Anna Knyazyan***, ***Wenji Wu***, ***K. Larry Head***

Phase durations are given by real-time optimization (RHODES) that considers all vehicle-delays, passenger-counts in transit vehicles and transit-schedule status (if the vehicle is late or early). In the phase optimization, the vehicle "weight" increases with the number of passengers and vehicle lateness. Simulations indicate that passenger delays are decreased.

4) A 0-1 Mixed Integer Linear Programming Formulation for the Traffic Signal Control Problem, ***Wei Hua Lin***, Virginia Polytechnic Institute & State University, Dept. of Civil & Environ. Eng., Blacksburg, VA 24061, whlin@vt.edu

The proposed 0-1 MILP formulation for the traffic signal optimization problem captures delay, stops and physical queues. It handles fixed and variable cycles, constrained by minimum and maximum green duration. The number of integer variables is equal to the number of intersections multiplied by the optimization duration.

MD07 INFORMS Case Competition 2000: Finalists 3 & 4

Sponsor: INFORM-ED
Sponsored Session
Chair: James J. Cochran, Louisiana Tech. University, Dept. of Comp. IS & Anlysis, Coll. of Admin. & Bus., Ruston, LA 71272, cochran@cab.latech.edu

1) INFORMS Case Competition 2000: Finalist 3

2) INFORMS Case Competition 2000: Finalist 4

MD08 Online Auctions

Cluster: Bidding
Sponsor: E-Business Section
Sponsor/Invite Session
Chair: Paulo B. Goes, University of Connecticut, Operations & Info. Mgmt., Sch. of Bus., Storrs, CT 06269

1) Understanding Revenue Drivers in E-Auctions, ***Kumar Mehta***, University of Illinois, Dept. of IDS, Chicago, IL 60607, kmehta1@uic.edu

Utilizing the advantages borne out of the new medium of communication and transaction, new business models and sales channels have accompanied the explosive growth of Internet economy. Departing from earlier approach of opening a retail front on the web that essentially inherited similar business and revenue models, businesses are increasingly adopting dynamic pricing mechanisms as a means for revenue maximization...

2) An Analysis of Business to Consumer On-Line Auctions, ***Ravi Bapna***, Northeast University, Coll. of Bus. Admin., Boston, MA 02115, r.bapna@nunet.neu.edu, ***Paulo B. Goes***, ***Alok Gupta***

We overview several research approaches that we have taken to analyze the increasingly popular multi-unit progressive auctions in the B2C marketplace: analytic modeling, empirical analysis of real web data, laboratory experiments and simulation. The focus has been to provide a broad understanding of the factors that influence the design of the mechanism from revenue-maximization and allocative efficiency perspectives.

3) Incompletely Specified Combinatorial Auction: Heuristic Solution Methodology to a Combinatorial Optimization, ***Gary J. Koehler***, University of Florida, Dept. of DIS, Box 117169, Coll. of Bus., 351 Stuzin Hall, Gainesville, FL 32611-7169, koehler@ufl.edu, ***Joni L. Jones***

The incompletely specified combinatorial auction is a mechanism that allows for the submission of bids that guide, rather than explicitly specify, the choice of goods to fulfil buyer's needs. To facilitate achieving a satisfying solution to the problem in real time, we present simplifying heuristics for the combinatorial allocation problem.

4) A Dynamic Pricing Mechanism for Determining Optimal Capacity & Service Mix in Quality-of-Service Environments, ***Ravi Bapna***, Northeast University, Coll. of Bus. Admin., Boston, MA 02115, r.bapna@nunet.neu.edu, ***Paulo B. Goes***, ***Alok Gupta***

Converging digital technologies of audio and video streaming require a certain level of service quality for acceptable performance. Internet content providers offering webcasting of special events are examples of such firms in B@C markets. Companies that deploy commercial video-on-demand servers in high-bandwidth digital cable markets are examples of such firms in B@B markets...

MD09 Tutorial: Revenue Management & Dynamic Pricing

Invited Session
Chair: E. Andrew Boyd, PROS Revenue Management, 3223 Smith St., Ste. 100, Houston, TX 77006, aboyd@prosrm.com

1) Tutorial: Revenue Management & Dynamic Pricing, ***E. Andrew Boyd***, PROS Revenue Management, 3223 Smith St., Ste. 100, Houston, TX 77006, aboyd@prosrm.com

RM has been employed with great success in the airline, hotel and car rental industries for many years. We introduce the basic concepts of RM and discuss some of the many new industries where RM is being employed. We also discuss the relationship with dynamic pricing, auctions and exchanges.

MD10 Complex Scheduling Problems

Cluster: Scheduling
Invited Session

Chair: Peter J.S. Brucker, University of Osnabrueck, Fac. of Math. & Info., Osnabrueck, D-49069, Germany, peter.brucker@mathematik.uni-osnabrueck.de

1) Solving a Chemical Batch Scheduling Problem by Local Search, ***Johann Hurink***, University of Twente, Faculty of Math. Sci., PO Box 217, Enschede, 7500 AE, The Netherlands, j.l. hurink@math.utwente.nl, www.math.utwente.nl/dos/hurink/htm, ***Peter J.S. Brucker***

A chemical batch scheduling problem is modeled in two different ways as a complex scheduling problem. Both models are used to solve the batch scheduling problem in a 2-phase tabu search procedure. The method is tested on real world data.

2) Batching Identical Jobs, ***Philippe Baptiste***, University of Technology of Compiegne, HeuDiaSyC, Ctr. Recherches de Royallieu, Compiegne Cedex, 60205, France, philippe.baptiste@hds.utc.fr

We study the problems of scheduling jobs, with different release dates and equal processing times, on serial batching machines and on parallel batching machines. We show that in both environments, for a large class of objective functions, the problems are polynomially solvable by dynamic programming.

3) A Complex Scheduling Problem in Telecommunication, ***Christian Prins***, University of Technology of Troyes, Dept. GSI Laboratory LOSI, 12 rue Marie Curie, Troyes Cedex, 10010, France, prins@univ-troyes.fr, ***Christelle Gueret***

Algorithms are proposed to schedule tasks with a common deadline and renewable resources on a set of processors. A processor can execute tasks requiring a resource only if it is equipped with that resource. The goal is to install a minimum number of resource units, while matching the common deadline.

4) Preemption Can Make Parallel Machine Scheduling Problems Hard, ***Peter J.S. Brucker***, University of Osnabrueck, Fac. of Math. & Info., Osnabrueck, D-49069, Germany, peter.brucker@mathematik.uni-osnabrueck.de, ***Svetlana Kravchenko***

It is shown that the problem of scheduling jobs with identical processing times on identical parallel machines with the objective of minimizing the weighted number of late jobs is NP-hard if preemption is allowed. However, on the other side the corresponding nonpreemptive problem can be solved polynomially.

MD11 Branch & Cut Algorithms

Cluster: **Integer Programming**
Invited Session

Chair: Roger Z. Rios, Universidad Autonoma de Nuevo Leon, Systems Eng. Program, AP 111-F, Cd. Universitaria, San Nicolas, NL, 66450, Mexico, roger@uanl.mx, http://osos.fime.uanl.mx/~roger/

1) The Allocation & Scheduling of Trainers & Trainees to Sites & Sessions, ***Stephanie R. Earnshaw***, Research Triangle Institute, 3040 Cornwallis Rd., PO Box 12194, RTP, NC 27709-2194, earnshaw@rti.org, ***Salah E. Elmaghraby***, ***Yahya Fathi***

We treat the problem of the optimal allocation/location/scheduling of trainers and trainees in face-to-face interview surveys. We propose and ILP model, which is efficiently solved via a B&C/heuristic algorithm. The computational results demonstrate the applicability of the

2) Matrix Reduction Techniques for Dense MIPs & their Application to Radionuclide Implants for Prostate Cancer, ***Eva K. Lee***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, eva.lee@isye.gatech.edu, http://www.isye.gatech.edu/~evakylee, ***Ellis L. Johnson***, ***George L. Nemhauser***

Matrix reduction techniques are developed to tackle dense MIP instances. The procedure involves decomposing the constraint matrix, solving the reduced system, and restoring the solutions for the original instance. Computational results related to radionuclide implants for prostate cancer will be presented.

3) A Branch & Cut Algorithm for the Vehicle Routing Problem, ***Ted Ralphs***, Rice University, Dept. of Comp. & Applied Math, 6630 Rodrigo St., Houston, TX 77007-2045, ted@mailzone.com, ***Leonid Kopman***, ***Leslie E. Trotter***, ***Bill Pulleyblank***

We will discuss recent results with a parallel B&C solver for the VRP. Various aspects of the algorithm will be discussed with a focus on separation. Specifically, we will discuss efforts to "borrow" separation technology from efforts to solve the TSP using a paradigm that has application

MD12 Designing the Supply Chain

Cluster: **Logistics & Supply Chain Management**
Invited Session

Chair: Vedat Verter, McGill University, Faculty of Mgmt., 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, Canada, verter@management.mcgill.ca

1) The Optimization of Manufacturing Network Structures, ***Guy Desaulniers***, Ecole Polytechnic de Montreal, GERAD, 3000 ch. Cote-Ste-Catherine, Montreal, Quebec, H3T 2A7, Canada, ***Alain Martel***, ***Marc Paquet***

With current globalization trends, several companies must redesign their manufacturing networks, that is determine the number, location and mission of their plants as well as the technology to use in these plants. We propose a mathematical programming model which can be used to support these decisions. We also show how the model can be solved using Benders decomposition.

2) Modeling & Design of Flexible & Robust Supply Chains, ***Marc Goetschalckx***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, ***Tjendera Santoso***

The design of strategic supply chains is many times based on uncertain data. We present a design framework, models, and solution algorithms to design flexible and robust supply chains that explicitly incorporate this uncertainty. Some preliminary computational experience will also be reported.

3) Contract-Based Tactical Planning of a Supply Chain, ***Sophie D'Amours***, Universite Laval, CENTOR, Quebec, Quebec, G1K 7P4, Canada, damour@gmc.ulaval.ca, ***Benoit Montreuil***

We address the decision process of dynamically planning a product-based supply chain. Our model minimizes operating costs and plans material flows in the supply chain over a rolling horizon. The result of the model is used to define long, mid and short terms contracts with suppliers, subcontractors, business units and

4) Evaluating Manufacturing Strategies in Production-Distribution Systems: A Continuous Approximation, ***Abdullah Dasci***, McGill University, Fac. of Mgmt., 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, Canada, adasci@management.mcgill.ca, ***Vedat Verter***

We will present a model for simultaneous optimization of market areas in a 2-echelon production- distribution system where demand as well as the other parameters is represented as continuous functions over the entire market. We will present the closed form solution and use of the model to evaluate

MD13 Game Theoretic Models for Manufacturing Logistics

Cluster: **Manufacturing & Logistics**
Invited Session

Chair: Suleyman Karabuk, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015

1) A Nash Game for Due-Date Coordination between Manufacturing & Marketing, ***Murat Erkoc***, Lehigh University, Dept. of IMSE, 200 West Packer Ave., Bethlehem, PA 18015, ***S. David Wu***

We analyze the global and competitive optimization of due-date quotation and capacity management in a make-to-order environment. Motivated by the fact that the competition degrades overall performance of the firm, we design a Nash game that induces incentives for the two parties to coordinate and work towards the system optimum.

2) Coordinating Delivery Schedules between a Buyer & Supplier in the Supply Chain, ***Kadir Ertogral***, Lehigh University, Dept. of IME, 200 West Packer Ave., Bethlehem, PA 18015, ***S. David Wu***

We propose a 2-phase coordination mechanism for the delivery scheduling between a buyer-supplier pair in the supply chain. Phase I identifies a delivery schedule that is system optimal while accommodating the interests of both parties. Phase II constitutes a profit sharing scheme between the parties based on a bargaining model.

3) Lead-Time-Based Supply Chain Coordination, ***Hakan Golbasi***, Lehigh University, Dept. of IME, 200 West Packer Ave., Bethlehem, PA 18015, ***S. David Wu***

We analyze supplier-buyer coordination in a supply chain. Expanding traditional EOQ type models, we develop lead-time based decision models representing the cost structures of the supplier and the buyer. We analyze equilibrium solution conditions taking into consideration queuing effects and WIP inventory costs.

4) Suppliers' Coalition Strategies in Business-to-Business E-Commerce, ***Mingzhou Jin***, Lehigh University, Dept. of IMSE, 200

West Packer Ave., Bethlehem, PA 18015-1582, ***S. David Wu***

Buyer-Centric eCommerce auction has been widely adopted to lower procurement costs. While suppliers benefit from increased sales opportunities, their margins often suffer. We propose a game-theoretic mechanism that allows suppliers to form coalitions to improve cost efficiency. We show that this mechanism improves overall market efficiency.

MD14 Advances in Stochastic Integer Programming

Cluster: **Integer Programming**
Invited Session

Chair: Nikolaos V. Sahinidis, University of Illinois, Dept. of Chem. Eng., 600 South Mathews Ave., Urbana, IL 61801-2906, nikos@uiuc.edu, http://archimedes.scs.uiuc.edu

1) A Branch & Price Algorithm for Stochastic IP & its Application to Simple Integer Recourse Problems, ***Suvrajeet Sen***, University of Arizona, Dept. of SIE, Tucson, AZ 85721, sen@sie.arizona.edu

Stochastic programming problems are known to be amenable to decomposition methods. We will discuss the application of a B&P method for stochastic IP problems and specializations that are possible when the problem has a structure called simple integer recourse.

2) An Asymptotically Optimal Heuristic for Capacity Expansion under Uncertainty, ***Shabbir Ahmed***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, s-ahmed1@uiuc.edu, ***Nikolaos V. Sahinidis***

We address a class of multi-period, multi-facility expansion problems under uncertainty that we formulate as multi-stage stochastic integer programs. We devise a decomposition-based heuristic that constructs integral solutions from the LP relaxation solution. The heuristic is proven to be asymptotically optimal in the number of planning periods.

3) Solving Stochastic Integer Programs with IBM's OSL Stochastic Extensions, ***Gyana Parija***, IBM TJ Watson Research Center, Math Sci. Dept., PO Box 218, Yorktown Heights, NY 10598, parija@us.ibm.com, ***Alan J. King***

The C-API of IBM's OSL Stochastic Extensions presents a set of new functions to handle integer variables present in stochastic LPs. We describe how stochastic integer programs can be effectively solved by combining well known MIP preprocessing techniques such as branching rules, prioritization of sets, etc. with a wide variety of decomposition strategies available in the stochastic programming literature...

MD15 Scalable Statistical Techniques for Quality Assurance

Cluster: **Scalable Statistical Techniques for Quality Assurance**
Invited Session

Chair: Nong Ye, Arizona State University, Dept. of IE, Box 875906, Tempe, AZ 85287, nongye@asu.edu

1) Scalable Clustering Techniques for Quality Assurance of Information Systems, ***Nong Ye***, Arizona State University, Dept. of IE, Box 875906, Tempe, AZ 85287, nongye@asu.edu, ***Xiangyang Li***

Intrusions into information systems compromise the security, i.e. availability, integrity and confidentiality, etc., of information systems. Intrusions must be detected at an early stage to prevent damages to information systems. Decision trees techniques have been used to learn intrusion signatures and to classify incoming events in information systems as normal or intrusive...

2) A Robust Clustering Method based on L1-Median, ***Yijun Zuo***, Dept. of Math, yijun.zuo@asu.edu

A robust clustering method, the K-medians method, based on the L1-median is introduced. Examples show that the new clustering method can outperform both the traditional K-means method and the SAS's K-means method (PROC FASTCLUS) in the sense that the new method can appropriately identify clusters in a given data set, whereas the other 2 may fail to do so.

3) Camouflaging Computer Networks based on Traffic Statisical Information, ***Wei Zhao***, Dept. of Computer Sci., zhao@cs.tamu.edu

We discuss how to apply statistical traffic modeling techniques in network security. In particular, we study the development of countermeasures for traffic analysis and denial of service for both wired networks and wireless ad-hoc networks. For traffic analysis attacks, we examine traffic stuffing algorithms that can effectively mask the actual operational modes of mission critical applications without compromising guaranteed quality of service...

4) On-Line Monitoring of SMD Assembly with Variable Sampling Intervals, ***J. Rene Villalobos***, Arizona State University, Dept. of IE, Box 875906, Tempe, AZ 85287-5906, rene.villalobos@asu.edu, ***Luis F. Munoz***

The introduction of real-time automated inspection systems onto the factory floor has accentuated the need for monitoring tools capable of performing real-time analysis of the large amounts of data generated by these systems. For example, AVI systems are capable of determining a component's presence, position and placement angle in real-time...

MD16 PROMETHEE MCDA Outranking Method

Cluster: **MCDM**
Invited Session

Chair: J. P. Brans, University of Brussels, Dept. of Stats & OR, Poeinlaan 2, Brussels, B-1050, Belgium, jpbrans@vub.ac.be

1) The PROMETHEE Methodology, ***J. P. Brans***, University of Brussels, Dept. of Stats & OR, Poeinlaan 2, Brussels, B-1050, Belgium, jpbrans@vub.ac.be

We present an introduction to MCDA and describe requisites for appropriate methods. PROMETHEE basic data are provided. Additional information includes generalised criteria, outranking graph, outranking flows, PROMETHEE I and II, sensitivity tools, walking weights, profiles of actions, applications and software demonstrations.

2) The PROMETHEE Associated Visual Interactive Module, ***J. P. Brans***, University of Brussels, Dept. of Stats & OR, Poeinlaan 2, Brussels, B-1050, Belgium, jpbrans@vub.ac.be

Decomposition of the PROMETHEE II net flow. The GAIA plane. Visualisation of the actions. Visualisation of the criteria. The decision stick. The PROMETHEE decision axis. PROMETHEE VI: The human brain. Sensitivity tools. PROMETHEE V: MCDA with additional constraints. Applications and software demonstrations.

3) Mathematical Properties of PROMETHEE, ***Philippe G. H. Vincke***, Universite Libre de Bruxelles, CP 210/01, Boulevard du Triomphe, Brussels, 1050, Belgium, pvincke@smg.ulb.ac.be

PROMETHEE is an outranking method devoted to the determination of a ranking in a set of alternatives which are evaluated on several criteria. We analyse this method in terms of mathematical properties and underlying assumptions.

MD17 Supply Chain Operational Strategies

Cluster: **Performance of Supply Networks**
Invited Session

Chair: Anthony D. Ross, Michigan State University, Business Sch., East Lansing, MI

1) Product Line Selection & Pricing under the Multinomial Logit Choice Model, ***Jennifer K. Ryan***, Purdue University, Sch. of IE, ***Goker Aydin***

We consider a retailer's product line selection and pricing problem under cannibalization and the MNL choice model. We describe the structure of the optimal product line and the optimal prices. We obtain several useful insights into the relationship between the optimal set of products, their "quality" or attribute levels and their optimal prices.

2) Coordinated Scheduling & Inventory Abatement, ***F. Barry Lawrence***, Texas A&M University, ETID Dept., College Station, TX 77843-3367, lawrence@entc.tamu.edu, ***Powell Robinson***

In batch manufacturing systems, a family of items may incur both major and minor setup costs during production. There is a major setup cost when one or more members of the product family are produced and a minor setup cost for each individual item produced. In such situations, the coordinated manufacture of the individual items is economically attractive...

3) Productivity Analysis for Supply Networks: Measuring Temporal Performance, ***Anthony D. Ross***, Michigan State University, Business Sch., East Lansing, MI

We present an approach for identifying best practice decision making units in a multi-product supply network operation. The availability of complete operational data often presents many challenges when used by researchers and management analysts. The data is often incomplete, ill-conditioned or not fully dimensioned. A translation invariant DEA model is formulated...

4) Supply Chain Partnering & Resource Sharing in the Petroleum Industry, ***Powell Robinson***, Texas A&M University, Grad. Sch. of Bus., Dept. of IOM, College Station, TX 77843-4217, probinson@cgsb.tamu.edu, ***Anthony D. Ross***

Based on the importance of SCM and partnering to the logistics function and the growing debate and discussion of the concept in this industry, we present a

timely demonstration and discussion of the resource sharing concept. As a backdrop, we are using the results from a logistics study. The objectives are to describe the upstream supply chain...

MD18 Industry Standards in E-Commerce Supply Chains

Cluster: E-Commerce
Invited Session
Chair: Ramnath Chellappa, University of Southern California, Bridge Hall 401D, Los Angeles, CA 90089-0809, chellapp@rcf.usc.edu

1) Rethinking Supply Chains for E-Business, ***Arvind Malhotra***, University of North Carolina, Kenan Flagler Bus. Sch., Chapel Hill, NC 27514, malhotra@icarus.bschool.unc.edu, ***Sanjay Gosain***, ***Omar A. Elsawy***

We draw on a field effort with an IT industry consortium to uncover two aspects of the emerging supply chain e-business model: process integration and collaborative knowledge sharing. The "orchestrated e-Process" model is characterized by groups of business partners electronically orchestrating around the customer based on collaborative process partnering.

2) The Specification of Process Standards for Electronic Business Interfaces, ***Sanjay Gosain***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, sgosain@rhsmith.umd.edu, ***Arvind Malhotra***, ***Omar A. Elsawy***

There are several efforts underway to allow enterprises to inter-operate and exploit fast changing market opportunities through market exchanges. We provide a framework for understanding the scope of these efforts. Using an industry effort example, we illustrate the issues and challenges involved in setting up process specifications.

3) Disincentives for Standards Formation in E-Markets, ***Ramnath Chellappa***, University of Southern California, Bridge Hall 401D, Los Angeles, CA 90089-0809, chellapp@rcf.usc.edu

While standards in general create greater social welfare in markets, firms often create certain impediments to sustain competition. In particular, the existence of third party integrators and centralized decision making create disincentives for standards formation. We argue that the enterprise resource planning software markets have suffered from this phenomena and explore the migration of ERP firms towards standards.

MD19 Product Development Process Management

Cluster: Product Development
Sponsor: Technology Management Section
Invite/Sponsor Session
Chair: Steven D. Eppinger, MIT, Sloan School of Mgmt., Rm. E53-347, Cambridge, MA 02139, eppinger@mit.edu

1) Ownership Structures in the Auto Industry: A Property Rights Perspective, ***Sharon Novak***, Northwestern University, Evanston, IL, novak@kellogg.nwu.edu

We examine the interaction between physical asset ownership and access to critical resources as it affects the investment incentives of a manufacturer and supplier in development of automotive parts. We find part design complexity to be a key determinant of the wide range of contracting choices observed empirically.

2) The Effects of Product Architecture on Technical Communication in Product Development, ***Manuel E. Sosa***, MIT, Sloan Sch. of Mgmt., Cambridge, MA 02139, msosa@mit.edu, ***Steven D. Eppinger***, ***Craig M. Rowles***

Management of product architecture knowledge by the development organization provides important competitive advantage for established firms facing architectural innovation. We study how the combination of product architecture and organizational structure determines technical communication in development teams. We illustrate our approach by analyzing the development process.

3) Product Information Evolution & Sensitivity in Product Development: Bi-Directional Changes & Causes of Evolution, ***David N. Ford***, Texas A&M University, Civil Eng. Dept., College Station, TX 77843-3136, dford@civilmail.tamu.edu, ***Ingo Notzon***

Krishnan's discrete 2-phase product development project model identifies evolution and sensitivity as important descriptors of product information. We use a continuous model to relax an important assumption about overlapping initial work and iteration, adds the return of changes to the upstream phase, and explores the causes of evolution.

4) Multiple Project Management using the DSM Method, ***Ali A. Yassine***, MIT, Rm. E40-252, Cambridge, MA 02139, yassine@mit.edu, ***Tyson R. Browning***, ***Steven D. Eppinger***

We consider multiple development projects that share a common set of resources. Within this setting, the availability of predecessor information is not sufficient to ensure that tasks will be executed on time. We address the availability of resources through a project portfolio plan that constrains task execution based on both information and resource availability.

MD20 Optimization in Data Mining

Cluster: Computational Intelligence
Invited Session
Chair: Erin J. Bredensteiner, University of Evansville, Dept. of Math, Evansville, IN 47722

1) Feature Selection in Clustering, ***W. Nick Street***, University of Iowa, MS Dept., 108 Pappajohn Bldg., Iowa City, IA 52242, ***YongSeog Kim***, ***Filippo Menczer***

We formulate the feature subset selection problem in unsupervised learning as a multicriteria optimization problem and search the combinatorial solution space using a specialized genetic algorithm. This approach lets the user explore trade-offs among different Pareto-optimal solutions, and also detects high-quality solutions for both feature subsets and number of clusters.

2) Separating Surfaces & Decision Trees, ***Ahmad Moghrabi***, Carleton University, Systems & Computer Eng., 1125 Colonel by Dr., Ottawa, Ontario, K1S 5B6, Canada, ***John W. Chinneck***

Classification accuracy depends on both the algorithm for finding the separating surfaces and on the method used to construct the decision tree. We present methods in which these processes interact: the method of placing the separating surface differs depending on the current status of the developing decision tree.

3) Unlabeled Data Classification by Support Vector Machines, ***Glenn Fung***, University of Wisconsin, Computer Sci. Dept., 1210 West Dayton St., Madison, WI 53706, ***Olvi L. Mangasarian***

An SVM classifies partially labeled datasets by assigning unlabeled data to one of two classes so as to maximize the separation between the two classes. For totally unlabeled data an oracle labels a small percentage of the data chosen by k-median clustering and then the partially labeled procedure is used.

4) Duality & Geometry in Support Vector Machine Classifiers, ***Erin J. Bredensteiner***, University of Evansville, Dept. of Math, Evansville, IN 47722, ***Kristin P. Bennett***

In SVM classification, maximizing the margin between two linearly separable sets is equivalent to finding the two closest points in the convex hulls. We extend this geometric argument to the inseparable case using reduced convex hulls. The effect of the choice of parameters on the solution becomes geometrically clear.

MD21 Session VII

Cluster: SICUP
Invited Session
Chair: Christine L. Valenzuela, Cardiff University, Dept. of Comp. Sci., PO Box 916, Cardiff, CF2 3XF, UK, christine@cs.cf.ac.uk

1) A Global Optimization Method for the 3-Dimensional Packing Problem, ***Loris Faina***, University of Perugia, Dipt. Matematica e Informatica, Via L. Vanvitelli 1, Perugia, 06123, Italy, faina@unipg.it

We introduce a new geometrical model which reduces the 3-dimensional packing problem to a finite enumeration scheme; a very efficient algorithm is derived. Several tests prove the validity of the algorithm, in particular, a numerical estimate of the asymptotic performance bound is given.

2) Towards a Systematic Treatment of Constraints of 3-Dimensional Packing Problems, ***Hermann Gehring***, University of Hagen, Dept. of Bus. Informatics, Hagen, 58084, Germany, ***Andreas Bortfeldt***

We discuss the modeling and algorithmic treatment of often occuring constraints of 3-D packing problems. A data format for 3-D packing problems including different constraints is proposed and experiences gained with the calculation of constrained 3-D packing problems are reported.

3) Solving the Linear Programming Relaxation of Cutting & Packing Problems: A Hybrid Simplex Method/Subgradient Optimization Procedure, ***Zeger Degraeve***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, zdegraeve@london.edu, zdegraeve@lbs.ac.uk, ***Marc Peeters***

We present an improved method for solving the LP relaxation of the cutting stock problem. The method is based on the relationship between column generation and Lagrange relaxation. We test our procedure on generated data

sets and compare it with the traditional column generation approach.

4) A New Genetic Algorithm for Solving Optimally the Two-Dimensional Cutting Problem, ***Loris Faina***, University of Perugia, Dipt. Matematica e Informatica, Via L. Vanvitelli 1, Perugia, 06123, Italy, faina@unipg.it, ***F. Mori***

We introduce a new GA, based on the method of the zones, for finding an optimal solution of a 2-dimensional rectangular packing problem. The algorithm has been tested with many examples from the literature and from random data. Results are very encouraging in comparison with some known GAs. Finally, our algorithm is able to reconstruct perfect rectangular puzzles with more than 20 pieces.

MD22 Recent Issues in Medicare Payment Systems

Sponsor: **Health Applications Section**
Sponsored Session

Chair: Peri H. Iz, Health Care Finance Administration, Strategic Plng. & Evaluation, 7500 Security Blvd, MS C31926, Baltimore, MD 21244, piz@hcfa.gov, izperi@iamdigex.net

1) Simulating Outlier Policy Parameters for the Medicare Home Health Prospective Payment System, ***Philip G. Cotterill***, Health Care Finance Administration, HCFA/OSP, 7500 Security Blvd., MS C32128, Baltimore, MD 21244, pcotterill@hcfa.gov

The Medicare Home Health Prospective Payment System pays for 60-day episodes of care. Additional payments for unusually expensive cases (outlier payments) are subject to specific criteria and aggregate constraints. We discuss the methods used to estimate the parameters that satisfy the policy criteria and constraints.

2) Risk Adjusting Capitation Payments to Health Plans that Disproportionately Enroll Frail Medicare Beneficiaries, ***Gerald F. Riley***, Health Care Finance Administration, Office of Strategic Plng., 7500 Security Blvd, MS C32017, Baltimore, MD 21244, griley@hcfa.gov

Medicare policymakers are concerned about the adequacy of diagnosis-based risk adjusters for establishing payments for health plans that disproportionately enroll frail beneficiaries. Two risk adjustment models were evaluated with respect to their ability to predict Medicare costs for groups defined by institutional status and functional impairments.

3) Developing a Geographic Payment Adjuster for Medicare Managed Care Payments, ***Edgar A. Peden***, Health Care Finance Administration, OSP/REG/DPR, 7500 Security Blvd, MS C31926, Baltimore, MD 21244, epeden@hcfa.gov

Based on the current service by service spending patterns of managed care providers, current health care financing administration geographic payment indexes for Medicare services are combined with other federal geographic indexes to build a county level geographic payment index for managed care plans. The result is then compared to the simpler geographic index currently being used to adjust Medicare managed care payments.

MD23 Operational Modeling in Semiconductor Wafer Fabrication

Cluster: **Simulation**
Sponsor: **Simulation Section**
Invite/Sponsor Session

Chair: Neal Pierce, Motorola, Advanced Products R&D Lab., 3501 Ed Bluestein Blvd. MD K10, Austin, TX 78721, neal.pierce@motorola.com

1) Enhancing Decision Support by Integrating Manufacturing & Material Handling Models, ***Nipa Patel***, Advanced Micro Devices, 5204 E. Ben White Blvd., MS 612, Austin, TX 78741, nipa.patel@amd.com

Semiconductor fabrication facilities, such as AMD's Fab25, use a bay layout configuration and an overhead monorail system for moving material. Lot delivery times and system utilization have a significant impact on factory metrics. We present the benefits of integrating the automated material handling system with the factory simulation model.

2) Simulating the Impact of Lot Priorities for Semiconducter Wafer Fab, ***James Berry***, Motorola, Advanced Products R&D Lab., 3501 Ed Bluestein Blvd. MD K10, Austin, TX 78721, james.berry@motorola.com, ***Neal Pierce***, ***Sue Stankus***

A semiconductor wafer fab usually operates with three primary levels of lot prioritization namely hand carry, rush and standard. Each of these priorities set schedules and expectations for wafer fab resources. We present the impact that higher priority lots have on wafer fab cycle time and throughput.

3) Value-Based Dispatching for Semiconductor Wafer Fabrication, ***Neal Pierce***, Motorola, Advanced Products R&D Lab., 3501 Ed Bluestein Blvd. MD K10, Austin, TX 78721, neal.pierce@motorola.com, ***Tanju Yurtsever***

The semiconductor industry has primarily emphasized lot dispatching decisions to achieve cycle time goals and customer on-time delivery satisfaction. We present a prototype lot dispatching system with the objective of VBD that incorporates maximization of profit, market share growth and technology transfer as its objectives.

4) Modeling & Analysis of a 300mm Wafer Fabrication Facility, ***Elizabeth Campbell***, International SEMATECH, 2706 Montopolis Dr., Austin, TX 78741, elizabeth.campbell@sematech.org

The results of an International SEMATECH project designed to use simulation to develop an understanding of factory operational issues associated with 300-mm wafer manufacturing show that the member company vision of a fully automated factory would sufficiently support the production requirements of a 300-mm factory.

MD24 Modeling Retail Operations

Cluster: **Modeling Retail Operations**
Invited Session

Chair: Kamran Moinzadeh, University of Washington, Dept. of MS, Sch. of Bus., Box 353200, Seattle, WA 98195, kamran@u.washington.edu

1) Virtual vs. Brick & Mortar Retailing, ***Gilles Reinhardt***, RPI, Lally Sch. of Mgmt. & Tech., Troy, NY 12180-3590, ***Moren Levesque***

We analyze the trade-off problem of how much a firm should supply through a brick-and-mortar network and how much it should supply through a virtual storefront. We use micro-economic models to look first at a monopolist's profit maximizing strategy and second to analyze 2 competing firms that offer a substitutable good and have access to both distribution channels...

2) Customer-Based Competitive Leverage from Retail Service Operations, ***Piyush Kumar***, Rice University, Jones Grad. Sch., 6100 Main St., Houston, TX 77251, ***Robert A. Westbrook***

We examine how improvements in the front-end service operations at one retailer impact customer satisfaction with the retailer itself as well as with its competitors. To this end, we apply a utility theory-based model of satisfaction with waiting to derive a set of testable hypotheses. We later test these hypotheses using data from 2 sources: a controlled experiment and a field study...

3) Managing Seasonal Goods Inventories with Primary & Secondary Markets, ***Nicholas C. Petruzzi***, University of Illinois, 350 Commerce West Bldg., 1206 South 6th St., Champaign, IL 61820, ***George E. Monahan***

A retailer has a single opportunity to procure prior to a primary selling season consisting of multiple periods. Demand in each period is random, but correlated. We develop a policy to determine when the retailer should terminate the primary selling season by selling any remaining inventory on a secondary market.

MD25 Advances in Cone-Linear Optimization

Cluster: **Linear Programming & Complementarity**
Sponsor: **Optimization Section**
Sponsored Session

Chair: Henry Wolkowicz, University of Waterloo, Dept. of Combinatorics & Opt., Fac. of Math., Waterloo, Ontario, N2L 3G1, Canada, hwolkowicz@uwaterloo.ca, http://orion.math.uwaterloo.ca/~hwolkowi

1) Second-Order Cone Programming: A Survey of Applications & Solution Methods, ***Robert J. Vanderbei***, Princeton University, Dept. of OR & Civil Eng., Princeton, NJ 08544, rvdb@princeton.edu, ***Hande Y. Benson***

We discuss several nonlinear optimization problems that can be cast as SOCPs. We consider various formulations, some convex, some not, and study which are amenable to solution using a general-purpose interior-point solver. We compare with other NLP solvers and special codes for SOCP.

2) New Developments in Primal-Dual Interior-Point Algorithms for Convex Optimization, ***Levent Tuncel***, University of Waterloo, Dept. of Cominatorics & Opt., Fac. of Math, Waterloo, Ontario, N2L 3G1, Canada, ltuncel@math.uwaterloo.ca

I will talk about generalizations of symmetric, polynomial time, primal-dual

interior-point methods (and their analyses) for linear programming problems to the convex optimization problems in conic form.

3) Semidefinite Programming & Matrix Completion, ***Henry Wolkowicz***, University of Waterloo, Dept. of Combinatorics & Opt., Fac. of Math., Waterloo, Ontario, N2L 3G1, Canada, hwolkowicz@uwaterloo.ca, http://orion.math.uwaterloo.ca/~hwolkowi

The matrix completion problem consists in finding numbers for unspecified (free) elements of a matrix to satisfy some given properties. We will look at the positive semidefinite and the Euclidean distance matrix completion problem. We will show that our approaches allow for efficient solutions for large sparse problems.

MD26 Queueing & Inventory I

Contributed Session

Chair: Kemal Gursoy, Long Island University, 1 University Plaza, H-700, Brooklyn, NY 11201, kgursoy@liu.edu, http://phoenix.liunet.edu/~kgursoy/

1) Application of VARI-METRIC at the Royal Netherlands Navy, ***Geert-Jan van Houtum***, Eindhoven University of Technology, PO Box 513, Paviljoen F18, Eindhoven, 5600 MB, The Netherlands, g.j.v.houtum@tm.tue.nl, www.tue.nl/tm/vakgr/lbs/vanhoutum.htm, ***Jan Willem Rustenburg***, ***W. H. M. Zijm***

The current spare parts control method at the Royal Netherlands Navy focuses on fill rates of individual items, while it is the system availabilities that really count. We report on the potential benefits of applying an adapted VARI-METRIC method.

2) Adaptive Dynamic Programming Methods for Aging & Replenishment Problems with Applications to Inventory Mgmt. & Vehicle Dispatching, ***Katerina Papadaki***, Princeton University, Dept. of ORFE, Princeton, NJ 08544, papadaki@princeton.edu, ***Warren B. Powell***

Aging and replenishment problems arise in inventory management and vehicle dispatching problems. Standard dynamic programming methods work for simple problems but do not scale to more complex situations. We propose and study approximation methods in the context of simple problems where optimal solutions exist but have the potential of scaling to more realistic problems...

3) The Single-Site, Two-Indenture Models for Repairable Item Systems, ***Zeynep M. Avsar***, Bilkent University, IE Dept., Ankara, 06533, Turkey, avsar@bilkent.edu.tr, ***W. H. M. Zijm***

A 2-indenture maintenance system is considered with facilities for failure detection/disassembly, component repair and assembly. A base stock policy is employed for each assembly and each component. Assuming that only one component causes an assembly failure, an approximate near-product-form steady-state distribution is proposed.

4) Multi-Item Lot-Sizing under GI/G/1 Queueing Assumptions, ***Sangjin Choi***, University of Calgary, Dept. of MME, Calgary, Alberta, T2N 1N4, Canada, sjinchoi@hyowon.pusan.ac.kr, ***S. T. Enns***

Recent relationships have been developed for multi-item lot-sizing under M/M/1 and M/G/1 assumptions. These have proved valuable in understanding tradeoffs that effects system performance. However, there is still a need to develop heuristics for generalized interarrival times, which can be applied in practice. The problem and one heuristic are examined.

5) Models Dynamic Repair Allocation in Discrete Time, ***Kemal Gursoy***, Long Is University, 1 University Plaza, H-700, Brooklyn, NY 11201, kgursoy@liu.edu, http://phoenix.liunet.edu/~kgursoy/, ***Michael N. Katehakis***

We consider problems of optimal allocation of repair to failed components of a system of known structure. It is assumed that the components' lifetimes and repair times are geometrically distributed with parameters that may depend on the individual component. The components are assumed to be stochastically independent, that repaired components restart as good as new and that preemption of repair is allowed...

MD27 Stochastic Inventory Models

Contributed Session

Chair: Robin Roundy, Cornell University, Dept. of OR/IE, 216 Rhodes Hall, Ithaca, NY 14853, robin@orie.cornell.edu

1) Optimal Inventory Policies for Start-Up Firms, ***Thomas W. Archibald***, University of Edinburgh, Dept. of Bus. Studies, 50 George Square, Edinburgh Midlothian, EH8 9JY, Scotland, UK, t.archibald@ed.ac.uk, http://www.ed.ac.uk/~twa, ***Lyn C. Thomas***, ***John M. Betts***, ***Robert B. Johnson***

In this age of innovation, strategies that ensure the success of start-up firms are important. Often, the main objective of start-up firms is survival probability rather than profit. This theme is explored using Markov decision process models of inventory strategy. The problem is based on a real manufacturing start-up firm.

2) A Continuous Review Inventory Model for a Multi-Product Stochastic Demand Production System with Backorders & Budget Constraints, ***Rasoul Haji***, Sharif University of Technology, Dept. of IE, Azadi Ave., PO Box 11365, Tehran, Iran, haji@www.sharif.ac.ir, ***Babak Ghalebsaz Jeddi***

In the literature of production and inventory control, there has been presented a continuous review inventory model for a single product stochastic demand unconstrained system where backorders are allowed. We consider the same model and we extend it for the case of multi-product inventory system with budgetary constraints.

3) Base-Stock Policies for Lost-Sales Problems, ***Robin Roundy***, Cornell University, Dept. of OR/IE, 216 Rhodes Hall, Ithaca, NY 14853, robin@orie.cornell.edu, ***Ganesh Janakiraman***

We consider base-stock policies for a single installation facing stochastic demand. Demand that is not met is lost. Some results about the convexity of the objective function are derived and infinitesimal perturbation analysis is used to find optimal base-stock policies.

MD28 Threats to Life & Limb

Sponsor: Public Programs & Processes Section

Sponsored Session

Chair: Arnold I. Barnett, MIT, Sloan Sch. of Mgmt., Cambridge, MA 02139-4307, abarnett@mit.edu

1) Too Many Hospital Beds?, ***Linda V. Green***, Columbia University, Grad. School of Bus., New York, NY 10027, lvg1@columbia.edu

Excess hospital capacity has been cited as a major factor contributing to the high cost of health care. As a result, significant reductions in the number of hospital beds continue to be made. Are there too many beds? What's the impact of bed reductions on patient care? We focus on these questions and related issues.

2) Factors in the US Homicide Drop, ***Alfred Blumstein***, Carnegie Mellon University, Heinz School of PP&M, NCOVR, 5000 Forbes Ave., Pittsburgh, PA 15213-3890, ab0q@andrew.cmu.edu

US homicide rates dropped more than 40% between the 1991 peak and 1999. We identify key factors contributing to the drop, including removing handguns from kids, tightening gun supply, reduction of new entrants to crack markets and the robust economy. We also examine the role of the growth of incarceration.

3) Allocating HIV Prevention Resources, ***Edward Kaplan***, Yale University, Sch. of Organization & Mgmt., Sch. of Med., New Haven, CT 06520-8200, edward.kaplan@yale.edu

The Institute of Medicine's Committee on HIV Prevention Strategies was charged with proposing a new national strategy for HIV prevention. Focusing on the allocation of HIV prevention resources, the committee estimated the value of wiser resource targeting. In summarizing the committee's report, we highlights OR ideas and contributions.

4) Runway Collisions: Crying Wolf?, ***Arnold I. Barnett***, MIT, Sloan Sch. of Mgmt., Cambridge, MA 02139-4307, abarnett@mit.edu, ***Gary Paull***

Both the National Transportation Safety Board and the Federal Aviation Administration have declared the danger of runway collisions as the number-one threat to US aviation safety. Analyzing various data sets, we assess whether this concern is justified. (Hint: It is.)

MD29 Price Volatility & Probabilistic Methods in the Energy Market

Sponsor: ENRE

Sponsored Session

Chair: Shi-Jie Deng, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, deng@isye.gatech.edu

1) Current Challenges in Modeling Power Price Volatility, ***Vince Kaminski***, Enron Capital & Trade Resources, vince.j.kaminski@enron.com

Developments in US power markets have created several unique challenges for energy industry economists. We discuss the major factors underlying the exceptionally high volatility of electricity prices. We feel that some of them may reflect flaws in power-pools design and incomplete transition to fully

deregulated markets in generation and transmission.

2) Jump-Diffusion Models in Pricing Energy Options, ***John R. Birge***, Northwestern University, McCormick Sch. of Engineering, 2145 Sheridan Rd., Evanston, IL 60208-3100, jrbirge@nwu.edu, ***S. G. Kou***

We will present 2 types of models for pricing energy options with jump-diffusion processes. Each may relate to different types of markets depending on the characteristics of the jump process. One appears more consistent for gas pricing while the other is more suitable for electricity pricing.

3) California Electricity Prices: A Spectral Analysis of Changing Price Patterns as a Result of Price Caps, ***Fernando L. Alvarado, Rajesh Rajaraman***

We recently applied spectral frequency domain methods to help with the characterization of price volatility process to be able to separate out predictable components of electricity prices from volatility. The results were applied to PJM prices. The methodology is applied to a sliding window of California zonal prices to try to understand the effect of price caps on predictability and volatility of prices.

4) An Alternative Model for Electricity Spot Prices, ***Shi-Jie Deng***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, deng@isye.gatech.edu

Unique characteristics of the electricity spot price make its modeling an extremely challenging task. We present an approach for modeling marginal distributions of power prices utilizing quantile functions. Such an approach is very appealing for purpose of empirical parameter estimation since simulations based on the resulting distributions can be easily performed.

5) A Probabilistic Method for Estimating Future Growth of Oil & Gas Reserves in the US, ***Robert A. Crovelli***, US Geological Survey, Denver Federal Ctr., PO Box 25046, MS 939, Denver, CO 80225, crovelli@usgs.gov, ***James W. Schmoker***

The Probabilistic Reserve Growth Spreadsheet system was developed from analytic probabilistic methodology to calculate estimates of future growth of crude oil and natural gas reserves in the US, where reserve growth is strongly positive and is a major component of remaining US oil and natural-gas resources.

MD30 Data Mining Applications

Sponsor: Computing Society
Sponsored Session

Chair: W. Dwight Calkins, IBM, MD 28-04-4003, 1503 LFB Freeway, Dallas, TX 75234, dcalkin@us.ibm.com

1) Using the SAS Enterprise Miner to Investigate Retail Consumer Segmentations using Data Obtained from the Bureau of Labor Statistics, ***W. Dwight Calkins***, IBM, MD 28-04-4003, 1503 LFB Freeway, Dallas, TX 75234, dcalkin@us.ibm.com

The Consumer Expenditure Survey obtained from the USA Department of Labor Statistics can be datamined using the SAS Enterprise Miner in order to classify consumer retail behavior in the US. After a particular retail expenditure category is selected for a given study, i.e., personal computer purchases, the resulting segmentation then defines the consumers in terms of a variety of demographic variables...

2) Mass Customization of Direct Marketing Materials using Data Mining Technology, ***Bruce Moore***, IBM, 1503 LBJ Freeway, Dallas, TX 75234, mooreb@us.ibm.com

An integrated use of data mining, OR and recent advances in printing technology are described for use in mass customization of direct mail and web-based marketing materials.

3) The Integration of Discovery- & Non-Discovery-Based Data Mining with Spatial Analysis Techniques to Create Solutions, ***Frederick D. Busche***, IBM, 3116 Lake Highlands Dr., Highland Village, TX 75077, fbusche@us.ibm.com

One aspect of data can be an entity and the attributes that represent that entity. The second is the rows and rows of this entity data. The third aspect of these data is the spatial relationship or location of the entity. We discuss the integration of processes that allow for the evaluation of these data.

4) Remapping Customer Relationship Management to the E-Business Environment, ***Jim Kraemer***, IBM, 1503 LBJ Freeway, Dallas, TX 75234, jkraeme@us.ibm.com

Our value proposition is to maximize customer portfolio results by providing applications and services that drive the profitability of your e-business customer relationships through the adaptation of relevant messages and synchronization across any customer touchpoints. This is accomplished using advanced data warehousing methods, deep analytical pattern recognition and mathematical optimization techniques.

MD31 Applying Optimization Technologies: Lectures of GMU Students Honoring Carl M. Harris

Sponsor: Computing Society
Sponsored Session

Chair: Karla Hoffman, George Mason University, Systems Eng. & OR Dept., 4400 University Dr., MS 4A6, Fairfax, VA 22030, khoffman@gmu.edu, iris.gmu.edu/~khoffman

1) A Nonlinear Rescaling Principle for Large-Scale Constrained Optimization: A Primal-Dual Approach, ***Igor Griva***, George Mason University, Dept. of SEOR, 4400 University Dr., Fairfax, VA 22030, ***Roman A. Polyak***

The nonlinear rescaling principle consists of rescaling constraints into an equivalent constraint set and using the Lagrangian for the equivalent problem. Newton's method is performed on the primal-dual system of equations consisting of both the optimality criteria equations and the Lagrange multipliers update. Convergence properties, numerical stability and numerical results on large-scale problems will be presented.

2) Modeling to Optimize Restoration Tracking & Investments, ***Linda Coblentz***, Center for Army Analysis, Ft. Belvoir, VA

The Center for Army Analysis developed an integer programming model to provide alternative schedules for environmental restoration projects, based on different objective functions. Restoration projects are broken down into phases that must occur sequentially and with specified phase lengths. To date, 2 objective functions have been used.

3) Mobile Optimization for the Scheduling of Transit Operations, ***Martin T. Durbin***, Decisive Analytics Corp., 1235 Jefferson Davis Hwy, Ste. 400, Arlington, VA, ***Karla Hoffman***

MOST optimizes the deployment and scheduling of a fleet of delivery vehicles in real-time. The software enables driver assignments and delivery schedules to be revised continuously, taking into account new high-priority orders, traffic and weather conditions and other unforeseen events. An intuitive interface allows the user to easily modify the current schedule while showing impacts on overall order fulfillment.

MD32 Telecommunication Systems III

Contributed Session

Chair: John G. Klincewicz, AT&T Labs., 200 Laurel Ave., Rm. D5-3C06, Middletown, NJ 07748, klincewicz@att.com

1) Routing & Restoration in Optical Networks, ***Iraj Saniee***, Bell-Labs, Lucent Technologies, 600 Mountain Ave., Rm. 2C-300, Murray Hill, NJ 07974, iis@bell-labs.com, ***Gang Liu***, ***Eric Bouillet***

We describe multiple schemes for restoration of wave-length routes in optical networks. We define and quantify critical metrics associated with these schemes such as cost, reconfigurability, port and wavelength efficiency and restoration times. We conclude with a description of 4 restoration classes, calculate their metrics and outline their associated routing algorithms on a large network.

2) Robust Location Problems on Trees, ***Helidon Dollani***, Technical University Graz, Inst. of Mathematics B, Steyrergasse 30, Graz, A-8010, Austria, dollani@opt.math.tu-graz.ac.at, ***Rainer E. Burkard***

We consider different aspects of robust 1-median problems on trees with uncertain or dynamically changing edge lengths and vertex weights which can also have negative weights. The dynamic nature of a parameter is modeled by a linear function of time. The uncertainty is modeled by given intervals, in which each parameter can take a value randomly...

3) Delay Allocation in a Packet Network with Quality of Service, ***John G. Klincewicz***, AT&T Labs., 200 Laurel Ave., Rm. D5-3C06, Middletown, NJ 07748, klincewicz@att.com

Different classes of traffic within a corporate intranet must meet different delay constraints. For a given class, we describe a heuristic for allocating a maximum allowable delay to each link in a network, such that for all node pairs, the end-to-end delays meet a pre-specified constraint. Motivation for this heuristic, in terms of an exact solution for a simple version of the problem, is discussed.

4) The Value of Combinatorial Auctions in Telecom Trading, ***Lakshman P. Sinha***, Telcordia Technologies, Dept. of Applied Research, 445 South St., Rm. 1A328B, Morristown, NJ 07960, lsinha@research.telcordia.com, ***Siddhartha Dalal***, ***Robert E. Hausman***, ***Tracy Mullen***

Telecom bandwidth and minutes are rapidly becoming commodities and are now traded as such on many exchanges e.g., Arbinet, RateXchange, Band-X and more. To the best of our knowledge, telecom trading is currently done for one

item at a time. We present initial results on the value of using combinatorial auctions in telecom trading.

MD33 Flowshop Scheduling

Contributed Session

Chair: Jerzy Kamburowski, University of Toledo, Coll. of Bus. Admin., Toledo, OH 43606, jkambur@utnet.utoledo.edu

1) A New Heuristic for an m-Machine Flowshop with the Total Completion Time Criterion, ***Ali Allahverdi***, Kuwait University, Dept. of MIE, PO Box 5969, Coll. of Eng. & Petroleum, Safat, 13060, Kuwait, allahverdi@kuc01.kuinv.edu.kw, ***Tariq Aldowaisan***

We consider an m-machine flowshop with the objective of minimizing total completion times of all the jobs. We compare the 2 recent independently developed heuristics and propose a new heuristic. Computational analysis shows that the proposed heuristic is superior to the most recent ones.

2) A Genetic Algorithm-Tabu Search Hybrid Heuristic for Permutation Flow-Shop Scheduling, ***Joao V. Moccellin***, University of Sao Paulo, Av. Trabalhador Sao-Carlense, 400, Sao Carlos SP, 13566-590, Brazil, jvmoccel@sc.usp.br, producao.prod.eesc.sc.usp.br/producao/docmocce.htm

We introduce a hybrid genetic algorithm-tabu search heuristic for the minimal makespan flow shop sequencing problem. In order to evaluate the effectiveness of the hybridization, we compare the hybrid metaheuristic with both pure GA and tabu search heuristics. Results from computational experience are discussed. and tabu search heuristics. Results from computational experience are discussed.

3) Heuristics for Hybrid Flow Shop Scheduling, ***Marcelo S. Nagano***, University of Sao Paulo, Fac. of Economics & Admin., Av. dos Bandeirantes 3900, Ribeirao Preto, SP, 14040-901, Brazil, drnagano@usp.br, ***Joao V. Moccellin***

We deal with the k-stage hybrid flow shop scheduling problem where, at any stage, there are 2 identical machines. We introduce 2 heuristic procedures with the objective of minimizing makespan. Computational experience was carried out in order to evaluate the performance of the heuristics. The main results are presented.

4) Efficiently Solvable Special Cases of the Three-Machine Flowshop Problem, ***Jerzy Kamburowski***, University of Toledo, Coll. of Bus. Admin., Toledo, OH 43606, jkambur@utnet.utoledo.edu

The well-known NP-hard problem of finding the job sequence that minimizes the makespan in a 3-machine flow shop is reconsidered. We define 2 new dominance relations on the job processing times and present corresponding heuristics that yield the optimal sequence for all efficiently solvable special cases identified so far.

MD34 Multicriteria Decision Making II

Contributed Session

Chair: Noel Artiles-Leon, University of Puerto Rico, IE Dept., PO Box 9043, Mayaguez, PR 00681-9043, n_artiles@rumac.uprm.edu

1) Balancing Conflicting Objectives in the News Vendor Problem, ***Mahmut Parlar***, National University of Singapore, Dept. of Dec. Sci., Singapore, 119260, Singapore, parlar@mcmaster.ca, ***Z. Kevin Weng***

We consider the news vendor problem as a bi-criteria optimization problem with 2 objectives: maximize the expected profit and maximize the probability of exceeding the expected profit. We use compromise programming to find the solution on the efficient frontier that has the shortest distance from the ideal solution.

2) The Compromise Hypersphere for Multiobjective Linear Programming, ***Saul I. Gass***, University of Maryland, 8809 Maxwell Dr., Potomac, MD 20854-3123, sgass@rhsmith.umd.edu, ***Pallabi Guha Roy***

We propose a method for ranking efficient solutions to a multiobjective LP problem. The solutions, as points in objective space, are enclosed within an annulus of minimum width, where the width is determined by a hypersphere that minimizes the maximum deviation of the points from the surface of the hypersphere.

3) Multi-Objective Optimization of the Low Temperature NOx Control Process, ***Yan Fu***, Ford Motor Co., Ford Research Lab., MD 2115, Rm. 2629, SRL, Dearborn, MI 48121, yfu4@ford.com, ***Urmila Diwekar***

Designing the best available control technology for NOx removal is a multiobjective optimization problem. A new and efficient multi-objective optimization algorithm based on a novel sampling technique was developed and successfully applied to obtain minimum cost and minimum pollution emissions designs for this large-scale real-world problem.

4) Bootstrapping-Based Confidence Regions for Multiple-Response Problems, ***Noel Artiles-Leon***, University of Puerto Rico, IE Dept., PO Box 9043, Mayaguez, PR 00681-9043, n_artiles@rumac.uprm.edu, ***Narcisa Meza***

We present a rational and practical approach to the problem of simultaneously optimizing several response variables and constructing a confidence region for the optimal settings. The methodology uses a desirability function to find the optimal settings and bootstrapping to construct their confidence regions.

MD35 Information Systems V

Contributed Session

Chair: Kenny Kwong, PricewaterhouseCoopers LLP, 13201 South Wakial Loop 2082, Phoenix, AZ 85044, kenny.kwong@us.pwcglobal.com, http://www.pwcglobal.com

1) "Different Slopes for Different Folks": Identifying the Source of Performance Variation following Implementation of Enterprise-Level IT, ***Mark Cotteleer***, Harvard Business School, Morgan Hall T-45, Soldiers Field Rd., Boston, MA 02163, mcotteleer@hbs.edu, www.people.hbs.edu/mcotteleer/, ***David Upton***

We ask from what level within the firm does variation in the rate of performance improvement arise following IT implementation. Understanding the source of this variation is crucial if research is to further reveal ways to accelerate it. Findings from a study of ERP implementation in 24 sites suggest a process-level approach to understanding enterprise-level information technology implementations.

2) Information Sharing in Business-to-Business Supply Chains, ***Larry J. LeBlanc***, Vanderbilt University, Owen Grad. Sch. of Mgmt., Nashville, TN 37203-9865, larry.leblanc@owen.vanderbilt.edu, ***James A. Hill, David M. Dilts***

We model the effects of sharing information in 3-level supply chains. Using simulation, we quantify the benefits of sharing information in terms of faster order fulfillment. When customers change their orders, information sharing can be harmful. Specifically, increased inventories result when vendors produce in anticipation of orders that are later cancelled.

3) Language & Electronic Commerce, ***Jeffrey M. Keisler***, University of Massachusetts, 100 Morrissey Blvd., M/5-230, Boston, MA 02125, jeff.keisler@umb.com

Transactions in e-commerce must meet each side's goals. Offers and requirements both consist of enactable first order logical statements. Using Craig interpolants, we examine how the set of achievable deals depends on customer and vendor languages and explore theoretical and real world implications of formal language as a strategic asset.

4) Leveraging E-Procurement in Supply Chain Management/ Master Planning, ***Kenny Kwong***, PricewaterhouseCoopers LLP, 13201 South Wakial Loop 2082, Phoenix, AZ 85044, kenny.kwong@us.pwcglobal.com, http://www.pwcglobal.com, ***Udesh Jha***

We discuss how emerging technologies in e-procurement augment supply chain and master planning tools and expedite the planning cycle. We discuss prevalent architecture and best practices for integrating master planning tools with third party e-procurement tools. One of the most observable benefits of this integration is the real-time availability of data using the simplest communication platform - the Web...

MD36 Operations Management III

Contributed Session

Chair: Ishpal S. Rekhi, California State University, Coll. of Business Admin., San Marcos, CA 92096-0001, irekhi@csusm.edu

1) An Order-up-to-Level Updating Mechanism for Inventory Systems with Unobserved Lost Sales, ***Baris Tan***, Koc University, 1 Cayir Cad 5 Istinye, Istanbul, 80860, Turkey, btan@ku.edu.tr, http://home.ku.edu.tr/~btan, ***Selcuk Karabati***

We consider an inventory management problem in the retail industry with unobserved lost sales. The retailer has access to point-of-sale (POS) data and uses a fixed review period, order-up-to level system to control the inventory of a particular product to achieve a pre-specified service level. However, due to the unobserved lost sales nature of the problem, the retailer cannot exactly measure the current service level...

2) The Effect of Integration of Manufacturing Practices on Performance, ***Kristy O. Cua***, University of Minnesota, 321 19th

Ave. South, Ste. 3-150, Minneapolis, MN 55455, kcua@csom.umn.edu, ***Roger Schroeder***, ***Kathleen E. McKone***

We investigate the effect of implementation of manufacturing practices and find that co-alignment of practices is positively related to performance. There are different configurations of co-alignment of practices depending on the performance measure being emphasized but good performance in several dimensions can be achieved simultaneously.

3) Knowledge Acquisition & Transfer in Service Settings: Customer Outrage in Airlines, ***Michael A. Lapre***, Boston University, Sch. of Mgmt., 595 Commonwealth Ave., Boston, MA 02215, mlapre@bu.edu, http://people.bu.edu/mlapre/, ***Nikos Tsikriktsis***

We analyze customer complaint learning-curves in the US domestic airline industry using data for all major airlines available since the Department of Transportation introduced service quality indicators. Geographic specialist airlines reduced complaints via learning-by-doing, whereas generalist airlines did not. Experience from other airlines employing similar strategies also reduced complaints.

4) Dynamic Stock Allocation & its Implication on Delayed Product Differentiation, ***Francis de Vericourt***, Bouygues Telecom, RED Europa L 30 av de l'Europe, Velizy, 78944, France, fdeveric@bouyguestelecom.fr, ***Fikri Karaesmen***, ***Yves P. Dallery***

We study dynamic stock allocation problems with different types of demand for a single item. We present results on the structure of optimal dynamic allocation policies and propose a framework which enables a characterization of the benefits of delayed product differentiation in terms of inventory related costs.

5) Allocation of Buffer in Unbalanced Parallel Assembly Systems, ***Ishpal S. Rekhi***, California State University, Coll. of Business Admin., San Marcos, CA 92096-0001, irekhi@csusm.edu

We consider a parallel assembly system where 2 or more units are processed at different workstations and the final product is assembled at an assembly station. We consider processing distributions that are not identical. We study the optimal location and allocation of buffer in this system and the factors that dictate the optimal placement of buffers.

MD37 Linear Programming & Applications

Contributed Session

Chair: Harold J. Schleef, Lewis & Clark College, 0615 SW Palatine Hill Rd., Portland, OR 97219, schleef@lclark.edu

1) Stripping Coupons with Linear Programming, ***Harry Zheng***, University of Southampton, Sch. of Mathematics, Southampton, Hants, SO17 1BJ, UK, h.zheng@ed.ac.uk, ***Lyn C. Thomas***, ***David E. Allen***

The yield curve of interest rates is obtained from bond prices. Most bonds have coupons which means there is a stream of payments which need to be translated into the value of a unit payment at each time point. Traditionally, this has been done by statistical methods including bootstrapping and fitting spline curve structures but these can lead to mispricing of risky bonds...

2) Large-Sample Analysis of Linear Programming under Random Data Perturbations, ***Manuel A. Nunez***, Chapman University, Sch. of Bus., 1 University Dr., Orange, CA 92866, mnunez@chapman.edu, www.chapman.edu/sbe/faculty/mnunez

We present results concerning laws of large numbers, central limit theorems and general convergence of optimal vector solutions and optimal objective values of LPs in the context of random data perturbations.

3) Proximity Functions for Linear & Semidefinite Optimization, ***Kees Roos***, TU Delft/University of Leiden, Mekelweg 4, Delft, 2628 CD, The Netherlands, c.roos@its.tudelft.nl, http://ssor.twi.tudelft.nl/~roos

Interior-point methods can use small or large updates of the barrier parameter. Contrary to theoretical results, large updates are more efficient than small updates, in practice. We discuss the classic approach and show why and how better complexity results can be obtained by using a so-called Upsilon-concordant proximity function.

4) A Priori Error Bounds for the Aggregated Generalized Transportation Problem, ***Igor S. Litvinchev***, Computing Center Russian Academy of Sciences, Arce 5169, Col. Valle Verde, Monterrey Nuevo Leon, 64360, Mexico, ***Socorro Rangel***, ***Oscar Chacon***

In contrast to the CTP, a priori error bounds have not been developed yet for the generalized one. We propose the a priori bounds for the customers aggregation in the GTP. Numerical experiments show a strong and statistically significant correlation between the actual aggregation error and the new a priori bound. This gives the analyst a key to compare various types of aggregation before an aggregated problem was solved.

5) Structuring IRA Settlements with Roth IRAs, ***Harold J. Schleef***, Lewis & Clark College, 0615 SW Palatine Hill Rd., Portland, OR 97219, schleef@lclark.edu

Settlements related to incorrect distributions of traditional IRAs may have substantial tax consequences. The tax characteristics of the Roth IRA make it a useful instrument for reducing the payment required of the IRA issuer. Several examples using LP are presented.

MD38 Semiconductor Industry

Contributed Session

Chair: Michael Pangburn, Pennsylvania State University, 315 Beam Bldg., MSIS Dept., Smeal Coll. of Bus., University Park, PA 16802-1913, mikepangburn@psu.edu, msp5@psu.edu

1) Anoxide Materials for Electronic Techniques, ***Andrey G. Petrov***, 3 Basseynaya St., Ste. 11, Kiev, 01004, Ukraine, lgi@lgi.ru.kiev.ua

We cover the aspects of chemistry, technology and physics of the complex chalcohenyd and chalcohalohenyd compounds. Theoretical basis of the searching and forecasting new compounds with prior set properties is discussed. Synthesis & growing monocrystals, their basic physical and chemical characteristics and structure. A theory of the new ferroelectrics-semiconductors, gyrotropous materials with pseudoisotropic point and other composites is presented.

2) Experiments with the Optimal Capacity Expansion Technique FIFEX, ***Metin Cakanyildirim***, Cornell University, Sch. of OR, 294 Rhodes Hall, Ithaca, NY 14853, metin@orie.cornell.edu, www.orie.cornell.edu/~metin, ***Robin Roundy***

We apply a technique to determine optimal machine, floor and shell expansion times in semiconductor fabs in the presence of uncertain product demands. We use real life demand, capacity data and explicitly account for the resolution of demand uncertainty. We run 4 sets of experiments to determine the effects of rounding expansion times, cost savings over some heuristics...

3) Capacity Planning & Intertemporal Pricing for Semiconductor Production, ***Michael Pangburn***, Pennsylvania State University, 315 Beam Bldg., MSIS Dept., Smeal Coll. of Bus., University Park, PA 16802-1913, mikepangburn@psu.edu, msp5@psu.edu, ***Shankar Sundaresan***

Semiconductor producers make significant and long-term capital expenditures in manufacturing technology. When setting manufacturing capacity, firms must assess how prices will change over time, as well as the impact of subsequent product introductions. By developing economic models that significantly extend previous manufacturing studies, we provide insights into this capacity-setting problem.

MD39 New Product Development II

Contributed Session

Chair: Pirooz Vakili, Boston University, Dept. of Mfg. Eng., 15 Saint Mary's St., Boston, MA 02215, vakili@bu.edu

1) A Decision Model for Managing New Product Development Risks, ***Sharon A. Johnson***, Worcester Polytech Institute, Dept. of Mgmt., 100 Institute Rd., Worcester, MA 01609, sharon@wpi.edu, ***Gary M. Searle***

A decision model for managing project risk in new product development projects was developed based on project and organizational objectives. Responses about risks are elicted from a management team and combined with progress data to create risk scorecards. Two case studies were used to develop, refine and test the model.

2) Evaluation of the Dynamic Screen Builder, ***Michael F. Johnson***, USAA Safety & Environmental Affairs, 9800 Fredricksburg Rd., San Antonio, TX 78228-0062, michael.johnson@usaa.com, ***Mary Garcia***, ***Hank Austin***, ***Rafael Moras***

The implications of software design relative to ergonomics are rarely investigated. We discuss the ramifications resulting from the introduction of a data entry package at a major insurance company. The use of surveys, statistics and ergonomic principles to evaluate the effects of this system on claims representatives is reported.

3) Dynamic Management of New Product Development Projects & Portfolios: A Modeling Framework, ***Pirooz Vakili***, Boston University, Dept. of Mfg. Eng., 15 Saint Mary's St., Boston, MA

02215, vakili@bu.edu, ***Yanfeng Wang***, ***Anil Khurana***

We describe a modeling framework for the management of new product development projects and portfolios. Tradeoffs when setting interim project performance targets and uncertainty in achieving them are explicitly modeled and budget allocation decisions in this context are considered. Some structural properties of optimal policies are derived and their implications in specific examples are illustrated.

MD40 Structural Models of Retail Competition

Cluster: **Structural Models of Retail Competition**
Invited Session
Chair: Sachin Gupta, Cornell University, Johnson Grad. Sch. of Mgmt., Sage Hall, Ithaca, NY 14853, s-gupta7@nwu.edu, sg248@cornell.edu

Co-Chair: Jean-Pierre Dube, University of Chicago, Grad. School of Bus., 1101 East 58th St., Chicago, IL 60637, jdube@gsbux1.uchicago.edu

1) Price Competition in Industries with Geographic Differentiation: The Case of Fast Food, ***Raphael Thomadsen***, Columbia University, Grad. School of Bus., 3022 Broadway, 613 Uris Hall, New York, NY 10027, raphael@stanford.edu

We have collected a data set of prices and locations of fast food restaurants in Santa Clara County, California. We fit this data to a model of supply and demand for fast food by estimating an indirect utility function for consumers and marginal costs for firms using a generalized method of moments estimator...

2) Endogeneity & Heterogeneity in Discrete Choice Models with Panel, ***Dmitri G. Kuksov***, University of California, Haas Sch. of Bus., Berkeley, CA 94720-1900, kuksov@haas.berkeley.edu, ***J. Miguel Villas-Boas***

We consider the existence of general correlations of error terms and propose a robust way to test whether the endogeneity problem is significant in a given data set under weak assumptions on the error structure that allow for heterogeneity and common shocks. The test is a test of the differences in GMM coefficient estimates of a model with and without instrumenting for right hand side variables...

3) Price Discrimination in Gasoline Markets: A Theoretical & Empirical Analysis, ***Ganesh Iyer***, Washington University, Olin Sch. of Bus., CB 1133, One Brookings Dr., St. Louis, MO 63130, iyer@olin.wustl.edu, ***P. B. Seetharaman***

We investigate price-discrimination in retail gasoline markets. We provide a theoretical analysis of price discrimination in this market in which a gas station's decision to price discriminate and the extent of price discrimination are endogenously determined by demographic variables characterizing its local market, the brand name and other station characteristics. We also do empirical testing.

4) Heterogeneity & Target Marketing using Aggregate Retail Data: A Structural Approach, ***Jean-Pierre Dube***, University of Chicago, Grad. School of Bus., 1101 East 58th St., Chicago, IL 60637, jdube@gsbux1.uchicago.edu, ***David Besanko***, ***Sachin Gupta***

We develop a heterogeneous logit model of consumer demand jointly with a structural model of pricing. We include a vertical channel consisting of competing manufacturers and a monopolistic retailer. We represent heterogeneity using the popular finite mixture approach, wherein consumers belong to a small number of latent classes that differ in their preferences and responsiveness to the marketing mix.

5) Category Pricing, ***Eric T. Anderson***, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637, eric.anderson@gsb.uchicago.edu

Category management is a critical function of retailers. Advances in the adoption of optical scanners and better use of information and technology give retailers detailed data that can be used towards this purpose. The recent proliferation of new product introductions by manufacturers has increased the importance of retail category management. One key aspect of retail category management is pricing the brands within a product category...

MD41 OR Applications

Sponsor: **CPMS**
Sponsored Session
Chair: Kaan Katircioglu, IBM Integrated Supply Chain, TJ Watson Research Ctr., Rte. 134, Yorktown Heights, NY 10598, kaan@us.ibm.com

1) Drivers of Performance in the Semiconductor Industry, ***Kaan Katircioglu***, IBM Integrated Supply Chain, TJ Watson Research Ctr., Rte. 134, Yorktown Heights, NY 10598, kaan@us.ibm.com, ***William Grey***, ***Robert J. Baseman***, ***Arnold B. Maltz***, ***William Grenoble***, ***Dale Rogers***

We investigate the factors that impact performance in semiconductor supply chains through regression analysis. This study is based on a set of detailed data collected in major semiconductor companies in the US. Our analysis reveals interesting results about the drivers of performance and their impact.

2) A Successful Implementation of a Stochastic Inventory Model in the Semiconductor Industry, ***Luis Diaz***, Xilinx Corporation, luisdiaz@xilinx.com

We have successfully implemented a business process for managing inventory at Xilinx. It was developed around IBM's stochastic inventory system: the Asset Management Tool, recipient of the 1999 Edelman Award for Achievement in OR. This work required development of cost and flow management models uniquely adapted to the semiconductor industry.

3) Lessons for OR/MS Practice from the History of Edelman Finalist Corporations, ***Peter C. Bell***, University of Western Ontario, Ivey Sch. of Bus., 1151 Richmond St., London, Ontario, N6A 3K7, Canada, pbell@ivey.uwo.ca

MS/OR groups that are finalists in the Edelman competition grab the spotlight for a moment, but what happens after that? We have contacted all the private sector Edelman finalists from 1989-1996 to find out what happened to OR/MS, and specifically the Edelman applications, in the 5 years following the competition. The results reveal important lessons for the successful practice of MS/OR.

MD42 Statistical Quality Control with Complex-Structured Data & Processes

Cluster: **Reliability & Quality Control**
Sponsor: **Quality, Statistics & Reliability Section**
Sponsor/Invite Session
Chair: Fugee Tsung, HKUST, Dept. of IE/EM, Clear Water Bay, Kowloon, Hong Kong, season@ust.hk

1) Multistage Process Monitoring & Diagnosis, ***Fugee Tsung***, HKUST, Dept. of IE/EM, Clear Water Bay, Kowloon, Hong Kong, season@ust.hk

As manufacturing quality has become a decisive factor in global market competition, quality control techniques such as statistical process control and automatic process control are becoming popular in industries. With advances in information, sensing and data capture technology, large volumes of data are being routinely collected and shared over multiple-stage processes...

2) Analysis of Diagnosability of Multistage Manufacturing Processes using a State Space Approach, ***Yu Ding***, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109, ***Darek Ceglarek***, ***Jan Shi***

Based on the state space model of MMPs, the diagnosability of MMPs is studied following a similar concept of observability in control theory, by defining diagnosability matrix and index and deriving their expressions in terms of process/product design. Case studies are presented to validate the proposed methodology.

3) Robust Minimum Variance Control with Model Uncertainty, ***Jeongbae Kim***, Texas A&M University, Dept. of IE, College Station, TX 77843-3131, ***Daniel W. Apley***

Given the nature of industrial processes and the manner in which their models are estimated, model uncertainty is unavoidable. It is well known that the performance of minimum variance control strategies deteriorates in the presence of model uncertainty, to the point that variance may actually be increased. Existing robust control strategies incorporate deterministic measures of model uncertainty...

4) An Optimal Filter Design Approach to Statistical Process Control for Autocorrelated Processes, ***Chang-Ho Chin***, Texas A&M University, Dept. of IE, College Station, TX 77843-3131, ***Daniel W. Apley***

EWMA and Shewhart charts, on either the original data or time-series residuals, are 2 of the most widely used methods for SPC of auto-correlated processes. The charted statistic can be viewed as the output of a linear filtering operation on the original data. We generalize this concept, with the goal of designing an "optimal" general linear filter, the output of which is the SPC statistic to be charted...

MD43 Best Dissertation Award Winners 2000

Sponsor: Technology Management Section
Sponsored Session
Chair: Jeffrey K. Liker, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117

1) An Investigation into Best Practice Usage of Quality Function Deployment with Proposed Extensions: A US/Japan Comparative Study, *John Cristiano*, University of Michigan

No abstract supplied.

2) Economic Issues Concerning the Mobility of Scientific Inventions & Implications for Firm Strategy, *Ajay Agrawal*, University of British Columbia

No abstract supplied.

3) Creative Destruction or Creative Cooperation? Empirical Investigation of Technological Discontinuities & Effect on the Nature of Competitio, *Frank Rothaermel*, University of Washington

No abstract supplied.

MD45 Software Demonstration V

Software Demo Session
Chair: David Krahl, Imagine That, Inc., 6830 Via Del Oro, Ste. 230, San Jose, CA 95119, davek@imaginethatinc.com

Co-Chair: Irvin J. Lustig, Ilog, 25 Sylvan Way, Short Hills, NJ 07078, ilustig@ilog.com

1) Simulation Modeling with Extend, *David Krahl*, Imagine That, Inc., 6830 Via Del Oro, Ste. 230, San Jose, CA 95119, davek@imaginethatinc.com

See why Extend is the acknowledged standard for discrete event and continuous simulation in top universities and corporations worldwide. View a demonstration of powerful Extend features: top-down/bottom-up hierarchy, built-in activity-based costing, customizable animation, 1-click output analysis, automatic confidence intervals, sensitivity analysis and integrated development and authoring environments...

2) Introducing the ILOG Concert Technology, *Irvin J. Lustig*, ILOG, 25 Sylvan Way, Short Hills, NJ 07078, ilustig@ilog.com

ILOG has recently released new versions of all its optimization components, based on ILOG Concert Technology. This new foundation for the ILOG Optimization Suite provides C++ modeling objects for constraint programming and mathematical programming applications. Come see how ILOG Concert Technology reduces your development time for applications based on ILOG CPLEX and ILOG Solver.

MD46 Data Envelopment Analysis I

Cluster: DEA
Invited Session
Chair: Yao Chen, Merrimack College, Dept. of Mgmt., Sch. of Bus. & Intl. Commerce, MA 01845, ychen@merrimack.edu

1) Treating Undesirable Measures in Efficiency Evaluation, *Joe Zhu*, Worcester Polytechnic Institute, Dept. of Mgmt., 100 Institute Rd., Worcester, MA 01609, jzhu@wpi.edu, ***Lawrence M. Seiford***

Undesirable input and output measures are very likely to present. We show that if these undesirable measures are treated as normal measures, the efficiency classification is not valid. Methods on treating undesirable measure are reviewed and a new approach is developed to preserve the convexity in production functions.

2) An Evaluation of Service Productivity for an Airline Company in Korea using Hierarchical Data Envelopment Analysis, *Young Bum Lee*, Ohio State University, Sch. of Public Policy & Mgmt., 314 Fisher Hall, 2100 Neil Av, Columbus, OH 43210, lee.1491@osu.edu, ***Hosun Rhim***

Service industries such as hospitals and airline companies often have hierarchical organizational structures embedded in them. We discuss the issue of hierarchies of DMUs in DEA and suggest a method that incorporates one level of the hierarchies into the performance evaluation of other levels. We illustrate theHDEA model using data on an airline company in Korea.

3) Combining Evolutionary Algorithms & DEA, *James Lill*, Portland State University, Eng. & Tech. Mgmt. Dept., Portland, OR 97207-0751, ***Timothy R. Anderson***

A description of several ways in which information from DEA can be incorporated into evolutionary or genetic algorithms is described and demonstrated using a multi-object knapsack problem. Each individual is allowed to define its own "efficiency" with respect to the other individuals without the imposition of specific "niche" parameters.

4) Productivity & Strategy Shift in Computer & Automobile Industries, *Yao Chen*, Merrimack College, Dept. of Mgmt., Sch. of Bus. & Intl. Commerce, MA 01845, ychen@merrimack.edu, ***Agha Iqbal Ali***

It is important to reveal strategy shifts at the company level at a particular time and to identify whether the strategic shift is favorable. We demonstrate how the Malmquist productivity index can be decomposed into different components to measure technology and strategy shifts. An empirical study on Global Fortune 500's computer and automobile industries from 1991-1997 is presented.

Monday 16:45-17:45

ME44 Plenary: Improving Performance & Flexibility at Jeppesen: The World's Leading Aviation Information Company

Plenary Session
Chair: Russell P. Labe, Merrill Lynch, MS Group, Section 31, PO Box 9065, Princeton, NJ 08543-9065, russ_labe@ml.com, rlabe@na2.us.ml.com

1) Edelman Reprise Plenary: Improving Performance & Flexibility at Jeppesen - The World's Leading Aviation Information Company, *Elena Katok*, Pennsylvania State University, Dept. of MSIS, 306 Beam BAB, University Park, PA 16802, ekatok@psu.edu, www.personal.psu.edu/faculty/e/x/exk106/, ***William Tarantino***, ***Ralph Tiedeman***

We introduce a suite of optimization-based decision support tools for production planning and a novel and general method for evaluating and justifying investments in production technology. Our work improved production planning, reduced product lateness and led to improvements in the production processes at Jeppesen Sanderson, Inc., the world's leader in the aviation information industry.

Tuesday 08:15-09:45

TA01 Decision Analysis at Schlumberger

Sponsor: Decision Analysis Society
Sponsored Session
Chair: Gary A. Lundeen, Schlumberger, 8311 North FM 620, Austin, TX 78726, lundeen@austin.apc.slb.com

1) Supply Chain Management at a Tester Manufacturing Facility, *Nagesh Gavirneni*, Maxager Technology, Austin, TX, sgavirneni@maxager.com

We developed a LP-based tool for managing the 4-stage supply chain at a tester manufacturing facility. In the presence of long lead times, capacity restrictions and yield losses, this tool was useful for fast computation of ship dates. In addition, it enabled determining effective reactive (to meet quoted shipping dates) measures to uncertainties in the supply chain.

2) A Study in Risk Attitudes in Schlumberger Geco-Prakla Marine, *James S. Dyer*, University of Texas, Dept. of MSIS, Grad. Sch. of Bus., Austin, TX 78712-1175, j.dyer@mail.utexas.edu, ***Gary A. Lundeen***, ***Michael R. Walls***

Geco-Prakla Marine, like all companies, is regularly confronted with the issue of allocating scarce capital and resources among a set of available investment opportunities - opportunities generally characterized by some degree of financial risk and uncertainty. This study was conducted to determine decision maker risk attitudes in order to assist Geco-Prakla Marine management to develop their corporate risk policy.

3) Life Service Valuation as a Real Options Derivative of Marginal Oil-Field Value, *Chris Kenyon*, Schlumberger, 8311 North FM 620, Austin, TX 78726, kenyon@austin.apc.slb.com

Secondary recovery in maturing oil-fields can be aided by lift services. Many current onshore US fields are either at this stage of their life or will be in coming years. These fields have been an area for electrical submersible pump (ESP) lift services. While an increasing oil-price may make these fields more attractive for ESP services, possible future price downturns carry considerable revenue risk for the service provider...

4) Simulation of Back Deck Operations on a Marine Seismic Vessel, *Douglas J. Morrice*, University of Texas, Dept. of MSIS,

Grad. Sch. of Bus., Austin, TX 78712-1175, morrice@mail.utexas.edu, douglas.morrice@bus.utexas.edu

Marine seismic vessels deploy exploration equipment from their back deck in configurations called streamers. Streamer deployment in a new area, called mobilization, is a complex process and typically takes 4-5 days. This time is considered part of the operational overhead, and is not billed to the clients. Since revenues are measured in tens of thousands of dollars per day, reducing deployment times directly affects profit...

TA02 Tutorial: Multi-Agent Systems

Invited Session

Chair: Abhijit Deshmukh, University of Massachusetts, Dept. of MIE, ELAB 220, Amherst, MA 01003, deshmukh@ecs.umass.edu, http://farm.ecs.umass.edu/~deshmukh

1) Tutorial: Multi-Agent Systems, ***Abhijit Deshmukh***, University of Massachusetts, Dept. of MIE, ELAB 220, Amherst, MA 01003, deshmukh@ecs.umass.edu, http://farm.ecs.umass.edu/~deshmukh

Multi-agent systems, where loosely coupled decision makers or problem solvers coordinate their activities to tackle a larger problem beyond their individual capabilities, has emerged as a powerful paradigm for representing and solving complex problems. The growth of this field has not only been spurred by the advances in distributed computing and wide spread information connectivity but also by the changing business environment...

TA03 Supply Chain Management

Sponsor: MSOM

Sponsored Session

Chair: Rachel Q. Zhang, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, rzhang@umich.edu

Co-Chair: Katia C. Frank, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, kfrank@umich.edu

1) Inventory Policies for Multi-Product Systems with Different Life Cycles, ***Katia C. Frank***, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, kfrank@umich.edu, ***Rachel Q. Zhang***

We consider a periodic review inventory system of an item with 2 components. While the lifetime of component 1 is long and assumed infinite, component 2 is discarded after one period. Since demand is correlated among parts, ordering decisions should be made simultaneously. We show that the optimal solution can be described as an (s, S1, S2) policy.

2) Modeling & Analyzing Vendor Managed Inventory Agreements, ***Michael Fry***, University of Michigan, IOE Dept., 2811 IOE Bldg., 1205 Beal Ave., Ann Arbor, MI 48109, mjfry@umich.edu, ***Tava Lennon Olsen***, ***Roman Kapuscinski***

We present a model of vendor managed inventory agreements, which are currently popular in industry as a way of introducing cooperation in the supply chain. We examine the effectiveness of VMI agreements in different settings and compare them to other, more traditional forms of supply chain arrangements.

3) A Dynamic Lot-Sizing Problem with Production Capacity & Demand Time Windows, ***Wikrom Jaruphongsa***, Texas A&M University, Dept. of IE, College Station, TX 77843-3131, wikrom@tamu.edu, ***Sila Cetinkaya***, ***Chung-Yee Lee***

We consider a dynamic lot-sizing problem where the production levels are subject to capacity constraints and the customer offers a grace period, a demand time window, during which a particular demand can be satisfied with no early- or late-shipping penalty. We study the optimality properties and provide a polynomial time algorithm for the solution.

4) No Title Supplied, ***Viswanath Cvsa***, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106, vxc10@po.cwru.edu

We consider a 2-tier supply chain and analyze the entry decision of a downstream retailer whose costs are influenced by a traded security. We study the investment decision of the potential retailer under 3 pricing policies of the manufacturer including a policy that caps the price of the manufacturer.

TA04 Value of Information in Dynamic Environments

Sponsor: MSOM

Sponsored Session

Chair: Joseph Milner, Washington University, 1 Brookings Dr., CB 1133, St. Louis, MO 63130, milner@olin.wustl.edu

1) A Framework on Value of Information for Inventory Replenishment, ***Michael E. Ketzenberg***, University of North Carolina, 1019 Laurel Hill Rd., Chapel Hill, NC 27514, mketz@aol.com

Recently, attention has focused on using information for inventory replenishment. Already, there are conflicts in the literature and most contributions rely principally on numerical results, without addressing the underlying theory. We present a theoretical framework that helps resolve the conflicts, classifies the literature and sets the stage for future research.

2) Leveraging Expedite Capacity with Quantity-Flexible Agreements to Manage ECO & Inventory Risk, ***Colin Kessinger***, University of Michigan Business School, 701 Tappan St., Rm. 4209C, Ann Arbor, MI 48109, ckess@umich.edu

Many companies and researchers have explored quantity-flexible procurement agreements to improve inventory management. Much fewer have exploited changes in operating policies that could further improve performance. We explore the consequences of agreements for suppliers with finite expedite capacity operating in a supply chain at risk from engineering change orders.

3) Accurate Demand Information & Production & Supplier Flexibilty, ***Joseph Milner***, Washington University, 1 Brookings Dr., CB 1133, St. Louis, MO 63130, milner@olin.wustl.edu, ***Panos Kouvelis***

We compare Bayesian and Martingale demand processes as sources of alternate accurate demand information. We do so by varying production and supplier flexibility as represented by order adjustment and leadtime constraints on inventory ordering policies. We demonstrate that the nature of the demand evolution leads to alternate managerial priorities.

TA05 Stability of Queueing Networks

Sponsor: Applied Probability Society

Sponsored Session

Chair: John J. Hasenbein, University of Texas, Grad. Program in OR/IE, Dept. of Mech. Eng., Austin, TX 78712-1063, jhas@mail.utexas.edu

1) Stability & Optimization of Packet Routing in Communication Networks, ***David Gamarnik***, IBM, Math. Sci. Dept., TJ Watson Research Ctr., Yorktown Heights, NY 10598, gamarnik@watson.ibm.com

In the packet routing problem, digital communication packets have a specified origin and destination in the communication graph and the scheduler has to choose paths along which to process the packets. We construct an asymptotically optimal offline schedule for the static version of this problem and a stable schedule for the dynamic (online) version of the problem...

2) Establishing Stability for Multi-Class Queueing Networks with Setups, ***Otis B. Jennings***, Stanford University, Grad. Sch. of Bus., 518 Memorial Way, Stanford, CA 94305-5015, otisj@isye.gatech.edu

In multi-class networks with setups, one cannot ignore questions of stability. We present a general framework for proving stability, provide a heuristic service meta-policy for guaranteeing stability and prove stability of the heuristic when used in conjunction with last-buffer-first-served (LBFS), FBFS, or a specific round robin policy...

3) Stability of Reentrant Lines with Batch Servers, ***Sunil P. Kumar***, Stanford University, Grad. School of Business, 518 Memorial Way, Stanford, CA 94305-5015, kumar_sunil@gsb.stanford.edu, ***Hao Zhang***

We explore stability in open reentrant lines with batch servers. We present simple combinations of fluctuation smoothing policies and minimum batch size rules that guarantee stability of reentrant lines with batch servers. We prove stability by adapting a fluid model method, first proposed by Dai.

4) Scheduling & Stability of Queues with Wait-Dependent Service Times, ***John J. Hasenbein***, University of Texas, Grad. Program in OR/IE, Dept. of Mech. Eng., Austin, TX 78712-1063, jhas@mail.utexas.edu, ***Valerie Tardif***, ***Elizabeth Campbell***

We consider single-station queueing systems in which the service time of a job may depend on its time spent in queue. We first present some new results on the optimal scheduling policy for such queues. Next, we consider the stability region for these systems under optimal policies. We examine 2 notions of

stability, q-stability (queue-length stability) and w-stability (workload stability)...
stability, q-stability (queue-length stability) and w-stability (workload stability)...

TA06 Dynamic Traffic Assignment

Sponsor: Transportation Science Section
Sponsored Session
Chair: Srinivas Peeta, Purdue University, Sch. of Civil Eng., 1284 Civil Eng. Bldg., West Lafayette, IN 47907-1284

1) Insights on Stable On-Line Route Guidance Strategies, ***Ta-Hui Yang***, Purdue University, Sch. of Civil Eng., West Lafayette, IN 47907-1284, ***Srinivas Peeta***

Stable on-line route guidance strategies developed using a dynamical system framework and commonly used assignment principles are analyzed. Some real-time implementation issues and solution effectiveness relating to dynamic traffic phenomena are also investigated.

2) A Combinatoric Algorithm for Single-Destination User-Optimal Dynamic Traffic Assignment, ***S. Travis Waller***, Northwestern University, Dept. of Civ. Eng., 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, travis@trans.civil.nwu.edu, ***Athanasis Ziliaskopoulos***

An efficient combinatoric network algorithm is presented for the single-destination dynamic traffic assignment problem when user-optimal routes are followed. The algorithm is based on the time-space expansion of a network as represented by the cell transmission theory for traffic flow. Algorithm design, properties and computational complexities will be presented.

3) Estimation of Dynamic Origin-Destination Flows from Traffic Counts in Congested Networks using Bi-Level Optimization, ***Hossein Tavana***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712, hossein@mail.utexas.edu, ***Hani S. Mahmassani***

In estimation of OD trips from traffic counts, the effect of congestion is often ignored. In other words, link-flow proportions (the proportion of OD flows traversing a link at any time interval) are considered to be constant. However, in congested networks and in particular when drivers have access to real-time route-guidance information, link-flow proportions might vary significantly as demand changes...

4) Traffic Assignment Properties under Demand Uncertainty, ***Jeffrey Fine***, Northwestern University, Dept. of Civ. Eng., 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, j-fine@nwu.edu, ***S. Travis Waller, Athanasis Ziliaskopoulos***

Insights into the problem of traffic assignment will be examined when the origin-destination demand values are assumed to be random variables with known probability distribution. The objective is to produce properties that can be used to develop more robust solutions for transportation optimization.

TA07 Initiatives in Management & Information Technology Pedagogy

Contributed Session
Chair: Gene Murkison, Georgia Southern University, Dept. of Mgmt., Bus. School, Statesboro, GA 30460-8152, murkison@gasou.edu

1) Fact, Fiction or Prediction: An Integrative Exercise for Information Systems Classes, ***Thomas G. Groleau***, Carthage College, 2001 Alford Park Dr., Kenosha, WI 53140, t-groleau@carthage.edu, www.carthage.edu/~tgroleau

We describe an interactive lecture that demonstrates rapid, and often unforeseen, changes in technology and their impact on decision strategies. Written excerpts from literature, news and textbooks are presented for students to determine whether the excerpts represent fact, fiction or prediction based on the author's intent.

2) Teaching a Client-Server Model in an Intermediate-Level Database Course, ***Yun Wang***, Mercy College, Div. of Math/CIS, 555 Broadway, Dobbs Ferry, NY 10522, ywang@mercynet.edu

Conventionally database courses can be taught without teaching computer system models. This practice discourages students' motivation of learning real-world application design. The impact of integrating client-server knowledge in an intermediate-level database course is profound. I document my teaching method to call for more practical ingredients in computer science education.

3) Internet Teaching Tools for Industrial Engineering, ***Reynaldo Rodriquez***, St. Mary's University, One Camino Santa Maria, San Antonio, TX 78228-8534, reyrv@yahoo.com, ***Rafael Moras***

We discuss the development of a web page that challenges students to solve problems in the areas of manufacturing and human factors. It features games and quizzes, with graphs, photographs and video clips and provides immediate feedback. It can be used as a teaching aid and as a recruitment tool.

4) The Semester-Long Case in Strategic Management Instruction, ***Gene Murkison***, Georgia Southern University, Dept. of Mgmt., Bus. School, Statesboro, GA 30460-8152, murkison@gasou.edu

Surveys indicated that a majority of strategic management professors used the small case approach. Capstone courses in business administration require new and innovative techniques across disciplines. I investigated other approaches and analyzed the effects of a semester-long case in real time using MNCs. Future research is suggested.

TA08 Electronic Commerce & Supply Chain Integration

Cluster: E-Business/Enterprise Integration: Intl. Bus. Perspectives
Invited Session
Chair: Li-Chih Wang, Tunghai University, Dept. of IE, Taichung, 407, Taiwan, wanglc@ie.thu.edu.tw

1) An Evolutionary Approach for Developing a Supply Chain Integration System, ***Li-Chih Wang***, Tunghai University, Dept. of IE, Taichung, 407, Taiwan, wanglc@ie.thu.edu.tw

For any enterprise which wants to develop its SCM system, a systematic developing methodology is necessary and critical. Currently, big-bang and phased-in approaches are employed to implement an integrated SCM system. We present an evolutionary approach which dramatically reduce the risk and cost upon the implementation. The issues discussed include the concept of evolutionary approach...

2) Guidance on Building Collaborative Commerce, ***Jung-Sing Jwo***, Tunghai University, Computer & IS Dept., Taichung, 407, Taiwan, jwo@mail.thu.edu.tw

Collaborative commerce, going beyond rigid supply-chain models and simple information sharing, is considered as the most advanced form of e-business. However, to build a c-commerce application is not trivial. We will introduce our experience of using patterns to help enterprises get into c-commerce quickly.

3) XML-Based E-Commerce & Supply Chain Integration, ***Tai-Ching Tuan***, SAIC, 8301 Greensboro Dr., MS E52, McLean, VA 22032, t.tuan@ieee.org

Internet technology makes e-commerce global in nature. Using Web-enabled, text-based XML as a data interchange enabler necessary for business-to-business, e-commerce has grown rapidly recently. We will discuss the issues of leveraging XML to accomplish the e-commerce for procurement and production supply chains automation.

TA09 Military Applications I

Contributed Session
Chair: Cole Smith, University of Arizona, 8858 East Desert Verbena Pl., Tucson, AZ 85715, cole@sie.arizona.edu

1) The Programming of Military Acquisitions, ***Omer S. Benli***, UCLA/Bilkent University, The Anderson Sch., Los Angeles, CA 90095-1481, omer.benli@anderson.ucla.edu, benli@bilkent.edu.tr, ***Serdar Yavuz***

The programming of military acquisitions is a resource allocation problem faced during PPBP. It is essentially a multi-period capital budgeting problem. A conceptual design of a DSS is proposed which utilizes a binary integer program to select projects as well as their starting times.

2) Optimizing Pre-Positioned Strategic Assets for the US Army, ***Terry P. Harrison***, Pennsylvania State University, Dept. of MSIS, 336 Beam BAB, University Park, PA 16802, tharrison@psu.edu, silmaril.smeal.psu.edu/tph, ***Elena Katok, William Tarantino***

We describe the design and implementation of a large mixed-integer programming model used to assist the US Army examine strategic lift requirements, determine the pre-positioning of strategic assets and prescribe flows of troops and equipment to meet a diverse set of deployment objectives from multi-theater warfare to regional humanitarian aid.

3) Radar Pulse Interleaving for Multi-Target Tracking, ***Cole Smith***, University of Arizona, 8858 East Desert Verbena Pl., Tucson, AZ 85715, cole@sie.arizona.edu, ***Hanif D. Sherali, Moustafa Elshafei***

In a multi-function radar, the maximum number of targets which can be tracked is an important performance measure. Interleaving algorithms developed to operate radars exploit the dead-times between the transmitted and the received pulses to allocate new tracking tasks that might involve transmitting or receiving pulses. We investigate efficient solution methods for the radar pulse interleaving

problem...

TA10 New Directions in Scheduling

Cluster: Scheduling
Invited Session

Chair: Nicholas G. Hall, Ohio State University, 301 Hagerty Hall, 1775 South College Rd., Columbus, OH 43210-1144, halln@cob.ohio-state.edu

1) An Implicit Enumeration Algorithm for the Batch Scheduling Problem, ***Alessandro Agnetis***, Universita di Siena, Dipt. di Ingegneria & Info., via Roma 56, Siena, 53100, Italy, agnetis@dii.unisi.it, http://www.dii.unisi.it/~agnetis, ***Fabrizio Rossi, Stefano Smriglio***

Given a set of parts, each requiring a set of tools, the problem is to select the most profitable set of parts compatible with the tool magazine capacity. For this NP-hard problem, we propose an implicit enumeration algorithm based on a particular branching rule. Extensive computational results are reported.

2) Coordination of Schedules in an Assembly-Type Supplier-Manufacturer System, ***Zhi-Long Chen***, University of Pennsylvania, Dept. of Systems Eng., 220 South 33rd St., Philadelphia, PA 19104-6315, zlchen@seas.upenn.edu, ***Nicholas G. Hall***

In an assembly-type supplier-manufacturer system, the suppliers' production schedules should be carefully coordinated with the manufacturer's schedule in order to achieve a satisfactory system-wide performance. We provide algorithms and complexity results for scheduling problems in this environment. Several efficiently solvable special cases are identified.

3) Combining Column Generation & Lagrangean Relaxation: An Application to the Common Due Date Scheduling Problem, ***Marjan van den Akker***, National Aerospace Laboratory NLR, Informatics Div., PO Box 90502, Amsterdam, 1006 BM, The Netherlands, vdakker@nlr.nl, ***Han Hoogeveen, Steef L. van de Velde***

The effectiveness of combining column generation with Lagrangean relaxation is demonstrated for an archetypical machine scheduling problem. Our comprehensive computational study shows that the combined algorithm solves instances with up to 125 jobs to optimality, while previous purely column generation algorithm can solve instances with up to only 60 jobs.

4) Properties of Complementary Hamiltonian Cycles on Bipartite Graphs: An Application in Workforce Leveling, ***George L. Vairaktarakis***, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, gxv5@po.cwru.edu, ***Daniel Solow***

Consider a paced assembly line where every job is a vector of workforce requirements with as many elements as the number of stations. We study a workforce leveling objective called range. This problem is related to complementary Hamiltonian cycles in bipartite graphs. An efficient solution algorithm is presented.

TA11 Advances in IP Methods & Applications I

Cluster: Integer Programming
Invited Session

Chair: Fred W. Glover, University of Mississippi, Hearin Ctr. for Enterprise Sci, Sch. of Bus. Admin., University, MS 38677, fglover@bus.olemiss.edu

1) Heuristics for Boolean Optimization Problems, ***Thomas Davoine***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, davoine@rutcor.rutgers.edu, ***Peter L. Hammer, Bela Vizvari***

A BOOP consists in maximizing a linear function in binary variables subject to a Boolean equation. Special cases include set covering, vertex packing and many other combinatorial optimization problems. We describe a heuristic method based on using the best linear approximation of a Lagrangian type combination of the objective function and of a polynomial expression associated to the Boolean constraint...

2) Branch & Bound Algorithms for the Transportation Problem with Exclusionary Side Constraints, ***Minghe Sun***, University of Texas, Coll. of Bus., Divison of Mktg. & Mgmt., San Antonio, TX 78249-0634, msun@utsa.edu, msun@lonestar.utsa.edu

The transportation problem with exclusionary side constraints is formulated as a 0-1 MIP model. B&B algorithms are developed to solve the problem. Penalties are used to strengthen the lower bounds so as to fathom subproblems, peg variables and guide the selection of separation variables. Computational results are reported.

3) An Optical-Fiber Routing Problem of Synchronous Optical Networks, ***Junghee Han***, Korea University, Dept. of IE, Sung-Buk Ku Anam Dong 5-1, Seoul, Korea, jhhan@kuccnx.korea.ac.kr, ***Youngho Lee***

We consider an optical-fiber routing problem for multiple clusters with minimum cost arising from the deployment of SONETs. We developed 2 mathematical formulations and a B&C procedure for solving the problem optimally. Also, we developed a tabu search heuristic that provides tight upper bounds,

TA12 E-Business: An Enabler for the Supply Chain

Cluster: Logistics & Supply Chain Management
Invited Session

Chair: Herbert Heinzel, Siemens Business Systems, Supply Chain Community, herbert.heinzel@mch20.sbs.de

1) Supply Networks Challenge Enterprise Models, ***Herbert Heinzel***, Siemens Business Systems, Supply Chain Community, herbert.heinzel@mch20.sbs.de

The complexity of business relationships has by far outgrown business processes and structures of today's supply networks. Customers continue to request and expect greater supply network flexibility consistent with their demands. Partner activities have to be synchronized across the network, their infrastructure to be adapted to the complexity of new businesses and customer requests...

2) Mapping the Supply Chain Operations Reference Model to RosettaNet, ***George Brown***, Intel Corp., Strategy & Tech. Section

The SCOR model, developed by the Supply Chain Council, is a methodology positioned to enable competitive supply networks through inter-enterprise business process alignment and performance management. The session describes how SCOR methodology can add value to RosettaNet, a Linqua franca set to standardize electronic communication between supply chain partners in the

3) Exploring E-Business Options through Supply Chain Simulation, ***Bruce Palmer***, Gensym Corp., bpalmer@gensym.com

Modeling and simulating supply chain operations enables companies to explore alternative strategies of doing business. Simulation is particularly useful for exploring the relatively uncharted waters of e-Commerce. By comparing the traditional bricks and mortar model with electronic commerce options, companies can achieve a better understanding of the complex interactions and technology associated with e-business...

TA13 Strategic Operations Planning

Cluster: Manufacturing & Logistics
Invited Session

Chair: Sergio Chayet, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637

1) Capital Budgeting for Capacity: Options & Operating Risk, ***Phillip J. Lederer***, University of Rochester, Simon Grad. Sch. of Bus. Admin, Rochester, NY 14627, ***Tushar Mehta***

We describe a model of capital budgeting where a firm must decide on technology and capacity size. Technology differs in cost structure-the fixed and variable operating cost and initial investment costs. Demand is uncertain. and we evaluate the NPV by adjusting for options value as well as operating risk.

2) Pricing in Delay-Sensitive Network Markets, ***Philipp Afeche***, Northwestern University, Kellogg Grad. Sch. of Mgmt., 2001 Sheridan Rd., Evanston, IL 60208

We study price and capacity decisions in markets where multiple independent providers control interconnected congestible resources. We investigate the impact of congestion effects on the structure of Nash equilibria. This problem is motivated by the situation in commercial data networks, where providers both compete for and jointly serve customers.

3) Options & Contracting for Capacity Allocation of Capital Goods, ***Stefan Spinler***, WHU Koblenz, Otto-Beisheim GSM, Burgplatz 2, Vallendar, 56179, Germany, ***Arnd H. Huchzermeier, Paul R. Kleindorfer***

We consider a class of capacity planning problems characterized as expensive, non-scalable, capital-intensive production and pre-commitments of capital payments by multiple agents requiring the output of this capacity. We propose an options approach to simultaneously determine capacity and to allocate output of the facility to competing agents.

4) Strategic Capacity Planning under Price & Lead-Time Competition, ***Sergio Chayet***, University of Chicago, Grad. Sch. of Bus., 1101 East 58th St., Chicago, IL 60637, ***Wallace J. Hopp***

We present a game theoretic model of capacity competition in a duopoly where

the market clears on price and delivery lead times. We analyze the Stackelberg equilibrium to the game to study the strength of the first mover advantage and investigate options a follower could use to overcome

TA14 Tutorial: Modern Experimental Design I: Planning & Analysis

Invited Session

Chair: C. F. Jeff Wu, University of Michigan, Dept. of Stats. & IOE, Ann Arbor, MI 48109-1285, jeffwu@umich.edu

1) Tutorial: Modern Experimental Design I - Planning & Analysis, *C. F. Jeff Wu*, University of Michigan, Dept. of Stats. & IOE, Ann Arbor, MI 48109-1285, jeffwu@umich.edu

This tutorial is based on the book "Experiments: Planning, Analysis & Parameter Design Optimization" by Wu & Hamada (2000, Wiley). The first part will focus on the choice of experimental plans (2-, 3- or mixed-level) fractional factorials and orthogonal arrays) and modeling and analysis techniques. Real experiments are used for illustration.

TA15 Supply Chain Management I

Contributed Session

Chair: A. D. Amar, Seton Hall University, Stillman Sch. of Business, South Orange, NJ 07079, amaramar@shu.edu

1) Supply Chain Performance Improvement, *Ali R. Behnezhad*, California State University, Dept. of MS, Northridge, CA 91330-8378, ali.behnezhad@csun.edu

A systematic approach to improve the flow of materials through the logistics network will be presented. Integration issues and the role of information technology in the design and management of supply chains will be discussed.

2) Combined Simulation-Optimization Modeling of Supply Chains: Methods & Applications, *David R. Heltne*, Equilon Enterprises, LLC, Westhollow Technology Ctr., PO Box 1380, Houston, TX 77251-1380, drheltne@equilon.com, ***Charles R. Standridge***, ***Jeffrey L. Slotter***

We have developed and successfully applied an approach to building combined simulation-optimization models of supply chains. The simulation model represents the operational details while the optimization model represents decision making. Strategic managers and operations engineers use model results in determining capital equipment requirements, inventory capacity and scheduling strategies.

3) Optimizing the Supply Chain for Business Collaboration, *A. D. Amar*, Seton Hall University, Stillman Sch. of Business, South Orange, NJ 07079, amaramar@shu.edu

We provide e-commerce-based models to reduce operating costs of supply replenishments and to shorten their cycle-times. These models are derived from the supply chain system principles. The work also includes models to manage single and multiple location demand centers and provides some exploration on their extension to multiple supply centers.

4) withdrawn - author request of 10/11, *Shaojun Wang*, Louisiana State University, Dept. of IMSE, Baton Rouge, LA 70803-6409, swang2@univx1.sncc.lsu.edu, ***Bhaba Sarker***, ***A. A. M. Jamal***

TA16 PROMETHEE Software & Applications

Cluster: MCDM

Invited Session

Chair: Bertrand M. Mareschal, Universite Libre de Bruxelles, Dept. of Stats & OR, Blvd. du Triomphe, CP 210/01, Brussels, B-1050, Belgium, bmaresc@csi.com

1) DECISION LAB 2000: A New PROMETHEE Software, *Bertrand M. Mareschal*, Universite Libre de Bruxelles, Dept. of Stats & OR, Blvd. du Triomphe, CP 210/01, Brussels, B-1050, Belgium, bmaresc@csi.com, ***Alexandre Cvetkovic***

Decision Lab is a Windows program that incorporates the PROMETHEE and GAIA methods as well as multiple enhancements such as the treatment of missing values, multiple scenarios and extensive sensitivity analysis and reporting capabilities.

2) Using PROMETHEE for Antibiotics Selection in an Intensive Care Unit, *Bertrand M. Mareschal*, Universite Libre de Bruxelles, Dept. of Stats & OR, Blvd. du Triomphe, CP 210/01, Brussels, B-1050, Belgium, bmaresc@csi.com, ***Jim Ilunga***

PROMETHEE is used to assist physicians in selecting the most appropriate antibiotics for the treatment of patients in a Belgian intensive care unit. Criteria such as cost, efficiency, ecological impact, pharmacodynamic characteristics and tolerance are included in the model. The advantages over the traditional efficiency/cost ratio approach are discussed.

3) Using PROMETHEE to Evaluate Urban Waste Management Systems, *Bertrand M. Mareschal*, Universite Libre de Bruxelles, Dept. of Stats & OR, Blvd. du Triomphe, CP 210/01, Brussels, B-1050, Belgium, bmaresc@csi.com, ***Virginie van de Kerchove***

PROMETHEE is used to asses the performance level of urban waste management systems in several European cities. Economical, environmental as well as social criteria are included in the model. Managers can compare their system with those of other cities, identify their weaknesses, and take appropriate decisions to improve their position.

TA17 Optimization Techniques VI

Contributed Session

Chair: Khosrow Moshirvaziri, California State University, Long Beach, CA 90840, moshir@csulb.edu, http://www.csulb.edu/~moshir/

1) A Weighted Analytic Center for Linear Matrix Inequalities, *Shafiu Jibrin*, Northern Arizona University, Dept. of Math. & Stats., Flagstaff, AZ 86011, shafiu.jibrin@nau.edu, jan.ucc.nau.edu/~sj9, ***Irwin Pressman***, ***Richard J. Caron***

A new weighted analytic center for LMIs will be introduced. We demonstrate how it can be used to improve the location of standing points for the stand and hit (SSH) algorithm for identifying necessary LMI constraints in semidefinite programming. We also describe how SSH can be used as a preprocessor in semidefinite programming.

2) An Approximation Scheme for Fractional Programming, *Jorge U. Villavicencio*, Pontificia Universidad Catolica de Chile, Facultad de Matematicas, Vicuna Mackenna 4860, Santiago, Chile, jvillavi@puc.cl

We present an approximation scheme to solve a certain class of fractional programming problems. The method we propose is based on a logarithmic potential function and it computes an approximate solution to a given accuracy. We show that the number of iterations the method performs is bounded by a polynomial on the given accuracy and on the number of constraints.

3) A Combined Heuristic Based on Path Relinking & Genetic Algorithms, *Guoqing Zhang*, Chinese University of Hong Kong, Dept. of SE/EM, Shatin NT, Hong Kong, Hong Kong, China, gqzhang@se.cuhk.edu.hk, ***Janny M. Y. Leung***, ***Jue Xue***

We propose a new heuristic by combining path relinking and a GA. Both parallel and series connections are investigated. We apply the approach to a multiple-level warehouse layout problem. Extensive experiments are carried out to compare the performance of the new approach.

4) An Efficient Data Structure for Project Networks, *Khosrow Moshirvaziri*, California State University, Long Beach, CA 90840, moshir@csulb.edu, http://www.csulb.edu/~moshir/

An efficient data structure for the nodes-arcs configuration of project networks is introduced. Under this structure, computational time needed to determine critical activities, critical paths and other essential components of the network is greatly reduced. The technique is currently being tested on large-scale networks of construction projects.

TA18 Novel Market Mechanisms & Applications in E-Commerce

Cluster: E-Commerce

Invited Session

Chair: Jan Stallaert, University of Southern California, IOM Dept., Marshall Sch. of Bus., Los Angeles, CA 90089, stallaer@usc.edu

1) Pricing Bundles in a Double-Auction Market & their Implications in Business-to-Business Commerce, *Mu Xia*, University of Texas, Austin, TX 78712

An IP model for combinatorial double auctions is proposed, in which complementarities among components are taken into account in bundle orders. A new approach to developing approximate prices for bundles is presented. We show both theoretically and via an example, that it leads to more efficient markets compared to other price-setting approaches.

2) A Centralized Market for Exotic Derivative Securities, *Siwei Gu*, University of Texas, TX

A mathematical model is developed to centralize the trading of different exotic derivatives by backing them with a common hedging portfolio. Each derivative is taken as a limit order in terms of its hedging portfolio. The market surplus is maximized and allocated to bidders. By charging a transaction fee, the market

maker can cover the rebalancing cost and induce the order that can lower the total

3) Internal Supply Chain Coordination through Bundle Markets, ***Jan Stallaert***, University of Southern California, IOM Dept., Marshall Sch. of Bus., Los Angeles, CA 90089, stallaer@usc.edu, ***Ming Fan***

We present a method of coordination in a supply chain where the activities are coordinated through internal bundle markets. The market mechanism is a double auction where participants can trade bundles of goods.

TA19 Aligning Project Management with Strategy

Cluster: Product Development
Sponsor: Technology Management Section
Invite/Sponsor Session
Chair: Christoph H. Loch, INSEAD, Blvd. de Constance, Fountainbleau Cedex, 77305, France, christoph.loch@insead.fr

1) Project Uncertainty & Management Styles, ***Christoph H. Loch***, INSEAD, Blvd. de Constance, Fountainbleau Cedex, 77305, France, christoph.loch@insead.fr, ***Michael T. Pich***, ***Arnoud De Meyer***

We propose a rigorous definition of uncertainty, conceptualizing a project in terms of payoff influence parameters rather than activities. Based on this general definition, we classify project uncertainty into 5 types: complexity, variation, risk, ambiguity and chaos. We link these types to project management methods that have previously been scattered across unconnected literatures and to a set of appropriate project management styles.

2) Managing Projects in Strategically Outsourced R&D Environments, ***Vish V. Krishnan***, University of Texas, Dept. of Mgmt., CBA 4.202, Austin, TX 78712, krishnan@mail.utexas.edu

It is increasingly the norm for many firms to do not all of their research and development in-house. We discuss the rationale for buying development services and its implications for managing product development projects within a company. Interesting managerial issues arise which will be framed under the topic of "development supply chains."

3) A Dynamic Development Project Portfolio for Uncertain Market Conditions, ***Stylianos Kavadias***, INSEAD, Blvd. de Constance, Fountainbleau Cedex, 77305, France, stylianos.kavadias@insead.fr, ***Christoph H. Loch***

We investigate the selection of a firm's portfolio of new product development projects. Uncertain and changing market conditions, resource allocation constraints and the product lifecycle are explicitly considered. With a dynamic model, we derive optimal policies that maximize the portfolio profits.

TA20 Strategic Planning I

Contributed Session
Chair: Steven R. Powell, California State Polytech University, CIS Dept., 3801 West Temple Ave., Pomona, CA 91768, srpowell@csupomona.edu

1) Project Coordination under Information Asymmetries, ***Steve Peng***, York University, Schulich Sch. of Bus., 4700 Keele St., Toronto, Ontario, M3J 1P3, Canada, hpeng@interlog.com, ***John A. Buzacott***, ***David A. Johnston***

This model is for contract design within the context of a project network with a firm using 2 suppliers to develop a new product. We find that contingent contract's value is mainly from coordinating rather than controlling agent's private decisions and the value depends on the network's flexibility.

2) An Algorithm for Evaluating the Multi-Variate Gamma Distribution Function, ***Ahmed M. Sultan***, Egyptian Air Force, 94 Wassef St., Ahmed Essmat St. Ain Shams, Cairo, Egypt, assultan@hotmail.com

An algorithm is described for the calculation of the values of the probability distribution function for the multivariate gamma distribution. The technique is based on fitting a non-parametric Gaussian kernel density to the given data. A Monte Carlo experiment of size 1000 is conducted to derive the results. Our results are compared with previous results from literature.

3) The Strategic Management of Telecommunications, ***Steven R. Powell***, California State Polytech University, CIS Dept., 3801 West Temple Ave., Pomona, CA 91768, srpowell@csupomona.edu

Although strategic management has become a well-developed field of study, relatively little of the current thinking in the discipline has been applied to telecommunications management. We examine how strategy currently is incorporated into telecommunications management and suggest ways telecommunications management can be performed more strategically in the future.

TA21 Facilities Planning & Design

Contributed Session
Chair: Ada S. F. Ng, Chinese University of Hong Kong, Dept. of SE/EM, 116 Ho Sin Hang Eng. Bldg., Hong Kong, Shatin NT, Hong Kong, sfng@se.cuhk.edu.hk

1) A Set-Covering-Based Heuristic for Districting Problems with Service-Time Constraints, ***Ada S. F. Ng***, Chinese University of Hong Kong, Dept. of SE/EM, 116 Ho Sin Hang Eng. Bldg., Hong Kong, Shatin NT, Hong Kong, sfng@se.cuhk.edu.hk, ***Janny M. Y. Leung***, ***Xiaoqiang Cai***

The problem is to partition areas into districts so that the maximum travel time within a district is no more than c, which we have proved to be NP-complete. We present a set-covering-based heuristic: we first find a minimum cover of maximally c-connected sets and then re-allocate the common vertices.

2) Capacity Expansion for a Loss System, ***Sarah M. Ryan***, Iowa State University, 2019 Black Engineering, Ames, IA 50011-2164, smryan@iastate.edu, www.public.iastate.edu\~smryan\, ***Alexander Simampo***

We consider capacity expansion for a service provider facing exponential demand growth. The capacity required to provide a given service level is approximately linear in the service request rate. For fixed plus variable capacity costs, we find the optimal time interval before the next expansion and explore its dependence on the demand growth rate, interest rate and cost parameters.

3) A Mathematical Modeling Approach for Solving an Unequal-Area Facility Layout Problem, ***Rasaratnam Logendran***, Oregon State University, Dept. of IME, 118 Covell Hall, Corvallis, OR 97331-2407, logendrr@engr.orst.edu, www.ie.orst.edu/INDUSTRIAL/Faculty/logen/logen, ***Thanat Kriausakul***

We present a mathematical modeling approach for solving unequal-area facility layout problems. The objective function of the model integrates both a distance measure for the transfer of parts between facilities and a similarity measure for the facilities configured in the layout. An example problem is used to demonstrate the applicability of the proposed approach.

4) A Multi-Start Clustering Technique for p-Facility Location Problems, ***Belen Melian-Batista***, Universidad de la Laguna, Dpto. Estad. IO y Comp., La Laguna, Tenerife, 38271, Spain, mbmelian@ull.es, ***Jose A. Moreno-Perez***, ***J. Marcos Moreno Vega***

We consider a new clustering technique in the multistart heuristic search for solving the fixed-size facility location/allocation problems. The local search procedure is based in the interchange move. We use the notion of regions of attraction of the local minima to modulate the diversification and intensification of the search.

TA22 Cost Effectiveness & Hospital Efficiency

Sponsor: Health Applications Section
Sponsored Session
Chair: Liam O'Neill, Cornell University, Policy Analysis & Mgmt., N229 MVR Hall, Ithaca, NY 14853-4401, lo22@cornell.edu

1) withdrawn - chair request of 10/6, ***Anke Richter***, Research Triangle Institute, Unit 10, Williams House, Manchester Sci. Park, Lloyd St, M15 6SE, UK, anke@rti.org, ***Stephanie R. Earnshaw***

2) Case Study: A Point of Care Blood Gas Monitors in a Neonatal Intensive Care Unit, ***Peter E. Hilsenrath***, University of Iowa, Dept. of Health Mgmt. & Policy, 2700 Steindler Bldg., Iowa City, IA 52242, peter-hilsenrath@uiowa.edu, ***Joseli Alves Dunkerson***

Neonates in ICUs are subject to frequent blood tests. Phlebotomy losses can be significant necessitating transfusions. The University of Iowa studied the use of the VIA Point of Care Blood Gas Monitor to evaluate cost-effectiveness. Potential savings result from averted laboratory tests and averted transfusions. The impact of more timely diagnoses is also considered.

3) Technical & Allocative Efficiency Changes: An Application to Provincial Hospitals in Taiwan, ***Ray-E Chang***, National Taiwan University, 19 Su-Chow Rd., Ste. 306, Taipei, Taiwan, ROC, rchang@ccms.ntu.edu.tw, ***Ying-Hui Hou***, ***Chi-Jeng Hsieh***

Provincial hospitals have suffered from criticism due to their underperformance for many years. Recent implementation of the National Health Insurance may have aggravated this situation as it is believed. We investigate the technical and allocative efficiency changes of provincial hospitals in Taiwan to provide insight

for policy maker.

4) The Effect of Proximity & Volume on the Treatment of Myocardial Infarction, ***Liam O'Neill***, Cornell University, Policy Analysis & Mgmt., N229 MVR Hall, Ithaca, NY 14853-4401, lo22@cornell.edu

Logistic regression is used to examine the tradeoffs between geographic distance and hospital volume for the treatment of myocardial infarction at 150 Pennsylvania hospitals.

TA23 Bidding: Combinatorial Auctions

Cluster: **Bidding**
Invited Session
Chair: Michael H. Rothkopf, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, rothkopf@rutcor.rutgers.edu

1) Improved Algorithms for Optimal Winner Determination in Combinatorial Auctions & Generalizations, ***Tuomas W. Sandholm***, Washington University, Dept. of Comp. Sci., 1 Brookings Dr., St. Louis, MO 63130-4899, sandholm@cs.wustl.edu, ***Subhash Suri***

Determining the winners in combinatorial auctions is NP-complete and inapproximable, but search algorithms do well on average. We present an improved algorithm for winner determination. We also uncover a more general tractable special case, and design algorithms for solving it as well as for solving known tractable special cases faster. We generalize combinatorial auctions, and present algorithms for generalizations.

2) Bidding for Airline Seats, ***Marta Eso***, IBM TJ Watson Research Center, PO Box 218, Yorktown Heights, NY 10598, eso@us.ibm.com, eso@cs.cornell.edu, ***Manoj Kumar***

We analyze online open cry and sealed bid auctions for airline seats. Each bid specifies a set of flights where any inbound and outbound combination is acceptable, the required number of tickets, and a price. Winning bids get the required seats on one outbound and one incoming flight. We provide real-time solutions for several objectives the of the auction organizer and discuss combinatorial optimization techniques and computational results.

3) Auctions with Endogenously Determined Allowable Combinations, ***Sun Park***, Rutgers University, Fac. of Mgmt. & RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, spark@rbs.rutgers.edu, ***Michael H. Rothkopf***

Winner determination in simultaneous auctions with unlimited combinations is NP complete. Some holders of large auctions may be unwilling or unable to limit biddable combinations sensibly. We propose and test successfully a combinatorial auction in which bidders prioritize the allowable combinations. This assures that the economically important combinations are included.

4) Equilibrium Prices in Auction Markets with Non-Convexities, ***Paul M. Sotkiewicz***, Federal Energy Regulatory Commission, 888 First St. NE, Rm. 61-58, Washington, DC 20426, sotkiepm@dale.cba.ufl.edu

We address the economic interpretation of strong duality for MIPs and the existence of market clearing prices. We show that the optimal solution to an LP that solves the MIP has dual variables that have the traditional economic interpretation as prices, explicitly price integral activities and support an equilibrium with non-convexities. We show how this methodology can be used to interpret solutions to non-convex problems such as Scarf's (1994).

TA24 Panel: Strategic Global Standards Management - A New Imperative in Technology Management Instruction

Sponsor: **Section on Management of Productivity & Technology/Management of Technology Section**
Sponsored Session
Chair: Jeffrey Strauss, Northwestern University, KGSM, Mgmt. & Organizations, Evanston, IL 60208

1) Panel: Strategic Global Standards Management - A New Imperative in Technology Management Instruction, ***Jeffrey Strauss***, Northwestern University, KGSM, Mgmt. & Organizations, Evanston, IL 60208, ***Alec McMillan***, Rockwell Automation, Global Standards & Trade, ***Richard Forselius***, Hamilton Sundstrand, Aircrafts Products Eng.

Globalization of markets, manufacturing, technology and information and intensifying competition accompanied by increased outsourcing, corporate interrelationships, technology convergence and a push toward harmonized standards demand sophisticated and strategic standards management. Once viewed only as the purview of engineers and lawyers, standards management is increasingly recognized as a competitive tool requiring understanding and active input from across the organization and coordination across the supply chain... input from across the organization and coordination across the supply chain...

TA25 Lectures in Honor of Carl M. Harris: Optimization in Medical Diagnosis & Treatment

Cluster: **Linear Programming & Complementarity**
Sponsored Session
Chair: Ariela Sofer, George Mason University, SEOR Dept., MS 4A6, 4400 University Dr., Fairfax, VA 22030, asofer@gmu.edu

1) MIP Approaches to Brain Tumor Radiosurgery Treatment Planning, ***Eva K. Lee***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, eva.lee@isye.gatech.edu, http://www.isye.gatech.edu/~evakylee

We present MIP models which are used for designing optimal treatment plans for brain tumor radiosurgery. Implementation schemes and clinical results of a specialized branch-and-bound solver will be reported.

2) Optimization of Gamma Knife Radiosurgery, ***Michael C. Ferris***, University of Wisconsin, Dept. of Comp. Sci., 1210 West Dayton St., Madison, WI 53706, ferris@cs.wisc.edu, http://www.cs.wisc.edu/~ferris, ***David M. Shepard***

The Gamma Knife is a highly specialized treatment unit that provides an advanced stereotactic approach to the treatment of brain tumors. We automate the treatment planning process by demonstrating how to formulate these problems as mathematical programming models and solve several test and real-patient examples.

3) Cancer Detection via Laser-Induced Fluorescence Spectroscopy, ***Stephen C. Billups***, University of Colorado, Dept. of Math., CB 170, PO Box 173364, Denver, CO 80217-3364, sbillups@carbon.cudenver.edu

Laser induced fluorescence spectroscopy is being explored as a means for detecting cervical cancer. Its success depends on developing an effective method for analyzing fluorescence signals and classifying them according to tissue pathology. We discuss an approach, which trains a classification algorithm using a robust LP with capacity control.

4) Optimized Biopsy Protocols for Prostate Cancer, ***Ariela Sofer***, George Mason University, SEOR Dept., MS 4A6, 4400 University Dr., Fairfax, VA 22030, asofer@gmu.edu, ***Jianchao Zeng***, ***Brett Opell***

Recent studies indicate that current biopsy protocols for detection of prostrate cancer have a high rate of false negative diagnoses. We use real prostate specimens removed by prostatectomy to develop a 3-D distribution map of cancer in the prostate and use this map to develop protocols with improved detection rates.

TA26 Issues in Rail Operations

Cluster: **OR/MS in the Service Industries**
Invited Session
Chair: Alexandra M. Newman, Colorado School of Mines, Division of Economics & Bus., Golden, CO 80401, newman@mines.edu

Co-Chair: Linda K. Nozick, Cornell University, Sch. of Civil & Environ. Eng., Ithaca, NY 14853-3501

1) An Overview of the Railroads' Optimization Needs, ***David W. Bell***, CSX Transportation, 500 Water St., Jacksonville, FL 32202, david_bell@csx.com

Railroads face many optimization problems, e.g., service design, car and train routing, equipment distribution and crew assignment. We emphasize not only the need for modeling (and solving) realistic versions of these problems, but also the need for integrating the solutions for individual problems into the railroad system as a whole.

2) Adaptive Dynamic Programming for Real-Time Locomotive Management, ***Warren B. Powell***, Princeton University, Dept. of OR & Financial Eng., CASTLE Lab., Princeton, NJ 08544, powell@princeton.edu, ***Belgacem Bouzaiene-Ayari***

We propose an adaptive dynamic programming algorithm for the real-time management of locomotives for rail freight transportation. The model uses the principle of information decomposition to create diagnosable subproblems. Value function approximations are used to coordinate actions between

subproblems. Numerical results for a large railroad will be presented.

3) An Optimization Model for Rail Boxcar Routing, ***Alexandra M. Newman***, Colorado School of Mines, Division of Economics & Bus., Golden, CO 80401, newman@mines.edu

Rail boxcar (merchandise) operations differentiate themselves from intermodal (container) operations in part by an increased complexity of the routing patterns for the traffic. We present a solution methodology for the (centralized) routing of boxcars and show why a simpler (decentralized) solution procedure would not be appropriate in this setting.

TA27 Panel: Reliability Education - Present & Future

Sponsor: Quality, Statistics & Reliability Section
Invited/Sponsor Session

Chair: Alice E. Smith, Auburn University, Dept. of ISE, 207 Dunstan Hall, Auburn, AL 36849, aesmith@eng.auburn.edu

1) Panel: Reliability Education - Present & Future, ***C. Richard Cassady***, University of Arkansas, cassady@engr.uark.edu, ***Mainak Mazumdar***, University of Pittsburgh, Dept. of IE, 1048 Benedum Hall, Pittsburgh, PA 15261, mmazumd@engrng.pitt.edu, ***O. Geoffrey Okogbaa***, University of South Florida, okogbaa@eng.usf.edu, ***John S. Usher***, University of Louisville, usher@louisville.edu, ***Joel A. Nachlas***, Virginia Tech., Dept. of ISE, nachlas@vt.edu

Abstract not supplied.

TA28 Modeling Regulated Performance

Sponsor: Public Programs & Processes Section
Sponsored Session

Chair: Patricia Byrnes, University of Illiois, Inst. for Public Affairs, Public Affairs Ctr. 332, Springfield, IL 62794-9243, byrnes.patricia@uis.edu

1) A Modeling Framework Combining Simultaneously Weight & Target Restrictions: A Gradual Path towards Overall Efficiency, ***Toni Ramirez-Arellano***, General Hospital Vall d'Hebron, Mgmt. Dept., Pg. Vall d'Hebron 119-129, Barcelona, 08035, Spain, aramirez@hg.vhebron.es

We introduce the notion of "gradual path" leading to the fulfilment of overall efficiency targets through a non-traumatic way. With the aim of setting independent and sequential targets, the DEA formulation is supplemented by a combination of weight and target restrictions. This encourages gradual movements through the DEA frontier.

2) A Malmquist Productivity Approach to Cost Efficient & Quality Service Delivery, ***Patricia Byrnes***, University of Illiois, Inst. for Public Affairs, Public Affairs Ctr. 332, Springfield, IL 62794-9243, byrnes.patricia@uis.edu, ***Mark A. Freeman***

We demonstrate how productivity measures can be used in implementing performance fund contracting of behavioral health services. Since the incentives for cost efficiency may conflict with the quality of care, we use a Malmquist productivity index to measure cost efficiency that incorporates quality of service delivery.

3) Inducing Efficient Quality Supply through Contracting Mechanisms: Or Contracting for Total Quality Management Effort that Pays, ***R. D. Weaver***, Pennsylvania State University, 207D Armsby Bldg., University Park, PA 16802, r2w@psu.edu, ***Taeho Kim***

Contracting based on DEA scores and benchmark identified peer groups is shown to enhance TQM agent effort and quality-based supply chain value. Simulation illustrates the potential of contracting for supply chains facing stochastic quality or damage that is conditional on otherwise non-productive quality control effort. Examples are provided.

4) Policy Interventions & Best Practice, ***Carla Amado***, Warwick Business School, Operational Research & Systems, Coventry, CV4 7AL, UK, ***James E. Storbeck***

We investigate modeling relationships between relative notions of best practice and absolute standards of performance. The latter notion is commonly used by exogenous, i.e., "regulatory," agencies to assure performance at or above a minimum threshold level. This research suggests systems for performance evaluation of such constrained best practice settings.

TA29 Operations Management IV

Contributed Session

Chair: Zinovy D. Radovilsky, California State University, Mgmt. & Finance, Hayward, CA 94542, zradovil@csuhayward.edu

1) withdrawn - author request of 10/2, ***Morgan L. Swink***, Michigan State University, Dept. of MCS, Eli Broad Coll. of Bus., East Lansing, MI 48824, swinkm@msu.edu, ***Ram Narasimhan***

2) Hierarchical Anticipation in Advanced Planning & Scheduling Systems, ***Jan C. Fransoo***, Eindhoven University of Technology, Dept. of Tech. Mgmt., PO Box 513, Pav. F12, Eindhoven, 5600MB, The Netherlands, j.c.fransoo@tm.tue.nl, www.tm.tue.nl/vakgr/lbs/fransoo.htm, ***Anastasia J. Schalla, A. G. de Kok***

APS systems have generally a number of hierarchically positioned planning components. We analyze the relationship between these components, focusing on anticipation (the higher level anticipating the possible outcome of later, lower-level decisions). We present a classification distinguishing between model anticipation and information anticipation and apply our classification to i2's rhythm.

3) The Impact of Plant Location Factors on Operational Performance: A DEA-Based Framework, ***Rohit Bhatnagar***, Nanyang Business School, S3-B2A-21 NTU, Nanyang Ave., Singapore, 639798, Singapore, arbhatnagar@ntu.edu.sg, http://www.ntu.edu.sg/home/arbhatnagar

Though the plant location decision significantly impacts the firm's performance, the nature of this relationship is not well understood. Using data collected from 320 firms in Asia, we propose a DEA-based framework for studying the cross-country differences relating to the plant location decision. Insights and results will be presented.

4) Developing an Optimal Film Schedule for a Multiplex Theater, ***Zinovy D. Radovilsky***, California State University, Mgmt. & Finance, Hayward, CA 94542, zradovil@csuhayward.edu, ***Bradley Vereen***

We describe a knapsack-related integer model used to optimize a film schedule in a multiplex theater. The objective function of the model is to maximize the theater revenue subject to 5 major types of constraints: total film capacity of the theater, number of available film copies, total available film time, ability to apply certain genre films and having a certain fraction of new films.

TA30 E-Commerce Security & Trust Issues

Sponsor: Computing Society
Sponsored Session

Chair: Dan Zhu, Iowa State University, 300 Carver Hall, Ames, IA 50011, dzhu@iastate.edu

1) Understanding Online Investors: An Analysis of their Investing Behavior & Attitudes, ***Sridhar Balasubramanian***, University of Texas, Dept. of Mktg., McCombs Sch. of Bus., Austin, TX 78712, sridhar.balasubramanian@bus.utexas.edu, ***Prabhudev Konana***

The adoption of online investing is widely attributed to electronic channel efficiency. However, the investing experience is also contingent upon the trust reposed in the broker and process, the biases involved when investors manage their portfolios and several social influences. We present a theoretical framework that integrates these factors.

2) A Measurement Model of Trust in Electronic Commerce, ***Liping Liu***, Southern Illinois University, Dept. of Mgmt., Carbondale, IL 62901-4627, lliu@siu.edu, liu@infonet.cba.siu.edu

We theoretically develop and empirically test a measurement model of trust in e-commerce. To first analyze the interactions between the components of trust and the conditions under which for trust to arise in the context of e-commerce, we search for a comprehensive set of business and technology factors that explain the notion of trust...

3) Data Mining for Network Intrusion, ***Dan Zhu***, Iowa State University, 300 Carver Hall, Ames, IA 50011, dzhu@iastate.edu, ***Xiaoning Zhang, G. Premkumar, Chao-Hsien Chu***

Intrusion detection systems help network administrators prepare for and deal with network security attacks. These systems collect information from a variety of systems and network sources, and analyze them for signs of intrusion and misuse. A variety of techniques have been employed for analysis ranging from traditional statistical methods to new data mining approaches...

TA31 Computing Issues in Quality & Reliability Research

Cluster: Reliability & Quality Control
Sponsor: Computing Society/Quality, Statistics & Reliability Section
Sponsor/Invite Session

Chair: Bruce A. Ankenman, Northwestern University, Dept. of IE, 2145 Sheridan Rd., Evanston, IL 60208, ankenman@iems.northwestern.edu

1) Computation of a Stationary Point of a Response Surface, ***Suntara Cahya***, Pennsylvania State University, Dept. of IE, University Park, PA 16802, exd13@psu.edu

No abstract supplied.

2) Optimal Microdata File Merging: A New Model & Network Optimization Algorithm, ***Richard S. Barr***, SMU, Science Info. Ctr. 306, Dallas, TX 75275-0122, barr@seas.smu.edu, ***Betty L. Hickman***, ***J. Scott Turner***

Microsimulation models are widely used for policy analysis by federal and state governments and are based on weighted statistical samples, called microdata. Techniques have been developed to merge microdata sets to enhance the analytical capabilities of the policy models. We present a brief overview of merging techniques and a new network-optimization-based approach for combining microdata sets...

3) Optimization Problems in Quality Improvement, ***W. Matthew Carlyle***, Arizona State University, Dept. of IE, PO Box 5906, Tempe, AZ 85287-5906, mcarlyle@asu.edu

No abstract supplied.

TA32 Organization Theory I

Contributed Session

Chair: Richard M. Burton, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708-0120, rmb2@mail.duke.edu

1) Successful Marriage of Knowledge Management & E-Business: Will it Last?, ***Edwin G. Dupnick***, Shell Services, International, 910 Louisiana St., 8th Fl., Houston, TX 77002-4916, edupnick@shell.com

We examine the basic tenets of knowledge management and e-business and suggest a framework to address the integration of social, technological and managerial subsystems necessary for e-business implementation. We suggest the joint optimization of these subsystems is critical to achieve the desired outcomes of e-business initiatives using knowledge management paradigms.

2) A Birth-Death Model for Organizational Learning, ***Jeffrey B. Arthur***, Virginia Tech., Pamplin Coll. of Bus., Dept. of Mgmt., Blacksburg, VA 24061, jarthur@vt.edu, ***Christopher L. Huntley***

How do organizations learn to learn? We posit that the introduction of a gain sharing incentive program can stimulate an organizational learning process. Data collected on employee suggestions over a 4-year period are used to develop and test a Poisson birth-death model of organizational learning over time.

3) Business Process Orientation: What Is It & How Do You Know When You Have It?, ***Kevin P. McCormack***, Sapient Corp., 2232 Baneberry Dr., Birmingham, AL 35244, kmccor@sapient.com

It is now widely accepted that smooth, productive interaction between corporate departments and functions is critical to success in today's business environment. Although several concepts, such as "reengineering," "process centering" and "the horizontal corporation" address this aspect of business activity, we suggest that "business process orientation" may be the most useful concept to managers...

4) The (Opportunity) Cost of Organizational Misfits, ***Richard M. Burton***, Duke University, Fuqua Sch. of Bus., Box 90120, Durham, NC 27708-0120, rmb2@mail.duke.edu, ***Jorgen Lauridsen***, ***Borge Obel***

Using data from 232 Danish firms, we show that firms with organizational misfits have opportunity losses that firms without misfits do not suffer. Further, a firm may not obtain increased performance from the elimination of misfits piecemeal, but will obtain significant increases when misfits are fixed within a systems approach.

TA33 Job Shop Scheduling

Contributed Session

Chair: Igor Averbakh, University of Toronto, Division of Mgmt., 1265 Military Trail, Scarborough, Ontario, M1C 1A4, Canada, averbakh@scar.utoronto.ca

1) A New Heuristic for the Ion Implanters Scheduling Problem in a Semiconductor Wafer Fabrication Plant, ***Zaid Duwayri***, University of Central Florida, 1515 Cricket Club Cir., #202, Orlando, FL 32828, zduwayri@mail.ucf.edu, ***Mansooreh Mollaghasemi***, ***Ghaith Rabadi***

We focus on the scheduling of production wafers at ion implanters facility groups in a semiconductor wafer fabrication plant. The re-entrant production line passes through the implanters several times at different production stages, which incurs a high setup time. The developed heuristic aims to reduce cycle time.

2) The Nested Partitions Method for the Job Shop Scheduling Problem, ***Leyuan Shi***, University of Wisconsin, Dept. of IE, 1513 University Ave., Madison, WI 53706, leyuan@engr.wisc.edu, ***Yunpeng Pan***

The nested partitions method is applied to solve job-shop scheduling problem. Numerical results are compared with a few well-known algorithms such as tabu search and GA.

3) Modeling a Reentrant Job Shop Scheduling Problem with Setups, ***Jeriad M. Zoghby***, University of Texas, 2425 Cromwell Cir #306, Austin, TX 78741, jmz@mail.utexas.edu

Although metaheuristics have been successfully applied to production scheduling problems, no model currently exists that will allow for its application to a production system with reentrancy and setups, i.e. semiconductor manufacturing. We introduce the reentrant job shop scheduling problem with setups and detail its success vs. other methodologies.

4) A Simple Heuristic for m-Machine Flowshop & its Application in Routing-Scheduling Problems, ***Igor Averbakh***, University of Toronto, Division of Mgmt., 1265 Military Trail, Scarborough, Ontario, M1C 1A4, Canada, averbakh@scar.utoronto.ca, ***Oded Berman***

We consider the routing-scheduling version of the flow shop scheduling problem, where n jobs located at different nodes of a transportation network must be executed by m machines (servers) travelling between the jobs. The objective is to minimize the makespan. For this problem, we present a simple heuristic and analyze its worst-case performance.

TA34 Economics I

Contributed Session

Chair: Jesse L. Miller, School of Mines, 6732 West Coal Mine Ave., Littleton, CO 80123, chaotic.flash.net

1) withdrawn - author request of 9/18, ***Carleen F. Maitland***, Technical University of Delft, Jaffalaan 5, PO BOx 5015, Delft, Zuid Holland, 2600GA, The Netherlands, carleenm@sepa.tudelft.nl, www.sepa.tudelft.nl/webstaf/carleenm

2) An Optimal Myopic Gambling Strategy & Relative Risk Aversion, ***Sheng-Pen Wang***, Chang Gung University, Dept. of Bus. Admin., Kewi-San, Taoyuan, 333, Taiwan, wangsp@mail.cgu.edu.tw

We consider the optimal strategy for a gambler who is faced with a finite sequence of 2-outcome games and wants to maximize the expected utility of his final wealth. We show that the optimal gambling strategy is myopic if and only if the gambler's utility function exhibits constant relative risk aversion.

3) Airlines' Choice of Aircraft Size in a Competitive Environment, ***Wenbin Wei***, University of California, Excellence for Aviation OR, 107 McLaughlin Hall, ITS, Berlekey, CA 94720, wenbin@ce.berkeley.edu

We are interested in how airlines make decisions on the size of aircraft to operate. Our research consists of 3 components: aircraft cost analysis, airline market share and demand analysis for the role of aircraft size in competition and airline competition analysis based on game theoretical models.

4) Simulation Models in Global Trade Policy Analysis: The Case of Croatia's Accession to the World Trade Organization, ***Jasminka Sohinger***, University of Zagreb, Fac. of Economics, Trg JF Kennedy 5, Zagreb, 10000, Croatia, jasminka.sohinger@ag.tel.hr, ***Glenn W. Harrison***, ***Davor Galinec***

We provide a quantitative, multi-regional, general equilibrium framework to facilitate the negotiation of trade policy options for Croatia. We evaluate the effects on Croatia of various regional trading arrangements which involve some unilateral trade liberalization along with those which also offer the benefits of access to foreign markets.

5) Economic Forecasting: Past, Present & Future, ***Jesse L. Miller***, School of Mines, 6732 West Coal Mine Ave., Littleton, CO 80123, chaotic.flash.net

Economists continue to predict market trends. To only predict trends is insufficient, it is necessary to determine prediction precision. We review prediction methods past and present. Additionally, we present new methods for predicting bounded market trends that provide time horizons of specific

accuracies. Examples exploit stock market data.

TA46 Data Envelopment Analysis II

Cluster: DEA
Invited Session
Chair: Timothy R. Anderson, Portland State University, Eng. & Tech. Mgmt. Dept., Portland, OR 97207-0751, tima@emp.pdx.edu

1) Organizational Flexibility: A General Model & Application, ***Fred Phillips***, Oregon Graduate Institute of Science & Technology, MST Dept., 2000 NW Walker Rd., Beaverton, OR 97006, fphillips@admin.ogi.edu, ***Gary Summers***

A general model of organizational flexibility was set forth by Phillips & Tuladhar (1998). This DEA-like model is based on a principle of "requisite variety" rather than efficiency. We use simulated data to advance our understanding of this model and how it complements DEA of the firm.

2) Using DEA to Improve the Management of Congestion in Chinese Industries, 1981 - 1997, ***William W. Cooper***, University of Texas, Dept. of MSIS, MC B6500, Austin, TX 78712, cooperw@mail.utexas.edu, ***Honghui Deng***, ***Bisheng Gu***, ***Shanling Li***, ***R. M. Thrall***

Congestion is said to be present when increases in inputs result in output reductions. An "iron rice bowl" policy instituted in China shortly after the revolution led by Mao Tse Tung resulted in congestion that ultimately led to bankruptcy in the textile industry, and near bankruptcy in other industries. A shift away from the "iron bowl policy" in 1990 led to massive layoffs...

3) An Evaluation of Construction Contracting Methods using DEA, ***Gerald H. Williams***, Portland State University, Eng. & Tech. Mgmt. Dept., Portland, OR 97207-0751, ***Timothy R. Anderson***

We present preliminary results of a study designed to evaluate construction project delivery systems used in the public building sector in Oregon between 1986 and 1998. We use DEA to assess the success of the State's approach to construction procurement.

4) The DEA Dataset Repository, ***Timothy R. Anderson***, Portland State University, Eng. & Tech. Mgmt. Dept., Portland, OR 97207-0751, tima@emp.pdx.edu, ***Keith B. Hollingsworth***, ***Paul P. Rouse***

A web-based database system has been developed for the archiving and dissemination of DEA datasets. This site, http://java.emp.pdx.edu/etm/dea/dataset/ can be used for teaching, research and software testing. We will provide an introduction to the system and invite feedback on meeting user needs.

TA47 Software Demonstration VI

Software Demo Session
Chair: Robert H. Clark
, roclark@us.ibm.com

1) OSL Version 3, ***Robert H. Clark***, IBM, roclark@us.ibm.com

IBM will demonstrate the enhanced performance and usability of OSL Version 3. The demonstration will include a vehicle routing application and integration of the optimization technology with spatial modeling techniques.

Tuesday 10:00-11:00

TO44 Omega Rho Distinguished Lecture: The World is Coming our Way: OR/MS Opportunities in E-Commerce

Plenary Session
Chair: David F. Rogers, University of Cincinnati, Dept. of QAOM, CBA, PO Box 210130, Cincinnati, OH 45221-0130, david.rogers@uc.edu

1) Omega Rho Distinguished Lecture: The World is Coming Our Way: OR/MS Opportunities in E-Commerce, ***John D. C. Little***, MIT, Sloan Sch., Rm. E56-308, Cambridge, MA 02142

In the early days of OR/MS, the biggest challenge frequently was to gain managerial acceptance of models. While this issue has not exactly disappeared, a new technology has appeared on the scene. Today, increasing numbers of business transactions are moving to the Internet, where, by necessity, many of the decisions must be pre-programmed into web software as algorithms and rules. This is a world made to order for OR/MS. Opportunities exist for models, optimization and construction of decision rules in a host of new applications. These include such diverse areas as supply chain management, manufacturing, customer service, e-tailer system design, pricing, advertising, web congestion control and more. We examine several of these, especially focusing on applications in marketing. The future appears rich with opportunities and we brush caution aside to speculate about a few of them. If OR/MS does not pick up the challenge of providing models for the new era, other fields will!

Tuesday 13:00-14:30

TC01 Environmental Applications of Decision Analysis

Sponsor: Decision Analysis Society
Sponsored Session
Chair: Kara M. Morgan, Research Triangle Institute, 1516 M St. NW, Ste. 740, Washington, DC 20036, kmorgan@rti.org

1) Value of Information on Lower Trophic Level Uncertainties for Lake Erie Fisheries Management, ***Benjamin F. Hobbs***, JHU, 313 Ames Hall, DOGEE, 3400 North Charles St., Baltimore, MD 21218, bhobbs@jhu.edu, ***Jong Bum Kim***, ***Joseph F. Koonce***, ***Ana B. Looci***, ***Richard D. Anderson***

The recent zebra mussel invasion has magnified uncertainties concerning phosphorus and energy flows into the management of Lake Erie's fisheries. Probabilities and multicriteria weights were elicited from experts from the Great Lakes Fisheries Commission, who then evaluated the expected value of information from research programs designed to reduce those uncertainties.

2) Stakeholder Goals for Water Quality Cleanup: Using Decision Analysis Tools to Help Articulate Public Values, ***Lynn A. Maguire***, Duke University, Sch. of the Environment, Box 90328, Durham, NC 27708-0328, lmaguire@duke.edu

The Neuse River suffers from nitrogen pollution and a modeling effort has been initiated to guide water quality regulations. To ensure that the models produce output meaningful to the public and decision makers, we elicited goals for river restoration from stakeholders. These fell into 4 substantive categories: biophysical, cultural, economic and recreation/health and 3 procedural categories: citizen involvement, fairness and balance...

3) Selecting a Remedial Action for a DNAPL Site, ***Karen Jenni***, GeoMatrix Consultants, Inc., 2101 Webster St., 12th Floor, Oakland, CA 94612

We will describe a multiple-stakeholder, multiple-objective decision analysis approach used to select a preferred cleanup alternative for a large site contaminated with DNAPL. Parties to the process included the responsible parties, the regulatory agency and a developer with plans to build on the site.

4) Understanding How Data Quality Impacts Decision Quality: Focus on Environmental Measurement Data, ***Kara M. Morgan***, Research Triangle Institute, 1516 M St. NW, Ste. 740, Washington, DC 20036, kmorgan@rti.org, ***Malcolm J. Bertoni***

Science-based decision-making is grounded in theory, follows accepted methodologies and uses good data. The link between data quality and the decision is not always clear, especially to those doing the data collection. We present a proposed framework for understanding and communicating how data quality can (and should) impact the decision-making process.

TC02 DEA I

Contributed Session
Chair: Randal J. Zimmerman, TRADOC Analysis Center, 4100 Grand Ave., Leavenworth, KS 66048, rzimmerm@waldenu.edu, zimmermr@trac.army.mil

1) Efficiency Measurements & Classification of Indian Nationalized Banks, ***Raghu N. Sengupta***, Indian Institute of Management Calcutta, FPM Office, PO 16757 Alipore, DH Rd via Joka, Calcutta West Bengal, 700 027, India, raghu@iimcal.ac.in, 206.103.11.34/community/ehomestudent.asp?ID=628

The Indian banking scenario after financial liberalization is undergoing significant changes. The government, which is the majority stakeholder of nationalized banks, must apply efficiency measurements and classification techniques for formulating comprehensive strategies. We attempt to measure relative efficiencies and classify banks using DEA and MDA.

2) The Weighted Priority Weights in DEA Approach, ***Tae-Sung Kim***, Louisiana State University, 910 Ridgepoint Ct., #95, Baton Rouge, LA 70810, mangho@hotmail.com, ***Thomas G. Ray***

The AHP is a procedure that can only consider relative priorities as estimated by decision-makers. A DEA model is a data-oriented approach for evaluating the relative efficiency of a group of entities referred to as DMUs. We integrate and combine positive aspects of AHP's estimated qualitative data and DEA's quantitative data.

3) Benchmarking the Efficiency of Government Warehouse Operations: A Data Envelopment Analysis Approach, ***Randal J.***

Zimmerman, TRADOC Analysis Center, 4100 Grand Ave., Leavenworth, KS 66048, rzimmerm@waldenu.edu, zimmermr@trac.army.mil, ***Ruth A. Maurer***, ***William F. Bowlin***

We benchmark the performance of 18 Defense Logistics Agency supply warehouses located within the contiguous US using a mathematical programming tool, DEA. Contrary to previous studies, this study concluded that less automated warehouses are more efficient than warehouses with higher levels of automation and that larger warehouses are more efficient than smaller warehouses.

4) Extending Data Envelopment Analysis to Manage Rapid Productivity Improvement in High-Technology Production Systems, ***David W. Moore***, University of California, Dept. of IEOR, 4135 Etcheverry Hall, Berkeley, CA 94720, davidm@ieor.berkeley.edu

We develop a non-parametric theory of productive efficiency for detailed data. The data may derive from sensors measuring performance of system components. System input and output sets obtain additional structure compared to traditional DEA models, leading to new production models and modes of efficiency analysis useful for improving system productivity.

TC03 Service Delivery Channel Design & Management

Sponsor: MSOM
Sponsored Session
Chair: Zeynep Aksin Karaesmen, INSEAD, Blvd. de Constance, Fontainebleau Cedex, 77305, France, zeynep.aksin@insead.fr

1) Performance Evaluation of Call Centers using the Erlang Formulas, ***Jerome Talim***, Vrije Universiteit, Fac. of Math & Comp. Sci., de Boolelaan 1081A, Amsterdam, 1081 HV, The Netherlands, jtalim@cs.vu.nl, ***Ger M. Koole***

We focus on the efficiency of Erlang formulas as an approximation of the performance of call centers with non-homogeneous Poisson arrivals, general homogeneous service times, and a time-varying workforce. Using simulations we derive rules of thumb for the use of the Erlang formulas.

2) Customer Loyalty & the Use of Customer Information Systems, ***Noah F. Gans***, University of Pennsylvania, OPIM Dept., The Wharton School, Philadelphia, PA 19104-6366, gans@wharton.upenn.edu

A customer's history with a service supplier influences his or her future purchase decisions, and customer information systems promise to capture that history and help suppliers do a better job of serving customers. We develop and analyze a simple model of such a system.

3) Distribution Channel Design in Insurance, ***Avi Giloni***, Yeshiva University, Syms Sch. of Bus., 500 185th St., New York, NY 10033, agiloni@ymail.yu.edu, ***Sridhar Seshadri***, ***Pasumarti V. Kamesam***

Several factors are making insurance firms rethink their distribution strategies. Determining the mix and intensity of channels is one of the uppermost questions in the minds of executives. We present and discuss a normative framework for determining the mix and the intensity of channels in this industry.

4) A Design for Alternative Delivery Channel Integration, ***Zeynep Aksin Karaesmen***, INSEAD, Blvd. de Constance, Fontainebleau Cedex, 77305, France, zeynep.aksin@insead.fr

The issue of integrating service delivery through alternative delivery channels, i.e., telephone, web, etc., in retail banking is addressed. A model is proposed to compare different integration schemes that use pricing and service level differentiation mechanisms. The customers' response to service delivery decisions in these channels are explicitly modeled.

TC04 Joint Forecasting in Supply Channels

Sponsor: MSOM
Sponsored Session
Chair: Yossi Aviv, Washington University, Olin Sch. of Bus., One Brookings Dr., CB 1133, St. Louis, MO 63141, aviv@olin.wustl.edu

1) Utilizing Forecast Band Refinement for Capacitated Production Planning, ***Philip M. Kaminsky***, University of California, IE/OR Dept., MC 1777, Berkeley, kaminsky@ieor.berkeley.edu, ieor.berkeley.edu/~kaminsky, ***Jayashankar Swaminathan***

In many industrial settings, marketing personnel can make more accurate demand estimates for a particular period, as the period gets closer. We consider a model for a single product under limited production capacity and develop exact and heuristic approaches for production planning which account for successive forecast evolution.

2) Selling to the Newsvendor: The Impact of Subjective Forecasts, ***Beril L. Toktay***, INSEAD, Boulevard de Constance, Fontainebleau Cedex, 77305, France, beril.toktay@insead.fr

We consider a 2-tier supply chain where each party has a subjective assessment of end-item demand. We analyze the impact of divergent forecasts on supplier, retailer and supply chain performance in the coordinated and decentralized information sharing and capacity planning settings.

3) The Value of Information Sharing in a Two-Stage Supply Chain with Production Capacity Constraints, ***David Simchi-Levi***, MIT, Dept. of Civil & Environ. Eng., 77 Massachusetts Ave. Rm. 1171, Cambridge, MA 02139, dslevi@mit.edu, ***Yao Zhao***

We consider a simple two-stage supply chain with a single retailer facing i.i.d. demand and a single manufacturer with a finite production capacity. We analyze the value of continuous information sharing in a finite time horizon scenario.

4) Joint Forecasting & Capacity Planning Processes in Supply Chains, ***Yossi Aviv***, Washington University, Olin Sch. of Bus., One Brookings Dr., CB 1133, St. Louis, MO 63141, aviv@olin.wustl.edu

Recent work has shown that collaborative forecasting planning and replenishment may contribute significantly to the performance of supply chains. In this work I will add a new important dimension to the analysis of such collaborative processes: joint capacity planning.

TC05 Tutorial: Some Mathematical Models of Cancer Treatment

Sponsor: Applied Probability Society
Sponsored Session
Chair: Lawrence M. Wein, MIT, Sloan Sch. of Mgmt., Cambridge, MA 02142, lwein@mit.edu

1) Tutorial: Some Mathematical Models of Cancer Treatment, ***Lawrence M. Wein***, MIT, Sloan Sch. of Mgmt., Cambridge, MA 02142, lwein@mit.edu

This tutorial will describe several (about 5) mathematical problems concerning the analysis, design and/or control of traditional (chemotherapy, radiation, surgery) and novel (gene therapy, angiogenesis inhibitors) cancer therapies. We will omit most of the mathematical details and instead focus on the biological aspects of the model formulations and the insights from our analyses.

TC06 Dynamic Transportation Modeling

Sponsor: Transportation Science Section
Sponsored Session
Chair: Athanasis Ziliaskopoulos, Northwestern University, Dept. of Civil Eng., 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, a-z@trans.civil.nwu.edu

1) Analyzing Traffic System Trancience under Different Driver Behavioral Rules, ***Raghubhushan Pasupathy***, Purdue University, Sch. of Civil Eng., 1284 Civil Eng. Bldg., West Lafayette, IN 47907-1284, ***Srinivas Peeta***

Most traditional traffic assignment models or associated applications assume that the link flows in a network are at or near their user equilibrium values. The validity of this assumption is analyzed by studying the evolution of a simple network starting from random initial states. A multi-agent system approach is used to analyze system transience under different driver behavioral rules.

2) A Mixed Meso/Microscopic Framework for Traffic Simulation, ***S. Travis Waller***, Northwestern University, Dept. of Civ. Eng., 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, travis@trans.civil.nwu.edu, ***Athanasis Ziliaskopoulos***, ***Huajing Shi***

A simulation framework known as RouteSim is presented that allows for the inclusion of multiple link-dependent traffic flow models. Design principles will be discussed as well as analytical properties such as shockwave propagation. Numerical comparisons on large networks will be presented in order to gain insight into the impact of aggregation within traffic simulation and the interaction between meso- and microscopic links.

3) A Fuzzy Model for Enroute Driver Diversion Behavior, ***Jeong Whon Yu***, Purdue University, Sch. of Civ. Eng., 1284 Civil Eng. Bldg., West Lafayette, IN 47907-1284, ***Srinivas Peeta***

A fuzzy model is developed for stated preference survey data on driver response under variable message signs in the context of route guidance. The structure of the membership functions and the weights of the fuzzy rules are estimated using the fuzzy inference scheme. The parameter calibration is based on real data and an efficient learning scheme.

TC07 Using Visual Basic to Teach OR/MS: Beyond Spreadsheets

Sponsor: INFORM-ED
Sponsored Session
Chair: Salwa Ammar, Le Moyne College, Dept. of Bus. Admin., Syracuse, NY 13214, ammars@palm.lemoyne.edu

1) Including Visual Basic Applications in Introductory Quantitative Methods Courses, *Ronald H. Wright*, Le Moyne College, Dept. of Bus. Admin., Syracuse, NY 13214-1399, wright@palm.lemoyne.edu

The use of spreadsheets is accepted as an excellent way to enhance students' ability to learn. VBA offers the next opportunity to use accessible tools to challenge and engage students. We demonstrate how we introduce VBA to students without assuming any prior programming experience.

2) Using Visual Basic Applications for Teaching Decision Support Systems, *Christopher W. Zobel*, Virginia Polytechnic Institute & State University, Dept. of MS & IT, Blacksburg, VA 24061-0235, czobel@vt.edu, ***Cliff T. Ragsdale, Loren Rees***

VBA and Microsoft Excel are used at Virginia Tech to teach a core-level MBA course on the design and implementation of computer-based DSSs. The inherent functionality and relative familiarity of these development tools allows students from varying technical backgrounds to build systems that effectively support managerial decision-making.

3) A Visual Basic Applications Simulator to Motivate Learning of Revenue Management Concepts, *Roger B. Grinde*, University of New Hampshire, Sch. of Bus. & Economics, Durham, NH 03824, roger.grinde@unh.edu

Revenue management is among the most significant OR/MS applications in terms of dollar impact to organizations. With increased electronic capture of the inquiry and buying process, along with dynamic and/or multiple-pricing practices, a basic understanding of revenue management in increasingly important for business-school graduates. A spreadsheet-based VBA simulator, coupled with an experiential exercise, has been developed...

4) Visual Basic Applications: Beyond Spreadsheets in POM, *Salwa Ammar*, Le Moyne College, Dept. of Bus. Admin., Syracuse, NY 13214, ammars@palm.lemoyne.edu

A major part of the introductory POM course is the section on planning and inventory control. We will include a VBA module used to present a comprehensive overview that links the various topics in this section. The module enhances student's understanding and appreciation of the subject.

TC08 ERP Requirements Definition in a Complex Environment

Cluster: E-Business/Enterprise Integration: Intl. Bus. Perspectives
Invited Session
Chair: Rainer Sommer, George Mason University, Policy Analysis Ctr., MS 2E4, Fairfax, VA 22030-4444, rsommer@gmu.edu

1) ERP in a Complex Environment, *George Blick*, Condor Technology Solutions, Inc., 2745 Hartland Rd., Falls Church, VA 22043, gblick@fcc1.com

We describe the ERP environment: Naval Air Systems Command. Issues discussed are the implementation scope, the timeline and the complex process owner environment. The selection procedures for the standard software solution and the implementation consultants are also discussed. The complexities of integrating multiple pilot projects are also discussed.

2) ERP Planning & Requirements Definition in a Complex Environment, *Thomas R. Gulledge*, George Mason University, Public Policy Ctr., MS 2E4, Fairfax, VA 22030-4444, gulledge@gmu.edu

This presentation describes the methodology used for ERP planning and requirements definition at Naval Air Systems Command. It includes discussions of strategic planning, master planning, procedural model development and object-linked documentation of business processes, organization, data and legacy systems. The linking of planning objectives to the models is also discussed.

3) ERP Requirements Models for a Complex Environment, *Rainer Sommer*, George Mason University, Policy Analysis Ctr., MS 2E4, Fairfax, VA 22030-4444, rsommer@gmu.edu

We present the requirements definition-level models that were developed for NAVAIR. We include a description of the methodology that was selected, the supporting toolset and a presentation of the actual models. Details of the interviewing process are also provided.

TC09 Military Applications II

Contributed Session
Chair: E. L. Perry, TASC, Inc., 4130 Carmichael Rd., Montgomery, AL 36106, elperry@tasc.com

1) Goal Programming & Military Application: Improving False-Alarm Ratio by Optimally Reducing Number of Target Representations in ATR Systems, *Dalton S. Rosario*, US Army Research Laboratory, 2800 Powder Mill Rd., Adelphi, MD 20783, rosario@math.umd.edu, ***Saul I. Gass***

An outstanding problem in the target recognition community is FA reduction. The variability in target radar signatures requires multiple templates to achieve robustness. The problem arises when attempting to balance number of templates, target id and FA. An LP model and results will be shown for this problem.

2) Performance Measurement for the Navy Marine Corps Intranet, *Edward J. Schmitz*, Department of the Navy, 9405 Wareham Ct., Vienna, VA 22180, schmitz.ed@hq.navy.mil

As large organizations have pursued outsourcing their basic IT services, management has developed a need for enterprise-wide performance measures to assure IT is providing value. We describe the design of a performance measurement system for the Navy Marine Corps Intranet.

3) Movement Algorithms for Constructive Simulation, *E. L. Perry*, TASC, Inc., 4130 Carmichael Rd., Montgomery, AL 36106, elperry@tasc.com

We compare movement algorithms used in several constructive warfare simulations including THUNDER, JTLS and ACES. Both air and ground movement are considered. A new movement algorithm based on tabu search is then proposed.

TC10 Scheduling & Dynamic Programming

Cluster: Scheduling
Invited Session
Chair: Xiaoqiang Cai, Chinese University of Hong Kong, Dept. of SE/EM, Hong Kong, Shatin NT, Hong Kong, xqcai@se.cuhk.edu.hk

1) Design & Development of a Decision Support System for Scheduling Operations in Iron Ore Mining, *Jim E. Everett*, University of Western Australia, Dept. of Info. Mgmt., Nedlands, Perth, WA 6009, Australia, jeverett@ecel.uwa.edu.au, http://www.imm.ecel.uwa.edu.au/je

Iron ore is mined, railed to a port and shipped to the customer. The quality of shipped product depends upon the uniformity of composition, not just in iron but also in several other elements. Quality can be controlled by scheduling the sequence in which mine faces are mined, by putting ore to an from stockpiles at the mine...

2) New Approaches to the Completion Time Variance Problem, *Xiaoqiang Cai*, Chinese University of Hong Kong, Dept. of SE/EM, Hong Kong, Shatin NT, Hong Kong, xqcai@se.cuhk.edu.hk, ***Wenci Yu, Shuzhong Zhang***

The completion time variance problem is to schedule jobs to minimize their completion time variance. We will study this problem from a different perspective. New results will be presented and some of the known results will be shown in an easier way.

3) New Dynamic Programming Algorithms for Single Machine E/T Scheduling Problems, *Tu Fengsheng*, Nankai University, Dept. of Comp. & System Sci., Tianjin, China, tufs@sun.nankai.edu.cn

We consider E/T scheduling problems with a common due date, which are usually solved in the literature with some sort of agreeable conditions. We observe that if we regard the common due date d as a variable, the objective function of the optimal solution is a function F(d). It can be easily shown that F(d) is a piecewise-linear function...

4) A Hybrid Algorithm for Dynamic Layout, *Jaydeep Balakrishnan*, University of Calgary, Faculty of Mgmt., Calgary, Alberta, T2N 1N4, Canada, balakris@mgmt.ucalgary.ca, ***Chun Hung Cheng, Chun Ming Lau, Daniel G. Conway***

The dynamic plant layout problem (DPLP) deals with multi-period layout plans; thus, it is an extension of the quadratic assignment model for the static plant layout problem (SPLP). Although an optimal solution method based on DP is available, it is not applicable for large DPLPs. It has recently been shown that heuristics based on GAs can solve large DPLPs. We extend and improve the use of GAs by creating a hybrid algorithm.

TC11 Applications of Mixed-Integer Programming

Cluster: Integer Programming
Invited Session

Chair: Ismael R. de Farias, Jr., SUNY, Dept. of IE, 403 Bell Hall, Buffalo, NY 14260-2050, defarias@buffalo.edu

1) Airline Crew Scheduling under Uncertainty, ***Andrew Schaeffer***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332, schaeffer@isye.gatech.edu, ***Ellis L. Johnson***, ***Anton J. Kleywegt***, ***George L. Nemhauser***

State-of-the-art crew schedules assume that every flight will operate as planned. Such a schedule may not be optimal in operations when it when it is subject to disruptions. We give alternative measures of the quality of a crew schedule and investigate methods for finding crew schedules that perform well in operations.

2) A Branch & Cut Algorithm for Multicommodity Unsplittable Flow Network Design Problems, ***Alper Atamturk***, University of California, Dept. of IEOR, 4175 Etcheverry Hall, Berkeley, CA 94720-1777, atamturk@ieor.berkeley.edu, ***Deepak Rajan***

We describe valid inequalities based on arc and cut sets of a multicommodity unsplittable flow network design problem. We discuss separation and lifting problems related to these inequalities and we present a summary of computational experiments on solving the network design problem with a B&C algorithm.

3) Reduced Costs for Set Partitioning Problems: Theoretical & Computational Aspects of a Subadditive Dual Approach, ***Diego Klabjan***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, klabjan@uiuc.edu, ***Ellis L. Johnson***

We present a new algorithm for computing an optimal subadditive function for set partitioning. We show how to warm start the algorithm by using cliques and how to handle preprocessing. By using subadditive functions we generalize the SPRINT approach to integer programs. We present computational results for small to medium size instances.

4) A Polyhedral Approach to the p-Median Problem, ***Ismael R. de Farias, Jr.***, SUNY, Dept. of IE, 403 Bell Hall, Buffalo, NY 14260-2050, defarias@buffalo.edu

We present 3 nontrivial facet-defining inequalities for the uncapacitated p-median polytope and a family of strong inequalities for the capacitated p-median polytope. We incorporate the inequalities in a B&C scheme and we report computational results that demonstrate their effectiveness.

TC12 Information Technology & Supply Chains

Cluster: Logistics & Supply Chain Management
Invited Session

Chair: Robert B. Robinson, Wilfrid Laurier University, Sch. of Bus. & Economics, Waterloo, Ontario, N2L 3C5, Canada, rrobins@wlu.edu

1) Logistics Information Systems used in the Supply Chain, ***Brian J. Gibson***, Auburn University, ***Craig M. Gustin***, ***Stephen M. Rutner***

As supply chains continue to grow, there is a growing dependence on the integration of timely and accurate information. The LIS is becoming an important part of any successful supply chain. Companies must identify the appropriate LIS tools and software to provide solutions and information to customers. Furthermore, members of the supply chain must be able to integrate the data to their partners.

2) The Use of Electronic Data Interchange & Supply Chain Management in the Food Industry, ***Craig A. Hill***, Georgia State University, Robinson Sch. of Bus., Atlanta, GA 30302-4014, ***Gary D. Scudder***

An interorganizational information system, such as EDI, is an enabling technology that is used for the development of supply chain management. Data from the food industry is used to analyze the relationships between EDI use, interfirm coordination activities, the firm's demographics and perceived achievement on performance measures.

3) withdrawn - author request of 10/2, ***Robert B. Robinson***, Wilfrid Laurier University, Sch. of Bus. & Economics, Waterloo, Ontario, N2L 3C5, Canada, rrobins@wlu.edu

TC13 Data Mining & Optimization of Supply Chains

Cluster: Manufacturing & Logistics
Invited Session

Chair: Peter B. Luh, University of Connecticut, Dept. of Elect. & Systems Eng., 260 Glenbrook Rd., Storrs, CT 06269-2157, luh@engr.uconn.edu

1) Data Mining in Supply Chains, ***Andrew Kusiak***, University of Iowa, Intelligent Systems Lab., 4132 Seamans Ctr., Iowa City, IA 52242-1527

Supply chain has created enormous potential for applications of innovative tools, including data mining. An overview of data mining models, algorithms, and software tools is presented. Applications of data mining of benefits to supply chain are discussed.

2) A Price-Based Approach for the Effective Coordination of Supply Chain Activities, ***Haoxun Chen***, University of Connecticut, Dept. of Elect. & Systems Eng., 260 Glenbrook Rd., Storrs, CT 06269-2157, ***Peter B. Luh***

The coordination of activities across supply chains is critical for an enterprise to quickly respond to changing markets. An optimization-based coordination approach is presented, where each organization makes its decisions based on the prices associated with inter-organization constraints and the coordination among organizations is performed through a distributed and asynchronous price adjustment mechanism for global near-optimal performance.

3) An Optimal Solution to the Generalized Procurement Problem, ***N. Viswanadham***, National University of Singapore, Mech. & Production Eng., Singapore, Singapore, mpenv@nus.edu.sg, ***V. Subramanian***, ***Roshan Gaonkar***

We consider a virtual broker with complete and perfect information about the customers (location and demands), assemblers (location, capabilities, capacities, cost), first tier suppliers (location, subassemblies supplied, capacities, cost), second tier suppliers, and the third party logistics providers. The problem is to identify the optimal procurement schedule - what to procure from whom and for whom...

4) withdrawn - author request of 10/10, ***Appa Iyer Sivakumar***, Gintic Institute of Manufacturing Technology, 71 Nanyang Dr., Singapore, 637075, Singapore, ***N. Viswanadham***

TC14 Tutorial: Modern Experimental Design II: Parameter Design for Variation Reduction & Quality Improvement

Invited Session

Chair: C. F. Jeff Wu, University of Michigan, Dept. of Stats. & IOE, Ann Arbor, MI 48109-1285, jeffwu@umich.edu

1) Tutorial: Modern Experimental Design II - Parameter Design for Varation Reduction & Quality Improvement, ***C. F. Jeff Wu***, University of Michigan, Dept. of Stats. & IOE, Ann Arbor, MI 48109-1285, jeffwu@umich.edu

It was proposed (Genichi Taguchi) as an off-line approach to variation reduction and quality improvement. We will discuss the motivation and tools developed in the last decade including planning techniques(cross arrays and single arrays) and modeling techniques (location-dispersion and response modeling). Real experiments are used for illustration.

TC15 Supply Chain Management II

Contributed Session

Chair: Ioannis S. Papadakis, University of British Columbia, 2053 Main Mall, HA 459, Vancouver, BC, V6T 1Z2, Canada, ioannis.papadakis@commerce.ubc.ca

1) withdrawn - author request of 10/13, ***Yu Zhenxin***, Hong Kong Polytechnic University, Dept. of Mgmt., Hong Kong, Hong Kong, 98900411r@polyu.edu.hk

2) Ordering Policies & Supply Chains Structure in the Food Industry, ***Vincent Hovelaque***, ENSAR, Dept. Economie Rurale Gestion, 65 rue de Saint Brieuc, Rennes, 35042, France, vincent.hovelaque@agrorennes.educagri.fr, ***Louis Georges Soler***, ***Severine Gaucher***

We present a model to analyze the ordering policies between 2 firms: A supplies B with raw materials and sells products on the final market; B gets raw materials from A and from another supplier and sells products on the market, too. We propose an application to the food sector.

3) Avoiding the Bullwhip Effect, ***Jeroen Dejonckheere***, Catholic University of Leuven, Naamsestraat 69, Leuven, 3000, Belgium, jeroen.dejonckheere@econ.kuleuven.ac.be, ***Marc R. Lambrecht***

Order-up-to policies are well known to create bullwhip. We present a general decision rule, of which order-up-to is a special case, that allows to avoid

bullwhip by generating smoothed order patterns, and the degree of smoothing can be chosen by the decision maker. The methodology is based on control engineering insights.

4) On the Differential Exposure of Personal Computer Supply Chains to Earthquake Risk, ***Ioannis S. Papadakis***, University of British Columbia, 2053 Main Mall, HA 459, Vancouver, BC, V6T 1Z2, Canada, ioannis.papadakis@commerce.ubc.ca

The 1999 earthquake-induced price increase of computer memories affected mainly negative cash-to-cash cycle producers, such as Dell. According to recent supply chain management theories, this is not surprising. Time series analysis of stock prices is employed to verify that Dell's unexpected shortfall in earnings had an impact on its stock value.

TC16 Group Aggregation in AHP

Cluster: MCDM
Invited Session
Chair: Gordon C. McMeekin, PO Box 6007, Plymouth, MI 48170

1) Golden Rule Power Relations in AHP-Based Group Aggregation, ***Gordon C. McMeekin***, PO Box 6007, Plymouth, MI 48170

Voting and negotiation are the traditional methods for aggregating the opinions of group decision makers. AHP uses ratio scale judgment data and the geometric mean to synthesize group member input and is better suited to model the negotiation process than voting. The dynamic golden rule negotiating ethic is presented.

2) A Numerical Example of the AHP Driven Linear Programming Algorithm, ***Gordon C. McMeekin***, PO Box 6007, Plymouth, MI 48170

The simplex LP algorithm employs a parallelogram rule to determine the optimal use of limited resources at minimum cost. Interior LP central path algorithms employ an ellipsoidal rule. The use of explicit AHP weights and the ellipsoidal rule leads to an AHP driven algorithm that includes the simplex and ellipsoidal algorithms as special cases.

TC17 Transportation Forecasting

Cluster: Forecasting
Invited Session
Chair: Kenneth D. Lawrence, NJIT, School of Mgmt., Newark, NJ 07102, lawrence@tesla.njit.edu

1) Development of a Decision Support System to Assist in Forecasting Freight Flow Within & Between States, ***Kenneth D. Lawrence***, NJIT, School of Mgmt., Newark, NJ 07102, lawrence@tesla.njit.edu, ***Gary B. Kleinman***

We report on the development and construction of a freight flow forecasting DSS. Having such a DSS is important in that it will enable transportation decision-makers to decide on where to spend scarce road building and road upgrading funds.

2) Improved Forecasting Accuracy from Unconstrained Demand Estimates, ***Richard H. Zeni***, US Airways, Revenue Mgmt., Arlington, VA, rick_zeni@usairways.com

The historical data that represents demand for transportation is often censored by some capacity constraint. We show how to improve forecast accuracy by estimating the true demand from censored observations. Several methods for unconstraining the demand estimates have been tested and compared using airline data.

3) A Sales & Operations Planning Decision Support System for the Freight Service Business, ***Timothy Elkins***, Rutgers University, Newark, NJ 07102, ***Kenneth D. Lawrence***

A sales and operations planning DSS is developed for the freight service industry. The system includes an appropriate forecasting scheme, which takes into account seasonality, the size of packages and route loads. This forecast is used for capacity planning, which encompasses staffing, equipment and space.

4) GIS-Based Travel Demand Forecasting, ***Maria P. Boile***, Lafayette College, Dept. of Civil & Environ. Eng., Easton, PA 18042, boilem@lafayette.edu, ***Michael Haynes***, ***Steven Sivak***

A GIS-based model for the analysis and evaluation of combined passenger and freight movements on regional transportation networks is presented. The model predicts traffic volumes and travel costs and may be used to evaluate various policies. The model visually displays the results for easy interpretation and fast comparison of various policy options.

TC18 E-Commerce I

Contributed Session
Chair: Markus Biehl, York University, Schulich Sch. of Bus., 4700 Keele St., Toronto, Ontario, M3J 1P3, Canada, markus.biehl@gmx.net

1) Designing E-Service Operations for Customer Contact, ***Craig M. Froehle***, University of North Carolina, 202 Brookgreen Dr., Chapel Hill, NC 27599-3490, froehlec@bschool.unc.edu, ***Aleda V. Roth***

We examine how customer contact processes should be designed for e-services. A structural equation model is formulated to examine how several service process design parameters associated with computer-mediated communication influence customers' beliefs, attitudes and intentions. The model is founded upon Chase's customer contact theory and the theory of reasoned action.

2) Adjusting Development Capabilities for E-Business: From Information Systems to Product & Service Innovation, ***Stephane Gagnon***, University of Quebec/McGill University, 315 rue Ste. Catherine Est, Local R-2550, CP 6192, Montreal, Quebec, H2S 2G9, Canada, gagnon.stephane@uquam.ca, http://www.er.uquam.ca/nobel/d125030

We build on 3 case studies to demonstrate that firms developing new solutions for e-business are moving away from information systems practices towards a product and service innovation approach. Key results contribute to new methods to reinvent offerings and value propositions, new hybrid development processes and new product portfolio management techniques.

3) The Impact of Business-to-Business Exchanges on Supply Chain Management, ***Markus Biehl***, York University, Schulich Sch. of Bus., 4700 Keele St., Toronto, Ontario, M3J 1P3, Canada, markus.biehl@gmx.net, ***David A. Johnston***

The use of e-commerce exchanges promises improved efficiencies and reduced costs in supply chains. We use mathematical modeling techniques to determine what types of B2B exchanges benefit suppliers vs. purchasers. We seek to explain the market structure and operational implications of B2B exchanges for supply chain management.

TC19 OR Models in Industry

Contributed Session
Chair: Alexis Takvorian, Dell Computer Corporation, Worldwide Operational Strategy, One Dell Way, Round Rock, TX 78682, alexis_takvorian@dell.com

1) Supply Chain Production Planning using Linear Optimization, ***Javad Ahmadi***, Advanced Micro Devices, 5204 W. Ben White Blvd., Austin, TX 78741, javad.ahmadi@amd.com

We describe the formulation and creation of an enterprise-wide global production planning system for the semiconductor industry using linear optimization as the core planning technology. Its objective is to generate production plans on a weekly or daily basis which are optimized to maximize customer service and cash flow in response to a prioritized statement of demand.

2) Lean Manufacturing & Mixed Model Production, ***Reza Ziai***, Applied Materials, 3100 Alvin Devane Blvd., Austin, TX 78741, r_ziai@yahoo.com

The high demand in the semiconductor technology field has created many challenges, especially with increasing demand in mixed model production. The lean manufacturing scheme has proven to be an effective method to keep the costs down and quality high. Our approach is to collect the needed data, find the commonalties and create the database for the analysis to balance the line incorporating the lean principles.

3) Strategic Planning for Dell's Worldwide Supply Chain, ***Oliver F. Campbell***, Dell Computer Corporation, One Dell Way, Round Rock, TX 78682, oliver_f_campbell@dell.com

Rapid e-commerce growth has a dramatic impact on how strategic operational planning is conducted. We will discuss the process by which Dell Computer Corporation integrates optimization methodologies and cross-functional organizational processes to drive improvements in its worldwide end-to-end supply chain from supplier to customer.

4) A Case Study of the Deployment of Broadband Consumer Services, ***George Kontoravdis***, Veltisto, Inc., 7820 Lakewood Dr., Austin, TX 78750, georgek@veltisto.com, ***Alexis Takvorian***

The rapid adoption of the internet has created a great challenge for telecommunications companies to deploy broadband services in a cost effective and timely fashion. We present some interesting aspects of the efforts of major telcos in dealing with the high resource requirements of broadband consumer

service deployment while keeping a high level of customer satisfaction.

TC20 Strategic Planning II

Contributed Session

Chair: Ronald N. Taylor, Rice University, 358 Baker Hall, MS 533, 6100 Main St., Houston, TX 77005-1892, rtaylor@rice.edu

1) Aligning a Firm's Strategic Goals with its Operational Activities, ***Tayo G. Fabusuyi***, University of Regina, Dept. of Economics, Regina, SK, S4S 0A2, Canada, gbolahan@fabusuyi@mailcity.com, fabusuyg@uregina.ca

We discuss an approach for aligning an organization's activities and resource allocation with its strategic goals. The approach makes use of an integrated planning process executives can employ to conceive and implement a creative and coherent strategy. The idea is to aim for strategic objectives which will be achieved through specific and flexible tactics...

2) E-Commerce Strategies of Turkish Businesses, ***Aysegul Toker***, Bogazici University, Dept. of Mgmt., Istanbul, 80815, Turkey, tokera@boun.edu.tr, ***Joachim Behrendt***

E-commerce is emerging as an increasingly important way for Turkish businesses to reach potential customers. It is commonly believed that e-commerce brings considerable benefits in terms of cost-savings and competitive advantage. We want to find the benefits e-commerce has brought to Turkish companies and questions whether there is a relationship with company strategy and observed benefits.

3) Epidemiology, Strategic Risk & Managers: Implications for Research & Practice, ***James M. Collins***, University of Alaska, Sch. of Mgmt., 201 Bunnell Bldg., Fairbanks, AK 99725, ffjmc@uaf.edu

In recent years, management researchers have demonstrated increased interest in the conceptualization and measurement of risk in a strategic context. This stream of work largely ignores important developments in epidemiology. Epidemiological conceptualizations and measures of risk are explored and their appropriateness to management research and practice evaluated. Examples are presented.

4) Stakeholder Inclusiveness & Creativity in Strategic Planning, ***Ronald N. Taylor***, Rice University, 358 Baker Hall, MS 533, 6100 Main St., Houston, TX 77005-1892, rtaylor@rice.edu

Including various stakeholders in strategic planning has been suggested as a method for improving strategic plans. We explore the influence of stakeholder involvement in strategic planning processes on creativity of strategic plans.

TC21 Location Analysis I

Sponsor: Society on Location Analysis
Sponsored Session

Chair: Rajan Batta, SUNY, Dept. of IE, 342 Bell Hall, North Campus, Buffalo, NY 14260-2050, batta@acsu.buffalo.edu

1) A Threshold-Satisfying Competitive Location Model, ***Tammy Drezner***, California State University, Coll. of Bus. & Economics, Fullerton, CA 92834, tdrezner@fullerton.edu, ***Zvi Drezner***, ***Shogo Shiode***

We introduce a new objective in modeling competitive location decisions, the concept of location to meet a certain pre-specified minimum threshold. We locate a new facility such that the probability that the new facility falls short of the threshold is minimized.

2) A Branch & Cut Algorithm for Median Cycle Problems, ***Martine C. Labbe***, Universite Libre de Bruxelles, Inst. of Stats & OR, CP 210/01, Blvd. du Triomphe, Brussels, B-1050, Belgium, mlabbe@smg.ulb.ac.be, ***Gilbert Laporte***, ***Inmaculada R. Martine***, ***Juan Jose S. Gonzalez***

In the median cycle problem, we determine a simple cycle containing a subset of vertices of a graph while considering 2 types of costs: fixed costs for building the cycle and cost for assigning vertices not on the cycle to vertices of the cycles. Two versions are investigated.

3) Using Genetic Algorithms for the Solution of the Quadratic Assignment Problem, ***Zvi Drezner***, California State University, Dept. of MS/IS, Rm. LH-323G, 800 North State College, Fullerton, CA 92834-9480, zdrezner@fullerton.edu

The QAP is one of the most difficult problems in combinatorial optimization. We devised a GA to solve the QAP and tested it on 27 sample problems ranging in size from 30 to 100 facilities. One version of the GA found the best known solution for all 27 problems.

4) Optimizing the Attraction Levels of Competitive Facilities in Generalized Spatial Interaction Models, ***Oded Berman***, University of Toronto, Rotman Sch. of Mgt., 105 Saint George St., Toronto, Ontario, M5S 3E6, Canada, berman@mgmt.utoronto.ca, ***Robert Aboolian***, ***Dmitry Krass***

In a network capturing market share and expansion where customers' spending is an exponential function of their total utility, we consider 2 models. The first optimizes the location and the size of the competitive facilities simultaneously. The second one optimizes the level of attraction for existing facilities.

TC22 Innovation & Entrepreneurship I

Contributed Session

Chair: Fariborz Damanpour, Rutgers University, Faculty of Mgmt., 111 Washington St., Newark, NJ 07102-3027, fdamanpo@andromeda.rutgers.edu

1) Modeling & Simulation of a Supply Network Enterprise, ***Nong Ye***, Arizona State University, Dept. of IE, Box 875906, Tempe, AZ 85287, nongye@asu.edu, ***Thomas Choi***, ***Kevin Dooley***, ***Jeffery K. Cochran***

We define an enterprise as a complex array of organizations coupled together in a network form for the purpose of creating a value proposition for end consumers. A simulation model of an enterprise can help researchers and practitioners answer important theoretical and practical questions about complex supply network enterprises at relatively low cost and risk...

2) Evaluating Investments in Disruptive Technologies, ***Carlos A. Zozaya-Gorostiza***, ITAM, Rio Hondo #1, Col. Tizapan San Angel, Mexico, DF, 01000, Mexico, zozaya@lamport.rhon.itam.mx, ***Eduardo Schwartz***

A computer simulation model for the valuation of investments in disruptive technologies is developed. The model represents the evolution of a technology from an emerging into a mainstream market using 2 phases in which development costs and net commercialization cash flows are stochastic. The effects of volatilities are discussed.

3) Research on Organizational Innovation: Conceptions, Measures & Inconsistent Results, ***Fariborz Damanpour***, Rutgers University, Faculty of Mgmt., 111 Washington St., Newark, NJ 07102-3027, fdamanpo@andromeda.rutgers.edu

The primary objective of empirical research is to test and develop theory. Theory development, however, requires research that produces comparable results. The results of innovation research have been inconsistent and incompatible. We review conceptions and measures of organizational innovation and suggest a framework for research so that the results become comparable and integrative.

TC23 Bidding: Auctions in Context

Cluster: Bidding
Sponsor: E-Business Section
Invite/Sponsor Session

Chair: Michael H. Rothkopf, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, rothkopf@rutcor.rutgers.edu

1) E-Commerce: Strategic Partnerships vs. Reverse Auctions, ***Barchi Peleg***, Stanford University, Dept. of MS & Eng., Stanford, CA 94305, ***Hau Lee***, ***Warren H. Hausman***

We compare the optimal costs under three procurement strategies: strategic partnership, pure auction and a specific mixed strategy and study the conditions under which each strategy is preferred to the others. For those strategies that use auctions we find the optimal number of potential suppliers to contact, and analyze how this number changes as a function of the cost and demand parameters.

2) Time Use in Oral Auctions, ***Ronald M. Harstad***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, harstad@rutcor.rutgers.edu, ***Michael H. Rothkopf***, ***Vladimir Mares***

A major cost of oral auctions of relatively low value items is the value of the time of the auction participants. We present empirical data on time use across different kinds of oral auctions and on the allocation of time within particular kinds of oral of auctions.

3) Slow Dutch Auctions, ***Michael H. Rothkopf***, Rutgers University, RUTCOR, 640 Bartholomew Rd., Piscataway, NJ 08854-8003, rothkopf@rutcor.rutgers.edu, ***Octavian Carare***

Existing auction theory notwithstanding, in recent controlled experiments comparing Dutch and sealed bid Internet auctions of collectibles, the Dutch auctions produced significantly more revenue. To explain this apparently

anomalous observation, we present a model of slow Dutch auctions in which bidders incur incremental transaction costs for delayed bidding.

4) How to Design Second-Price Combinational Auctions, ***Aleksandar Pekec***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120, pekec@duke.edu

Defining second prizes for the winners in a combinational auction is not straightforward. In fact, any second-prize, combinational auction design free of inconsistencies requires use of sophisticated data aggregation methods. We show that such a design is unique under reasonable conditions.

TC24 Estimation & Prediction Policies for Traffic Management I

Sponsor: Telecommunications Section
Sponsored Session

Chair: Kavitha Chandra, University of Massachusetts, Dept. of Electric & Comp. Eng., 1 University Ave., Lowell, MA 01854, kavitha_chandra@uml.edu

1) Temporal Locality of Reference & its Relationship to Popularity over Multiple Time Scales, ***Azer Bestavros***, Boston University, Dept. of Comp. Sci., 111 Cummington St., MCS 276, Boston, MA 02215, best@bu.edu

The relationship between temporal locality of reference and popularity of Web objects over multiple time scales is established. A new, robust metric that enables accurate delineation between popularity over long- scales and short-time scales is proposed. The performance of a novel Web cache replacement policy (greedydual) which dynamically adjusts the cache's sensitivity to both long- and short-term popularity is presented.

2) How Valuable are Packet Delay Measurements for Traffic Engineering? A Simple & Somewhat Surprising Result, ***A. E. Eckberg***, Lucent Technologies, 101 Crawfords Corner Rd., Rm. 4K-418, Holmdel, NJ 07733, aeckberg@lucent.com

We focus on the problem of measuring total packets, bytes and average packet delay at a link queue over a T-second interval and predict the mean packet delay that would result if the link bandwidth were to be changed. A result that is "counter-intuitive," but has a rational explanation, is that the maximum fractional amount by which the link bandwidth can be reduced...

3) Source Rate Regulation in the Presence of Propagation Delay, ***Charles Thompson***, University of Massachusetts, Dept. of Electric & Comp. Eng., 1 University Ave., Lowell, MA 01854, charles_thompson2@uml.edu, ***J. Davis, P. Zhou, K. Poksawad***

Source rate regulation in the presence of round-trip propagation delay and cross-traffic generated by multiplexed VBR sources at a congested node is examined. In the fluid limit, multiplexed VBR streams are modeled by a threshold autoregressive process. Linear quadratic rate regulation of the source rate based on the nonlinear modulation of buffer occupancy at the congested node is carried out...

4) Optimal Design of SONET Feeder Networks, ***June S. Park***, University of Iowa, Dept. of MS, 108 Pappajohn Bldg., Iowa City, IA 52242-1000, june-park@uiowa.edu, www.biz.uiowa.edu/faculty/jpark/jpark.html, ***Byung Ha Lim, Larry J. LeBlanc***

Telecommunication carriers have actively deployed fiber facilities in the feeder segment of local loop networks. We consider designing unidirectional SONET rings to connect central offices and remote nodes. We formulate the problem as a 0/1 integer program, show that it is NP hard and develop Lagrangian dual-based solution algorithms.

TC25 Complementarity Problems

Cluster: Linear Programming & Complementarity
Sponsor: Optimization Section
Sponsored Session

Chair: Andreas Fischer, University of Dortmund, Dept. of Mathematics, Dortmund, D-44221, Germany, andreas.fischer@math.uni-dortmund.de

1) Iterative Algorithms for Complementarity Problems, ***Ana Friedlander***, University of Campinas, Dept. of Applied Math., IMECC-UNICAMP, CP 6065, Campinas SP, 13081-970, Brazil, friedlan@ime.unicamp.br, ***Sandra S. Santos***

The design of efficient algorithms for solving complementarity problems and generalizations has been a matter of intensive research in the last years. We analyze different algorithmic approaches, discuss the viability of their computational implementations and present numerical experiments for methods that formulate complementarity problems as equivalent optimization problems.

2) Leray-Schauder Type Alternatives, Exceptional Family of Elements & Complementarity, ***Gheorghe Isac***, Royal Military College of Canada, Dept. of Math., PO Box 17000 STN Forces, Kingston, Ontario, K7K 7B4, Canada, isac-g@rmc.ca

Several problems considered in complementarity theory can be studied applying the Leray-Schauder type alternatives and some variants of the concept of exceptional family of elements. We will present several results on complementarity problems obtained by this method.

3) Solving MPEC using Smoothing VIP Reformulations, ***Roberto Andreani***, University of the State of Sao Paulo, Dept. of Comp. Sci. & Stats., CP 136, Sao Jose do Rio Pret, 15054, Brazil, andreani@dcce.ibilce.unesp.br, ***Jose Mario Martinez***

Strategies for the resolution of optimization problems with variational inequality constraints (MPEC) are discussed. The VIP constraints are replaced by a feasibility reformulation. For dealing with this reformulation, we use different alternatives. The solution of the associated problem using classic methods is discussed from the theorical and practical point of view.

4) Experiences in using the Semi-Smooth Code for Solving Complementarity Problems, ***Andreas Fischer***, University of Dortmund, Dept. of Mathematics, Dortmund, D-44221, Germany, andreas.fischer@math.uni-dortmund.de

A popular approach for solving complementarity problems is to reformulate the complementarity problem as semi-smooth system of equations by means of so-called NCP-functions. We will discuss theoretical differences of some NCP-functions and highlight their numerical influence on a Newton-type algorithm for solving the semi-smooth system within the GAMS modeling package.

TC26 Call Center-Related Research

Cluster: OR/MS in the Service Industries
Invited Session

Chair: Yongpin Zhou, University of Washington, Dept. of MS, Box 353200, Seattle, WA 98195-3200, yongpin@wharton.upenn.edu

1) An Alternative Method to Solid Tour Scheduling, ***Sridhar Seshadri***, NYU, Op. Mgmt. Dept., Stern Sch., 7-05 Tisch Hall, New York, NY 10012, sseshadr@stern.nyu.edu, ***Michael L. Pinedo, J. George Shanthikumar***

Call centers are subject to non-stationary arrival processes and there are constraints with regard to the deployment of operators. We determine operational rules for the assignment of multiple classes of operators using a dynamic programming formulation of the problem. The novelty of this approach is in combining queueing analysis and solid tour scheduling within a single problem.

2) Setting Staffing Levels in Call Centers with Random Arrival Rates, ***Shane Henderson***, University of Michigan, IOE Dept., 1205 Beal Ave., Ann Arbor, MI 48109-2117, shane.henderson@umich.edu

Erlang queueing models are widely used in call center staffing problems. In such models, the arrival rate of calls is assumed to be deterministic. However, some days are inherently busier than others due to unpredictable elements such as weather. If this additional source of randomness is ignored, the performance of a given staffing level will typically be overestimated.

3) Call Center Deployment Analysis, ***Brad A. Decker***, Sun Microsystems, 500 Eldorado Blvd., MS UBRM03-192, Broomfield, CO 80021, brad.decker@central.sun.com, ***Mark Connolly, Judie Hunter, Blaine K. Taylor***

The current call center deployment model involves a front-line engineering group that attempts to resolve customer issues within a specified time limit. Issues not resolved by the front-line engineering group are escalated to a more experienced engineering group. A call center deployment analysis is performed using Monte Carlo simulation of the LP, drawing random variables from specified distributions.

4) Managing a Call Center with Cross-Trained Operators, ***Nathalie Tabordon***, Universite Catholique de Louvain, Dept. d'admin. et de gestion, Place des Doyens, 1, Louvain la Neuve, B-1348, Belgium, tabordon@qant.ucl.ac.be, ***Philippe Chevalier***

We analyze the case of call centers dealing with several types of calls. Our aim is to evaluate the benefits brought by a cross-trained team of operators. We use Markovian models in order to derive approximations of the performance of the call center as a function of the competence of the operators.

TC27 Quality Control Research

Cluster: Reliability & Quality Control
Sponsor: Quality, Statistics & Reliability Section
Invited/Sponsor Session
Chair: Christina Mastrangelo, University of Virginia, Dept. of Systems Eng., PO Box 400747, Charlottesville, VA 22904-4747, christina@virginia.edu

1) Identification & Tuning of an EWMA Feedback Admustment Method Operating in Closed Loop, ***Enrique Del Castillo***, Pennsylvania State University, Dept. of IME, 310 Leonhard Bldg., University Park, PA 16802, exd13@psu.edu

Feedback process adjustment methods based on the EWMA statistic are popular in semiconductor manufacturing. Tuning these controllers usually relies on open-loop experiments that may be overly expensive. We discuss how to identify the underlying process disturbance while the feedback controller is acting upon the process, i.e., we consider closed-loop identification.

2) Methods for Multiple Response Design Problems, ***John F. Kros***, Hawaii Pacific University, Dept. of Bus. Admin., 1188 Fort St., Honolulu, HI 96813, jkros@hpu.edu, ***Christina Mastrangelo***

Unifying objectives approaches have wide-spread use in solving multi-response engineering design problems. However, unbeknown to many decision makers, these approaches carry with them strong assumptions with regard to the risk aversion, response independence and marginal rates of substitution. We investigate 4 techniques and demonstrate that each contains strong assumptions not intuitively evident to the decision maker.

3) Exploring Multivariate Process Control, ***Robert L. Mason***, Southwest Research Institute, 6220 Culebra Rd., San Antonio, TX 78228-0510, rmason@swri.edu

Technological advances have improved the quality of production in industry. One useful tool is multivariate statistical process control, which is a procedure based on monitoring the information contained in the correlations existing among the process variables. We explore this methodology, demonstrate how it performs and show why such systems are important.

TC28 Evaluating Critical Services

Sponsor: Public Programs & Processes Section
Sponsored Session
Chair: Robert van der Meer, University of Strathclyde, Dept. of MS, Graham Hills Bldg, 40 George St., Glasgow, G1 1QE, Scotland, UK, robert@mansci.strath.ac.uk

1) An Evaluation of UK Coast Guard Station Closings, ***Robert van der Meer***, University of Strathclyde, Dept. of MS, Graham Hills Bldg, 40 George St., Glasgow, G1 1QE, Scotland, UK, robert@mansci.strath.ac.uk, ***John Quigley***

The UK Government controversially set in motion plans to close 5 search and rescue coordination stations in the Coast Guard Service. We analyse critical issues related to these proposed closures, including cost efficiency, local knowledge, labour force deskilling and technology substitution. Soft and hard OR models are employed.

2) Performance...in Sickness & Health, ***Thomas E. Hartman***, Keele University, Dept. of Mgmt., Staffordshire, ST5 5BG, UK, t.e. hartman@keele.ac.uk

This exploratory study investigates the scope for implementing DEA for efficiency assessment in research hospitals in Sweden using a multi-period analysis. The results are compared with the management control system for performance measurement currently deployed by the hospitals.

3) The Relative Performance of Branch Funding in Major Mexican Banks from a Regulator's Point of View, ***Jose de Jesus Herrera Rosas***, Comision Nacional Bancaria y de Valores, Insurgentes Sur No. 1971, Torre Norte, Piso 6, Plaza Inn, Col. Guadalupe Inn, 01020, Mexico, jerrera@cnbv.gob.mx

We use DEA to assess the relative performance in branch funding for major Mexican banks. The sample includes 6 large banks between July 1998 and December 1999. This project explores the somewhat problematic nature of branch operation and funding in the Mexican economy.

4) Evaluating Performance in UK Children's Services, ***Robert Flavell***, DERA Malvern, St. Andrews Rd., Malvern, Worcs., WR14 3PS, UK, rcflavell@dera.gov.uk

The assessment of UK local authorities in delivering children's services is our primary purpose. The selected children's services represents high priority services currently targeted as part of a Department of Health 3-year quality protects program. Implications for the government's "best value" program are also explored.

TC29 Environment & Natural Resources I

Contributed Session
Chair: Roger Z. Rios, Universidad Autonoma de Nuevo Leon, Systems Eng. Program, AP 111-F, Cd. Universitaria, San Nicolas, NL, 66450, Mexico, roger@uanl.mx, http://osos.fime.uanl.mx/~roger/

1) An Optimization Model to Enhance Sustainable Utilization of Resources, ***Guohao Zhao***, University of Wisconsin, Sch. of Bus. Admin., 3202 North Maryland Ave., Milwaukee, WI 53211, ghaozhao@yahoo.com, ***Jing Shentu***

Resources are material foundation for sustainable development. To enhance resources utilization is the key factor for realizing sustainable development. Based on the idea of sustainable development, we establish the model to effectively distribute resources and propose a method for studies on sustainable development.

2) Urban Solid Waste Management & Minimization, ***Judea Al-Shammari***, Kuwait Municipality, Al-jahra Municipality, Kuwait, 13060, Kuwait, marwen.marwen@caramail.com, ***Ali Elkamel, Abdul Rehman Khan***

We investigate the existing solid waste system in Kuwait in terms of its limitations, potential problems and suggested solutions for existing facilities and for future ones. An MIP model is presented and solved using the B&B technique for the case study of Kuwait. The model gives the strategic planning for waste management and the appropriate options for treatment and reduction...

3) Natural Gas Pipeline Optimization: The State-of-the-Art, ***Roger Z. Rios***, Universidad Autonoma de Nuevo Leon, Systems Eng. Program, AP 111-F, Cd. Universitaria, San Nicolas, NL, 66450, Mexico, roger@uanl.mx, http://osos.fime.uanl.mx/~roger/

In the first part, an introduction of the mathematical framework describing the problem of fuel cost minimization in a natural gas transmission network is made. In the second part, the most relevant modeling and algorithmic work (including current and most promising research trends) is highlighted.

TC30 Optimization & Modeling for Human Experts

Sponsor: Computing Society
Sponsored Session
Chair: Alex Meeraus, GAMS Development Corp., 1217 Potomac St. NW, Washington, DC 20007, ameeraus@gams.com

1) Class Scheduling at the USMA at West Point, ***Frederick P. O'Brien***, USMA, Software Engineering, Bldg. 2104, Rm. 4-1, West Point, NY 10996, zf2708@exmail.usma.army.mil, ***Michael R. Bussieck***

The Academy at West Point has developed a family of large-scale mixed-integer models to support the scheduling of the 8-term academic program. The time tabling of the courses must provide a schedule for each cadet that contains all requested courses without a conflict. Furthermore, academic activities have to be coordinated with military and physical activities.

2) Computerized Treatment Planning for Radiosurgery, ***David M. Shepard***, University of Maryland School of Medicine, Dept. of Radiation Oncology, 22 South Greene St., Baltimore, MD 21201-1595, dshep001@umaryland.edu, ***Michael C. Ferris***

Gamma Knife radiosurgery replaces the surgeon's scalpel with a single, large dose of gamma radiation. Currently, a tedious, trial-and-error process is used to determine each patient's treatment plan. We have developed a tool that automates this procedure while providing improvements in both quality and efficiency.

3) Blending Data, Models & Human Expertise, ***Lloyd Kelly***, Hill & Associates, Inc., 222 Severn Ave., Annapolis, MD 21403, lloyd-hillcoal@erols.com, ***Michael R. Bussieck***

Hill & Associates has been using optimization models since the early 1980s. Simple LP models have grown into a large-scale modeling and knowledge base providing essential support for specialized consulting activities in the energy industry. We will report how data, optimization and human expertise have been blended together into a highly effective system.

TC31 Artificial Intelligence I

Contributed Session
Chair: Barin N. Nag, Towson University, Dept. of Mgmt., Towson, MD 21252, bnag@towson.edu

1) Image Memorization using a Progressive Learning Strategy, ***Wilmer Gonzalez-Valerio***, Universidad Central de Venezuela, C.

Geminis, Edif. Mayurupi, Apto. 3A, Sta. Paula, Caracas DF, 1053, Venezuela, wgonz@elecrisc.ing.ucv.ve

An algorithm is proposed that builds a code for each new image, based on previous learned patterns and in the error of the system in approximating the new item. The strategy works in the space and in the frequency domain, driving to 0 the error, as more images are learned.

2) Guided Inference of Monotone (Boolean) Regression Models, ***Vetle I. Torvik***, Louisiana State University, Dept. of IE, 3128 CEBA Bldg., Baton Rouge, LA 70803-6409, vtorvik@lsu.edu, http://cda4.imse.lsu.edu/torvik, ***Evangelos Triantaphyllou***

Guided inference of monotone Boolean functions is considered in the presence of stochastic misclassifications. Their probabilities are modeled using the single parameter monotone Boolean regression model and the full parametric monotone regression model. Simulations indicate that inference guided by likelihood provides a much improved learning rate over the traditional variance approach of sequential experiment design.

3) Functional Relationships of Agents in an Agent Community, ***Barin N. Nag***, Towson University, Dept. of Mgmt., Towson, MD 21252, bnag@towson.edu, ***Walter Truszkowski, Jay Karlin***

We consider a set of intelligent agents in a community of the same, operating autonomously but in cooperation with selective subsets of agents assisting in the realization of goals. We discuss issues of agent characteristics and relationships in the group, in the areas of rights, privileges, rules and responses.

TC32 Organization Theory II

Contributed Session

Chair: Gary L. McBryde, Texas A&M University, Dept. Agronomy & Resource Sci., MSC 156, Kingsville, TX 78363, g-mcbryde@tamuk.edu

1) Proximity & the Sharing of Tacit Knowledge, ***Quintus R. Jett***, Rice University, 323 Herring Hall, MS 531, 6100 Main St., Houston, TX 77005-1892, jettq@rice.edu, ***Adria A. Brown***

We examine how different kinds of accessibility (physical, virtual) and shared experience (occupational, organizational and personal) affect group innovation. We use field data from US and Japanese technology companies to illustrate how proximity, broadly construed, contributes to problem solving. We provide insight into how tacit knowledge is shared.

2) The Theory of Missions & Applied Mission Dynamics, ***Jan Griebe***, Organizational Analysis Corp., 1539 Mason Rd., PMB 67, Katy, TX 77450, jangriebe@aol.com, ***Roger Griebe***

We present a unique application of the theory of missions. We discuss the mission definition process by characterizing the primary components of the mission system and by a discussion of how missions are formed. We guide one through the process of defining a mission in context to its business environment. through the process of defining a mission in context to its business environment.

3) withdrawn - author request of 9/30, ***Abdallah E. Mohamed Elamin***, Lancaster University, Dept. of MS, Mgmt. Sch., Lancaster, LA1 4YX, UK, magzoob@hotmail.com

4) Towards a Definition of Post-Modern Economic Firms, ***Gary L. McBryde***, Texas A&M University, Dept. Agronomy & Resource Sci., MSC 156, Kingsville, TX 78363, g-mcbryde@tamuk.edu

Neo-classic economics define firms in terms of production functions relating inputs to outputs. An alternative is to define firms through knowledge creation. A computational theoretical approach is adopted to define firms from a knowledge-based perspective. Modeling results within this framework using the agent based Swarm (http:\\www.swarm.org) software are presented.

TC33 Machine Scheduling

Contributed Session

Chair: Jaideep T. Naidu, Philadelphia University, Sch. of Bus. Admin., Sch. House Ln. & Henry Ave., Philadelphia, PA 19144, naiduj@philau.edu

1) Scheduling a Single Machine with Sequence-Dependent Setup Durations using an Ant-Colony Algorithm, ***Caroline Gagne***, University of Quebec, Dept. of Info. & Math, Chicoutimi, Quebec, G7H 2B1, Canada, caroline.gagne@gigger.net, ***Marc Gravel, Wilson L. Price***

We minimize total tardiness in scheduling a single machine with sequence dependent setups using an ant-colony algorithm. We use 2 indicators for local decisions and a new type of look-ahead capability. We obtain competitive computational results and show a measurable advantage in the case of larger problem instances.

2) Minimizing Makespan on Parallel Machines Subject to Release Dates & Delivery Times, ***Mohamed Haouari***, Ecole Polytechnique de Tunisie, BP 743-2078 La Marsa, La Marsa, Tunisia, mohamed.haouari@ept.rnu.tn, ***Anis Gharbi***

We present a B&B algorithm for the problem of minimizing the makespan on identical parallel machines subject to release dates and delivery times. A preprocessing algorithm and a new tight lower bound are introduced. Also, the search tree is reduced using a polynomial selective algorithm. Computational experiments on large instances are reported.

3) Insights into an Optimal Procedure to Minimize the Single Machine Tardiness Problem, ***Jaideep T. Naidu***, Philadelphia University, Sch. of Bus. Admin., Sch. House Ln. & Henry Ave., Philadelphia, PA 19144, naiduj@philau.edu

The single machine tardiness problem is considered. We compare the modified due date rule of Baker & Bertrand and the optimal decomposition algorithm of Potts & Van Wassenhove. We show that these concurrent pieces of work have some striking similarities. We also discuss the key differences.

TC34 Economics II

Contributed Session

Chair: Daniel L. Leighton, SRA International, Inc., 1777 Northeast Loop 410, Ste. 510, San Antonio, TX 78217, dan_leighton@sra.com

1) Pricing, Competition & Advertising on the Internet, ***Benoit Leloup***, Ecole Normale Superieure, 61 avenue du President Wilson, Cachan, 94230, France, leloup@grid.ens-cachan.fr, ***Laurent Deveaux***

On digital markets, Web-stores must take into account in their pricing strategy, the uncertainty on the customers' demand functions, the competitiveness of the environment and the impact of advertising. In this setting, we study the various market structures that can emerge and show that only 2 market equilibria exist.

2) School of Business Salary Equity & Compression at a Regional Midwestern University, ***Mohammad I. Chowdhury***, Emporia State University, Sch. of Bus., 1200 Commercial St., Emporia, KS 66801, chowdhum@emporia.edu, ***Kenneth C. Hoffman***

Our purpose is to determine if there were salary inequities between male and female faculty members in the School of Business at a small Midwestern university. The variables collected and treated with ANCOVA were gender, rank, years of service and academic subject area. No significance could be attached to the differences between male and female salaries among the faculty.

3) Personnel Inventory & Cost Modeling in the Department of Defense, ***Daniel L. Leighton***, SRA International, Inc., 1777 Northeast Loop 410, Ste. 510, San Antonio, TX 78217, dan_leighton@sra.com, ***Gregory Wise***

The Office of the Secretary of Defense recently developed a comprehensive Windows-based military personnel inventory, cost and compensation model called PICCM. We include an overview of the model, examples of how it is used and highlights of the OR and econometric techniques used in the model.

TC46 Panel: Data Envelopment Analysis Applications in E-Commerce Activities

Cluster: DEA

Invited Session

Chair: Lawrence M. Seiford, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109-2117, seiford@umich.edu

1) Panel: Data Envelopment Analysis Applications in E-Commerce Activities, ***Lawrence M. Seiford***, National Science Foundation, OR/Production Systems, 4201 Wilson Blvd. DMII Rm. 550, Arlington, VA 22230, lseiford@nsf.gov, ***Joseph C. Paradi***, University of Toronto, Mgmt. of Tech. & Entrepreneur., 200 College St., Toronto, Ontario, M5S 3E5, Canada, paradi@mie.utoronto.ca, ***Joe Zhu***, Worcester Polytechnic Institute, Dept. of Mgmt., 100 Institute Rd., Worcester, MA 01609, jzhu@wpi.edu, ***Timothy R. Anderson***, Portland State University, Eng. & Tech. Mgmt. Dept., Portland, OR 97207-0751, tima@emp.pdx.edu

DEA has been proven an effective tool for productivity and performance evaluation under the context of multiple performance measures that are essential to a full performance characterization. This panel discusses e-commerce activities in banking and demonstrates how DEA can be used to measure and benchmark the e-commerce initiatives in bank branch automation.

TC47 Software Demonstration VII

Software Demo Session

Chair: Jay Stacey, AutoSimulations, Inc., jay_stacey@autosim.com

Co-Chair: Daniel H. Fylstra, Frontline Systems, Inc., PO Box 4288, Incline Village, NV 89450, dfylstra@frontsys.com

1) AutoMod, *Jay Stacey*, AutoSimulations, Inc., jay_stacey@autosim.com

AutoMod allows you to experiment in the virtual world to save time and money in the real world. AutoMod, an easy to use true scale 3-D simulation tool, combines the ease of a simulator with the power of a simulation language and includes templates for material handling, manufacturing and continuous flow. Come see why AutoMod is the simulation software of choice.

2) Solving Challenging Large-Scale Optimization Problems in Excel with the Premium Solver Platform, *Daniel H. Fylstra*, Frontline Systems, Inc., PO Box 4288, Incline Village, NV 89450, dfylstra@frontsys.com

The Premium Solver Platform, Frontline Systems' new "flagship" spreadsheet solver product, supports multiple "plug-in" Solver engines. We'll demonstrate several new Solver engines solving linear programming problems with up to 65,000 constraints, nonlinear problems with thousands of constraints and very challenging mixed-integer and non-smooth optimization problems.

Tuesday 14:45-16:15

TD01 Decision Analysis & Portfolio Applications

Sponsor: Decision Analysis Society

Sponsored Session

Chair: Peter C. Anselmo, New Mexico Institute of Mining & Technology, Dept. of Mgmt., Socorro, NM 87801, anselmo@nmt.edu

1) Utilizing Portfolio Management in the Corporate Planning Process: A Case Study, *Michael R. Walls*, Colorado School of Mines, Dept. of Mineral Economics, Golden, CO, mwalls@mines.edu

Modern portfolio theory has provided managers in the petroleum industry a deeper understanding of the risk and returns associated with alternative mixes of assets. More and more companies have adopted this technique to gain better insights about their portfolio of E&P investment activities. We discuss one such application at a major oil company and discuss the implications of utilizing this approach...

2) Real Options & Manufacturing Capacity Decisions, *Robert F. Bordley*, GM Labs., Detroit, MI, robertbordley@gm.com

We focus on a manufacturing plant that is projected to have excess capacity. We could potentially modify that plant so that it could produce one of several possible vehicles with that excess capacity. We address this problem using the theory of real options.

3) Valuation of Enhanced Oil Recovery Research, *Peter C. Anselmo*, New Mexico Institute of Mining & Technology, Dept. of Mgmt., Socorro, NM 87801, anselmo@nmt.edu

A portfolio optimization approach is used to value enhanced oil recovery research from the perspective of the funding firm. The basic idea of valuing enhanced recovery research as the expected present value of the difference between using or not using enhanced-recovery techniques is expanded to the context of a portfolio of drilling projects.

TD02 DEA II

Contributed Session

Chair: Karl Einolf, Mount St. Mary's College, Emmitsburg, MD 21727, einolf@msmary.edu

1) Efficiency, Performance & Dominance in Influential Subsets: An Evaluation using Fuzzy Methods & Regression Diagnostics, *Konstantinos P. Triantis*, Virginia Tech., Dept. of ISE, 7045 Haycock Rd., Falls Church, VA 22043, traintis@vt.edu, *Bill Seaver*, *Barbara J. Hoopes*

We address the identification and evaluation of influential subsets in efficiency studies using a fuzzy clustering strategy and general-purpose regression diagnostics. The diagnostics can be used to further investigate the influence character of dominant observations within the influential subsets. Two production-based data sets are used to illustrate these concepts.

2) A DEA Model for Real Estate Appraisals, *Juan J. Gonzalez*, University of Texas, College of Bus., 6900 North Loop 1604 West, San Antonio, TX 78249, jgonzalez@utsa.edu

A DEA model to appraise single property residences is presented. We suggest that DEA could be considered as a viable alternative approach to other appraisal models that are now in use. This application is illustrated with an example.

3) Efficient Salary Spending in the National Football League: A Data Envelopment Analysis, *Karl Einolf*, Mount St. Mary's College, Emmitsburg, MD 21727, einolf@msmary.edu

Revenue sharing agreements, the salary cap and escalating television money has changed the face of efficient player payroll management in the NFL. We use DEA to characterize winners and losers during USFL competition, the plan B years, the implementation of free agency and the introduction of a salary cap.

4) New Efficiency Measures: The Valued Technical Efficiency Measures, *Rachid Khamliche*, Universite Libre de Bruxelles, HEC Bus. School, Ave. FD Roosevelt 50 (CP135), Brussels, 1050, Belgium, rkhamlic@ulb.ac.be, *Bertrand M. Mareschal*

We present new efficiency measures called the valued technical efficiency measures. These measures differentiate between the inputs and outputs and associate an efficiency function with each of them to model the decision-maker's preferences with respect to the slack variables over these inputs or outputs. The properties of these new measures are also presented.

TD03 Current Issues in Supply Chain Management

Sponsor: MSOM

Sponsored Session

Chair: Nikhil Jain, University of Cincinnati, Coll. of Bus. Admin., PO Box 210230, Cincinnati, OH 45221, nikhil.jain@uc.edu

1) Demand Management through Guaranteed Lead Times in a Make-to-Order Environment, *Jayashankar Swaminathan*, University of California, Berkeley, msj@haas.berkeley.edu, *Uday S. Rao*, *Jun J. Zhang*

We present a model on the interaction between lead-time-based production planning in a make-to-order environment and its impact on customer demands. We assume that the demand is stochastically related to the lead-time quoted and the firm has limited production capacity in every period. The firm can use in-house capacity or outsource at a higher cost...

2) Market Segmentation & Remanufacturing, *Geraldo Ferrer*, University of North Carolina, Kenan-Flagler Business Sch., Chapel Hill, NC 27599-3490, geraldo_ferrer@unc.edu

We examine the interaction of customer preferences and cost variables to determine the feasibility of the remanufactured product in the market. We offer some insights on why remanufacturing can be successful with some products but nonexistent with others. We introduce a firm that participates in a market with 2 machines: a remanufactured and an all-new...

3) Coordinating Life Cycle Transitions & Capacity Acquisition for Remanufacturable Products, *Sean P. Willems*, University of Cincinnati, Dept. QAOM, Coll. Bus. Admin., 520 Lindner Hall, Box 210130, Cincinnati, OH 45221-0130, sean.willems@uc.edu, http://homepage.uc.edu/~willems/

A mathematical program has been developed to optimally transition between products in Kodak's Single-Use Camera group. The problem has 4 critical dimensions: price depends on introduction period, multiple types of capacity exist, product substitution is an alternative to introducing new products or expanding capacity and a significant recycling stream has to be managed.

4) Incentive Compatibility in Supply Chain Contracts, *Anand Paul*, University of Cincinnati, PO Box 210130, Cincinnati, OH 45221, abraham@uts.cc.utexas.edu, *Nikhil Jain*

In general, the first best contracting solution to the supply chain coordination problem is not pareto efficient. We study the feasibility of efficient contractual arrangements in a retailer manufacturer supply chain.

TD04 Planning & Control in Flexible Workforce Systems

Sponsor: MSOM

Sponsored Session

Chair: Esma S. Gel, Arizona State University, Dept. of IE, PO Box 5906, Tempe, AZ 85287-5906, esma.gel@asu.edu

Co-Chair: John W. Fowler, Arizona State University, Dept. of Ie, PO Box 5906, Tempe, AZ 85287-5906, john.fowler@asu.edu

1) Human Resource Planning in Knowledge-Intensive Operations with Stochastic Turnover, ***Sanjeev K. Bordoloi***, College of William & Mary, Sch. of Bus., PO Box 8795, Williamsburg, VA 23197, skbord@business.wm.edu, ***Hirofumi Matsuo***

Because of rapid evolution in product and process technology, many operations in recent years require workers to acquire and maintain more extensive "knowledge stock", resulting in a higher need for labor flexibility. We address the human resource planning in these knowledge-intensive operations with stochastic turnover rates.

2) Modeling Operator Cross-Training in Semiconductor Manufacturing Given Uncertain Demand, ***Megan Walsh***, Intel Corporation, CH3-96 5000 W Chandler Blvd., Chandler, AZ 85226-3699, megan.a.walsh@intel.com, ***W. Matthew Carlyle***, ***John W. Fowler***

A 2-stage stochastic integer programming model with recourse is used to determine optimal labor force planning in semiconductor manufacturing given uncertain labor requirements. The expected value of perfect information and the value of the stochastic solution are calculated and help demonstrate the importance of using stochastic integer programming in these situations.

3) Using Technical & Interpersonal Factors in Team Work Assignments, ***Ronald G. Askin***, University of Arizona, Dept. of SIE, PO Box 210020, Tucson, AZ 85721-0020, ron@sie.arizona.edu, ***Erin Fitzpatrick***

Technical and interpersonal skills both impact the performance of individuals belonging to a team of interacting workers. We describe empirically derived measures for predicting the performance of teams. These measures are used to find near-optimal assignments of workers to teams and assignment of specific tasks to workers within the team.

4) Optimal Work Sharing in Systems with Hierarchical Cross-Training, ***Esma S. Gel***, Arizona State University, Dept. of IE, PO Box 5906, Tempe, AZ 85287-5906, esma.gel@asu.edu, ***Wallace J. Hopp***, ***Mark P. Van Oyen***

We study worksharing systems in which workers have increasing or decreasing skill sets along a flowline. Using sample path arguments, we characterize the optimal policy for 2 station CONWIP systems with general processing times, which leads us to the "fixed-before-shared" principle for the scheduling of flexible workers.

TD05 Dynamic Control for Stochastic Networks II

Sponsor: Applied Probability Society
Sponsored Session

Chair: Sunil P. Kumar, Stanford University, Grad. School of Business, 518 Memorial Way, Stanford, CA 94305-5015, kumar_sunil@gsb.stanford.edu

Co-Chair: Ruth J. Williams, University of California, Dept. of Math., 9500 Gilman Dr., LA Jolla, CA 92093-0112, williams@russel.ucsd.edu

1) Heavy-Traffic Limit Theorems for Controlled Queues through Linear Programs, ***Thomas G. Kurtz***, University of Wisconsin, Dept. of Math., 480 Lincoln Dr., Madison, WI 53706-1388, kurtz@math.wisc.edu

Stochastic control problems for queueing networks are formulated as martingale problems and the optimal solutions are characterized as the solutions of infinite dimensional LPs. Assuming heavy traffic scaling, the solution of the LP is shown to converge to the optimal solution of the limiting singular control problem.

2) Multi-Class Queueing Networks with Batch Processing, ***Jim G. Dai***, Georgia Institute of Technology, School of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, dai@isye.gatech.edu, ***Caiwei Li***

If a server is capable of grouping a certain number of jobs into a single processing batch at its service station, the server is said to be a batch processing server. A furnace in a semiconductor wafer fabrication facility is an example of a batch processing server. We consider multiclass queueing networks for which one or many service stations have batch processing servers...

3) Inventory Control in Supply Chains: A Large Deviations Approach, ***Ioannis Paschalidis***, Boston University, Dept. of Mfg. Engineering, 15 Saint Mary's St., Boston, MA 02215, yannisp@bu.edu, ***Yong Liu***

We consider a supply chain of a single product class consisting of a tandem of production facilities. We derive large deviations asymptotics to devise production policies that minimize expected inventory costs subject to given service-level constraints. Extensions to multiple product classes will be discussed.

4) Largest Weighted Delay First Discipline, ***Alexander L. Stolyar***, Bell Labs., Lucent Technologies, 600 Mountain Ave., Murray Hill, NJ 07974-0636, stolyar@research.bell-labs.com

It was shown recently that the LWDF discipline is optimal in a single server system with arbitrary number of flows, in that LWDF achieves the desired exponential decay rates of the waiting time distributions if this is feasible at all. We will discuss some extensions of this result.

TD06 Transportation Network Design & Optimization

Sponsor: Transportation Science Section
Sponsored Session

Chair: Elise D. Miller-Hooks, Pennsylvania State University, Dept. of Civil & Environ. Eng., 212 Sackett Bldg., University Park, PA 16802, edm3@psu.edu

1) Physical Network Design for Multi-Mode, Multi-Service Logistics Systems, ***Karen R. Smilowitz***, University of California, Dept. of CEE, 416G McLaughlin Hall, Berkeley, CA 94720-1720, smilo@uclink4.berkeley.edu, ***Carlos F. Daganzo***

We present analytic (and analytic/numeric) network design models based on idealizations of network geometry, distribution costs, service-level demands and routing patterns. Such models are then used to obtain near optimal design guidelines for the integration of single mode, single service (overnight delivery, 2-day, etc.) networks into a multi-mode, multi-service network.

2) Models & Algorithms for the Design of Optimal Transportation Networks, ***Hans-Jurgen Sebastian***, Aachen Institute of Technology, Dept. of OR, Promenade 9, Aachen, 52056, Germany, sebasti@or.rwth-aachen.de, ***Tore Grunert***, ***Stefan Irnich***

We present a network design problem which has important applications in several areas of transportation logistics. We consider a 2-stage transportation system with consolidation terminals. We discuss real-world applications of such 2-stage transportation systems, then present a basic model and discuss several solution strategies such as metaheuristics. We conclude by presenting a video which shows the letter-mail transportation network of the Deutsche Post.

3) A Deterministic & Stochastic Formulation for a Parking Reservation System, ***Kyriacos C. Mouskos***, New Jersey Institute of Technology, Inst. of Transport., University Heights, Newark, NJ 07102, tavantzis@njit.edu, ***John Tavantzis***, ***David Bernstein***

We present 2 formulations for a parking reservation system. The first assumes that all arrivals and departures for the time period of interest is known a priori; the second assumes that arrivals and departures are random. The objective function is to minimize the total systemwide cost.

4) Adaptive Routing in Stochastic, Time-Varying Networks with Link Constraints, ***Baiyu Yang***, Pennsylvania State University, Dept. of Civ. & Environ. Eng., 212 Sackett Bldg., University Park, PA 16802, bxy115@psu.edu, ***Elise D. Miller-Hooks***

We will present algorithms for determining adaptive least expected time hyperpaths in stochastic, time-varying networks where link constraints are introduced in order to accurately depict periodic movement prohibitions (known perfectly or imperfectly a priori) such as imposed at signalized intersections in transportation networks.

TD07 Panel: Best Cases

Sponsor: INFORM-ED
Sponsored Session

Chair: Peter C. Bell, University of Western Ontario, Ivey Sch. of Bus., 1151 Richmond St., London, Ontario, N6A 3K7, Canada, pbell@ivey.uwo.ca

1) Panel: Best Cases, ***Peter C. Bell***, University of Western Ontario, Ivey Sch. of Bus., 1151 Richmond St., London, Ontario, N6A 3K7, Canada, pbell@ivey.uwo.ca

Several presenters will discuss cases that have proven effective in teaching their OR/MS course. Sample cases and, where possible, teaching notes will be made available to attendees.

TD08 Product Data Integration

Cluster: E-Business/Enterprise Integration: Intl. Bus. Perspectives
Invited Session

Chair: Parisa Ghodous, University of Lyon I, LIGIM, Bat 710, Bd. du 11 Nov. 1918, Villeurbanne Cedex, 69622, France, ghodous@ligim.univ-lyon1.fr

1) Web-Based Product Data Exchange, ***Amy J. C. Trappey***, National Tsing Hua University, Dept. of IE/EM, Hsinchu, Taiwan ROC, trappey@ie.nthu.edu.tw

We present the architecture of a web-based PDE system. The architecture of the standard PDE middleware presents the function view, the data view and the process view of PDE system. We will also show a prototyping Web-base PDE system.

2) A Multi-Agents System for Product Development Activities, ***Parisa Ghodous***, University of Lyon I, LIGIM, Bat 710, Bd. du 11 Nov. 1918, Villeurbanne Cedex, 69622, France, ghodous@ligim.univ-lyon1.fr

The process development is a complex engineering process requiring not only different sources of knowledge but different types of knowledge, e.g., physical, mathematical and experiential. The multi-agents systems of distributed AI permit to develop coordination models, communication among experts, multiple representations and concurrent reasoning. We explain a multi-agent system and verify it by an example in the domain of mechanical engineering.

3) Harmonizing Standards to Support Electronic Business & Enterprise Integration, ***Ricardo J. Goncalves***, UNINOVA, Quinta da Torre, Monte de Caparica, 2825, Portugal, rg@uninova.pt, ***Adolfo Steiger-Garcao***

We address architectures, methodologies and toolkits to support, assist and speed up the modeling and integration of data within industrial environments mixing different standards (including "de facto") supporting electronic business and enterprise integration, based on experience and results from some European projects. The ESPRIT Project 27111 ECOS, Lite E-Commerce Operative Scalable Solutions for SMEs, shows an example of the concept.

4) Fabrication Integration, ***Imad Khakhaldi***, AIP Bat 302, INSA de Lyon, Villeurbanne Cedex, 69621, France, ***Michel Martinez***

In manufacturing, the global aim is the integration of all firm's functions. We present the particular case of fabrication which should be integrated with the other functions in particular, with manufacturing management and the supply chain. The specificity of product and process models used in the fabrication step are studied. Choosing an integration method and solutions for integration architectures are presented.

TD09 Military Applications III

Contributed Session

Chair: John B. Willis, US Military Academy, Dept. of Systems Eng., 535-A Winans Rd., West Point, NY 10996, rj4238@usma.edu

1) Manning the Force: Analysis of Personnel Distribution in Support of the US Army's Transformation, ***Al Sweetser***, US Army, Army 300 Pentagon, DAPE-PRS, Washington, DC 20310, sweetwa@hqda.army.mil

We describe the analysis conducted to implement a new US Army manning standard: all units will be manned to100% of their personnel authorizations, by grade and specialty. The results of the analysis are currently being implemented and will, in the initial year, shift approximately 10,000 soldiers from training and headquarters units to warfighting units.

2) Analysis of Alternatives Study Tool, ***Dan Briand***, Applied Research Associates, Inc., 4300 San Mateo Blvd. NE, Ste. A-220, Albuquerque, NM 87110, dbriand@ara.com

The AoA study tool is a near end-to-end mission level weapons effectiveness and lethality simulation. Four distinct models, ArcView, OPUS, MSTARS and MEVA, are being integrated to combine a mission controller, mission planning, weapon flyout and weapon lethality, respectively for concept effectiveness, alternative and operational employment studies.

3) Supply & Maintenance Effects on the F-16 Mission Capability Rates, ***Eric J. Zarbnisky***, US Air Force, 2354 Fairchild Dr., Ste. 6D2A, USAFA, CO 80904, co1eric.zarbnisky@usafa.af.mil, ***Robert N. Gilchrist***

The USAFA provides OR majors with the opportunity to apply techniques learned in class to a variety of military problems. We look at variables that contributed to the mission capability rates of the F-16 and construct a model to determine the best allocation of financial and human resources to meet MC goals.

4) Design of the Reconnaissance, Surveillance & Target Acquisition Squadron for the US Army's Interim Brigade Combat Team, ***John B. Willis***, US Military Academy, Dept. of Systems Eng., 535-A Winans Rd., West Point, NY 10996, rj4238@usma.edu

The primary source of intelligence proposed for the Army's Interim BCT is the RSTA Squadron. We address the process used to design the current RSTA Squadron force structure and present a systems engineering methodology to formulate, analyze and interpret design alternatives.

TD10 E-Commerce in Logistics & Supply Chain Management

Cluster: Scheduling

Invited Session

Chair: Pinar Keskinocak, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, pinar@isye.gatech.edu

1) E-Logistics Technologies, ***H. Donald Ratliff***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30327, don.ratliff@isye.gatech.edu

Under the umbrella of e-business, the execution of business processes with the assistance of Internet technologies, supply chains will increasingly be based on electronic business integration. We will discuss the evolution and growing availability of information and decision technology for addressing logistics problems resulting from e-business.

2) Analysis of Capacity Reservation & Spot Bidding under Horizontal Competition, ***Feryal Erhun***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, ferhun@andrew.cmu.edu, ***Pinar Keskinocak***, ***Sridhar Tayur***

Consider a model where a single supplier of limited capacity sells to 2 identical downstream manufacturers that compete not only in the supply market but also in the demand market which depends on the "state" of the world. This study is motivated by several internet-enabled operations enhancing business-to-business commerce in supply chains.

3) Which E-Business is Right for your Supply Chain?, ***Jan A. Van Mieghem***, Northwestern University, Kellogg Grad. Sch. of Mgmt., MEDS Dept., Evanston, IL 60208-2009, vanmieghem@nwu.edu, ***Sunil Chopra***

The Internet is revolutionizing the way companies conduct business. Or is it? We argue that the value of the Internet for a firm is strongly dependent on the firm's industry and on the strategy it pursues. Firms that can fully exploit the revenue enhancements and cost reduction opportunities offered by the Internet and optimally integrate the new e-business with existing channels are likely to be the big winners in the Internet age.

TD11 Advances in IP Methods & Applications II

Cluster: Integer Programming

Invited Session

Chair: Fred W. Glover, University of Mississippi, Hearin Ctr. for Enterprise Sci, Sch. of Bus. Admin., University, MS 38677, fglover@bus.olemiss.edu

1) Exploiting the Relationships between Column Generation, Constraint Generation & Lagrangean Relaxation, ***Monique Guignard***, University of Pennsylvania, Wharton Sch., Dept. of OPIM, Philadelphia, PA 19104-6366, guignard@wharton.upenn.edu, ***Arnaud Freville***

Lagrangean relaxation and Dantzig and Wolfe decomposition being dual to each other, it is interesting to consider simultaneously constraint and column generation and the Lagrangean dual. We describe efficient iterative steps, as well as some novel column generation schemes, based on their relationships and report on some preliminary computational experiments.

2) A New Perspective on a Classic Linearization Technique, ***Warren Adams***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634-0975, wadams@clemson.edu, ***Richard Forrester***, ***Fred W. Glover***

Recently-posed linearization methods for mixed 0-1 nonlinear programs claim to provide more succinct representations than previous techniques. We show how, by using a transformation of variables and identifying constraints that are redundant at optimality, these newer methods can be explained in terms of a classic approach of Glover (1975).

3) Solving Hard Integer Programs with Lift & Project, ***Sebastian Ceria***, Columbia University, Grad. Sch. of Business, 417 Uris Hall, New York, NY 10027, sceria@dashopt.com, ***Gabor Pataki***, ***Stefan Schmieta***

L&P cutting planes are used to solve the hardest instances of MIPLIB. A combination of techniques, that includes good cut selection, cutting off fractional solutions and preprocessing is very

4) An Iterative Approach for Generating Strong Disjunctive Cuts, ***Egon Balas***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, eb17+@andrew.cmu.edu, ***Michael Perregaard***

We give an iterative procedure for generating strong disjunctive cuts in the

problem space of a mixed 0-1 program. The procedure exhibits an advantage over the standard lift-and-project algorithm when disjunctions involving multiple 0-1 variables are used.

TD12 Optimization Issues in Supply Chains

Cluster: Logistics & Supply Chain Management
Invited Session
Chair: Stephan E. Kolitz, Draper Lab 3F, 555 Technology Square, Cambridge, MA 02139, kolitz@draper.com

1) withdrawn - chair request of 9/7, *Henk A. Akkermans*, Eindhoven University of Technology, Technology Mgmt., PO Box 513, Pav F12, Eindhoven, 5600 MB, The Netherlands, ***Will J. M. Bertrand***

2) A Heuristic Procedure for the Vehicle Routing Problem with Simultaneous Delivery & Pick-Up, *Jan Dethloff*, University of Hamburg, Inst. for Logistics/Transport., Von-Melle-Park 5, Hamburg, 20146, Germany, dethloff@gmx.de

Recently, in addition to the distribution process to customers, re-usable packaging and goods to be recycled/remanufactured have to be transported in the reverse direction. In this context, the vehicle routing problem with simultaneous delivery and pick-up arises. This problem is investigated, a heuristic construction procedure and numerical results are presented.

3) Optimization in Military Logistics, *Steve Clark*, Draper Lab 3F, 555 Technology Sq., Cambridge, MA 02139, ***Cynthia Barnhart, Stephan E. Kolitz***

An optimization model of the munitions flow through the logistics supply-chain during contingencies. Special considerations include ship scheduling, port and depot throughput capabilities, proper management of explosive material and honoring required delivery dates.

4) Global Strategic Distribution Management, *Stephan E. Kolitz*, Draper Lab 3F, 555 Technology Square, Cambridge, MA 02139, kolitz@draper.com, ***Janet Lepanto, Miranda Moore***

Global strategic distribution management is a logistics integration agency project to develop new approaches to solving military logistics problems, both for deliberate planning and execution. A hierarchical closed-loop approach has been developed. Intelligent agents and optimization are key elements of the

TD13 Logistics Network Design & Analysis

Cluster: Manufacturing & Logistics
Invited Session
Chair: Erhan Kutanoglu, University of Arkansas, 4207 Bell Eng. Ctr., Dept. of IE, Fayetteville, AR 72701, erhank@engr.uark.edu

1) Efficient & Regularized Routing/Dispatching in a Terminal City Network, *Darsono Tjokroamidjojo*, University of Arkansas, 4207 Bell Eng. Ctr., Dept. of IE, Fayetteville, AR 72701, ***Erhan Kutanoglu, G. Don Taylor***

A major concern in the trucking industry is producing routes that return drivers to their domicile in a regular and timely manner, which is sometimes in contradiction with the cost objectives. We present a mathematical model that makes this tradeoff and generates solutions that control tour-length and costs. We present the effectiveness of the model using data provided by our industry partner, J.B. Hunt Transport, Inc.

2) Empty Container Management for Container-on-Barge Transportation, *Michael H. Cole*, University of Arkansas, 4207 Bell Eng. Ctr., Dept. of IE, Fayetteville, AR 72701, ***Sook T. Choong, Tze-chen Hau, Erhan Kutanoglu***

We consider the problem of managing pools of empty containers for use in barge-based transportation. Decisions include number of containers, location of container pools, allocation of river ports to container pools and transportation mode choice for empty container flows.

3) Design of Multi-Echelon Distribution Networks with Service Level Constraints, *Erhan Kutanoglu*, University of Arkansas, 4207 Bell Eng. Ctr., Dept. of IE, Fayetteville, AR 72701, erhank@engr.uark.edu, ***Wei-Chek Oon***

Most distribution supply chains are composed of a multi-echelon network structure. Motivated by a spare parts distribution network, we present a mathematical model for locating distribution centers and lower-level facilities. The model not only captures the interactions among echelons but also includes response time-based service constraints. We show several possibilities for solving the model...

TD14 Flexible Automation Issues I

Cluster: Flexible Manufacturing Systems
Invited Session
Chair: Kathryn E. Stecke, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI 48109-1234, kstecke@umich.edu

Co-Chair: Ashok Kumar, Grand Valley State University, Dept. of Mgmt., 510 Eberhard Ctr., Grand Rapids, MI 49504-6495, kumara@gvsu.edu

1) An Analytical Method for Performance Evaluation of Push, Pull & POLCA, *Ananth Krishnamurthy*, University of Wisconsin, Ctr. for Quick Response Mfg., 1513 University Ave., Madison, WI 53706, akrishna@cae.wisc.edu, ***Rajan Suri, Mary Vernon***

We present an analytical method for the performance evaluation of push, pull and POLCA in a multi-stage production network manufacturing multiple products. The network is decomposed into several multi-class closed queueing networks that are solved using product form approximation techniques. We compare our results to those from simulation.

2) Dynamic Tool Replenishment Policies for an FMS when Tool Ordering Cost has a Fixed Component, *Ashok Kumar*, Grand Valley State University, Dept. of Mgmt., 510 Eberhard Ctr., Grand Rapids, MI 49504-6495, kumara@gvsu.edu, ***Kathryn E. Stecke***

We develop an optimal tool replenishment policy for a periodic review tool planning system for FMSs. The tool life distribution is assumed Weibull and shortage and overage costs are charged at the end of each period. The procurement cost of each tool has a variable and a fixed cost component.

3) A Communication Environment for a Distributed Virtual Factory in Agile Manufacturing, *Tomohiro Kishigami*, Kobe University, Dept. of Comp. & Systems Eng., Rokkodai, Nada, Kobe, 657-8501, Japan, kisigami@kaede.seg.kobe-u.ac.jp, ***Susumu Fujii, Toshiya Kaihara, Hiroshi Morita, Etsuko Kumamoto***

A communication environment is proposed to develop a distributed simulation system integrating multiple simulators on different platforms such as simulation languages and computers. A distributed virtual factory representing a large scale manufacturing system is constructed on the platforms of SLAM II, SMPL, Awesim, AutoMod, Extend and Simul8.

TD15 Management of Technology I

Contributed Session
Chair: Debasish N. Mallick, University of Minnesota, 3-145 Carlson Sch. of Mgmt., 321 19th Ave. South, Minneapolis, MN 55455, dmallick@csom.unm.edu

1) The Co-Evolution of Jobs, Technology & Organization: An Exploratory Study of US Manufacturing Jobs, *David F. Robinson*, Texas Tech. University, Coll. of Bus. Admin., MS 2101, Lubbock, TX 79409, drobinson@coba.ttu.edu, ***Harald M. Fischer, Anne Miner***

An inductive study of 45 organizations revealed that a period of resurgence in manufacturing employment was associated with the creation of newly combined or hybrid job activities rather than simple replacement of old jobs. Improvisation and experimentation often resulted in unplanned organizational learning as jobs, technology and firm practices co-evolved.

2) On the Development & Application of Self-Organizing Feature Map-Based Patent Maps, *Byung-Un Yoon*, Seoul National University, Dept. of IE, San 56-1, Sillim-Dong, Kwanak, Seoul, Korea, postman3@snu.ac.kr, ***Sung-Zoon Cho, Yong-Tae Park***

Recently, patent map has attracted an increasing attention from practitioners and researchers in R&D planning. The utility of conventional 2-dimensional map, however, is limited since patent database contains multi-variate information and a data-mining tool is required. We develop a SOFM-based patent map that visualizes the complex relationship among patents and dynamic pattern of technological advancement...

3) A Coordination Theory Framework of Supply Chain Management, *Debasish N. Mallick*, University of Minnesota, 3-145 Carlson Sch. of Mgmt., 321 19th Ave. South, Minneapolis, MN 55455, dmallick@csom.unm.edu, ***Abhijit Chaudhury, Jean-Pierre Kuilboer***

Information is the glue that holds a supply chain together. Progress in technology-based solutions to managing information flow has opened up new opportunities and challenges in supply chain management. We present a coordination theory-based framework to measure and evaluate these IT-based

solutions to supply chain management.

4) A Model on Technological Progress, ***Jaesun Park***, University of North Dakota, Mgmt. Dept., Box 8377, Grand Forks, ND 58202, jpark@plains.nodak.edu, ***John K. S. Chong***

We formulate the Schumpeterian "process of creative destruction" as a model. From the standpoint of the profit maximizing theory of firm behavior, a firm's R&D investment decision in relation to the market structure and the size of the reward provided to the innovator will be considered.

TD16 Stochastic Programming Applications

Cluster: Stochastic Programming
Invited Session
Chair: David P. Morton, University of Texas, Grad. Program in OR, Austin, TX 78712, morton@mail.utexas.edu

1) Stochastic Programming for Flood Control Operations Support, ***David W. Watkins, Jr.***, Michigan Technological University, Dept. of Civil & Environ. Eng., Houghton, MI 49931, dwatkins@mtu.edu

Formulation of a 2-stage stochastic programming model of dam operations for flood control is discussed, with emphasis on scenario generation and computational issues. Use of the model by water management agencies hinges on the acceptance of short-term probabilistic forecasts and the ability to model non-convex constraints and objectives.

2) Solving Stochastic Network Interdiction Problems, ***Javier Salmeron***, Naval Postgraduate School, Dept. of OR, Monterey, CA 93943

Network interdiction involves the use of limited resources to attack and degrade the operation of an adversary's network. When data or attack successes are uncertain, these problems are modeled as 2-stage stochastic programs. We describe decomposition-based algorithms for solving these problems and provide computational results.

3) Capacity Planning of Web-Server Farms, ***Shabbir Ahmed***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, s-ahmed1@uiuc.edu, ***Alan J. King***, ***Gyana Parija***

A web-server farm is a network of servers with high speed internet connection, providing web-hosting services to client companies. We address the problem of capacity planning of such a facility to meet uncertain customer demands. We present a stochastic integer programming model for this problem and discuss solution strategies.

4) On Solving Stochastic Integer Programs, ***Gyana Parija***, IBM TJ Watson Research Center, Math Sci. Dept., PO Box 218, Yorktown Heights, NY 10598, parija@us.ibm.com, ***Alan J. King***

We present some computational results on solving a few hard stochastic integer programs using IBM's OSL Stochastic Integer Solver. In particular, we exploit the structures underlying these stochastic programs to devise effective resolution strategies.

TD17 Forecasting Applications

Cluster: Forecasting
Invited Session
Chair: Kenneth D. Lawrence, NJIT, School of Mgmt., Newark, NJ 07102, lawrence@tesla.njit.edu

1) Issues on Enterprise Resource Planning Forecasting: What's Working & What's Not, ***Harold Rahmlow***, St. Joseph's University, Dept. of Finance, Philadelphia, PA 19131, hrahmlow@sju.edu

The highly competitive and global nature of business has made ERP necessary and technology has made it possible. However, while numerous commercial and in-house varieties of ERP exist, detractors armed with implementation and operational horror stories abound.

2) A New Measure of Relative Forecasting Error, ***Ronald Klimberg***, St. Joseph's University, Haub School of Mgmt., 5600 City Ave., Philadelphia, PA 19131, klimberg@sju.edu, ***Samuel Ratick***

A new measure of relative percentage forecast error (PFE) is introduced and discussed. The results of simulations to test its robustness are presented.

3) Broadband Alternatives for Accessing the Internet, ***William J. Havlena***, NJIT, School of Mgmt., Newark, NJ 07102, havlena@admin.njit.edu, ***Kenneth D. Lawrence***

The market for Internet access providers has changed dramatically with the widespread availability of alternatives to traditional phone-based modern access. A computer-administered survey was developed to measure consumer interest in alternative methods of high-speed Internet access.

TD18 E-Commerce II

Contributed Session
Chair: Syed Shah, Central Michigan University, 1306 East Preston, Mt. Pleasant, MI 48858-3929, shaha1s@cmich.edu

1) withdrawn - author request of 10/3, ***Edward K. Chu***, California State University - Dominguez Hills, School of Mgmt., 1000 East Victoria St., Carson, CA 90747

2) Design of a Web-Based Knowledge Management Environment, ***Ranjit Bose***, University of New Mexico, Anderson Sch. of Mgmt., Albuquerque, NM 87131, robse@unm.edu

Knowledge management concepts and techniques are increasingly gaining value in the corporate world. Our focus is to design, develop and field test an intranet- and extranet-based knowledge management environment with the intention of improving the way organizations create, preserve, use and share their corporate knowledge across its knowledge workers.

3) E-Commerce & Purchasing, ***Syed Shah***, Central Michigan University, 1306 East Preston, Mt. Pleasant, MI 48858-3929, shaha1s@cmich.edu

Purchasing requires careful evaluations of the supplier before establishing a long-term business relationship. Evaluation is a long process that assures quality and timely delivery of products. On the other hand, e-commerce allows purchasing based on low prices. Thus, the purchasing manager is facing a choice of whether to use e-commerce or the standard purchasing methods. We discuss some pros and cons of the choices.

TD19 Integer Programming II

Contributed Session
Chair: Kurt Spielberg, IBM, 2005 Market St., Philadelphia, PA 19103, kurtspie@vnet.ibm.com

1) A Note on the P-NP Conjecture, ***Jian Yang***, NJIT, 45 Forest St., 2nd Fl., North Arlington, NJ 07031, yang@adm.njit.edu, http://www-ec/njit.edu/~yang

We attempt to show the polynomial-time insolvability of the directed Hamiltonian cycle problem. To this end, we show that it is impossible to solve a problem closely linked to DHC in polynomial time by using algorithms that can retrieve information only in a certain way.

2) Toward Solving the HP-Lattice Model of Protein Folding, ***Joel S. Sokol***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, jsokol@isye.gatech.edu

We present preliminary work on developing useful formulations and solution approaches for the HP-lattice model of protein folding.

3) Hot Starts for (0,1) MIP with Logical Programming, ***Kurt Spielberg***, IBM, 2005 Market St., Philadelphia, PA 19103, kurtspie@vnet.ibm.com, ***Monique Guignard***

We construct "short hot start trees" to create improved solutions for large (0,1) MIP problems, with numbers of nodes decreased substiantially. We use standard BB programming, modifed to force integer valued branches, under IBM OSL-MIP user exits. In addition, we are exploring limited neighborhoods of hot starts for possible solutions.

TD20 Logistics I

Contributed Session
Chair: Marina A. Epelman, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, mepelman@umich.edu, http://www-personal.engin.umich.edu/~mepelman

1) Optimal Policies for Production/Inventory Models with Limited Capacity & Markov-Modulated Demand & Supply Processes, ***Haichao Hu***, Columbia University, Dept. of IE/OR, 507 West 113th St., Apt. 53, New York, NY 10025, hhu@ieor.columbia.edu, ***Guillermo Gallego***

We consider a single-item, single-location, periodic-review production/inventory model with limited capacity and Markov modulated demand and supply processes. Assuming demand and supply processes are driven by 2 independent discrete-time, finite-state, homogeneous Markov chains, we show that a modified, state-dependent, inflated base-stock policy is optimal for both the finite and infinite horizon planning problems...

2) Computation of the Bullwhip Effect using an AR(1) Process for Demand, ***Juan Gaytan***, ITESM Campus Toluca, Eduardo Monroy Cardenas 2000, Toluca, 50252, Mexico, jgaytan@campus.tol.itesm.mx, ***Pilar E. Arroyo***, ***Aleksander Wojcik***

We measure the bullwhip effect for a single supply chain by asumming an AR1 process for forecasting demand. We found the effect is an L-order polynomial for the autocorrelation coefficient (r). The effect increases with L (lead time) and is minimum when r is close to 0 or 1.

3) Analysis of Intermediary Services, ***Erkki Hamalainen***, Helsinki School of Economics, PO Box 1210, Helsinki, 00101, Finland, hamalain@hkkk.fi

The need for intermediary services can be driven from the allocation of upstream and downstream capabilities. In heavy logistics the capabilities in processing and handling of product-mixes along the supply chain are modeled taking into account the implications for transportation and stockholding. An application to steel service centers is discussed.

4) A Shortest Path Approach to Multi-Vehicle Routing with Split Demand, ***Marina A. Epelman***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, mepelman@umich.edu, http://www-personal.engin.umich.edu/~mepelman, ***Chi-Guhn Lee***, ***Chelsea C. White***

We examine the multiple VRP with split pick-ups. Such problems are presently modeled as mixed integer problems and solved via heuristic methods. We derive a novel equivalent discrete reformulation, which can be represented as the shortest path problem in a finite network. Preliminary computational experiments are discussed.

TD21 Location Analysis II

Sponsor: Society on Location Analysis
Sponsored Session

Chair: Joyendu Bhadury, California State University, IE Program, Warren Hall 771, 25800 Carlos Bee Blvd., Hayward, CA 94542, jbhadury@csuhayward.edu

1) The 1-Center Placement Problem on the Manhattan Plane with Barrier, ***Rajan Batta***, SUNY, Dept. of IE, 342 Bell Hall, North Campus, Buffalo, NY 14260-2050, batta@acsu.buffalo.edu, ***Pavan Nandikota***, ***Rakesh Nagi***

We consider the placement of a single facility in a plane under the presence of barriers. A weighted center objective is considered. All travel follows the rectilinear metric. We discuss difficulties in solving the problem for arbitrary-shaped barriers and facilities and develop results for analytically tractable special cases.

2) The Partial Medial Problem, ***Oded Berman***, University of Toronto, Rotman Sch. of Mgt., 105 Saint George St., Toronto, Ontario, M5S3E6, Canada, berman@mgmt.utoronto.ca, ***Zvi Drezner***, ***George O. Wesolowsky***

We are given a set of nodal demand points, each with a demand weight and a cover weight. A facility must cover at least a given proportion of the total cover weight. We would like to find the location that minimizes the total cost of covered demand.

3) Competition Involving Different Regions, ***H. A. Eiselt***, University of New Brunswick, Fac. of Admin., PO Box 4400, Fredericton, NB, E3B 5A3, Canada, eiselth@fac.fadmin.unb.ca

Two firms compete on multiple markets. Customers patronize the facility with the highest utility, measured in (weight)/(distance). The weight is a composite measure of attractiveness. The locations of the facilities are fixed, but their weights are not. Given a fixed budget, the firms sequentially and repeatedly optimize their weights.

TD22 Innovation & Entrepreneurship II

Contributed Session

Chair: Moren Levesque, RPI, Lally Sch. of Mgmt. & Tech., 110 Eight St., Troy, NY 12180, levesm@rpi.edu

1) Venture Design & Scalability, ***Richard J. Bergin***, Harvard Business School, Morgan T91, Boston, MA 02163, rbergin@hbs.edu, www.people.hbs.edu/rbergin/, ***Marco Iansiti***

Scalability is important to effective entrepreneurship and getting even more important with shrinking time scales. However, scalability has not been explored in detail, partly because the topic falls in a gap between entrepreneurial and innovation/technology management. We will try to bridge some of this gap, reporting on an empirical investigation of 30 Internet ventures.

2) Strategic Orientation of New Ventures in Transitional Economies: The Case of Tanzania, ***Vladimir Vlahovich***, Mgmt. Dept., ***Surrendra Pal***

The question of how firms compete has been a central concern for management as well as entrepreneurship scholars. Although there are a number of normative models that explain strategic behavior in the management literature, very little is known as to whether those theories developed in Western market economies can be applicable to other different forms of economies...

3) Corporate Venturing & Timing of Entry, ***Moren Levesque***, RPI, Lally Sch. of Mgmt. & Tech., 110 Eight St., Troy, NY 12180, levesm@rpi.edu, ***Dean A. Shepherd***

Firms differ in their amount of capabilities and the market fit of those capabilities each have a unique relationship between timing of entry and performance. We utilize an analytical model to propose the optimal time for a corporate venture to enter a new market. The model acknowledges an apparent trade-off between profit potential and mortality risk in the timing of entry decision...

TD23 Auctions/Competitive Bidding

Contributed Session

Chair: Vivek B. Iyer, University of Massachusetts, Dept. of MIE, ELAB 204, Amherst, MA 01003, viyer@farm.ecs.umass.edu, http://farm.ecs.umass.edu/~viyer

1) withdrawn - author request of 9/25, ***Mahmut Sonmez***, UMIST, Manchester School of Management, PhD Office, PO Box 88, Manchester, Lanchash, M60 1QD, UK, mahmut.sonmez@stud.umist.ac.uk, ***Deli Yang***

2) An Auction Model for an Elective Course Bidding System, ***Direnc Ersahin***, Middle East Technical University, Dept. of Bus. Admin., Ankara, 06531, Turkey, ***Cemal Akyel***

We compare various auction theories and present the elective pre-registration bidding system used at the Department of Business Administration, Middle East Technical University. Auction theory forms the basis for evaluating the current bidding system and a number of enhancements to the system are proposed.

3) Equilibrium of a Competitive Electricity Market: Issues & Methods, ***Alexis L. Motto***, McGill University, 3480 University St., Montreal, Quebec, Canada, alexis@ece.mcgill.ca, www.ece.mcgill.ca/~alexis, ***Francisco D. Galiana***

We present a decentralized nodal-price double auction scheme for a competitive electricity market. The model includes actual characteristics of power systems such as transmission losses and line congestion in addition to mixed-integer variables, ramping rates, start-up costs and minimum up and down times. Convergence is obtained via an improved Walrasian tatonnement.

4) Models & Algorithms for Combinatorial Auctions, ***Jawad Abrache***, DIRO/Universite de Montreal, CRT, CP 7128 Succ Centre-Ville, Montreal, Quebec, H3C 3J7, Canada, ***Teodor Gabriel Crainic***, ***Michel Gendreau***

Combinatorial auctions that allow bidding on combinations of items often lead to efficient allocations. However, the exponential number of combinations results in computational intractability. We review classic results on the problem structure and some of the recent mechanisms that use combinatorial bidding. A model for bundle trading in financial markets and a procedure for the discrimination of multiple allocations are presented.

5) Crew Scheduling of Transit Bus Operators using Dual Auction Mechanisms, ***Vivek B. Iyer***, University of Massachusetts, Dept. of MIE, ELAB 204, Amherst, MA 01003, viyer@farm.ecs.umass.edu, http://farm.ecs.umass.edu/~viyer, ***Srikanth K. Reddy***, ***Abhijit Deshmukh***

We present a dual auction scheme for scheduling transit bus operators. The first stage auction protocol is based on negative bidding and the second stage protocol is using an English auction. The dual auction resource allocation scheme allows us to incorporate operator preferences in the shift allocation while ensuring that no shift is left unassigned.

TD24 Estimation & Prediction Policies for Traffic Management II

Sponsor: Telecommunications Section
Sponsored Session

Chair: A. E. Eckberg, Lucent Technologies, 101 Crawfords Corner Rd., Rm. 4K-418, Holmdel, NJ 07733, aeckberg@lucent.com

1) Real-Time State Estimators for HTTP Traffic, ***Kavitha Chandra***, University of Massachusetts, Dept. of Electric & Comp. Eng., 1 University Ave., Lowell, MA 01854, kavitha_chandra@uml.edu, ***M. Parikh***, ***G. Olowoeye***, ***M. Denis***

Allocation of network resources to HTTP access traffic is examined using model based state estimation. A Gauss-Markov process models the mean trend in the arrival process that modulates the instantaneous packet arrival rates. This model

is applied in a Kalman filter-based estimation of the traffic states for real-time adaptation of the buffer and service rates at an access link.

2) Unicast Inference of Network Internal Link Loss, ***Nick Duffield***, AT&T Labs Research, 180 Park Ave., Rm. B139, Florham Park, NJ 07932, duffield@research.att.com, ***Francesco Lo Presti, Vern Paxson, Don Towsley***

We describe a method for inferring network internal link loss rates based on end-to-end unicast measurements. Building upon earlier work which showed that accurate loss estimates can be computed via multicast measurements, we design unicast experiments which yield accurate link loss estimates by approximating the multicast behavior.

3) Soft Service Guarantee in the Shared Service Model, ***B. G. Kim***, University of Massachusetts, Comp. Sci. Dept., Lowell, MA 01854, kim@cs.uml.edu

We examine a SS model that avoids hard guarantees of integrated services and differentiated services models and only guarantees that the prevailing SS bandwidth be fairly shared among SS users at the time. The SS service model is motivated by needs of soft guarantees by which delivery delays may increase at busy times but reliable deliveries are assured...

4) Intelligent Wireless Management: Improving TCP Performance over Wireless Networks, ***T. Suarez***, Florida State University, Tallahassee, FL 32306, suarez@cs.fsu.edu, ***L. W. Hawkes***

Fault tolerant techniques are being investigated as a means of improving TCP performance over wireless networks. We are implementing an IWM mechanism that will maintain the characteristics of the wireless link and execute modifications of the TCP source and data link layer based on this information.

TD25 Intelligent Math Programming Software

Cluster: Linear Programming & Complementarity
Sponsor: Optimization Section
Sponsored Session
Chair: Allen Holder, Trinity University, Math Dept., 715 Stadium Dr., San Antonio, TX 78212, aholder@trinity.edu

1) MProbe: Software for Analyzing Mathematical Programs, ***John W. Chinneck***, Carleton University, Systems & Computer Eng., 1125 Colonel By Dr., Ottawa, Ontario, K1S 5B6, Canada, chinneck@sce.carleton.ca

During formulation and debugging you often need analytic information about your model. Example questions: What are the shapes of the nonlinear functions and constrained region? How effective are the constraints? Which constraints are redundant? MProbe is a software tool for answering analytic questions such as these.

2) Linking ANALYZE with AMPL, ***Harvey J. Greenberg***, University of Colorado, Mathematics Dept., CB 170, PO Box 173364, Denver, CO 80217-3364, hgreenbe@carbon.cudenver.edu

I wrote an interface that takes AMPL's output files plus a new file type in my ANALYZE utility and produces 2 files as input to ANALYZE. The first is the packed (binary) file that contains LP and solution information; the second is the syntax file that enables English translations and other commands.

3) Modern Sensitivity Analysis Software, ***Allen Holder***, Trinity University, Math Dept., 715 Stadium Dr., San Antonio, TX 78212, aholder@trinity.edu

While interior point solvers are readily available, no software is currently available that allows users to perform post-solution analysis based upon strictly complementary solutions. We discuss the new software Sleuth that uses a strictly complementary solution provided by most interior point solvers.

4) A Common Framework for Infeasibility, Redundancy & Minimal Representations, ***Richard J. Caron***, University of Windsor, Fac. of Science, PO Box 33830, Detroit, MI 48232, rcaron@uwindsor.ca, ***Tim Traynor***

We present a common framework from which to examine infeasibility, redundancy and minimal representations for general constraint sets arising in mathematical programming problems. The framework leads naturally to a probabilistic algorithm for finding the data for a certain set-covering problem the analysis of which leads to the identification of an irreducible infeasible system or a minimal representation.

TD26 Optimization in Finance

Cluster: OR/MS in the Service Industries
Invited Session
Chair: Ilan Adler, University of California, Dept. of IE/OR, Berkeley, CA 94720-1777, adler@ieor.berkeley.edu

1) An Optimization Approach to Credit Risk, ***Dimitris Bertsimas***, MIT, Sloan Sch. of Mgmt., E53-359, OR Ctr., 50 Memorial Dr., Cambridge, MA 02139, dbertsim@mit.edu, ***Dessi Pachamanova***

We address the relation between the survival probability distribution and the price of a risky bond. Using no-arbitrage arguments, we provide bounds on the survival probability distribution of defaultable bonds from existing prices of comparable risky securities. We provide extensions to classification of risky bonds and improving term structure estimation.

2) Some Optimizing Problems in Finance, ***Sheldon M. Ross***, University of California, Dept. of IE/OR, Berkeley, CA 94720-1777, ross@ieor.berkeley.edu, ***Ilan Adler***

Suppose the price of a security follows a geometric Brownian motion and that options concerning this security, and the security itself, can be bought or sold. We discuss a variety of mean-variance optimization problems that arise when the geometric Brownian motion parameters are not constrained to constitute a risk-neutral environment.

3) Optimal Policy Structure in Dynamic Asset-Liability Management, ***John R. Birge***, Northwestern University, McCormick Sch. of Engineering, 2145 Sheridan Rd., Evanston, IL 60208-3100, jrbirge@nwu.edu

We consider a discrete-time asset-liability management problem with an expected utility objective. When the utility function has a piecewise-linear form, we derive characteristics of the optimal solution. In particular, we show how the number of assets held depends on the structure of the scenario tree.

4) Optimization Models for Cash Flow Management, ***Ilan Adler***, University of California, Dept. of IE/OR, Berkeley, CA 94720-1777, adler@ieor.berkeley.edu, ***Maxim Oks***

We present several optimization based models to asses cash flow streams with a variety of cash flow transfer mechanisms.

TD27 Reliability Research I

Cluster: Reliability & Quality Control
Sponsor: Quality, Statistics & Reliability Section
Invited/Sponsor Session
Chair: David W. Coit, Rutgers University, Dept. of IE, 96 Frelinghuysen Rd., Piscataway, NJ 08854-8018, coit@rci.rutgers.edu

1) Reliability Test Plans for a Series System with Imperfect Interfaces, ***Mainak Mazumdar***, University of Pittsburgh, Dept. of IE, 1048 Benedum Hall, Pittsburgh, PA 15261, mmazumd@engrng.pitt.edu, ***Jayant Rajgopal***

We consider a series system consisting of n components. The system fails whenever any component fails or the interfaces among these components fail. The reliability of the interfaces can be determined only by testing the entire system. We address the question of how to allocate the testing effort among components and the system so that appropriate inferences for the system reliability can be made...

2) Allocation of Component Test Units to Minimize Reliability Estimation Variation: A Bayesian Approach, ***Tongdan Jin***, Rutgers University, Dept. of IE, 96 Frelinghuysen Rd., Piscataway, NJ 08854-8018, ***David W. Coit***

A methodology is presented based on gradient projection to determine the optimal number of component testing units to minimize the system reliability variance for a series-parallel system. Component reliability is unknown but described by a Bayesian prior beta distribution. It is necessary to consider the propagation of component certainty to the system-level...

3) Scheduling Maintenance Activities for Deteriorating Systems with Uncertain State Information, ***Lisa M. Maillart***, University of Michigan, Dept. of IOE, 1205 Beal Ave., Ann Arbor, MI 48109-2117, ***Stephen M. Pollock***

We consider a system that has immediately obvious failures, but undergoes a stochastic deterioration process that is not outwardly visible. Imperfect observations of the deterioration level can be made. Given this situation, we are left with 2 decisions: the preventive maintenance schedule and the observation schedule. We discuss the development and behavior of adaptive policies that dictate these schedules...

4) System Reliability Measures Considering Risk Aversion, ***David W. Coit***, Rutgers University, Dept. of IE, 96 Frelinghuysen Rd., Piscataway, NJ 08854-8018, coit@rci.rutgers.edu

System reliability is often determined based on uncertain component reliability estimates. Reliability optimization problems involve the maximization of system

reliability given certain design constraints. When component estimation uncertainty is considered and propagated to the system-level, the problem becomes more difficult because of the stochastic objective. For other types of problems, stochastic optimization involves the maximization of the expected objective...

TD28 Auditing & Performance Measurement

Sponsor: Public Programs & Processes Section
Sponsored Session

Chair: Estelle A. Shale, Warwick Business School, Operational Research & Systems, Coventry, CV4 7AL, UK, orses@wbs.warwick.ac.uk

1) Optimizing Staff-to-Youth Ratios in Juvenile Corrections Settings: Comparing Budget to Actual is Not the Best Measure, ***Colleen G. Waring***, Texas Youth Commission, Internal Audit, PO Box 4260, Austin, TX 78765, colleen.waring@tyc.state.tx, ***Karin Hill***

What factors cause understaffing in 6 juvenile corrections facilities and how can staffing, and thus safety, be maximized? All managers compare budgeted positions to actual staff, but disagree on what creates the difference. Integrating several data sources and data collection techniques, we quantify various factors' effect on staff:youth ratios.

2) Efficiency, Quality & Size: An Application to Swedish Public Employment Offices, ***Jonas Mansson***, Vaxjo University, Sch. of Mgmt. & Economics, Vaxjo, S-351, Sweden, jonas.mansson@ehv.vxu.se

We investigate the effects on scale and size as a result of omitting information on quality in an efficiency analysis. The main result is that both scale elasticity and the optimal size increases if the quality indicators are omitted. The application is on Swedish public employment offices.

3) Investment Budgeting: From Private to Public to Private, ***Estelle A. Shale***, Warwick Business School, Operational Research & Systems, Coventry, CV4 7AL, UK, orses@wbs.warwick.ac.uk, ***James E. Storbeck***

The public sector has shown considerable interest in "investment budgeting," a concept borrowed largely from "capital budgeting" frameworks within the private sector. We trace that journey and demonstrate in an application how these concepts, when used in a DEA context, are equally applicable in public and private planning problems.

4) Evaluating Large Public Sector R&D Projects with DEA, ***Boaz Golany***, Technion, Faculty of IE & Mgmt., Haifa, 32000, Israel, golany@ie.technion.ac.il

We use DEA models to evaluate large public sector R&D projects. The workings of the models are illustrated in a number of examples from the Israeli context.

TD29 Environment & Natural Resources II

Contributed Session

Chair: Kiriakos Vlahos, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, kvlahos@london.edu

1) Economically Optimum-Processing & Storage of Sugar Cane Juice, ***Mohammad A. Quasem***, Howard University, School of Bus., Dept. of IS&A, Washington, DC 20059, mquasem@howard.edu, ***Mohammed S. Quasem***

A method to prepare an acceptable ready-to-serve bottled sugarcane juice was developed. The method consisted of steam balancing of unpeeled uncut sugarcane followed by the addition of 25 ppm. The shelf life of sugarcane was assessed.

2) Spot & Futures Prices in Emissions Trading Markets, ***Akira Maeda***, Keio University, 5322 Endo, Fujisawa, Kanagawa, 252-8520, Japan, akmaeda@sfc.keio.ac.jp

We examine the equilibrium prices in emissions trading markets where the rights of giving off green house gas are traded. The emphasis is on the stochastic property of emission rights spot prices and futures and forward contracts that are employed as risk hedging instruments.

3) A Price Setting Alternative to Deal with Disequilibrium in Unit Commitment Electricity Power-Pool Auctions, ***Marcelino Madrigal***, University of Waterloo, E&CE Dept., 200 University Ave. West, Waterloo, Ontario, N2L 3G1, Canada, mmadriga@kingcong.uwaterloo.ca, http://ece.uwaterloo.ca/~mmadriga, ***Victor H. Quintana, Rodrigo Fuentes***

We elaborate on the determination, existence and effects of competitive market disequilibrium in electricity power pool auctions driven by unit commitment models. A proposed price setting alternative, based on dual variables, is shown to avoid the flaws of average pricing and minimizes the conflicts of interest when the auction has multiple primal solutions.

4) Pricing Power Stations using Option Theory, ***Kiriakos Vlahos***, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, kvlahos@london.edu, ***John Bower***

Power plants can be valued as a series of options, each corresponding to a half-hour of operating life. We model underlying price (electricity) and exercise price (cost of fuel) as stochastic processes. Monte-Carlo simulation is used to estimate theoretical values for comparison with sale prices of divested UK plants.

TD30 Novel Applications in the Energy Industry

Sponsor: Computing Society
Sponsored Session

Chair: Michael R. Bussieck, GAMS Development Corp., 1217 Potomac St. NW, Washington, DC 20007, mbussieck@gams.com

1) Energy/Environmental Modeling with the MARKAL Family of Models, ***Gary A. Goldstein***, International Resources Group Ltd., 1211 Connecticut Ave. NW, Ste. 700, Washington, DC 20036, ggoldstein@irgltd.com

The MARKAL models have been contributing to energy/environmental planning since the early 1980s. Under the auspices of the IEA, the models have evolved from an integrated energy assessment tool to the most widely used energy/environment/economy planning models, playing a central role in climate change analysis in numerous countries and communities around the world.

2) The Utility Fuel Economic-National Power Model Forecasting System, ***Lloyd Kelly***, Hill & Associates, Inc., 222 Severn Ave., Annapolis, MD 21403, lloyd-hillcoal@erols.com

The UFEM and the NPM form the core of an integrated assessment system to analyze the impact of changes in regulations and environmental policies in the US energy industry. The system projects fuel choices and determines the economic dispatch of all electric generating plants.

3) Weekly Asset Portfolio Management in a Hydro-Thermal Power System, ***Josef H. Bogensperger***, Austrian Power Trading, Am Hof 6A, Vienna, A-1010, Austria, bogenspergerj@apt-power.at

APT manages the Verbund's portfolio, the biggest power utility in Austria. A large-scale mixed-integer stochastic optimization model supports the weekly planning of thermal powers stations (on/off), executions of puts and calls, week ahead contracts and flexible contracts. Short- and long-term price risks, water volume risks and demand risk are taken into account.

TD31 Artificial Intelligence II

Contributed Session

Chair: Xiaoqing Li, McMaster University, Sch. of Bus., Hamilton, Ontario, L8S 4M4, Canada, lix2@mcmaster.ca

1) Cooperative Agents in Electronic Business, ***Taner Bilgic***, Bogazici University, Dept. of IE, Bebek, Istanbul, TR-80815, Turkey, taner@boun.edu.tr, www.ie.boun.edu.tr/~taner, ***Onder Tombus***

We cast the supply chain management processes into a setting where major supply chain management processes are owned and controlled by intelligent software agents. Coalition forming agents behave cooperatively to fulfill a task. We discuss how game theory approaches this problem, but shift our focus to algorithms with which we can build coalitions. We provide an algorithm and discuss our computational experience...

2) An Improved Parallel Neural Network Solution on the Maximum Clique Problem, ***Haibo Wang***, University of Mississippi, 105 Powers Hall, University, MS 38677, chwang@olemiss.edu, www.olemiss.edu/~chwang, ***Bahram Alidaee***, ***Gary A. Kochenberger***

We present an improved solution on the parallel organization of the neural network model that helps the overall performance on finding maximum clique. We conduct the study on multiprocessor and multicomputer parallel environments with a SGI Origin 2000 supercomputer and a Linux Beowulf cluster. We also present a general procedure to optimize the sequential algorithms and parallel algorithms...

3) Time Series Analysis with Soft Computing Techniques, ***Yan Deng***, West Virginia University, Dept. of IMSE, PO Box 6070, Morgantown, WV 26505, ydeng@55500.cemr.wvu.edu, ***Majid Jaraiedi***

A new procedure that combines ANNs, fuzzy logic and GAs to build an intelligent forecasting system is proposed. Unlike most forecasting research which only focuses on the forecast value, we present a methodology to perform statistical analysis of the forecasts generated by neuro-fuzzy procedure.

4) A Multi-Agent System in Support of Distributed CBR Systems, ***Xiaoqing Li***, McMaster University, Sch. of Bus., Hamilton, Ontario, L8S 4M4, Canada, lix2@mcmaster.ca, ***Ali Reza Montazemi***

Multi-agent systems can solve decision problems that are beyond the individual capabilities of a single agent. We present the architecture of a multi-agent system in support of a distributed case-based reasoning system. We have applied this architecture in the development of a DSS in support of selecting a stock portfolio.

TD32 Production & Scheduling III

Contributed Session

Chair: Cerry M. Klein, University of Missouri, E3437 Engineering Bldg. East, Columbia, MO 65211, kleinc@missouri.edu

1) A Lower-Bound on Flowtime for Cyclic Schedules, ***Woonghee Tim Huh***, Cornell University, Dept. of OR/IE, 293 Rhodes Hall, Ithaca, NY 14853, huh@orie.cornell.edu, ***Peter L. Jackson***, ***Ganesh Janakiraman***

We consider an environment with multiple machines and a single job, including the possibility of it visiting the same machine many times for different operations. We derive a lower bound for the flowtime of a job over the class of cyclic schedules with the highest throughput.

2) withdrawn - author request of 9/25, ***Victor M. Albornoz***, Universidad Tecnica Federico Santa Maria, Dept. de Industrias, Av Espana 1680, Casilla 110V, Valparaiso, Chile, valborno@ind.utfsm.cl

3) Stochastic Scheduling: A Mathematical Programming Approach, ***Cerry M. Klein***, University of Missouri, E3437 Engineering Bldg. East, Columbia, MO 65211, kleinc@missouri.edu, ***Wooseung Jang***, ***Dong K. Seo***

We study the single machine scheduling problem for the purpose of minimizing the expected number of tardy jobs. Jobs have normally distributed processing times and common deterministic due dates. The original stochastic problem is transformed into nonlinear integer programming models and computationally validated.

4) A Decision Support System for Daily Scheduling in an Aircraft Assembly Shop, ***Olga Bagatourova***, Knowledge Based Systems Inc., 1408 University Dr. East, College Station, TX 77840, obagatourova@kbsi.com, www.kbsi.com, ***Ki-Young Jeong***, ***Mike Graul***

The simulated annealing-based hybrid scheduling system (SABHSS) is designed to provide task schedules as a decision aid tool for an aircraft assembly shop. The DSS generates a reasonable schedule that takes into consideration the shop status and randomness in work contents. The SABHSS consists of the task generator, schedule generator and shop status database...

TD33 Stochastic Scheduling

Contributed Session

Chair: Meimei Wang, Chinese University of Hong Kong, Dept. of SE/EM, Hong Kong, Shatin NT, PRC, mmwang@se.cuhk.edu.hk

1) Probabilistic Analysis of Flow Shop Models, ***Philip M. Kaminsky***, University of California, IE/OR Dept., MC 1777, Berkeley, kaminsky@ieor.berkeley.edu, ieor.berkeley.edu/~kaminsky

We review the results of probabilistic analysis of easy to implement algorithms for single machine and flow shop models with average completion time and maximum delivery-completion time objectives.

2) Bi-Criteria Stochastic Single Machine Scheduling, ***Hossein H. Soroush***, Kuwait University, Dept. of Stats. & OR, Kuwait City, 13060, Kuwait, hsoroush@kuc01.kuniv.edu.kw

We study the problem of scheduling a static set of jobs on a single machine when job processing attributes are stochastic. The objective is to determine an optimal schedule that minimizes the expected value of a cost function of 2 performance criteria. The general problem is difficult to solve however, some important cases are solvable exactly when there are special structures on cost functions and performance criteria.

3) Performance Evaluation of Re-Entrant Lines with Failure-Prone Machines, ***Youngshin Park***, Pohang University of Science & Technology, Division of MIE, San 31 Hyoja-dong, Pohang, 790 784, South Korea, pys@postech.ac.kr, ***Sooyoung Kim***, ***Chi-Hyuck Jun***

We propose an approximation method for estimating the performance measures of re-entrant lines with failure-prone machines based on the mean value analysis technique. The system is found in the semiconductor wafer fabrication line in which several device types are manufactured through re-entrant processes at the single-job and the batch machines. Multi-class jobs are assumed to be processed in predetermined routings...

4) withdrawn - author request of 10/11, ***Meimei Wang***, Chinese University of Hong Kong, Dept. of SE/EM, Hong Kong, Shatin NT, PRC, mmwang@se.cuhk.edu.hk, ***Xiaoqiang Cai***

TD34 Economics III

Contributed Session

Chair: Christopher M. Rump, SUNY, Dept. of IE, Buffalo, NY 14260-2050, crump@eng.buffalo.edu, www.acsu.buffalo.edu/~crump/

1) Analysis of the Transport Costs in the Road Traffic Subsystem in Croatia, ***Damir Simulcik***, University of Zagreb, Faculty of Traffic Sci., Vukeliceva 4, Zagreb, Hrvatska, HR-10000, Hrvatska, simulcik@fpz.hr, http://www.fpz/hr

Research of the transport costs participation in the price of the goods points to a significant number of facts which may be santed by the suggested system solutions in Croatia. All significant facts present within the road traffic transport process in Croatia have been analyzed...

2) Computing Optimal Decisions on Markets, ***Jan M. Edman***, Stockholm School of Economics, Sveavagen 59, Stockholm, 113 83, Sweden, cje@hhs.se

Markets models are used to study real markets. However, some theoretical market models are too simple compared to real markets, but with obtainable solutions, while for more realistic and complex market models solutions are difficult to obtain. We present methods for computing optimal decisions of some complex markets models.

3) Stability of a Crime Rate Equilibrium, ***Christopher M. Rump***, SUNY, Dept. of IE, Buffalo, NY 14260-2050, crump@eng.buffalo.edu, www.acsu.buffalo.edu/~crump/, ***Rajan Batta***, ***Shoou-Jiun Wang***

We create a socio-economic model of criminal behavior in which criminals weigh the expected return of a crime against their heterogeneous opportunity costs for committing that crime. Using this model, we explore the dynamic stability of the resulting crime rate equilibrium in response to various levels of police enforcement.

TD46 Data Envelopment Analysis III

Cluster: DEA

Invited Session

Chair: Kaoru Tone, National Graduate Institute for Policy Studies, 2-2 Wakamatsu-cho, Shinjuku-ku, Tokyo, 162-8677, Japan, tone@grips.ac.jp

1) An Estimation of Production Functions for Multiple Inputs & Outputs Systems via DEA Concepts, ***Takashi Namatame***, Science University of Tokyo, Dept. of IME, Fac. of Eng., 1-3 Kagurazaka, Shinjuku-ku, Tokyo, 162-8601, Japan, namatame@ms.kagu.sut.ac.jp, ***Shunsaku Sato***, ***Toshikazu Yamaguchi***

DEA analysis can be extracted efficient DMUs but cannot be represented relationship between each input and output for these DMUs, directly. We attempt to estimate a production function for multiple inputs and outputs systems via DEA analysis, canonical correlation analysis and covariance structure analysis.

2) An Aspiration Level Approach to the Multi-Objective Optimization Method using Generalized Data Envelopment Analysis, ***Ye Boon Yun***, Kagawa University, Reliability-Based ISE, 2217-20 Hayashicho, Takamatsu, Kagawa, 761-0396, Japan, yun@eng.kagawa-u.ac.jp, ***Hirotaka Nakayama***, ***Masao Arakawa***, ***Hiroshi Ishikawa***

It is difficult to decide a final decision making solution from a number of Pareto optimal solutions. Therefore, we suggest an aspiration level approach to the multi-objective method using GDEA and show how to generate Pareto optimal solutions that are the closest to the aspiration level of the decision maker by the proposed method.

3) An Experimental Study of Efficiency Change Evaluation: The Stochastic Frontier vs. DEA, ***Hiroshi Morita***, Kobe University,

Dept. of Comp. & Systems Eng., Rokkoudai Nada, Kobe, 657-8501, Japan, morita@cs.kobe-u.ac.jp, ***Noriyoshi Nakayama***, ***Takafumi Hayashi***

The efficiency change or the technology change can be evaluated by some means. One is a parametric approach as stochastic frontier analysis and the other is a non-parametric approach as data envelopment analysis. We discuss the robustness of these estimates for noisy data by numerical experiments.

4) An Adjusted Projection in Oriented DEA Models, ***Kaoru Tone***, National Graduate Institute for Policy Studies, 2-2 Wakamatsu-cho, Shinjuku-ku, Tokyo, 162-8677, Japan, tone@grips.ac.jp

One of the main concerns of DEA is the projection onto the referenced efficient frontier. This task needs care when organizations with several different characteristics are involved. We discuss such situations and propose a simple and practical method for coping with target setting in such mixed business environments.

TD47 Software Demonstration VIII

Software Demo Session

Chair: Marcel Roelofs, Paragon Decision Technology, PO Box 3277, Haarlem, 2001 DG, The Netherlands, marcel.roelofs@paragon.nl

1) AIMMS & Multi-Agent Technology, ***Marcel Roelofs***, Paragon Decision Technology, PO Box 3277, Haarlem, 2001 DG, The Netherlands, marcel.roelofs@paragon.nl

Autonomous multi-agent technology will be the principal new feature in the presentation of the revolutionary AIMMS 3 modeling system during the software demonstration by Paragon Decision Technology. AIMMS is an all-around development environment for creating complex and easily maintainable decision support applications.

Tuesday 16:30-18:00

TE01 Risk Management

Sponsor: Decision Analysis Society

Sponsored Session

Chair: Vicki Bier, University of Wisconsin, Mech. Engineering Bldg., 1513 University Ave., Rm. 451, Madison, WI 53706, bier@ie.engr.wisc.edu

1) A Risk Analysis for the Management of Safety & Delays in Airline Maintenance Operations, ***Elisabeth M. Pate-Cornell***, Stanford University, Dept. of MS & Eng., Stanford, CA 94305-4024, mep@leland.stanford.edu, ***Marc Sachon***

We studied the maintenance of the flaps and slats of an airplane leading edge for a major airline. We constructed a probabilistic risk analysis model, extended to include the maintenance process and quality as a function of factors such as location, crews' training and availability of spare parts. We then made recommendations for a more effective management of maintenance and for safer flights.

2) Value Focused Thinking, PRA & Supercomputers for Space Mission Design, ***Ralph F. Miles Jr.***, EER Systems Corp., 2550 Honolulu Ave., Ste. 201, Montrose, CA 91020, rmiles2@earthlink.net

The power of supercomputers now makes it possible to bring together value focused thinking and probabilistic risk assessment in simulation modeling for space mission design. The mission environment (space trajectories, and the surfaces of planets, asteroids and comets) and the mission systems can be simulated with probabilistic reasoning and sufficient validity to support major space mission decisions.

3) Designing Effective Risk Management Decision Processes, ***Tony Cox***, Cox Associates, 503 Franklin St., Denver, CO 80218, ton@cox-associates.com, ***Vicki Bier***

Many social risk management processes depend on information and participation of multiple stakeholders. Private information and incentives can distort production of relevant risk information, creating ineffective risk management decisions. We apply lessons from mechanism design theory and practice to suggest principles for designing more effective risk management processes.

4) Empirical Validity of Exponential Discounted Utility for Decisions involving Sequences of Monetary Outcomes, ***Jeffery L. Guyse***, University of California, Grad. School of Mgmt., 350 GSM, Irvine, CA 92697-3125, jguyse@uci.edu

Experimental results on individuals' preferences for temporal sequences of monetary outcomes are discussed and compared to results on preferences for outcome/timing pairs. Anomalies that have surfaced in experiments with isolated outcomes (gain/loss asymmetry, long/short asymmetry and the absolute magnitude effect) are investigated with sequences of monetary outcomes over time.

TE02 DEA III

Contributed Session

Chair: Michael J. Kwinn, Jr., University of Texas, MSIS Dept., 513 Lima Trail, Harker Heights, TX 76548, kwinnm@mail.utexas.edu

1) A Pre-Processor for Identifying the Frame of a Pointed Finite Polyhedral Cone, ***Mahboob Shaheen***, 3233 Peter St., Windsor, Ontario, N9C 1H6, Canada, shaheen1000@yahoo.com

We present a computational procedure to identify some extreme rays of a pointed finite polyhedral cone generated by finite set of vectors without solving any linear program and also classify a significant numbers of redundant vectors by checking feasibility of a small linear system. That is, the procedure can be used as a pre-processor to identify the frame of a pointed finite polyhedral cone. used as a pre-processor to identify the frame of a pointed finite polyhedral cone.

2) Algorithms for the Frame of a Finitely Generated Unbounded Polyhedron, ***Francisco J. Lopez***, 535 South Mesa Hills Dr., Apt. 912, El Paso, TX 79912, fjlopez@olemiss.edu, www.olemiss.edu/~fjlopez, ***Jose H. Dula***

Consider 2 finite sets, A and V, of points in m-dimensional space. The convex hull of A and the conical hull of V can be combined to create a finitely generated unbounded polyhedron. We are interested in finding frames of these polyhedral sets; that is, minimal cardinality subsets of A and V that generate the same object. We present 2 algorithms to obtain the frame...

3) Anchor Points in DEA, ***Marie-Laure Bougnol***, University of Mississippi, Sch. of Bus. Admin., University, MS 38677, mbougnol@olemiss.edu, www.olemiss.edu/~mbougnol, ***Jose H. Dula***

Anchor points are a special category of extreme points of the production possibility sets in DEA. They are of special interest because they define the transition from the efficient frontier to the "free-disposability" portion of the boundary. Their identification is important. These points confound DEA procedures because they frequently satisfy the necessary conditions for "weak" efficiency...

4) Combining DEA & Statistical Regression to Determine Efficiency & Effectiveness in Military Recruiting Advertising Strategies, ***Michael J. Kwinn, Jr.***, University of Texas, MSIS Dept., 513 Lima Trail, Harker Heights, TX 76548, kwinnm@mail.utexas.edu, ***Patrick L. Brockett***, ***William W. Cooper***

We report on the combination of 2 analytic techniques to examine the impact of joint and service-specific advertising on military recruiting. In stage 1, we apply DEA to distinguish between efficient and inefficient performers. In stage 2, we incorporate these results in a statistical regression model.

TE03 Pricing & Competitive Issues in Inventory Management

Sponsor: MSOM

Sponsored Session

Chair: Paul Zipkin, Duke University, Fuqua Sch. of Bus., Durham, NC 27708-0120

1) Inventory Levels under Uncertain Demand: The Effects of Product Durability, ***Oded Koenigsberg***, Duke University, Fuqua Sch. of Bus., Durham, NC 27708, ok2@mail.duke.edu, ***Preyas Desai***, ***Devavrat Purohit***

We develop a dynamic model of a durable product market. We characterize the firm's optimal production and sales decisions and examine the relationship between the manufacturer and marketing decisions. We analyze how the durability of the product and the level of demand uncertainty effect the optimal inventory levels (cannibalization).

2) Durability Selection of Components in a Remanufacturable Product, ***Laurens G. Debo***, INSEAD, Blvd. de Constance, Fontainebleau, 77300, France, laurens.debo@insead.fr, ***Beril L. Toktay***, ***Luk N. Van Wassenhove***

We consider the supply chain for a remanufacturable product where the supplier of the reusable component determines its durability level and price, and the manufacturer facing a heterogeneous customer market determines the prices of the new and remanufactured final products. We analyze how the structure of the durability cost and the market impacts profitability, market segmentation and durability provision.

3) The Trade-Off Between Price & Commitment Timing in Supplier Contracts, ***Mark E. Ferguson***, Duke University, Fuqua Sch. of Bus., Box 304, Durham, NC 27708, mef2@mail.duke.edu, www.duke.edu/~mef2

Negotiations between a manufacturer and a parts supplier often involve the length of time the manufacturer is contractually held to its order quantity. We find conditions under which the manufacturer is better off with a contract that requires an early commitment to its order quantity, before the supplier commits resources.

TE04 Remanufacturing Strategy & Competition

Sponsor: MSOM
Sponsored Session
Chair: Pranab Majumder, University of Rochester, Simon Sch. of Bus., Rochester, NY 14627, majumderpr@simon.rochester.edu

1) Production Planning for Bulk Recycling, ***Qin Lu***, Ohio State University, IWSE, 210 Baker Systems Bldg., 1971 Neil Ave., Columbus, OH 43210-1271, lu.102@osu.edu, ***Julie Ann Stuart***

We develop a discrete optimization model to help recyclers decide what incoming products to accept and how to allocate limited processing capacity and inventory space. The model distinguishes between profitable output destined for reuse and costly output destined for further processing or disposal.

2) A Heuristic for Stochastic Repair Processing Decisions for Multiple Product Categories, ***Jianhong Qiao***, Purdue University, West Lafayette, IN 47907, qiao@ocu.edu, ***Julie Ann Stuart***

We first set up a stochastic repair process model for a single product category. Then, on the basis of the results, we introduce a heuristic method to calculate the priorities for multiple product categories under limited inventory space and processing capacities.

3) Implications of Product Take-Back on the Strategic Behavior of Channel Members, ***Canan R. Savaskan***, INSEAD, Technology Mgmt. Dept., Blvd. de Constance, Fountainebleau Cedex, 77300, France, rezzan.canan.savaskan@insead.fr

We examine the implications of product take-back and recovery on a distribution channel with competing retail outlets. We compare the impact of 2 channel structures: where products are taken back by the manufacturer and where retail outlets do so. We explore channel coordination in a particular reverse channel structure.

4) Competition in Remanufacturing, ***Pranab Majumder***, University of Rochester, Simon Sch. of Bus., Rochester, NY 14627, majumderpr@simon.rochester.edu, ***Harry Groenevelt***

We establish a framework for examining remanufacturing in the face of price competition. An original equipment manufacturer competes with a local remanufacturer, when facing a joint demand. Under a steady state multi-period model, the closed form solutions allow us to prescribe ways to increase remanufacturing activity.

TE05 Analysis & Control of Flexible Service Networks

Sponsor: Applied Probability Society
Sponsored Session
Chair: Constantinos Maglaras, Columbia Business School, 409 Uris Hall, 3022 Broadway, New York, NY 10027-6902, c.maglaras@columbia.edu

1) Scheduling Open Queueing Networks with Sufficiently Flexible Resources, ***Sunil P. Kumar***, Stanford University, Grad. School of Business, 518 Memorial Way, Stanford, CA 94305-5015, kumar_sunil@gsb.stanford.edu

We study asymptotically optimal scheduling of open queueing networks with flexible non-identical servers with overlapping capabilities. We describe a condition that ensures the corresponding Brownian control problem is 1-dimensional. We propose an asymptotically optimal discrete review scheduling policy for networks satisfying this condition.

2) Diffusion Limits for Multi-Skill Call Centers with Many Agents, ***Martin I. Reiman***, Bell Labs., Lucent Technologies, Math. Sci. Research Ctr., 600 Mountain Ave., 2C-315, Murray Hill, NJ 07974, marty@research.bell-labs.com

We consider a queueing model of a call center providing service to several customer types (skills), where each server (agent) can handle some subset of the skills. We examine this model in the Halfin-Whitt regime, which involves the number of servers growing large while the traffic intensity approaches unity.

3) Skills-Based Routing with Service-Level Constraints, ***Noah F. Gans***, University of Pennsylvania, OPIM Dept., The Wharton School, Philadelphia, PA 19104-6366, gans@wharton.upenn.edu, ***Yongpin Zhou***

In the skill-based routing problem, many types of jobs arrive to queues with heterogeneous servers. The objective is to devise a routing scheme that best utilizes the server capacities, subject to a service-level constraint. We analyze a common special-case of the problem with simple, MDP-type models.

4) Service Networks with Channel & Service Level Flexibility, ***Mor Armony***, NYU, Op. Mgmt. Dept., Stern Sch. of Bus., 40 W 4th, New York, NY 10012-1118, marmony@stern.nyu.edu, ***Constantinos Maglaras***

Consider flexible service networks that provide customers' interaction through a variety of channels with differentiated quality of service specifications. The users may choose their service channel based on the respective expected waiting times provided by the system. We characterize system equilibrium and quantify the benefits of service flexibility.

TE06 Incident Detection & Management

Sponsor: Transportation Science Section
Sponsored Session
Chair: Srinivas Peeta, Purdue University, Sch. of Civil Eng., 1284 Civil Eng. Bldg., West Lafayette, IN 47907-1284

1) A Multi-Stage Stochastic System Optimum Dynamic Traffic Assignment Program with Recourse for Incident Traffic Management, ***Omar Sawaya***, Northwestern University, Dept. of Civil Eng., 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, o-sawaya@nwu.edu, ***Dung Doan***, ***Athanasis Ziliaskopoulos***, ***Robert Fourer***

We introduce a multistage stochastic mathematical model with recourse to compute and disseminate real-time traffic control actions, which account for system uncertainties such as demand variation and incident severity. The benefits include the provision of a priori robust traffic control actions that are ideal under all circumstances of system uncertainties.

2) Fourier Technique for Fault Tolerance & Incident Detection in Real-Time Traffic Systems, ***Ioannis Anastassopoulos***, Purdue University, Sch. of Civil Eng., 1284 Civil Eng. Bldg., West Lafayette, IN 47907-1284, ***Srinivas Peeta***

A real-time architecture for on-line traffic operations is subject to fault tolerance associated with malfunctioning detectors. We propose a Fourier-based framework where such faults and traffic incidents are treated as abnormalities. Our procedure can distinguish between faults and incidents, correct faults and detect incidents.

3) Incident Management using VMS-Based Messages Consistent with Driver Behavior, ***Shyam Gedela***, Purdue University, Sch. of Civ. Eng., 1284 Civil Eng. Bldg., West Lafayette, IN 47907-1284, ***Srinivas Peeta***

We propose and analyze a heuristic that uses VMS to achieve optimal diversion under incidents. The VMS message content is used as a control variable to generate messages that are consistent with controller objectives and driver behavior. Implemented within a rolling horizon framework, the approach determines the VMS locations to be activated and the consistent time-dependent messages to be displayed.

4) A Linear Quadratic Gaussian Approach for Real-Time Traffic Management, ***Dung Doan***, Northwestern University, Dept. of IEMS, 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, d-doan@transcivil.edu

We introduce a LQG control approach for real-time traffic management. The methodology constantly monitors the traffic on a real-time basis and adjusts its control actions to respond to the unpredictable driver compliance. The testing results indicate that the approach effectively helps to reduce total system delays under the effect of traffic incidents.

TE07 Spreadsheet Models & Management Science Principles

Sponsor: INFORM-ED
Sponsored Session
Chair: Jane N. Hagstrom, University of Illinois, Dept. of Info. & Dec. Sci., 601 South Morgan, MC 294, Chicago, IL 60607, hagstrom@uic.edu

1) Good vs. Bad Spreadsheet Models for OR/MS, ***Robert F. Nau***, Duke University, Fuqua Sch. of Bus., Durham, NC 27514, robert.nau@duke.edu, www.duke.edu/~rnau

When teaching MS/OR methods using spreadsheets, it helps to also teach principles of "good" modeling, such as letting the data structure determine the

model structure, separating data from formulas, using formulas that are simple and replicable, following a self-evident progression to the "bottom line" and making liberal use of internal documentation.

2) Spreadsheet Programming vs. Templates, ***John Lawrence***, California State University, Dept. of MS/IS, Fullerton, CA 92834, jlawrence@exchange.fullerton.edu

The use of spreadsheets, particularly Excel, to teach MS is now commonplace. Virtually all new introductory texts feature Excel to the exclusion of other dedicated software packages and old standbys such as LINDO. Spreadsheets open up exciting possibilities in teaching but can tend to refocus the course away from MS principles, concepts and applications, placing more emphasis on the spreadsheet programming and presentation...

3) Spreadsheet Model Verification, ***Jane N. Hagstrom***, University of Illinois, Dept. of Info. & Dec. Sci., 601 South Morgan, MC 294, Chicago, IL 60607, hagstrom@uic.edu

Except for very small spreadsheet models, it is often extremely wearisome to verify the correctness of a model and to determine whether it is linear or nonlinear. A combination of spreadsheet programming techniques serves to expose the structure of the model without requiring the examination of formulas. These are database structure, simple formulas, descriptive labels, unit-of-measurement labels and color-coding.

TE08 Electronic Commerce: Trends & Development

Cluster: **E-Business/Enterprise Integration: Intl. Bus. Perspectives**
Invited Session

Chair: Charles V. Trappey, National Chiao Tung University, Dept. of MS, Hsinchu, Taiwan, trappey@cc.nctu.edu.tw

1) Inventory Models with Stock-Dependent Demand & Shortages for Deteriorating Items, ***Jinn-Tsair Teng***, University of New Jersey, Dept. of Mktg. & MS, Wayne, NJ 07470-2103, jteng@ie.nthu.edu.tw, ***Chun-Tao Chang***, ***Maw-Sheng Chern***

We point out that it is a mistake to minimize the costs in an inventory system with a stock-dependent demand rate. We also find the conditions in which an inventory policy with shortages is less expensive to operate than an inventory policy without shortages and vice versa.

2) Great China E-Commerce Trends & Development, ***Charles V. Trappey***, National Chiao Tung University, Dept. of MS, Hsinchu, Taiwan, trappey@cc.nctu.edu.tw

The huge market in Greater China continues to modernize and over the last 5 years has maintained a growth rate at least 5% greater than Europe and the US. The combination of market size and economic growth makes Greater China the most promising place in the world for Internet products and services. We present some key developments occurring in the region.

TE09 Inventory Models & Management

Cluster: **Inventory Management**
Invited Session

Chair: Frank W. Ciarallo, University of Arizona, Dept. of SIE, PO Box 210020, Tucson, AZ 85721, frank@sie.arizona.edu

Co-Chair: Anand Iyer, I2 Technologies, Inc., 909 East Las Colinas Blvd., Ste. 16, Irving, TX 75039, iyer@i2.com

1) Investigating Discontinuities in an Inventory Problem, ***Graham K. Rand***, Lancaster University, Dept. of MS, The Mgmt. Sch., Lancaster, LA1 4YX, UK, g.rand@lancaster.ac.uk

For a product where demand is increasing, several methods have been proposed for the determination of the replenishment policy. In particular, 4 proposed heuristics have the same structure and only differ in a parameter value in a cubic equation. An analytic algorithm has been developed that simply varies the parameter vector so many different results can be obtained...

2) Multi-Item Production Planning with Resource Failures: Feasibility, Safety Stocks & Inventory Targets, ***Frank W. Ciarallo***, University of Arizona, Dept. of SIE, PO Box 210020, Tucson, AZ 85721, frank@sie.arizona.edu, ***Sridhar Sundaram***

We examine a single stage, muli-item production system with random production failures. Using both analytic- and simulation-based models, we explore the feasibility of production plans and the structure of planning decisions. Critical managerial decisions in the system include sequencing, reserving time for production and the structure of inventory targets for each item.

3) Inventory Requirements Planning: A Highly Effective Decision Support Methodology for Inventory Planning, ***Donald R. Smith***, Lucent Technologies, 7 Walnut Hollow Ln, Holmdel, NJ 07733

The IRP methodology was developed by Bell Laboratories to aid Lucent Technologies in the management of inventory in a fast-paced and rapidly changing product environment. Implementation of the methodology within Lucent Technologies has resulted in spectacular improvements in inventory and customer service simultaneously. We describe IRP and the results achieved with it...

4) Inventory Planning for Perishable Items, ***Anand Iyer***, i2 Technologies, Inc., 909 East Las Colinas Blvd., Ste. 16, Irving, TX 75039, iyer@i2.com

We discuss the use of queueing models for the analysis of inventory planning problems where items have shelf life or demands expire. Technical details as well as functional use cases will be discussed.

TE10 Tutorial: Sensitivity Analysis for Scheduling Problems

Cluster: **Scheduling**
Invited Session

Chair: Nicholas G. Hall, Ohio State University, 301 Hagerty Hall, 1775 South College Rd., Columbus, OH 43210-1144, halln@cob.ohio-state.edu

Co-Chair: Marc E. Posner, Ohio State University, Fisher Coll. of Bus., Columbus, OH 43210-1271, posner.1@osu.edu

1) Tutorial: Sensitivity Analysis for Scheduling Problems, ***Nicholas G. Hall***, Ohio State University, 301 Hagerty Hall, 1775 South College Rd., Columbus, OH 43210-1144, halln@cob.ohio-state.edu, ***Marc E. Posner***

We introduce a variety of new directions in formulating and solving sensitivity analysis questions. Although we focus on applications to scheduling problems, many of these questions and solution approaches can be applied to other optimization problems. For some problems, we provide fast methods to determine when a previously optimal solution remains optimal. Other methods restore an optimal solution after a parameter change....

TE11 Approximations, Linearizations & Cutting Planes

Cluster: **Integer Programming**
Invited Session

Chair: Warren Adams, Clemson University, Dept. of Math. Sci., Clemson, SC 29634-0975, wadams@clemson.edu

1) Norm-Based Approximation in Discrete Multiple Objective Programming, ***Margaret M. Wiecek***, Clemson University, Dept. of Math Sci., Clemson, SC 29634-0975, wmalgor@clemson.edu, ***Bernd Schandl***, ***Kathrin A. Klamroth***

An algorithm to approximate the nondominated set of discrete multiple objective programs is proposed. The algorithm employs block norms to find an approximation and evaluate its quality. By automatically adapting to the problem's structure and scaling, the approximation is constructed without interaction with the decision maker.

2) Enumerative Approaches for a Cut Scheduling Problem, ***Douglas R. Shier***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634-0975, shierd@clemson.edu, ***Dawn Rose***

We describe exact and heuristic algorithms for solving a scheduling problem arising in the apparel industry: finding all feasible cutting schedules requiring the minimum number of setups. Computational evidence shows that surprisingly large instances of this problem can be solved exactly. Heuristics are also developed to solve larger instances.

3) The COIN-OR Open Solver Interface: Toward Solver-Independent MIP Algorithms, ***Matthew J. Saltzman***, Clemson University, Dept. of Math. Sci., Clemson, SC 29634-0975, mjs@math.clemson.edu

The COIN-OR initiative (http://www.coin-or.org) promotes open source software for the OR community. The Open Solver Interface (OSI) component of COIN-OR provides a common programming interface to multiple solvers, allowing a single implementation to be run using different LP solvers. We describe the OSI architecture and how to use it.

4) The COIN-OR Cut Generation Library: Toward Greater Code Reuse, ***Robin Lougee-Heimer***, IBM TJ Watson Research Center, PO Box 218, Rte. 134, Yorktown Heights, NY 10598-0218,

robinlh@us.ibm.com

Cutting planes are familiar tools for solving MILP. Yet there is no repository of non-proprietary implementations for OR professionals to reuse and build upon. We propose an open source "cut generation library" as part of the common optimization interface for operation research initiative. http://www.coin-or.org
optimization interface for operation research initiative. http://www.coin-or.org

TE12 Recent Innovations in Supply Chain Management & Electronic Commerce

Cluster: Logistics & Supply Chain Management
Invited Session

Chair: Beth J. Feichtinger, i2 Technologies, 909 East Las Colinas Blvd., 11th Floor, 1108, Dallas, TX 75039, beth_feichtinger@i2.com

1) Warehouse Sizing & Selection, ***Brian T. Downs***, Aspen Technology, Inc., Chesapeake Supply Chain Div., ***John H. Semple***

Building upon recent inventory modeling work, we show how to create warehouse sizing and selection models for retail operations. These models can be used in conjunction with simulated data or forecasts of future demand to effectively determine the appropriate warehouse capacity for managing a diverse range of products.

2) LTL Core Carrier Selection, ***Jeffrey D. Camm***, University of Cincinnati, QAOM Dept., ML 0103, Cincinnati, OH 45221-0130, jeff.camm@uc.edu, ***Carl C. Offhaus***, ***Cliff Barber***

Companies utilizing common carriers today recognize the benefits of a core carrier program. Having a large percentage of total volume awarded to the core set can lower cost, increase service and lower overhead. We present integer-programming models we have used to help companies choose a set of core carriers in the LTL environment.

3) Enabling Business-to-Business E-Commerce Growth through Logistics, ***Ted Farris***, University of North Texas, ***Nan Hollingsworth***, ***Wes Guillemaud***

Projections for e-commerce growth suggest significant increases in B2B commerce. Critical to the growth of e-commerce is the support of logistics activities both as a means to increase business and as a means to improve operations. We address how the Internet has opened up a variety of new and innovative methods to accomplish the principles of logistics more effectively.

4) Supply Chain Strategies for E-Commerce Companies, ***Beth J. Feichtinger***, i2 Technologies, 909 East Las Colinas Blvd., 11th Floor, 1108, Dallas, TX 75039, beth_feichtinger@i2.com, ***Uday Apte***

We review the supply chain strategies being adopted by different e-commerce companies and present a framework for understanding the challenges and opportunities faced by supply chain managers in these companies. Opportunities for conducting research in this important area are also identified.

TE13 Manufacturing & Logistics: Industrial Challenges

Cluster: Manufacturing & Logistics
Invited Session

Chair: V. Jorge Leon, Texas A&M University, 106 Fermier Hall, MS 3367, College Station, TX 77843-3367, jleon@acs.tamu.edu

1) A Real-Time Dispatching Problem in the Trucking Industry, ***Robert H. Storer***, Lehigh University, IMSE Dept., Mohler Lab., 200 West Packer Ave., Bethlehem, PA 18017, ***Joseph C. Hartman***, ***Selcuk Avci***

We discuss a project aimed at developing real time decision software that matches trucks to loads in the full truck load industry. We will focus on the problem presented, how it changed over time and implementation issues we faced.

2) Issues in US/Mexico Logistics, ***J. Rene Villalobos***, Arizona State University, Dept. of IE, Box 875906, Tempe, AZ 85287-5906, rene.villalobos@asu.edu, ***Benjamin Vega***, ***Paul M. Griffin***

Many US companies have established their operations in the Mexican side of the US/Mexico border. Rising labor costs and turnover have forced an increasing number of companies to locate their facilities in the interior of Mexico. We explore issues associated with locating manufacturing and distribution centers in the interior of Mexico.

3) Cellular Configuration of a Flexible Electronics Manufacturing Facility, ***Jeffrey S. Smith***, Auburn University, Dept. of ISE, 207 Dunstan Hall, Auburn University, AL 36849-5346, jsmith@eng.auburn.edu

We will describe the implementation of cellular manufacturing at a low volume consumer electronics manufacturing company that produces a single key product line along with several secondary products. The secondary products are produced to increase the utilization of the PCB assembly lines.

4) Material Flow, Capacity & Layout Problems in Micro-Electronics Assembly, ***Claribel Castillo***, Amkor Technology, 1900 South Price Rd., Chandler, AZ 85284-1604, ***V. Jorge Leon***, ***Cesar O. Malave***

The microelectronics assembly industry generates unique challenges for the OR and IE specialists. Traditional models must be tailored to accommodate the volatility of semiconductor markets, short product and technology life-cycles, technological constraints and multi-national facilities. We will focus on the description of material flow, capacity and layout problems.

TE14 Flexible Automation Issues II

Cluster: Flexible Manufacturing Systems
Invited Session

Chair: Kathryn E. Stecke, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI 48109-1234, kstecke@umich.edu

1) A Decision Support System for Integration of Logistics in Concurrent Engineering, ***Diane Riopel***, Ecole Polytechnique, Dept. of Math & IE, CP 6079, Succ. Centre-ville, Montreal, Quebec, H3C 3A7, Canada, diane@grime1.ind3.polymtl.ca, ***Claude Turmel***, ***Andre Langevin***

We present a prototype of a DSS to guide logistics engineers in a revision of the logistics operations when the product characteristics change. The system is based on a mapping of operational logistics decisions affected by a change in the production.

2) Integer Programming Models for Scheduling Surface Mount Technology Lines, ***Tadeusz J. Sawik***, University of Mining & Metallurgy, Faculty of Mgmt., Al. Mickiewicza 30, Krakow, 30-059, Poland, tsawik@wzn4.zarz.agh.edu.pl

Mixed integer programming models are proposed for the blocking schedule of SMT lines for printed wiring board assembly. A SMT line consists of several processing stages in series, separated by finite intermediate buffers and connected by conveyors. Various SMT line configurations are considered to illustrate possible applications of the models proposed.

3) Clearing Price Dynamism with a Complex Virtual Market, ***Kenji Harada***, Kobe University, Dept. of Comp. & Systems Eng., Rokkoudai Nada, Kobe, 657-8501, Japan, harada@kaede.seg.kobe-u.ac.jp, ***Susumu Fujii***, ***Toshiya Kaihara***

We propose a complex market-oriented programming framework, which is based on the economics of complex systems. Three types of heterogeneous agents are defined in a complex virtual market and the clearing price dynamism can be analyzed in economic terms. The applicability of the framework into a resource allocation problem is discussed.

TE15 Management of Technology II

Contributed Session

Chair: Reetika Gupta, Baruch College, Dept. of Mktg., Sch. of Bus., 17 Lexington Ave., New York, NY 10010, reetika_g@hotmail.com

1) Modeling & Measuring Marketing Assets as a Central Value Driver in the New Economy, ***Tobias Schnitzer***, Ludwigstr. 28 RG, Munich, 80539, Germany, schnitzer@bwl.uni-muenchen.de, www.marketingworld.de, ***Christian Blumelhuber***, ***Markus Pfeiffer***

The so-called new economy is changing the business and marketing environments as some of the controlling mechanisms in use, e.g., market shares, balance sheets, etc., are failing to map the real values of internet-driven companies. We focus on different finance, e.g. market cap analysis, and marketing-oriented approaches, e.g. CLT, to model a set of variables driving the relevant values such as flexibility, fame or even fun.

2) Distributed Teams: Managing the Dynamics of Global Teamwork, ***Nora I. Misiolek***, Syracuse University, Sch. of Mgmt., Ste. 400, Syracuse, NY 13244, eimisiol@som.syr.edu, ***David Wilemon***

With the explosive growth in IT and globalization, there has been a significant increase in distributed teamwork. Unfortunately, many organizations fail to understand distributed communications. We synthesize the accumulated work from management, communications, sociology and social psychology to extract major findings on facilitating teamwork in computer-mediated environments.

3) How Presentation Formats of Internet Brands Influence Information Processing of Web Consumers, ***Reetika Gupta***, Baruch College, Dept. of Mktg., Sch. of Bus., 17 Lexington Ave., New York, NY 10010, reetika_g@hotmail.com, ***Sucheta S. Nadkarni***

Using an experimental design, we investigate how presentation formats of Internet brands, e.g., Amazon.com, affect the information processing of web consumers by reducing the competitive brand interference. The results of the study have significant implications for website design and the decision making process of web consumers.

TE16 Stochastic & Global Optimization Models

Cluster: Stochastic Programming
Invited Session

Chair: Suvrajeet Sen, University of Arizona, Dept. of SIE, Tucson, AZ 85721, sen@sie.arizona.edu

1) Global Optimization: A Review of Some Recent LGO Applications, ***Janos D. Pinter***, Pinter Consulting Services/Dalhousie University, 129 Glenforest Dr., Halifax, Nova Scotia, B3M 1J2, Canada, jdpinter@is.dal.ca

We review a few recent projects in which the LGO software system for global optimization has been applied. Comments regarding the practical need for, and viable combinations of, exact and heuristic approaches in global optimization will also be offered.

2) Global Optimization of Two-Stage Stochastic Integer Programs, ***Shabbir Ahmed***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, s-ahmed1@uiuc.edu, ***Mohit Tawarmalani, Nikolaos V. Sahinidis***

The highly non-convex nature of stochastic integer programs motivates the need for global optimization approaches. We develop a B&B-based global optimization algorithm for 2-stage stochastic integer programs with discretely distributed parameters. We devise specialized lower bounding and branching strategies and discuss finiteness issues.

3) An Effective Solution of Very Large Binary Quadratic Programs, ***Bahram Alidaee***, University of Mississippi, Hearin Ctr. for Enterprise Sci, Holman Hall, School of Bus., University, MS 38677, balidaee@bus.olemiss.edu, www.bus.olemiss.edu/balidaee, ***Gary A. Kochenberger, Fred W. Glover***

Recent years have seen significant progress in applying and solving the unconstrained BQP. Nonetheless, large instances of these combinatorial problems remain exceedingly difficult to solve. We present a new approach, based on ghost image processing, for solving very large instances and report preliminary computational experience.

TE17 OR in Sport, Leisure & the Arts

Cluster: OR in Sport, Leisure & the Arts
Invited Session

Chair: John M. Norman, University of Sheffield, Mgmt. School, 9 Mappin St., Sheffield, S1 4DT, UK, j.norman@sheffield.ac.uk

1) OR & the Management of Public Art Projects, ***Elizabeth H. Norman***, Sheffield Hallam University, Sch. of Cultural Studies, Psalter Ln Campus, Sheffield, S11 8UZ, UK, e.h.norman@shu.ac.uk, ***John M. Norman***

A public art project has 3 phases: 1) requirements determination, 2) design and installation and 3) evaluation. Phase 1 may be well served by community OR and Phase 3 by "traditional" OR. Phase 2 needs a single decision maker. These views are supported by an analysis of 16 public art projects in Japan, the UK and US.

2) Bellman, Carroll & Dudeney: Games, Puzzles & OR, ***David K. Smith***, University of Exeter, Sch. of Mathematical Sci., Exeter, Devon, UK, d.k.smith@exeter.ac.uk

Many puzzles and board games can be seen as sequential decision processes. This was noted by Richard Bellman; the origins of a sequential mathematical approach to such recreations can be traced to the 19th century. We will examine how recent analysis has developed links between OR and non-trivial entertainments.

3) OR's Impact on World Cricket, ***Tony Lewis***, Oxford Brookes University, The Business Sch., Wheatley, Oxford, OX33 1HX, UK, ajlewis@brookes.ac.uk

We look at the effect that OR/MS has had on the game of one-day cricket at international, national and even club levels. We consider OR's impact on strategy, on the game's organization and its most recent success - in devising a fair playing regulation for revising the target score whenever rain interrupts a match.

4) Dynamic Programming in Cricket: Choosing a Night Watchman, ***John M. Norman***, University of Sheffield, Mgmt. School, 9 Mappin St., Sheffield, S1 4DT, UK, j.norman@sheffield.ac.uk, ***Stephen R. Clarke***

When a batsman is dismissed towards the end of a day's play, he is replaced by a "night watchman," whose objective is not to be dismissed before close of play. A dynamic programming analysis suggests that the common practice of using a lower order batsman is often sub-optimal.

TE18 Models for Supply Chain Management

Cluster: Models for Supply Chain Management
Invited Session

Chair: Joseph Geunes, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6596, geunes@ise.ufl.edu

1) A Combined Inventory & Transportation Problem under Demand Uncertainty, ***H. Edwin Romeijn***, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, romeijn@ise.ufl.edu, ***Paveena Chaovalitwongse***

Two major cost components in supply chain operations are inventory (holding and shortage) costs and transportation costs. We construct a model and a solution approach that minimizes total expected costs in a system of warehouses and retailers, with demand uncertainty at the retailers and fixed charge transportation cost functions.

2) Network Algorithms for Supply Chain Planning Problems, ***Burak Eksioglu***, University of Florida, Dept. of ISE, Gainvesville, FL 32611-6596, burak@grove.ufl.edu, ***Panos M. Pardalos***

Supply chain planning problems typically have inventory and transportation cost functions that are piecewise-linear concave or piecewise-linear and nonconvex in volume. We discuss algorithms and heuristics developed for minimum concave-cost network flow problems. We extend these methods to piecewise-linear nonconvex cases and discuss local search procedures that increase solution quality.

3) Multi-Commodity Supply Chain Network Planning Problems, ***Sandra Duni Eksioglu***, University of Florida, Dept. of ISE, Gainesville, FL 32611-6596, ***Panos M. Pardalos***

We present preliminary computational results for heuristically solving minimum cost, multi-commodity network flow problems with piecewise-linear concave cost functions. The model and solution methods apply to a variety of supply chain planning problems such as transportation planning, production-inventory control, economic lot sizing problems, facility location and capacity expansion planning.

4) Optimizing Supply Shortage Decisions in Base-Stock Distribution Systems, ***Joseph Geunes***, University of Florida, Dept. of ISE, 303 Weil Hall, PO Box 116595, Gainesville, FL 32611-6596, geunes@ise.ufl.edu, ***Amy Z. Zeng***

We investigate how shortage decisions impact costs in base-stock distribution systems and develop a model that decides whether to backlog, expedite or employ a combination of the two. Results indicate that combined expediting and backlogging outperforms complete expediting or backlogging in certain cases due to transportation savings induced by backlogging.

TE19 Logistics II

Contributed Session

Chair: Lawrence Snyder, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208-3119, l-snyder3@nwu.edu

1) A Heuristic Approach for the Inventory Routing Problem on Inbound Logistics Networks, ***Chi-Guhn Lee***, University of Michigan, 1205 Beal Ave., IOE Bldg., Ann Arbor, MI 48109-2117, chiguhn.lee@umich.edu, ***Yavuz A. Bozer***

The inventory routing problem minimizes the combined inventory and transportation costs. For inbound logistics networks such as automotive parts supply, we show an annealing-based heuristic that uses LP to optimize the inventory carrying costs while perturbing the truck routes and pickup quantities. Numerical results suggest the heuristic performs well.

2) A Random-Key Genetic Algorithm for the Generalized Traveling Salesman Problem, ***Lawrence Snyder***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208-3119, l-snyder3@nwu.edu, ***Mark S. Daskin***

We present an efficient heuristic for the generalized TSP. The heuristic

combines a random-key GA with a local improvement strategy. It finds optimal solutions for 36 of 41 test problems and outperforms all other heuristics to date in solution quality and speed.

TE20 Modeling Systems & Languages

Contributed Session

Chair: Dean C. Chatfield, Virginia Tech, Dept. of MS & IT, 1007 Pamplin Hall 0235, Blacksburg, VA 24061, deanc@vt.edu

1) A Modeling System to Combine Optimization & Constraint Programming, ***John N. Hooker***, Carnegie Mellon University, GSIA, Pittsburgh, PA 15213, jh38@andrew.cmu.edu

I present a comprehensive scheme to formulate declarative models of problems to be solved by combining optimization and constraint programming. The syntax of the model indicates how these approaches are combined. I will illustrate with a series of examples.

2) Missile Production Simulation & Analysis, ***AmyLynne Ruhle***, Raytheon, PO Box 85931, Tucson, AZ 85754, aruhle@west.raytheon.com, ***Randell P. Burgess***

A missile assembly line is modeled using discrete event simulation software, ProModel. This model is used to evaluate system performance and production capacity. The simulation and analysis effort examines the effects of bottlenecks, failures and resource utilization on the production rate. Recommendations are provided to improve production capacity and resource utilization.

3) Utilizing SISCO, the Simulator for Integrated Supply Chain Operations, ***Dean C. Chatfield***, Virginia Tech, Dept. of MS & IT, 1007 Pamplin Hall 0235, Blacksburg, VA 24061, deanc@vt.edu, ***Terry P. Harrison***, ***Jack C. Hayya***

We present SISCO to address the supply chain model detail, flexibility and reuse issues facing supply chain simulation modeling endeavors. SISCO provides visual model definition with unparalleled options that can be extended further by customizing SISCO's standard Java structures. An open, XML-based, storage format (SCML) enables information reuse and sharing.

TE21 Location Analysis III

Sponsor: Society on Location Analysis

Sponsored Session

Chair: Zvi Drezner, California State University, Dept. of MS/IS, Rm. LH-323G, 800 North State College, Fullerton, CA 92834-9480, zdrezner@fullerton.edu

1) A Dynamic Model & Parallel Tabu Search Heuristic for Real-Time Ambulance Relocation, ***Gilbert Laporte***, University of Montreal, Ecole des HEC, 3000 Chemin Cote-Ste-Catherine, Montreal, Quebec, H3C 3J7, Canada, gilbert@crt.umontreal.ca, ***Michel Gendreau***, ***Frederic Semet***

We consider the real-time redeployment problem for a fleet of ambulances. A dynamic model is proposed and a dynamic ambulance management system is described. The system includes a parallel tabu search heuristic to precompute redeployment scenarios. Simulations based on real data confirm the efficiency of the proposed approach.

2) Aggregation Error Bounds for Some Special Constrained Location Models, ***Hulya Emir***, University of Florida, Dept. of ISE, Gainesville, FL 32611, hulya@ufl.edu, ***Richard L. Francis***

We consider the error arising from replacing certain "original" location functions by approximating functions, where the approximation is due to demand point aggregation. We consider problems, including the covering problem, of finding error bounds when such functions appear in constraints instead of the objective. Computational results will be reported.

3) A Framework for Locating Competitive Facilities on a Network, ***Oded Berman***, University of Toronto, Rotman Sch. of Mgt., 105 Saint George St., Toronto, Ontario, M5S 3E6, Canada, berman@mgmt.utoronto.ca, ***Dmitry Krass***

We present a new framework for locating competitive facilities on a network, which is based on spatial interaction models. An overview of algorithmic approaches and open problems will be presented.

4) A Web-Based Implementation of Facility Location Models, ***Yu-Huei Lai***, California State University, IE Program, Warren Hall 771, 25800 Carlos Bee Blvd., Hayward, CA 94542, ***Joyendu Bhadury***

Although excellent models are available to aid decision makers in choosing optimal locations for their facilities, there are no widely available implementations on the Internet. We have initiated a web site where we wish to implement most major models of facility location. We will focus an initial phase of model implementation.

TE22 Health Applications I

Contributed Session

Chair: Linda Roberge, Syracuse University, Sch. of Mgmt., Syracuse, NY 13244, lroberge@syr.edu

1) Inventory Policies at a Blood Bank, ***Erdal Erel***, Bilkent University, Faculty of Bus. Admin., Ankara, 06533, Turkey, erel@bilkent.edu.tr, http://www.bilkent.edu.tr/~erel, ***Emre Berk***, ***Tahar Ellejmi***

We examine the blood inventory management of a major hospital blood bank. Fill rate and perished quantities are the two performance measures of the system. We propose alternative replenishment policies to improve system performance measures and test them using simulation.

2) Prescriptions for Better Service, or Better Service for Prescriptions, ***Thomas R. Jefferson***, Sultan Qaboos University, PO Box 20, Al-Khod, Muscat, 123, Sultanate of Oman, tjeffers@squ.edu.om, ***John T. Simon***

We present interim results of a study of the service operations of a hospital pharmacy in Oman. These results include data collection, modeling, capacity estimation staffing and shift design. Future plans call for redesigning the service system, both front and back operations.

3) The Internet, Medical Records & Personal Privacy, ***Linda Roberge***, Syracuse University, Sch. of Mgmt., Syracuse, NY 13244, lroberge@syr.edu

While the Internet can provide a powerful tool for making medical records available when needed, maintaining the privacy of those records remains a prime concern. We explore the impact of the media on whether or not individuals are willing to place health records in an Internet-accessible database.

TE23 Simulation I

Contributed Session

Chair: Karen J. Napoleon, University of Georgia, Terry Coll. of Bus., Athens, GA 30602, knapol@terry.uga.edu

1) Assessing the Need & Impact of Electronic Payment on Cash Management: A Simulation Approach, ***Ying Zhou***, National University of Singapore, Dept. of IS, Sch. of Computing, Singapore, 119260, Singapore, zhouying@comp.nus.edu.sg, ***Hock Hai Teo***, ***Kwok-Kee Wei***

We quantified the impact of payment method on cash management into 3 costs: cost of transactions demand for cash, processing cost and float. Simulation approach is used to investigate the impact and to find out the optimal percentage of electronic payment adoption under different conditions. We also give some general rules that could be applied to more general cases...

2) withdrawn - author request of 9/29, ***John Ladbrook***, Dunton Engineering Centre, Mail 15/4A-F04D, Laindon, Basildon, Essex, SS15 6EE, England, UK, jladbroo@ford.com, ***Annette Januszczak***

3) A Simulation Study of Manufacturing Supply Chains Cost under Demand Variations, ***Rakesh Nagi***, SUNY, Dept. of IE, 342 Bell Hall, Box 602050, Buffalo, NY 14260, nagi@eng.buffalo.edu, www.acsu.buffalo.edu/~nagi, ***Ana Maria Sarmiento***

The cost performance of a set of manufacturing supply chains under demand variations is presented. Integrated chain cost is calculated as the sum of setup, production, holding and backorder for all manufacturing locations. The bullwhip effect is considered in the analysis. Statistical results are presented to validate the accuracy of the study.

4) Cross-Training in Services to Increase Customer Responsiveness, ***Karen J. Napoleon***, University of Georgia, Terry Coll. of Bus., Athens, GA 30602, knapol@terry.uga.edu

In service industries, process flexibility is critical to overall organizational performance since demand is less predictable in terms of both the timing and the nature of service required. This study examines the effects of cross training in service environments as a method for effectively increasing service capacity and customer responsiveness.

TE24 Combinatorial Applications in Telecommunication

Sponsor: Telecommunications Section

Sponsored Session

Chair: Tony Cox, Cox Associates, 503 Franklin St., Denver, CO 80218, ton@cox-associates.com

1) Least-Cost Design of Unidirectional Path-Switched Rings,

Jenny Sanchez, Cox Associates, 503 Franklin St., Denver, CO 80218, jenny@cox-associates.com, ***Tony Cox***

SONET ring networks require optimizing the trade-off between network elements and fiber costs. We introduce a GRASP meta-heuristic with Steiner TSP sub-heuristics for solving the UPSR problem and use it to compare OC192, DWDM and optical cross connect mesh topology technologies.

2) Partition of Numbers in Design of SONET Communication Networks, *Djangir Babayev*, Qwest Advanced Technologies, 4001 Discovery Dr., Boulder, CO 80303, dbabayev@advtech.uswest.com, ***Dan Wilson***

The design of linear chains in SONET networks is considered. The problem of generating all possible sets of systems to carry the traffic between a given pair of nodes is reduced to the problem of partitioning of numbers. Based on this reduction, the original design problem is modeled and solved as an integer-programming problem to minimize the total cost of systems and regenerators.

3) Finding Cycles in Graphs, *Michael Galloy*, Qwest Advanced Technologies, 4001 Discovery Dr., Boulder, CO 80303, mgalloy@advtech.uswest.com, ***Dan Wilson***

Techniques are presented for 2 problems of finding cycles in graphs. First, finding a single cycle containing a given set of nodes. Second, given a set of nodes N, finding a set of cycles such that each node in N is contained in at least one of the cycles and such that in the sub-graph induced by the cycles, there is a path between each pair of nodes. Both problems arise in design of telecommunications networks.

4) withdrawn - author request of 9/19, *Djangir Babayev*, Qwest Advanced Technologies, 4001 Discovery Dr., Boulder, CO 80303, dbabayev@advtech.uswest.com

TE25 Computational Advances in Global & Nonlinear Integer Programming

Cluster: Global Optimization
Sponsor: Optimization Section
Sponsored Session
Chair: Sanjay Mehrotra, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208-3119, mehrotra@iems.nwu.edu

1) Solution of Quadratic Assignment Problems using Quadratic Programming Relaxations, *Nathan Brixius*, University of Iowa, Dept. of Comp. Sci., Iowa City, IA 52242, brixius@cs.uiowa.edu, ***Kurt M. Anstreicher***

We describe a new B&B algorithm for the QAP that uses a convex quadratic programming (QP) relaxation to obtain a bound at each node. The QP relaxations are approximately solved using the Frank-Wolfe algorithm. The branching strategy makes extensive use of dual information associated with the QP subproblems. We obtain state-of-the-art computational results on large benchmark QAPs.

2) Disjunctive Cuts for Mixed Integer Convex Programming, *Joao Luis Cardo Soares*, Universidade de Coimbra, Dept. of Math., Coimbra, 3000, Portugal, jsoares@mat.uc.pt

We present 2 conceptual algorithms for finding the infimum of a convex function over the convex hull of the union of convex sets: a constraint generation algorithm that generates a sequence of outer approximations and a column generation algorithm that generates a sequence of inner approximations. We explain how the 2 can be combined in order to define a cutting-plane algorithm for mixed integer convex programming.

3) A Combinatorial Lower Bounding Heuristic for Network Design Problems, *Oktay Gunluk*, AT&T Labs., 120 Laurel Ave., Rm. D5 3D-21, Middletown, NJ 07748, oktay@att.com

For large-scale network design problems, solving the strengthened LP-relaxation of the standard MIP formulation can be very time consuming. We describe a fast heuristic that produces lower bounds without solving LPs. Computational results would also be presented.

4) The Sample Average Approximation Method for Stochastic Optimization, *Anton J. Kleywegt*, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, anton.kleywegt@isye.gatech.edu, anton@isye.gatech.edu, ***Alexander Shapiro***

We consider stochastic optimization problems with objective of minimizing the expected value of a function of decision variables and random variables. We study the SAA method, discuss convergence properties, propose an algorithm and present numerical results.

TE26 Issues in Service Capacity Planning

Cluster: OR/MS in the Service Industries
Invited Session
Chair: Candace A. Yano, University of California, IE/OR Dept., 4135 Etcheverry Hall, Berkeley, CA 94720-1777, yano@ieor.berkeley.edu

1) Estimating Effective Capacity in Erlang Loss Systems with Competing Traffic, *Andrew M. Ross*, University of California, Dept. of IE/OR, Berkeley, CA, aross@ieor.berkeley.edu

Internet and telecommunications service providers often purchase capacity from multiple external sources with unknown capacities, thus competing for resources with other customers' traffic streams. We estimate the "effective capacity" of an Erlang loss system under such conditions, taking into account non-stationary input, incomplete data and accidental blocking.

2) Capacity Planning with Random Rework or Revisits, *Candace A. Yano*, University of California, IE/OR Dept., 4135 Etcheverry Hall, Berkeley, CA 94720-1777, yano@ieor.berkeley.edu

Many services processes, as well as those in semiconductor fabrication and biotechnology applications, e.g., genome sequencing, require random revisits of a customer or job to the same type of processor, often due to rework. We address the problem of setting capacity levels in such an environment.

3) Capacity Planning of Data Offload Network, *John Shortle*, George Mason University, Dept. of Systems Eng. & OR, ST2, Rm. 111, MSN 4A6, Fairfax, VA 22030, jshortle@gmu.edu

One way to relieve congestion on the phone network is to transfer Internet calls to a separate data network. We present a MIP that optimizes the locations and capacities of transfer points to the data network. An interactive implementation is used to design and expand the offload network.

TE27 Reliability Research II

Cluster: Reliability & Quality Control
Sponsor: Quality, Statistics & Reliability Section
Invited/Sponsor Session
Chair: Bert Keats, Arizona State University, AZ, keats@asuvax.eas.asu.edu

1) An Investigation of "Sudden Death" Testing using Weibull Time-to-Failure Data, *James W. Wisnowski*, US Air Force Academy

SD testing is presented in many reliability texts as a worthy means of saving test time. There are many unanswered questions concerning this procedure. We investigate trade-offs with respect to getting better parameter estimates but taking longer to obtain them. Using simulated weibull data, we compare least-square parameter estimates under the sd procedure ($k < m$) with the sd procedure ($k > m$)...

2) Transient Behavior of Time-between-Failures of Complex Repairable Systems, *Stephen P. Chambal*, Air Force Institute of Technology

It is well known for complex repairable systems (with as few as 4 components), regardless of the time-to-failure distribution of each component, that the time-between-failures tends toward exponential. Aware of this, many such systems tend to base spares provisioning, maintenance personnel availability and other decisions on an exponential time between failures distribution. Such a policy may suffer serious drawbacks...

3) A Simulation-Based Approach to Determine Producer's Risk for a Weibull Sequential Probability Ratio Test with Imperfect Information, *Alejandro Heredia-Langner*, Arizona State University

The SPRT is a popular decision-making tool for hypothesis testing in the reliability area due to its efficient use of resources and relative ease of implementation. In the traditional test, the user specifies acceptable Type I and Type II error rates that hold as long as perfect information regarding the shape parameter is available...

4) A New Software Reliability Model Based on Software Type, Environment & Process, *Fran Zenzen*, Motorola SG

Increased use of software cost products requires new approaches to software reliability prediction. There are a limited number of software reliability prediction models in practical use. These models are reviewed and critiqued. A new model that uses actual production data is developed. This model focuses on software type, environment and process. Model assumptions and data inputs are introduced...

TE28 Panel: Can We Discard the Economic Model in DEA Studies?

Sponsor: Public Programs & Processes Section
Sponsored Session

Chair: James E. Storbeck, Warwick Business School, Operational Research & Systems, Coventry, CV4 7AL, UK, j.e.storbeck@warwick.ac.uk

1) Panel: Values, Evaluation & Resource Allocation in the Public Sector: Economics or Data Analysis?, *Patricia Byrnes*, University of Illiois, Inst. for Public Affairs, Public Affairs Ctr. 332, Springfield, IL 62794-9243, byrnes.patricia@uis.edu, ***Robert G. Dyson***, Warwick Business School, Operational Research & Systems, Coventry, CV4 7AL, UK, orsrd@wbs.warwick.ac.uk, ***Lawrence M. Seiford***, National Science Foundation, OR/Production Systems, 4201 Wilson Blvd. DMII Rm. 550, Arlington, VA 22230, lseiford@nsf.gov, ***James E. Storbeck***, Warwick Business School, Operational Research & Systems, Coventry, CV4 7AL, UK, j.e.storbeck@warwick.ac.uk

No abstract supplied.

TE29 Quality Management & Statistics II

Contributed Session

Chair: John D. Barrett, University of North Alabama, UNA Box 5103, Florence, AL 35632, jdbarret@unanov.una.edu

1) Application of the Generalized Control Chart to Stationary Autocorrelated Data, *Lotfi K. Gaafar*, American University in Cairo, 5 Yousif Elgendy, Apt. 35, Cairo, Egypt, gaafar@aucegypt.edu

We investigate the applicability of the GCC to autocorrelated data and use simulation to approximate the average run lengths for different combinations of parameters. The results of the simulations show a reasonable performance of he GCC when applied to autocorrelated data.

2) A Generalized Approach to Algorithmic Process Control, *John D. Barrett*, University of North Alabama, UNA Box 5103, Florence, AL 35632, jdbarret@unanov.una.edu

Algorithmic process control (APC) combines the monitoring capability of statistical process control with engineering process control. The benefits offered by APC apply to each of these components. We offer a generalized APC approach that can be used with any engineering controller and the appropriate process monitoring scheme. Such a scheme offers greater flexibility to the practicing engineer.

TE30 Tutorials: CPLEX Power Tools

Sponsor: Computing Society
Sponsored Session

Chair: Irvin J. Lustig, ILOG, 25 Sylvan Way, Short Hills, NJ 07078, ilustig@ilog.com

1) Customized Branch & Cut Strategies with CPLEX 7.0, *Ed Klotz*, ILOG, 889 Alder Ave., Ste. 200, Incline Village, NV 89451, eklotz@ilog.com

The first tutorial will discuss additional ways to control CPLEX 7.0's B&C search using new routines that simplify the interaction between the pre-solve and MIP callback functions. Thus, users can now express cuts and heuristics in terms of the original model while maintaining the benefits of the pre-solve.

2) ILOG Concert Technology, *Roland Wunderling*, ILOG, 889 Alder Ave., Ste. 200, Incline Village, NV 89451, roland@ilog.com

The second tutorial will present Concert Technology, a C++ API for building and solving optimization models. By extending the expressiveness for modeling known from constraint programming with column-wise modeling and manipulation capabilities it helps greatly reducing the implementation and maintenance effort for optimization applications, while providing unrestricted access to all CPLEX functionality.

TE31 Artificial Intelligence III

Contributed Session

Chair: James C. Reynolds, Teknowledge, 842 Santmyer Dr., Leesburg, VA 20175, reynolds@teknowledge.com

1) Discovering Subproblem Prioritization Heuristics by Induction, *Haldun S. Aytug*, University of North Carolina, IOM Dept., College of Bus., 9201 University City Blvd., Charlotte, NC 28223, haytug@email.uncc.edu, www.uncc.edu/haytug, ***Vince Osisek***

The shifting bottleneck procedure has been very successful in solving jobshop and flowshop problems. However, it can be shown that there are better schedules that can be built by changing its subproblem prioritization rule. We describe various procedures to discover prioritization rules using inductive learning. Current results show that such rules can yield better solution quality in less time.

2) An Approach for a Controlled Generalization of Boolean Functions, *Rafael E. Estrella*, Louisiana State University, 3128 CEBA Bldg., Baton Rouge, LA 70803-6409, restrel@tiger.lsu.edu, ***Evangelos Triantaphyllou***

Although the issues of generalization and overfitting have been well studied for neural networks, there are not many studies of inferring a Boolean function from training examples. We study ways of improving the accuracy of Boolean functions inferred from 2 classes of examples by means of controlling their generalization capability.

3) Applying Machine Learning to Prioritize the Delivery of Military Information, *James C. Reynolds*, Teknowledge, 842 Santmyer Dr., Leesburg, VA 20175, reynolds@teknowledge.com

A machine learning technique is applied to the problem of prioritizing military information by its value. Value is determined by how much the information reduces uncertainty for the commander and his mission. The application has advantages in objectivity and flexibility over more traditional approaches based on utility theory.

TE32 Production & Scheduling IV

Contributed Session

Chair: Vernon N. Hsu, George Mason University, Sch. of Mgmt., 4400 University Dr., Fairfax, VA 22030, vhsu@som.gmu.edu

1) Market-Based Distributed Scheduling Algorithms for Manufacturing & Internet-Based Supply Webs, *Aysegul Toptal*, Texas A&M University, Dept. of IE, College Station, TX 77843, a0t8587@unix.tamu.edu, ***Ihsan Sabuncuoglu***

We propose 2 bidding-based scheduling algorithms for product team based manufacturing. A product team is a collection of resources that are specialized to perform certain processes, products or projects. These teams can be a factory of a multi-national company as well as a department or a group technology cell in a company...

2) Production Factors Affecting the Marination Pick-Up Rate, *Ulysses J. Brown, III*, Jackson State University, Dept. of Mgmt. & Mktg., Sch. of Bus., PO Box 18230, Jackson, MS 39217, ubrown@ccaix.jsums.edu, ***Willie C. Anderson***

We investigated the factors affecting the marination pick-up rate at a Mississippi poultry plant. A 1% increase in the marination pick-up rate can translate into a $234,000 increase in profits per year. Using regression analysis, 3 significant variables that contributed to optimizing the marination pick-up rate were determined. Production implications and future research suggestions were discussed.

3) Modeling Setup Carry-Overs with Setup Time, *Pasi P. Porkka*, Helsinki School of Economics & Business Administration, PO Box 1210, Helsinki, Finland, porkka@hkkk.fi, http://ky.hkkk.fi/~k22570/index.html, ***Ari P. Vepsalainen***, ***Markku Kuula***

In comparing capacitated lot sizing models with set-up time, 2 new models allowing period-to-period carry-overs show promising capacity savings and decreased inventories for modest size production planning problems. An experiment with post-optimal removal of set-ups from the non-carry-over model is discussed.

4) The Dynamic Capacity Expansion Problem with Deferred Expansion & Shortage Costs, *Vernon N. Hsu*, George Mason University, Sch. of Mgmt., 4400 University Dr., Fairfax, VA 22030, vhsu@som.gmu.edu

We consider a deterministic finite-period capacity expansion problem that allows temporary capacity shortage at certain shortage costs. We explore special structure of the optimal solution to the problem and present a dynamic programming algorithm to solve the problem in polynomial time.

TE33 Manufacturing Systems

Contributed Session

Chair: Ignacio Castillo, Texas A&M University, 3131 TAMU, Dept. of IE, College Station, TX 77843-3131, icastillo@tamu.edu

1) A Strategic Product Range Split Problem, *Zeger Degraeve*, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK, zdegraeve@london.edu, zdegraeve@lbs.ac.uk, ***Raf***

Jans, Luc Schepens

We study a real life case of a product redesign at an international manufacturer. The product range is split up into families. All the models within each family make use of some common basic components. The range split problem is an assortment problem at subassembly level leading to component commonality.

2) Modeling a Basic Assembly System, ***Liesje De Boeck***, University of Antwerp, Prinsstraat 13, Antwerp, 2000, Belgium, liesje.deboeck@ufsia.ac.be, ***Nico J. Vandaele***

We focus on the modeling of a basic assembly system, consisting of 2 equally uniformly distributed input processes and infinite buffers. An assembly part consists of one unit of each input stream. We obtain exact results for the average matching times and the average interarrival times at the assembly machine.

3) Production Line Reconfiguration for Remanufacturing, ***Uday S. Rao***, Carnegie Mellon University, GSIA, Schenley Park, Pittsburgh, PA 15213, urao@andrew.cmu.edu, ***Jayashankar Swaminathan, Jun Zhang***

Motivated by a capacity management problem at Visteon's re-manufacturing facility, we study production line reconfiguration for a 4-task serial, asynchronous assembly system with no buffer inventory. We develop an analytical model that simultaneously considers line balancing and line length to maximize the reman system's effective per stage throughput. We provide analytical results on the change in throughput...

4) Petri Net-Based Modeling & Analysis of Tandem AGV Systems, ***Ignacio Castillo***, Texas A&M University, 3131 TAMU, Dept. of IE, College Station, TX 77843-3131, icastillo@tamu.edu, ***Sergio A. Reyes, Brett Peters***

We present a Petri net modeling approach for analyzing tandem AGV systems. The approach allows the consideration of several critical design issues that have not been addressed previously. The proposed approach is capable of providing analytical as well as simulative results and allows tandem AGV systems to be fully explored within a single framework.

TE34 Vehicle Routing

Contributed Session

Chair: Robert A. Russell, University of Tulsa, 600 South College Ave., Tulsa, OK 74104-3189, rrussell@utulsa.edu

1) withdrawn - author request of 9/22, ***Kenny Q. Zhu***, National University of Singapore, Blk 403, Clememti Ave. 1, #11-186, Singapore, 120403, Singapore, kzhu@comp.nus.edu.sg, http://www.comp.nus.edu.sg/~kzhu/, ***Kar-Loon Ong***

2) Study of the VRP Considering Joint-Distribution with Multi-Fleet Size using a Hybrid Heuristic of Simulated Annealing & Tabu Search, ***Tetsuya Uchida***, Waseda University, Dept. of IMSE, 3-4-1 Okubo Shinjuku-ku, Tokyo, 169-8555, Japan, tets@yoshi.mgmt.waseda.ac.jp, ***Kazuho K. Yoshimoto***

We present a VRP considering joint distribution, using existing trucks of multi-fleet-size. The problem is solved through a hybrid heuristic that combines simulated annealing with tabu search to approach a near optimal solution. We use the total cost of fixed and variable truck cost as the objective function.

3) Arc Routing Problems with Vehicle Site Dependencies, ***Lawrence D. Bodin***, University of Maryland, Smith Sch. of Bus., College Park, MD 20742, lbodin@rhsmith.umd.edu, ***John Sniezek, Laurence S. Levy***

A mathematical programming formulation of the arc routing problem with vehicle-site dependencies is presented. This problem is solved using CPLEX/ILOG. An upper bound procedure is also developed. Computational results on problems involving several hundred arcs are presented.

4) A Scatter Search Approach to the Vehicle Routing Problem with Time Windows, ***Robert A. Russell***, University of Tulsa, 600 South College Ave., Tulsa, OK 74104-3189, rrussell@utulsa.edu, ***Wen Chiang***

We examine a scatter search approach to solving the VRP with time windows. The methodology is developed in conjunction with reactive tabu search. Computational results and comparisons with other approaches will be presented.

TE46 Data Envelopment Analysis IV

Cluster: DEA

Invited Session

Chair: Fred Phillips, Oregon Graduate Institute of Science & Technology, MST Dept., 2000 NW Walker Rd., Beaverton, OR 97006, fphillips@admin.ogi.edu

1) Estimation of Elasticities of Output Substitution by Combining a Distance Function Approach with a Full Dimensional Facet Approach, ***Ole Bent Olesen***, Odense University, Dept. of Organization & Mgmt., Campusvej 55, Odense, DK-5230, Denmark, ole@sam.sdu.dk, ***Niels Christian Petersen***

We focus on a DEA-based piecewise linear approximation of a production possibility set by a complete representation of its full dimensional efficient facets, Olesen & Petersen (1996). This is followed by an estimation of the relevant elasticities of substitution based upon this representation. These estimates are compared to those obtained by a semi-paramtric approach combining the distance function approach...

2) DEA in Mutual Fund Evaluation, ***Tarja Joro***, University of Alberta, 3-40F Business Bldg., Alberta, T6G 2R6, Canada, tarja.joro@ualberta.ca, ***Paul Na***

Astronomical amounts of money are being invested in financial markets. Consequently, the evaluation of portfolio performance has created a great deal of interest among practitioners as well as academic researchers. We discuss weaknesses of the Sharpe ratio, introduce a DEA model and report comparative numerical evaluations based on the market data.

3) Website Design Efficiency, Customer Satisfaction & Customer Loyalty, ***Mei Xue***, University of Pennsylvania, OPIM Dept., The Wharton Sch., Philadelphia, PA 19104-6366, xuem@wharton.upenn.edu, ***Patrick T. Harker, Gregory R. Heim***

We propose a method involving DEA and a post-DEA statistical analysis proposed in Xue & Harker (1999) for the evaluation and analysis of service quality ratings observed in on-line retailing. We apply the method in an empirical analysis of a study sample of on-line food retailers. The results suggest a strong association between a DEA generated measure of service quality efficiency and customer loyalty.

4) A New Technique for Estimating Confidence Intervals on DEA Efficiency Estimates, ***Janice Forrester, Timothy R. Anderson***

A new approach to chance constrained DEA is described and experimental results are given for calculating a confidence band for the estimated production function. This allows an interval containing the most likely production function, to be specified with a predetermined level of confidence.

Wednesday 08:30-10:00

WA02 Analytic Hierarchy Processes

Contributed Session

Chair: Casey Brace, Puget Sound Energy, PO Box 97034, Bellevue, WA 98009-9734, cbrace@puget.com

1) An AHP-Based Simple Recursive Procedure for Determining Weights, ***Yubo Gao***, Hebei Institute of Technology, Dept. of Economic Mgmt., Tangshan, Hebei, 063009, PR China, gaoyubo@263.net

Based on Saaty's AHP judgement matrix, we present a simple recursive procedure to determine index weights, which only uses the upper triangular elements in the pairwise comparison matrix in AHP and can be easily implemented. The example shows that this method involves less computation and the result is satisfactory.

2) The Ranking of Suppliers in the Automotive Industry using an AHP Method, ***Alireza Arshadi Khamseh***, No. 24-Afshin Alley, Koshe Shomaly St. Azadi Ave., Tehran, Iran, arshadi@yahoo.com

In automotive industries with respect to no complexity in production of most parts and parts plurality, large quantities of suppliers are expected. I consider factors such as performance, business, quality systems and cost assessments. By using AHP, suitable structure in six levels and group decision making specifications suppliers could be prioritized.

3) AHP Meets the Self-Managed Workgroup, ***Casey Brace***, Puget Sound Energy, PO Box 97034, Bellevue, WA 98009-9734, cbrace@puget.com, ***Richard Adams, Michael Sheehan***

Puget Sound Energy was faced with switches that had the potential to cause serious injury to the works assigned to operate them. AHP was used to allow a safety committee to rank switches with respect to this danger. Pictures of switches were taken to confirm AHP ranking to union members.

WA03 Horizontal Competition in Supply Chains

Sponsor: MSOM

Sponsored Session

Chair: Siddharth Mahajan, Duke University, Fuqua Sch. of Bus., 134 Towerview Dr., Box 90210, Durham, NC 27708-0120, mahajan@mail.duke.edu

1) Pricing & Replenishment in a Distribution System with Competing Retailers, ***Fernando G. Bernstein***, Columbia University, Grad. Sch. of Bus., New York, NY 10027, fb65@columbia.edu, ***Awi Federgrun***

We consider a 2-echelon distribution system with a supplier and N competing retailers. The demand rate for each retailer depends on all the retailer's prices. There is an inventory carrying cost at the retailers and supplier transfers incur fixed and variable costs. Channel decisions consist of retail price and replenishment strategy for each retailer. Two channel coordination schemes are studied...

2) Competition & Structure in Serial Supply Chains, ***Charles J. Corbett***, UCLA, AGSM, 110 Westwood Plaza, Box 951481, Los Angeles, CA 90095-1481, charles.corbett@anderson.ucla.edu, ***Uday S. Karmarkar***

We examine the impact of process economics on the structure and competitiveness of supply chains with a serial structure with fixed and variable costs and price-sensitive linear demand. The entry stage is modeled as a simultaneous game, where the players take the outcomes of the subsequent post-entry (Cournot) competition into account in making their entry decisions...

3) Supply Chain Coordination under Horizontal Competition, ***Garrett J. van Ryzin***, Columbia University, 412 Uris Hall, Grad. School of Bus., New York, NY 10027, gjv1@columbia.edu, ***Siddharth Mahajan***

We analyze a model of a 2-echelon supply chain, in which there is horizontal competition among either manufacturers and retailers in one of the echelons. Competing goods are held in inventory at the retail echelon. A sequence of heterogenous customers dynamically substitute among goods, based on availability of stocks. Channel decisions consist of a wholesale price and retail inventory levels.

WA04 Combinatorial Methods for Manufacturing I

Contributed Session

Chair: Susan K. Norman, University of Cincinnati, Dept. of QAOM, PO Box 210130, Cincinnati, OH 45221-0130, normansk@econqa.cba.uc.edu

1) Stochastic Programming in Telecommunications Networks, ***Abdel Lisser***, France Telecom R&D, 38-40 rue du General Leclerc, Issy Les Moulineaux, 92794, France, abdel.lisser@francetelcom.fr, ***Rafael Castro de Andrade***

We present experiments on stochastic programming under uncertain demands in telecommunications networks. Poisson demands and different distributions have been used. The Monte Carlo method was applied to simulate the expectation function and the problem was solved by using cutting plane and subgradient methods. Numerical results are given on real network data.

2) Heuristics to Determine Job Batches that Minimize Manufacturing Time in Printed Circuit Board Assembly, ***Susan K. Norman***, University of Cincinnati, Dept. of QAOM, PO Box 210130, Cincinnati, OH 45221-0130, normansk@econqa.cba.uc.edu, ***Michael Magazine***, ***George G. Polak***

A problem from the PCB industry is to partition a set of jobs into batches so that total manufacturing time, setup time and processing times are minimized. Heuristic approaches considered are cluster analysis, an FFD bin-packing approach, a sequencing GA and a grouping GA.

WA05 Dynamic Control & Performance for Stochastic Networks

Sponsor: **Applied Probability Society**
Sponsored Session

Chair: Sunil P. Kumar, Stanford University, Grad. School of Business, 518 Memorial Way, Stanford, CA 94305-5015, kumar_sunil@gsb.stanford.edu

Co-Chair: Ruth J. Williams, University of California, Dept. of Math., 9500 Gilman Dr., LA Jolla, CA 92093-0112, williams@russel.ucsd.edu

1) A Processor Sharing Queue in Heavy Traffic, ***H. Christian Gromoll***, University of California, Dept. of Math., 9500 Gilman Dr., La Jolla, CA 92093-0112, cgromoll@math.ucsd.edu

We discuss some recent results on the heavy traffic behavior of a processor sharing queue. Our main approach is to study a certain measure valued process, which encodes information about the residual service times and from which standard measures of performance such as queue length, workload and sojourn time can be recovered.

2) Performance of the Closed Lu-Kumar Network, ***Jenny Steichen***, IBM, TJ Watson Research Ctr., Yorktown Heights, NY 10598, steiche@us.ibm.com

We study the performance of the closed Lu-Kumar network under heavy traffic. The idleness processes and throughput are compared in the supercritical, critical and subcritical cases. In addition, the performance of the Lu-Kumar policy is compared to performance under the optimal control policy (studied by Harrison, Wein, S. Kumar).

3) A Dynamic Threshold Routing System in Heavy Traffic, ***Vlada Limic***, Cornell University, Dept. of Math., Malott Hall, Ithaca, NY 14850-4201, limic@math.cornell.edu, ***Ruth J. Williams***

We derive, under suitable regularity conditions, a heavy traffic approximation for a sequence of dynamic threshold routing queueing systems. A special case of this problem was first considered by Kelly & Laws (1993). The diffusion approximation is related to the submartingale reflecting Brownian motion of Varadhan & Williams (1985).

4) Critical Thresholds for Dynamic Scheduling in Heavy Traffic, ***Yih-Choung Teh***, University of Oxford, Dept. of Statistics, 1 South Parks Rd., Oxford, OX1 3TG, UK, teh@stats.ox.ac.uk

We consider queueing systems which exhibit complete resource pooling in heavy traffic and, in particular, a threshold routing strategy. The behavior of the limiting system depends critically on thresholds which grow at a logarithmic rate. We establish necessary and sufficient conditions for reflected Brownian motion, stability and asymptotic optimality.

WA10 OR Applications for the NYC Government Budget

Cluster: **Scheduling**
Invited Session

Chair: Lijie Shi, New York City Government, OR Unit OMB, 75 Park Pl., 7th Floor, New York, NY 10007, shil@omblan.ci.nyc.ny.us

1) Optimal Budgeting for the 911 Calling System in New York City, ***Lijie Shi***, New York City Government, OR Unit OMB, 75 Park Pl., 7th Floor, New York, NY 10007, shil@omblan.ci.nyc.ny.us

Maintaining a 911 calling system is very important for the security of a big city such as New York City. Ordinal operation of the 911 calling system depends on the budget signed to it. Determining the number of call-takers and their working shifts scheduling are difficult tasks. In this project, a queuing model is set up based on daily (weekly) call volumes from forecasting...

2) Safe & Timely Adoption & Reunification, ***Anindita Sen***, New York City Government, NYC-ACS-OMB, 75 Park Pl., 7th Floor, New York, NY 10007, sena@omblan.ci.nyc.ny.us

The key motivation of the project is to remove the fiscal incentive that exists in the current foster care system to keep children in foster care. This is caused by the per diem fee for service payment structure. The proposal is to construct a set of capacitated payments based on projected caseloads and historical performance of each agency...

WA11 Dynamic Routing

Cluster: **Integer Programming**
Invited Session

Chair: Jian Yang, University of Texas, MSIS Dept., Austin, TX 78712, jiany@uts.cc.utexas.edu

1) Study of a Real-Time Multi-Vehicle Truckload Pickup & Delivery Problem, ***Jian Yang***, University of Texas, MSIS Dept., Austin, TX 78712, jiany@uts.cc.utexas.edu, ***Patrick Jaillet***, ***Hani S. Mahmassani***

We study a real-time multi-vehicle pickup and delivery problem. For stochastic demand arrival processes, we devise various on-line policies based on off-line observations with the purpose of reducing average long-term operational cost. Through simulations, we study the efficiency of the policies and the impact of information advancements.

2) Solving Arc Routing Problems with Turn Penalties, ***Gilbert Laporte***, University of Montreal, Ecole des HEC, 3000 Chemin Cote-Ste-Catherine, Montreal, Quebec, H3C 3J7, Canada, gilbert@crt.umontreal.ca, ***Jacinthe Clossey***, ***Patrick Soriano***

We consider arc routing problems with turn penalties. The standard approach for these problems is a transformation into an equivalent traveling salesman

problem. We show that a direct approach is superior. It is better to solve these problems as Chinese postman problems and to handle turn penalties during the end-pairing phase. Computational results are reported.

3) Real-Time Strategies for Large Commercial Fleet Operations, ***Yongjin Kim***, University of Texas, Dept. of Civil Eng., ECJ 6.2, Austin, TX 78712, yongjin@mail.utexas.edu, ***Patrick Jaillet***, ***Hani S. Mahmassani***

We present real-time operational strategies for a large fleet truckload pickup and delivery problem under time windows. These strategies combine a fast initial assignment algorithm with an improved reassignment methodology using MIP. The performance of various heuristic strategies is evaluated using simulation techniques.

WA12 The Effectiveness of Component Commonality

Cluster: Inventory Management
Invited Session
Chair: Amit Eynan, Washington University, 1 Brookings Dr., CB 1133, St. Louis, MO 63130, eynan@olin.wustl.edu

1) Effects of Component Commonality under Bivariate Normal Distribution of Demands, ***Thierry M. Fouque***, University of Paris X, Dept. of Economics & Mgmt., Nanterre Cedex, 92000, France

This paper is devoted to the study of product flexibility through the analysis of component commonality effects. Unlike most previous research, we consider that products' demand follow a bivariate normal distribution. Additionally, we provide a comprehensive analysis on the impact of various parameters on the effectiveness of component commonality.

2) Rationalizing Product Line using Component Commonality, ***Ajay K. Mishra***, SUNY, Sch. of Mgmt., Binghamton, NY 13902, amishra@binghamton.edu

Manufacturers' use of high-differentiation strategy to compete requires trade-off between the benefits of providing mass customized goods to customers and the cost of high product variety. We model the problem of selecting product-specific and common components to rationalize the product line to maximize profits in a make-to-stock environment.

3) Composite Assembly Policies with Common Component Allocation, ***Amit Eynan***, Washington University, 1 Brookings Dr., CB 1133, St. Louis, MO 63130, eynan@olin.wustl.edu, ***Meir J. Rosenblatt***

Assemble in advance reduces assembly costs due to advance planning while assemble to order eliminates assembly of excessive (undemanded) units. Additionally, common components may be used in different products in order to take advantage of risk pooling. We evaluate the effects of combining composite assembly policies and component commonality.

WA13 Facility Design & Material Handling

Cluster: Manufacturing & Logistics
Invited Session
Chair: Bryan A. Norman, University of Pittsburgh, 1033 Benedum Hall, Dept. of IE, Pittsburgh, PA 15261, banorman@engrng.pitt.edu

1) Development of a Scientific Methodology for the Design of Storage Systems, ***Marc Goetschalckx***, Georgia Institute of Technology, Sch. of ISyE, 765 Ferst Dr., Atlanta, GA 30332-0205, ***Gunter P. Sharp***, ***T. Govindaraj***, ***Douglas A. Bodner***, ***Leon McGinnis***

Today, storage systems and warehouses are often designed and evaluated with very empirical and ad hoc methods. We will present a scientific design methodology for the design storage systems and, in particular, of unit load storage systems as a first major component. The structure of the underlying database and preliminary tools and computational experiences will also be discussed.

2) Dynamic Layout Design in Flexible Manufacturing Systems, ***Brett Peters***, Texas A&M University, 3131 TAMU, Dept. of IE, College Station, TX 77843-3367, bpeters@tamu.edu, ***Taho Yang***

FMSs must operate under uncertain production requirements and adapt to a continually changing environment. Often the layout of the system is a key issue in determining the flexibility of the system in responding to these changes. We focus on developing flexible layouts, which attempt to optimize the trade-off between a robust, static design and an ever-changing dynamic strategy...

3) Warehouse Design: What's the Problem?, ***Leon McGinnis***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205

Practicing warehouse designers have been largely unaffected by the existing body of warehouse design research. Now we know why and what we need to do to make warehouse design research relevant.

4) Locating Material Transfer Points in Facilities, ***Bryan A. Norman***, University of Pittsburgh, 1033 Benedum Hall, Dept. of IE, Pittsburgh, PA 15261, banorman@engrng.pitt.edu, ***Alice E. Smith***

We consider the problem of locating material transfer points for departments within a facility. The objective is to minimize the total costs, which include the cost of transporting material and establishing the transfer points. Alternative solution methodologies are compared on a suite of test problems.

WA15 Decision Support Systems II

Contributed Session
Chair: Daniel Relles, RAND, 1700 Main St., Santa Monica, CA 90407-2138, daniel_relles@rand.org

1) Decision Support for Power Dispatch: Very Short-Term Forecasts of Change in Load, ***John Adams***, RAND, 1700 Main St., Santa Monica, CA 90407-2138, john_adams@rand.org, ***Richard J. Hillestad***

Even with sophisticated predictions of the expected daily patterns of load, some short-term adaptations to deviation from expected load are required. Adjusting to the deviations can be facilitated by adaptive very short-term (20 minutes - 2 hours) forecasting. The key is to work with the longer time-scale forecasting tools already in place and augment them by monitoring their errors...

2) Decision Support for Power Dispatch: Predicting & Managing the Risks of Errors in Load Prediction & Possible Generator Failure, ***Daniel Relles***, RAND, 1700 Main St., Santa Monica, CA 90407-2138, daniel_relles@rand.org, ***Richard J. Hillestad***

We will describe a decision support tool for power dispatch that estimates the risks of inaccurate load prediction (from historical prediction error) and the risks of specific generator failure (from historical generator maintenance records and inputs from plant operators).

WA16 Multistage Stochastic Programming

Cluster: Stochastic Programming
Invited Session
Chair: Julia L. Higle, University of Arizona, Dept. of SIE, Tucson, AZ 85721, julie@sie.arizona.edu

1) The Abridged Nested Decomposition Method & its Application to Stochastic Vehicle Routing Problems, ***Christopher J. Donohue***, ALPHATECH, Inc., 2101 Wilson Blvd., Arlington, VA 22201, ***John R. Birge***

We will discuss a variation of the nested decomposition method for multistage stochastic programs and will demonstrate its application to stochastic vehicle routing problems and multiple asset mission planning problems.

2) A Primal-Dual Bounding Method for Multistage Stochastic Programs, ***Chanaka Edirisinghe***, University of Tennessee, MS Program, 610 SMC, Knoxville, TN 37996

We present an approximation-based solution technique for multistage stochastic programs using primal and dual programs. Through a cyclic iteration of a certain modified versions of the primal-dual pair, an improving sequence of bounds are developed. The procedure will be numerically tested on a multistage financial optimization problem involving a large number of structural constraints and scenarios of random events.

3) Stochastic Scenario Decomposition for Multistage Stochastic Programs, ***Julia L. Higle***, University of Arizona, Dept. of SIE, Tucson, AZ 85721, julie@sie.arizona.edu, ***Suvrajeet Sen***, ***Brenda Rayco***

SSD combines dual decomposition and random sampling to develop statistically based piecewise linear approximations for multistage stochastic linear programs. Row and column aggregation schemes are used to manage the size of the master program. Theoretical properties of SSD and computational experience will be discussed.

WA17 Transportation Management

Contributed Session
Chair: Shaw-Pin Miaou, Texas Transportation Institute, TX A&M Univ. System, 3135 TAMU, College Station, TX 77843-3135, s-miaou@tamu.edu

1) A Diagnostic Tool for Analyzing Traffic Data, ***Juan Carlos Munoz***, University of California, 109 McLaughlin Hall, Berkeley, CA 94720-1720, juanca@uclink4.berkeley.edu, www.ce.berkeley.

edu/~juanca, ***Carlos F. Daganzo***

An extension of the Cassidy-Windower cumulative plot methods, this tool allows an even more detailed analysis of traffic data. With it, one can identify individual vehicle groups and even detect and diagnose unusual disturbances. A puzzle and its solution will be presented as an illustration of this powerful procedure.

2) The Loading & Unloading of Liquid Products to Oceangoing Vessels in Multiple-Leg Journeys, ***Abdelghani A. Elimam***, University of California, Anderson Grad. Sch. of Mgmt., Riverside, CA 92521-0203, elimam@ucr.edu, ***Mohsen ElHafsi, Bajis M. Dodin***

We deal with the assignment of liquid chemicals to ship compartments for ocean bulk ransportation. Our objective is to minimize the sum of ship loading/unloading times at all legs of the journey while satisfying demand requirements of the shipped products as well as ensuring a well-balanced ship. This is realized by maintaining the ship trim stability within specified safety tolerances...

3) Hybrid Genetic Algorithms for Two-Dimensional Bin-Packing Problems, ***Anna S. Mukhacheva***, Ufa State Aviation Technical University, Karl Marx Str. 12, Ufa, Bashkortostan, 450000, Russia, anna@vmk.ugatu.ac.ru, ***Artem V. Chiglintsev***

Two-dimensional bin-packing problems are proposed to be solved by linear cutting approximation presented as block structure. It is necessary for the case to rearrange elements in blocks. Guillotine structure of bin-packing is investigated. Two probabilistic methods are considered: genetic block algorithm and genetic guillotine algorithm. Numerical experiments results are shown.

4) Modeling the Safety Performance of Highway Transportation Systems: A Bayesian Semi-Parametric Generalized Linear Mixed Modeling Approach, ***Shaw-Pin Miaou***, Texas Transportation Institute, TX A&M Univ. System, 3135 TAMU, College Station, TX 77843-3135, s-miaou@tamu.edu

Highway engineers need flexible statistical models with realistic assumptions to study complex motor vehicle crash events on highway networks. We present a model development effort aimed at establishing better relationships between crashes and important driver, engineering and environmental factors. A Bayesian semi-parametric GLMM modeling approach with spatial-temporal effects is taken.

WA18 Ensuring Quality in the Supply Chain

Cluster: Performance of Supply Networks
Invited Session

Chair: Susan Slotnick, Arizona State University West, 4701 West Thunderbird Rd., MC 2451, PO Box 37100, Phoenix, AZ 85069-7100, slotnick@asu.edu

1) Models of Quality Assurance & Price Competition, ***Apostolos N. Burnetas***, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, atb4@po.cwru.edu, ***Panida Petsong, Hamilton Emmons***

Consider a supply chain for an imperfect quality product in a competitive market. A single retailer can control the price/quality competition among several suppliers by soliciting different offers (bids). We develop game models for alternative contracts, and compare in terms of retailer's profitability, equilibrium price and end customer quality.

2) Inventory Positioning in an Aerospace Manufacturing Supply Chain, ***Mohan Gopalakrishnan***, Arizona State University West, Sch. of Mgmt., MC 2451, PO Box 37100, Phoenix, AZ 85069-7100

We analyze the impact of positioning inventory at the different stages of engine manufacturing in an aerospace supply chain. We attempt to model this through simulation and will test different inventory policies and their impact on performance measures such as throughput time.

3) Dual Sourcing with Tournament as a Supplier Selection Mechanism, ***Shi-Jie Deng***, Georgia Institute of Technology, Sch. of ISyE, Atlanta, GA 30332-0205, deng@isye.gatech.edu, ***Wedad Elmaghraby***

As companies increase their use of outsourcing, we must understand the strengths of various supplier selection mechanisms. It is our goal to gain insights into the role of parallel sourcing with tournament as a mechanism for selecting suppliers. We establish the market environments under which such sourcing arrangement is desirable.

4) The Fill Rate of a Supply Chain, ***Matthew J. Sobel***, Case Western Reserve University, Dept. of OR & Op. Mgmt., WSOM, 10900 Euclid Ave., Cleveland, OH 44106-7235, mjs13@po.cwru.edu

An easily calculated lower bound is given for the fill rate of a make-to-stock supply chain with: stochastic end-item demand, series structure, buffer inventories and shipment sizes selected via a modified base-stock level policy applied to echelon inventories. Such a shipment policy optimizes various criteria.

WA21 Location Analysis IV

Sponsor: Society on Location Analysis
Sponsored Session

Chair: Michael P. Johnson, Carnegie Mellon University, Heinz Sch. of PP&M, Hamburg Hall, Rm. 2107C, Pittsburgh, PA 15213-3890, johnson2@andrew.cmu.edu, heinz.cmu.edu/heinz/faculty/MiJohnson.html

1) The P-Median Problem with Relaxed Coverage Constraints, ***Lawrence Snyder***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208-3119, l-snyder3@nwu.edu, ***Mark S. Daskin***

We study a P-median problem variation in which only an exogenously specified fraction of the demands must be served. We formulate the problem as a (P+1)-median problem and solve it using Lagrangian relaxation coupled with knapsack problems, embedded within a B&B scheme. Computational results and a heuristic are also presented.

2) A Joint Location-Inventory Model, ***Zuo-Jun Shen***, University of Florida, Dept. of ISE, 303 Weil Hall, Gainesville, FL 32611-6595, shen@ise.ufl.edu, ***Collette R. Coullard, Mark S. Daskin***

We introduce a joint location-inventory model. Initially formulated as a nonlinear model, it is then restructured as a set partitioning problem and solved using column generation. We prove that the pricing problem can be solved in polynomial time although it contains a nonlinear term. Computational results are presented.

3) The Use of Electric Fields in Facility Location Research, ***Trevor S. Hale***, Ohio University, Dept. of IMSE, Athens, OH 45701-2979, thale@bobcat.ent.ohiou.edu, ***Leslie C. Hale***

The use of electrostatic forces in continuous space facility location problems is investigated using Coulomb's Law. Locating varying magnitudes of electrostatic forces as existing facilities provides a physical, real-world model, shown to be analogous to the minisum (or maxisum) squared Euclidean facility location problem. Additional physical models are proposed.

4) Modeling Nonlinear Impacts Associated with Location of Subsidized Housing, ***Michael P. Johnson***, Carnegie Mellon University, Heinz Sch. of PP&M, Hamburg Hall, Rm. 2107C, Pittsburgh, PA 15213-3890, johnson2@andrew.cmu.edu, heinz.cmu.edu/heinz/faculty/MiJohnson.html

Previous work on location of subsidized housing has assumed that dollar-valued impacts are linear in the number of families located and that equity measures may be easily linearized. However, recent social science research indicates that community impacts of subsidized location may be characterized by nonlinearities and threshold effects. Multi-objective nonlinear integer location models for subsidized housing are presented, solved and interpreted.

WA22 Health Applications II

Contributed Session

Chair: Travis C. Porco, San Francisco Dept. of Public Health, 25 Van Ness Ave., #9, San Francisco, CA 94102, tcporco@mathepi.com, http://www.mathepi.com

1) Optimal Tax/Subsidy Combinations for the Flu Season, ***Peter J. Francis***, Center for Naval Analyses, 4401 Ford Ave., Alexandria, VA 22302, francisp@cna.org

We use a dynamic susceptible-infected-recovered (SIR) model to identify optimal policy mixes for the flu season. The optimal and unregulated-market outcomes are characterized by switching curves in S-I state space. We then show how various tax-subsidy combinations can be used to attain the optimal outcome.

2) Evaluating the Performance of Nursing Homes using Data Envelopment Analysis, ***Janet M. Wagner***, University of Massachusetts, Dept. of MSIS, 100 Morrissey Blvd., Boston, MA 02125, janet.wagner@umb.edu, ***Melanie L. Lenard, Daniel G. Shimshak, Frank Porell, Ronald Klimberg***

Using publicly available federal and state data for nursing homes, we have developed a methodology and an Excel-based software tool to apply DEA to nursing home performance. Our objective is to allow end-users, i.e., nursing home managers, NOT OR/MS analysts, to use insights gained from DEA results to improve their operations.

3) Optimal Virulence of Pathogens under Treatment Regimes, ***Travis C. Porco***, San Francisco Dept. of Public Health, 25 Van Ness

Ave., #9, San Francisco, CA 94102, tcporco@mathepi.com, http://www.mathepi.com

Simple mathematical models imply that treatment programs may shift the optimal virulence of a pathogen towards strategies which maximize the number of secondary cases per unit time this shift increases the optimal virulence (for transmissibility-mortality constrained evolution) and decreases the optimal virulence (for host activity-host recovery constrained evolution).

WA23 Simulation II

Contributed Session

Chair: Reza S. Lashkari, University of Windsor, Dept. of IE, 401 Sunset Ave., Windsor, Ontario, N9B 3P4, Canada, lash@uwindsor.ca

1) Stop Rule & Supremum Comparisons for i.i.d. Sequences of Exponential & Uniform Random Variables, ***Ileana Castillo***, ITESM Campus Toluca, Eduardo Monroy Cardenas 2000, Toluca, 50110, Mexico, icastill@campus.tol.itesm.mx, ***Martin Jones***

For a finite sequence of integrable random variables, we define the value of the sequence (the supremum over all stop rules) and the expected gain of an observer who is allowed recall and may choose the maximum of the sequence. We will show sharp inequalities for the differences and ratios of these 2 values for i.i.d. sequences of exponential random variables and i.i.d. sequences of uniform (0,1) random variables.

2) withdrawn - author request of 9/24, ***Wheyming T. Song***, National Tsing Hua University, Dept. of IEEM, 101 Sec. 2 Kuang-Fu Rd., Taiwan, ROC, wheyming@ie.nthu.edu.tw, ***Boshing Wang***, ***Tsu-Kuang Yang***

WA24 Operations Research in Telecommunications

Sponsor: **Telecommunications Section**
Sponsored Session

Chair: Jason W. Rupe, Qwest Advanced Technology, 4001 Discovery Dr., Ste. 220, Boulder, CO 80303, jrupe@qwest.com

1) Using Operations Research to Improve Broadband Service Order Processing, ***Michael T. Tapia***, MediaOne Labs., Westminster, CO, mtapia@mediaone.com

The introduction of new products in the broadband industry, such as high-speed data and digital telephony, creates new demands on operating personnel. The Management Science Applications group of MediaOne Labs employs OR to assist MediaOne management in understanding the problems with their SOP and together develop process improvements.

2) A Comparative Study of Three Routing Algorithms for Data Networks, ***Rosemary T. Berger***, Level 3 Communications, Broommfield, CO, rosemary.berger@level3.com

Two important benefits of efficient routing are lower network augmentation costs and improved response to traffic variability. We compare the performance of 3 routing algorithms under single link failures and under traffic forecast uncertainty. We present results for several topologies.

3) Optimal Optical Switching & Routing in Dense Wave Division Multiplexing Networks, ***Tony Cox***, Cox Associates, 503 Franklin St., Denver, CO 80218, ton@cox-associates.com, ***Jenny Sanchez***, ***Steve Y. Chiu***, ***Leonard Lu***, ***Xiaorong Sun***

DWDM networks can increase the capacity and survivability of fiber networks without the costs associated with traditional (e.g., SONET) equipment. We introduce GA and GRASP heuristics for optimally locating switches & DWDM systems and assigning traffic to routes and wavelengths, while meeting restoration requirements.

4) Modeling ATM Network Architectures, ***Daphne Skipper***, Qwest Advanced Technologies, 4001 Discovery Dr., Boulder, CO 80303, dskippe@qwest.com, dskipe@uswest.com, ***Amie Elcan***, ***Dennis C. Dietz***

We consider the migration to ATM of an RBOC's local network within a large urban area. We restrict our attention to hubbing architectures with 2 or 3 hubs (cores) and consider issues such as core locations, communities of interest, back hauling and multi-period rollout plans.

WA25 Advances in Global Optimization

Cluster: **Global Optimization**
Sponsor: **Optimization Section**
Sponsored Session

Chair: Nikolaos V. Sahinidis, University of Illinois, Dept. of Chem. Eng., 600 South Mathews Ave., Urbana, IL 61801-2906, nikos@uiuc.edu, http://archimedes.scs.uiuc.edu

1) Generating General Disjunctions for Solving Mixed Integer Programs, ***Sanjay Mehrotra***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Evanston, IL 60208-3119, mehrotra@iems.nwu.edu

We will present heuristics for generating disjunctions in a generalized B&C method for solving mixed integer programs. Depending on the progress, computational results will be presented for suggested techniques.

2) Convexification Strategies in Global Optimization, ***Mohit Tawarmalani***, University of Illinois, Dept. of MIE, 1206 West Green St., Urbana, IL 61801, tawarmal@uiuc.edu, http://archimedes.scs.uiuc.edu/tawarmal/, ***Nikolaos V. Sahinidis***

We start by developing a unifying theory for domain reduction as a consequence of which we derive new as well as known range reduction strategies. We present a new recipe for relaxing nonlinear functional forms using convex extensions and disjunctive programming techniques. Finally, we present extensive computational experience with our implementation on MINLPs.

3) Mixed-Integer Optimization with Dynamic Models, ***Paul I. Barton***, MIT, Dept. of Chemical Eng., 77 Massachusetts Ave., Cambridge, MA 02139, pib@mit.edu, web.mit.edu/cheme/www.People/Faculty/Barton_Paul.html, ***Jin-Kwang Bok***

Rigorous convex underestimators for a broad class of variational and optimal control problems are developed. The development relies only on the functional form of the optimization problem. These convex underestimators are employed to develop deterministic global optimization algorithms for continuous and mixed-integer problems. Illustrative numerical examples are presented.

4) Very Large-Scale Neighborhood Search using DP State-Space Reductions, ***Ozlem Ergun***, MIT, OR Ctr., 77 Mass Ave., Bldg. E40-130, Cambridge, MA 02139, ozie@mit.edu, ***James B. Orlin***

There is an exponential time DP for the TSP. As a heuristic, we show how to reduce the number of states of the DP to 0(n*3) states while still optimizing over exponentially tours. We use this approach for very large-scale neighborhood search and show an interesting connection to dynasearch.

WA26 Queueing & Inventory II

Contributed Session

Chair: Ralph D. Badinelli, Virginia Polytechnic Institute & State University, Dept. of MS & IT, Blacksburg, VA 24061-0235, ralphb@vt.edu

1) Pricing/Inventory Decisions & Profit Shares in a Non-Integrated Marketing Channel for a Single-Period Product, ***Hon-Shiang Lau***, City University of Hong Kong, Dept. of MS, 88 Tat Chee Ave., Kowloon, Hong Kong, mshslau@cityu.edu.hk, ***Amy Hing-Ling Lau***, ***John F. Kottas***

The manufacturer of a single-period product first sets the unit wholesale price, then the retailer responds with an order size. We present some counter-intuitive effects of the system's parameters, e.g., demand uncertainty, on the optimal decisions, e.g., unit wholesale price, order size, etc., and on the players' expected profits.

2) EOQ Models with Random Yield, ***Suleyman Ozekici***, George Washington University, EMSE Dept., 707 22nd St. NW, Washington, DC 20052, ozekici@seas.gwu.edu, ***Asli Erdem***

We consider an EOQ inventory models where the capacity of the vendor is random. Interesting characterizations are obtained on the optimal order quantity for models with a single vendor and multiple identical vendors. The optimal solution is compared with the classic EOQ formula.

3) A Traffic-Pricing Model for the Packet-Switching Network, ***Zhangxi Lin***, Texas Tech University, ISQS, Coll. of Bus. Admin., Lubbock, TX 79409, zlin@ba.ttu.edu, http://zlin.ba.ttu.edu, ***Dale O. Stahl***, ***Andrew B. Whinston***

We present a traffic-pricing model, in the economic approach, for the optimization of network bandwidth service benefits for the packet-switching network. Round-robin bandwidth allocation with a preemptive prioritization is assumed. The analytical pricing formula from the model is proved applicable to a network with dynamic pricing mechanisms.

4) A Perishable Inventory System with Batch Demands & Random Shelf Lives, ***Ulku Gurler***, Bilkent University, Faculty of Eng., Dept. of IE, Ankara, 06533, Turkey, ulku@bilkent.edu.tr, ***Banu Yuksel***

We consider an inventory model with random shelf lives and batch demands generated according to a general renewal process. Expressions for the operating characteristics of the system are derived and sensitivity results are presented.

5) withdrawn - author request of 10/11, *Ralph D. Badinelli*, Virginia Polytechnic Institute & State University, Dept. of MS & IT, Blacksburg, VA 24061-0235, ralphb@vt.edu

WA27 New Developments in Reliability

Cluster: Reliability & Quality Control
Sponsor: Quality, Statistics & Reliability Section
Invited/Sponsor Session
Chair: John S. Usher, University of Louisville, usher@louisville.edu

1) Performability Circuit Models for Telecommunications Applications, *Jason W. Rupe*, Qwest Advanced Technology, 4001 Discovery Dr., Ste. 220, Boulder, CO 80303, jrupe@qwest.com

While researchers have applied performability concepts to computer networks for some time, telecommunications practitioners rely on traditional methods for reliability, availability, maintainability, survivability and performance when selecting, designing and maintaining networks. We develop some circuit models for performability that support design decisions, provide engineering rules and provide input to network optimization tools.

2) Bivariate Models in Maintenance Planning, *Sang-Chin Yang*, Chung-cheng Institute of Technology, Logistics & Systems Eng. Dept., Taiwan, ROC, ***Joel A. Nachlas***

Existing reliability and maintenance planning models are expressed in terms of uni-variate measures of life duration - usually time or cycles. We have developed bi-variate failure models along with the associated formulation of hazard and reliability measures as well as basic renewal functions. Using the bi-variate life distribution models, we develop a basic bi-variate failure and repair model...

3) Assessment of Complex System Operational Readiness, *Randall L. Walker*, Naval Surface Warfare Center, Crane Division, 300 Hwy 361, Code 809, Crane, IN 47522

The assessment of a system's readiness to provide its intended functionality has historically been evaluated using the traditional operational availability (Ao) metric. We review the limitations of the traditional approach, propose a methodology which specifies readiness in terms of system performance attribute, and provids an example of how such an approach would be applied.

WA29 Operations Management V

Contributed Session
Chair: Shaoxiang Chen, Nanyang Technological University, B2A-30 Nanyang Bus. School, Singapore, 639798, Singapore, aschen@ntu.edu.sg

1) The News Vendor Problem under Pricing: From Single-Agent Model to Coordinated Channel, *Li Yao*, Chinese University of Hong Kong, Dept. of SEEM, Hong Kong, Shatin NT, PR China, lyao@se.cuhk.edu.hk, ***Houmin Yan***

For the traditional news vendor problem under pricing, we propose some characteristics that generalize all existing demand models and find certain important properties under this framework. We then extend our vision to a supply channel. We'll study traditional contracts, find directions to design a coordinating contract and give a concrete example.

2) Dynamic Inventory & Revenue Management, *Alp Muharremoglu*, MIT, OR Ctr., 77 Massachusetts Ave., E40-130, Cambridge, MA 02139, alp@mit.edu, ***John N. Tsitsiklis***

Consider a firm that sells an item to customers who come with a bid for the item. Given some assumptions, we show that the optimal policy is to employ a base stock policy for inventory control and a selling limit policy for customer acceptance-rejection decisions.

3) A Capacity Planning Problem with Demand Postponement, *Zhengping Wu*, Purdue University, 123-05 Marshall Dr., West Lafayette, IN 47906, zhengping_wu@mgmt.purdue.edu, ***Ananth V. Iyer, Vinayak V. Deshpande***

A monopolist supplier must satisfy all the uncertain demand by either capacity or subcontracting at a higher price. He has the power to split demand and pay a unit shortage cost to postpone a fraction to the next period. Given some demand information signal, we examine the optimal capacities and the splitting rule.

4) The Optimality of the Hedging Base-Stock Policy for the Two-Product & Single-Facility Production Systems, *Shaoxiang Chen*, Nanyang Technological University, B2A-30 Nanyang Bus. School, Singapore, 639798, Singapore, aschen@ntu.edu.sg

We study the 2-item, single facility periodic review production systems. We prove that the hedging base-stock policy is optimal to finite and infinite time horizon problems. This result applies to continuous and discrete demand cases, as the optimality proof makes no assumption on the strictness of the convexity of the expected cost function nor on its smoothness...

Wednesday 10:15-11:45

WB02 Risk Analysis

Contributed Session
Chair: Frank Noonan, Worcester Polytechnic Institute, Dept. of Mgmt., 1001 Institute Rd., Worcester, MA 01609, fnoonan@wpi.edu

1) Risk Profiling of the UK Railway, *David Griffin*, RM Consultants, Ltd., 7 Hitching Ct., Abingdon Business Park, Abingdon Oxfordshire, OX14 1RA, UK, dg@rm-consultants.co.uk

We describe a holistic approach to risk analysis, aimed at improving the standards of the UK railway. A 7-stage approach is used, from identification of hazards through to eventual demonstration of compliance. We also demonstrate the establishment of safety targets and optimal strategies for reducing risk.

2) Quantification of Risk for Smuggling Valuable Material, *Stanley A. Erickson*, LLNL, PO Box 808, Livermore, CA 94550, serickson@llnl.gov

To optimize anti-smuggling capital and operational expenses, a metric should be defined and evaluated for different expense allocations. Regarding smuggling nuclear materials, a useful metric is the risk to smugglers for smuggling a defined amount of material from source to destination. The components and quantification of such a metric are discussed.

3) Infection Transmission System Models for Microbial Risk Assessment, *Sada Soorapanth*, University of Michigan, 1695 Broadway St. #202, Ann Arbor, MI 48105, sada@engin.umich.edu, ***Stephen E. Chick, James S. Koopman, Mary E. Brown***

We present new models of infection transmission systems taking into account exposure from exogenous environmental sources of risk and exposures that depend on infection status of other individuals in the population. Our objective is to quantify the risk of microbial infection to help inform water treatment system design decisions.

4) Risk-Based Inspection in the US Coast Guard, *Frank Noonan*, Worcester Polytechnic Institute, Dept. of Mgmt., 1001 Institute Rd., Worcester, MA 01609, fnoonan@wpi.edu

Marine safety inspection of foreign vessels entering US ports is a core business activity for the USCG. We describe a prototype development and evaluation of a formal risk based decision making process intended to maximize risk prevention under limited inspection manpower through inspection process design decisions.

WB03 Dynamic Lot-Size Models

Contributed Session
Chair: Vasa Kosadat, Texas Technical University, Dept. of IE, Box 43061, Lubbock, TX 79409, z3vas@ttacs.ttu.edu

1) Uncapacitated & Capacitated Dynamic Lot Size Models for an Integrated Manufacturer-Buyer Production System, *Piyen Chang*, Texas Technical University, Dept. of IE, MS 3061, Lubbock, TX 79409, pchang@ttacs.ttu.edu, ***Surya D. Liman***

We present a single item uncapacitated and capacitated dynamic lot size model for an integrated manufacturer-buyer production system. We develop a deterministic dynamic programming algorithm and a heuristic to analyze the manufacturing setup cost, delivery cost, ordering cost and inventory costs for the production system simultaneously.

2) Optimal Lot Sizing/Vehicle Dispatching Policies under Stochastic Lead Times & Stepwise Fixed Costs, *Refik Gullu*, Middle East Technical University, IE Dept., Ankara, 06531, Turkey, gullu@ie.metu.edu.tr, www.ie.metu.edu.tr/~gullu, ***Osman Alp, Nesim K. Erkip***

We characterize optimal policies of a dynamic lot sizing/vehicle dispatching problem under dynamic deterministic demands and stochastic lead times. An essential feature is that a fixed cost is incurred every time a batch is initiated (or a vehicle is hired) regardless the portion of the batch (or vehicle) utilized.

3) The Dynamic Assignment Problem, *Michael Z. Spivey*, Princeton University, 34B Witherspoon Ln, Princeton, NJ 08542, mzspivey@princeton.edu, ***Warren B. Powell***

Unlike the classic assignment problem, the dynamic assignment problem has

received little attention as a general problem class. We provide a formulation of the problem and propose a series of functional approximations that can be estimated using adaptive dynamic programming techniques.

4) The Power-of-Two Approach to an Economic Lot Size Model for Single Vector & Multiple Purchasers, ***Vasa Kosadat***, Texas Technical University, Dept. of IE, Box 43061, Lubbock, TX 79409, z3vas@ttacs.ttu.edu, ***Surya D. Liman***

We propose the power-of-2 approach to a deterministic economic lot size model with one vendor and multiple purchasers. We developed a heuristic to determine the production cycle of the vendor, while allowing different ordering cycles for each purchaser.

WB04 Combinatorial Methods for Manufacturing II

Contributed Session

Chair: William A. Christian, Rice University, 6100 South Main St., Houston, TX 77074, christia@rice.edu, http://www.caam.rice.edu/~christia

1) Exact Algorithms for Solving N-Dimensional Bin-Packing Problems, ***Elita A. Mukhacheva***, Ufa State Aviation Technical University, Karl Marx Str. 12, Ufa, Bashkortostan, 450000, Russia, elita@vmk.ugatu.ac.ru, ***Vadim M. Kartak, Lidiya I. Vasilyeva***

The N-dimensional parallel piped bin-packing problem is presented. The exact algorithm based on transforming ND bin-packing to N-binary matrices of a certain type have been developed. The method was then applied to figures consisting of set ND rectangles (gofr). Numerical experiments results are shown.

2) Procurement Optimization with Volume Discount Schedules, ***Ronald E. Davis***, San Jose State University, Coll. of Business, 1 Washington Square, BT 750, San Jose, CA 95192, ron.davis@matpro.com, www.matpro.com

A mixed integer programming model with binary variables is presented to model volume discount schedules from multiple suppliers. Results obtained with the MPL OptiMax 2000 DLL on test data including 5 demand locations and 10 supply sites are presented. Time-cost trade-off analysis is included in the results. supply sites are presented. Time-cost trade-off analysis is included in the results.

3) Reachability Analysis of Petri Nets using Acyclic Transformations, ***Partha Ramachandran***, 6520 Broadway, #1034, Pearland, TX 77584, pramachandran@mac.com, ***Manjunath Kamath***

Petri nets are one of the most useful tools for analyzing discrete event systems and have the potential to address combinatorial optimization problems such as machine scheduling. Deciding reachability of one state from another is fundamental to these applications. Sufficient conditions for reachability are available for only restricted classes of nets, acyclic nets being one among them...

4) A Linear-Time Algorithm for Finding Hamiltonian Cycles using Branch Decompositions, ***William A. Christian***, Rice University, 6100 South Main St., Houston, TX 77074, christia@rice.edu, http://www.caam.rice.edu/~christia

An implementation of a practical and efficient algorithm for finding Hamiltonian cycles is presented. The algorithm can be extended to solve the corresponding optimization problem. This algorithm is one of several using a general framework that I am developing.

WB05 Numerical Applied Probability Methods: In Honor of Carl M. Harris

Sponsor: **Applied Probability Society**
Sponsored Session

Chair: L. D. Servi, GTE Laboratories, 40 Sylvan Rd., Waltham, MA 02254-1128, lds0@gte.com

1) Analysis of a Machine Repair Problem with an Unreliable Server & Phase-Type Repairs & Services, ***Srinivas R. Chakravarthy***, Kettering University, Dept. of IME & Business, 1700 West 3rd Ave., Flint, MI 48504-4898, schakrav@kettering.edu, ***Atul Agarwal***

Using matrix-analytic methods we perform steady state analysis of a machine repair model with a single unreliable server and N identical machines. The repair times of the machine and the service times of the repairman are of phase type. An optimization problem and several illustrative numerical examples are presented.

2) Exploiting the Layered Structure in Matrix Geometric Tandem Priority Queues, ***David A. Stanford***, University of Western Ontario, Dept. Stats. & Actuarial Sci., Western Science Ctr., London, Ontario, N6A 5B7, Canada, stanford@stats.uwo.ca, ***Kandiyan P. Sapna, Karuna Ramachandran***

In matrix geometric models, it is often possible to arrange the state information so that computations can be carried out in a layered way. This approach enables one to focus on the calculations at the current level without being distracted by information from a lower level. We illustrate this approach in the analysis of a tandem M/PH/1 queue.

3) Analysis of MAP/PH/1 Multi-Class General Preemptive Priority, ***Attahiru S. Alfa***, University of Windsor, Windsor, Ontario, N9B 3P4, Canada, alfa@uwindsor.ca, ***Qi-Ming He***

We use the matrix-analytic methods to study the MAP/PH/1 general preemptive priority queue with a multiple class of jobs. We show that the structure of the R matrix obtained by Miller for the birth-death system can be extended to the quasi-birth-death case. Procedures for computing performance measures associated with the queue lengths and busy periods are developed.

4) Equilibrium Distribution of Block-Structured Markov Chains with Large Numbers of States, ***L. D. Servi***, GTE Laboratories, 40 Sylvan Rd., Waltham, MA 02254-1128, lds0@gte.com

Many telecommunication applications require solving a Markov chain whose transition matrix has a block tri-diagonal structure with each block, itself, tri-diagonal. We present improvements to our previous algorithms that are specialized for systems with a very large number of states and compared with alternative algorithms such as the GTH algorithm.

WB10 Combine Heuristics with Math Programming Models for Operational Planning

Cluster: **Scheduling**
Invited Session

Chair: Jeremy F. Shapiro, MIT, Sloan Sch. of Mgmt. E53-307, 50 Memorial Dr., Cambridge, MA 02142-1347, jshapiro@mit.edu

1) Hybrid Heuristic- & Optimization-Based Scheduling of Semiconductor Manufacturing, ***Robert C. Leachman***, University of California, Dept. of IE/OR, MS 1777, Berkeley, CA 94720

We describe a hybrid heuristic and integer programming approach to short-term scheduling of wafer fabrication. A sophisticated math programming model is formulated and the first-feasible integer solution generates the priorities of scheduling rules incorporated in a detailed discrete-event simulation model. We demonstrate superior performance on industry data.

2) Supporting the Development of DSS Applications Combining Heuristic Simulation with Optimization using OPTRANS Object, ***Michael R. Klein***, HEC, Sch. of Mgmt., Jouy-en-Josas, 78350, France

We review the objectives of the OTRANS Object knowledge-based DSS development environment. The system presently integrates: an algebraic modeling language, a report generator and multidimensional data base management system, a rule based system, a GUI, a resource management definition language, a hypertext engine and libraries of forecasting and optimization algorithms.

3) A Unified Optimization Methodology for Advanced Planning & Scheduling, ***Jeremy F. Shapiro***, MIT, Sloan Sch. of Mgmt. E53-307, 50 Memorial Dr., Cambridge, MA 02142-1347, jshapiro@mit.edu

We discuss the complementarity between heuristics and mathematical programming models and methods in proposing a unified optimization methodology for advanced planning and scheduling problems. The methodology combines Lagrangean relaxation of large-scale MIP models with heuristic methods that initialize optimization, provide feasible solutions to sub-models and extract feasible solutions from the MIP models...

WB11 Optimization in Computational Biology

Cluster: **Integer Programming**
Invited Session

Chair: Vijay Chandru, Indian Institute of Science, Dept. Comp. Sci. & Automation, Bangalore, Karnataka, 560 012, India, chandru@csa.iisc.ernet.in

1) Efficient Algorithms for Inverting Evolution, ***Sampath Kannan***, University of Pennsylvania, Dept. of CIS, Philadelphia, PA 19104, kannan@central.cis.upenn.edu, ***Martin Farach-Colton***

2) SVM Technology in Bioinformatics, ***Jean-Louis Lassez***, Integrated Genomics, PO Box 407, Magdalena, NM 87825, jll@gilanet.com

3) The Algorithmics of Folding Proteins on Lattices, ***Vijay***

Chandru, Indian Institute of Science, Dept. Comp. Sci. & Automation, Bangalore, Karnataka, 560012, India, chandru@csa.iisc.ernet.in, ***Abhi Dattasharma***, ***V. S. Anil Kumar***

It should be possible to predict the fold of a protein into its native conformation, once we are given the sequence of the constituent amino acids. This is known as the protein structure prediction problem and is sometimes referred to as deciphering the second half of the genetic code. We will present an account of the remarkable progress in the algorithmics of folding proteins on discrete lattice models.

WB12 Economics & Operations

Cluster: **Inventory Management**
Invited Session

Chair: Garrett J. van Ryzin, Columbia University, 412 Uris Hall, Grad. School of Bus., New York, NY 10027, gjv1@columbia.edu

1) Shifts in Control of the Supply Chain: Global Analysis of Module Development & Outsourcing in the Auto Industry, ***Sharon Novak***, Northwestern University, Evanston, IL, novak@kellogg.nwu.edu, ***Sridhar Tayur***

We examine the current trend toward module outsourcing in the context of its incentive effects on investment in parts development and control and power in the supply chain by looking at seat and brake subsystems.

2) Coordination Mechanisms in Decentralized Supply Chains with Retailer Competition & Uncertain Demand, ***Fernando G. Bernstein***, Columbia University, Grad. Sch. of Bus., New York, NY 10027, fb65@columbia.edu, ***Awi Federgrun***

We analyze the equilibrium behavior of a decentralized one warehouse, multiple retailers system with retailers competing in price space and facing uncertain demands. We also establish the existence of simple perfect coordination schemes (under which aggregate expected profits in the supply chain equal those achievable in a centralized system.

3) An Inventory Model with Customers that Remember Stockouts, ***Noah F. Gans***, University of Pennsylvania, OPIM Dept., The Wharton School, Philadelphia, PA 19104-6366, gans@wharton.upenn.edu

Traditional multi-period inventory models represent the demand distribution in a given period as being independent of previous periods' levels of service. In this talk, I'll present a simple competitive model in which stockouts at a supplier drive customers to switch to a competitor.

4) Yield Management under a Consumer Choice Model of Demand, ***Garrett J. van Ryzin***, Columbia University, 412 Uris Hall, Grad. School of Bus., New York, NY 10027, gjv1@columbia.edu, ***Kalyan Talluri***

We analyze the traditional single-leg, multiple-fare-class yield management problem using a discrete choice model of demand. We show that a form of nested allocation is optimal in this setting and propose an efficient algorithm. We also compare the allocations produced to those from traditional models that ignore choice behavior.

WB13 Iterated Constructive Heuristics

Cluster: **Manufacturing & Logistics**
Invited Session

Chair: Robert H. Storer, Lehigh University, IMSE Dept., Mohler Lab., 200 West Packer Ave., Bethlehem, PA 18017

1) Multi-Objective Scheduling using Problem Space-Based Neighborhoods, ***V. Jorge Leon***, Texas A&M University, 106 Fermier Hall, MS 3367, College Station, TX 77843-3367, jleon@acs.tamu.edu

We discuss general issues associated with neighborhood search with multiple objectives. Problem space-based neighborhoods are proposed as an alternative for "informed" search. Two search strategies are proposed for a machine-scheduling problem for which Pareto-efficient solutions can be found. machine-scheduling problem for which Pareto-efficient solutions can be found.

2) Workplace Scheduling & Design for a Sawmill Environment, ***Bryan A. Norman***, University of Pittsburgh, 1033 Benedum Hall, Dept. of IE, Pittsburgh, PA 15261, banorman@engrng.pitt.edu, ***Wipawee Tharmmaphornphilas***, ***Brian J. Carnahan***

We consider the problem of effectively scheduling and designing a sawmill where the objective is to minimize the potential hearing loss of the workers. We consider combinations of both job rotation and job redesign. Alternative solution methodologies for this problem are compared on a suite of test problems.

3) Iterated Constructive Heuristics, ***Robert H. Storer***, Lehigh University, IMSE Dept., Mohler Lab., 200 West Packer Ave., Bethlehem, PA 18017

We propose a class of "iterated constructive heuristics" that includes ant systems, GRASP, beam search and problem space search. The unifying feature is an embedded constructive heuristic that generates a space of solutions via various mechanisms. Research issues include learning mechanisms, search strategies, ranking and selection and embedded local search.

WB15 Transportation Modeling

Sponsor: **Transportation Science Section**
Sponsored Session

Chair: Michael R. Bartolacci, Pennsylvania State Berks/LV College, PO Box 7009, Reading, PA 19610, mrb24@psu.edu

1) Measuring the Level of Services at Airports using a Fuzzy Algorithm, ***Jin-Ru Yen***, National Taiwan Ocean University, Dept. Shipping & Transp. Mgmt., No. 2 Peining Rd., Keelung, 202, Taiwan, jryen@mail.ntou.edu.tw, ***Peter Chen***

We propose a fuzzy algorithm to measure the level of services at an airport passenger terminal. Empirical data are collected from 2 major airports located in Taiwan. The results demonstrate the feasibility of this new approach to evaluate existing airports and design new ones.

2) Development of Queues in a Traffic Network with Route Guidance: A Projected Dynamic System Approach, ***Leonid Engelson***, Centre for Traffic Simulation, KTH Teknikringen 72, Stockholm, S-10044, Sweden, lee@infra.kth.se

The proposed model describes within-day dynamics of queue lengths, when at each intersection, drivers choose their routes using information on current queue lengths. Criteria of existence of equilibria and their stability are obtained by means of variational inequality and projected dynamical system techniques.

3) Development of a Deterrence Function for the Garvity Modeling of Electronic Commerce, ***Michael R. Bartolacci***, Pennsylvania State Berks/LV College, PO Box 7009, Reading, PA 19610, mrb24@psu.edu, ***Erhan Kutanoglu***, ***Yong-Piow Ho***

The measurement of e-commerce in a manner that is useful for transportation planners and network infrastructure providers has not been undertaken. We are currently developing gravity models that can be used for the estimation of e-commerce flows. One key part of gravity modeling is the development of the deterrence function(s).

4) An Internet-Based Geographic Information System that Integrates Data, Models & Users for Transportation Applications, ***Athanasis Ziliaskopoulos***, Northwestern University, Dept. of Civil Eng., 2145 Sheridan Rd., Tech. Inst., Evanston, IL 60208, a-z@trans.civil.nwu.edu, ***S. Travis Waller***, ***Curtis D. Barrett***

We are concerned with the development of an Internet-based GIS that brings together spatio-temporal data, models and users in a single efficient framework to be used for a wide range of transportation applications - planning, engineering and operational. The functional requirements of the system are outlined taking into consideration the various enabling technologies, i.e., Internet tools, large scale databases and distributed computing systems...

WB17 Transportation Management II

Contributed Session

Chair: Emanuel Melachrinoudis, Northeastern University, MIME Dept., 360 Huntington Ave., Boston, MA 02115, emelas@coe.neu.edu, www.coe.neu.edu/~emelas

1) A Linear Statistical Analysis of Multi-Lane Highways, ***Mostafa Ghandehari***, University of Texas, Civil Eng. Dept., Box 19308, Arlington, TX 76019, ghandeha@utarlg.uta.edu, ***Siamak A. Ardekani***

A linear model is used to express densities of multi-lanes as a function of speed in each lane. Transformation techniques are used to find the joint distribution of densities as a function of joint densities of velocity fields. In the case that the transformation is nonlinear, a Jacobian matrix of transformation is used.

2) Dynamic Programming Approximations for Time-Staged Stochastic Integer Multicommodity Flow Problems, ***Topaloglu Huseyin***, Princeton University, 210 Millstone Apts., Lakeview Terrace, Princeton, NJ 08540, topalglu@princeton.edu, ***Warren B. Powell***

We consider the time dependent version of the integer multicommodity flow problem which arises in the context of dynamic resource allocation problems.

At each decision epoch, a set of resuable resources of different types has to be assigned to tasks and each assignment modifies the state of the resource. The assignment of the resource removes the task from the system and generates a reward.

3) Adaptive Control Models in Infrastrucure Management Systems, ***Pablo Durango***, University of California, Dept. of IE/OR, 4135 Etcheverry Hall, Berkeley, CA 94720-1777, durango@ieor.berkeley.edu, ***Samer M. Madanat***

AC models explicitly include inter-temporal feedback that results from the operation of an infrastructure network/facility and allow for the development of superior inspection, maintenance and repair policies. We present AC models for facilities and networks and discuss the potential benefits that may result from their implementation.

4) A Combined Model for dynamic Trip Distribution & Assignment, ***Yue Li***, Northwestern University, Civil Eng. Dept., 2145 Sheridan Rd., Evanston, IL 60201, liyue@nwu.edu, ***Athanasis Ziliaskopoulos***

A combined model for dynamic trip distribution and traffic assignment is presented. A solution algorithm is proposed by applying Dantzig-Wolfe decomposition and Lagrangian relaxation techniques. The subprogram obtains new flow patterns by solving for the dynamic O-D matrix and solving a min-cost flow problem given the dynamic O-D matrix. The master problem solves for the optimal combination of currently available flow patterns...

5) Allocating Funds to Highway Improvements: A Mixed Integer Knapsack Model, ***George Kozanidis***, Northeastern University, MIME Dept., 360 Huntington Ave., Boston, MA 02115, gkozanid@coe.neu.edu, ***Emanuel Melachrinoudis***

We present a method for allocating funds to highway improvements. Both discrete and continuous interventions are considered. The problem is formulated as a mixed integer knapsack model with linear multiple choice constraints. Some insight into its properties is provided and an efficient B&B algorithm is presented.

WB23 Simulation III

Contributed Session

Chair: Antonio C. Pedrosa, ISCAP, Rua Sao Tome e Principe 402 5D, Vila Nova de Gaia, 4430-228, Portugal, antonio.pedrosa@mail.telepac.pt

1) A Patchwork Algorithm for Gnerating Normal Random Variates, ***Do L. Minh***, California State University, Dept. of MS/IS, Fullerton, CA 92834, dminh@fullerton.edu, ***Yosef S. Sherif***

We develop a fast and relatively simple algorithm based on patchwork for generating standard normal variates. The algorithm requires one irrational constant for the exact evaluation of the normal density function. The algorithm is simple to understand and implement and is superior to other algorithms in speed and memory.

2) Vector Autoregressive to Anything Input Processes for Simulation, ***Bahar Deler***, Northwestern University, Dept. of IE/MS, 2145 Sheridan Rd., Rm. C230, Evanston, IL 60208-3119, bahar@iems.nwu.edu, ***Barry L. Nelson***

An important simplifying assumption in the development of input models for simulation is the independence of the data. We explore the ways of representing the dependence via the use of time-series models. The pros and cons are discussed in detail and supported with proofs when necessary.

3) An Efficient Batch Means Algorithm, ***Antonio C. Pedrosa***, ISCAP, Rua Sao Tome e Principe 402 5D, Vila Nova de Gaia, 4430-228, Portugal, antonio.pedrosa@mail.telepac.pt, ***Bruce Schmeiser***

We develop the 1-2-1 OBM algorithm, which estimates the variance of the sample mean from a stationary process. The mean squared error performance of 1-2-1 OBM approaches the idealistic performance that could be obtained if the correlation structure of the data were known.

WB25 Stochastic Methods in Global Optimization

Sponsor: Optimization Section
Sponsored Session

Chair: Zelda B. Zabinsky, University of Washington, Dept. of IE, Box 352650, Seattle, WA 98195-2650, zelda@u.washington.edu

1) An Analytically Derived Cooling Schedule for Simulated Annealing, ***Seksan Kiatsupaibul***, University of Michigan, Dept. of IOE, Ann Arbor, MI 48109-2117, centered@engin.umich.edu, ***Robert L. Smith***

We present an analytically derived cooling schedule for a simulated annealing algorithm applied to optimizing the class of Lipschitz functions on compact subsets in R*n. The cooling schedule is shown to be the best possible.

2) Integrating Inventory & Transportation under Stochastic Demand, ***Paveena Chaovalitwongse***, University of Florida, Dept. of ISE, Weil Hall, PO Box 116595, Gainesville, FL 32611-6595, ***Panos M. Pardalos, H. Edwin Romeijn***

We consider the problem of supplying a set of n retailers from m warehouses, where the demand at the retailers is stochastic. The (global optimization) problem is to decide on the quantities transported to each of the retailers, while minimizing transportation costs as well as expected inventory and shortage costs.

3) Interaction between Generator & Acceptance Probability for Random Search Algorithms, ***Birna P. Kristinsdottir***, University of Iceland, MIE Dept., Hjardarhaga 2-6, Reykjavik, 107, Iceland, bkristinsdottir@yahoo.com, ***Zelda B. Zabinsky***

The performance of a random search algorithm depends on the interplay of many factors. We specifically look at how the generator, acceptance probability, random restarts and problem structure interact to influence the performance of a random search algorithm. We present both analytical and numerical results.

4) Convergence & Landscape, ***W. Baritompa***, University of Canterbury, Dept. of Math., Christchurch 1, New Zealand, b.baritompa@math.canterbury.ac.nz, ***Zelda B. Zabinsky***

Convergence of a stochastic global optimization algorithm is often measured by summary measures which can hide subtle effects. A Markov chain model is used to obtain details about the transition matrix to give a more complete picture of convergence and to provide insights relating the geometry of the landscape to algorithm behavior.

WB27 Advanced Quality & Reliability Research & Implementations

Cluster: Reliability & Quality Control
Sponsor: Quality, Statistics & Reliability Section
Invited/Sponsor Session

Chair: Jionghua Jin, University of Michigan, 1815 IOE Bldg., Ann Arbor, MI 48109-2117, jhjin@engin.umich.edu

1) Statistical Characterization of Fiber Preform Permeability for Composite Manufacturing, ***Chuck Zhang***, Florida State University, Dept. of IE, 2525 Pottsdamer St., Tallahassee, FL 32310, chzhang@eng.fsu.edu, ***Zhiyong Liang, Rong Pan, Ben S. Wang***

A major technical challenge in the resin transfer molding process is the characterization of fiber preform permeability for quality control. DOE, ANOVA analysis and distribution characterization techniques are used to analyze the permeability-influencing factors and the statistical properties of fiber preform permeability. The results can be used to improve RTM process design and control.

2) Proactive Maintenance Methodology through Integration of Statistics, an Engineering Model & OR, ***Jionghua Jin***, University of Michigan, 1815 IOE Bldg., Ann Arbor, MI 48109-2117, jhjin@engin.umich.edu

Maintenance is a very important topic; however, it has been conducted in different disciplines separately. We aim to develop a general analysis framework to integrate reliability-based maintenance and condition-based maintenance and consider the cost constraint. The detailed modeling and evaluation analysis of different maintenance policies will be presented.

3) A Diagnostic Method of Control In/Out in a Glass Furnace, ***Jin-Hyung Cho***, Kumoh National University of Technology, Dept. of ISE, Kumi, 730-701, Korea, joy@knut.kumoh.ac.kr, ***Sung-Ho Chang, Sung-Sik Kim***

Indirect measurement of the temperature in a glass furnace is possible by measuring the temperature at its crown. However, the temperature fluctuates in a very short time-interval so it is hard to determine whether the fluctuation is stable or not. Usually a Shewhart-chart is used to determine the control status; however, it does not give the exact information about the fluctuation...

4) A Stream of Variation Methodology for Ramp-Up Time Reduction of Reconfiguration Machining Systems, ***Jan Shi***, University of Michigan, Dept. of IOE, 1724 IOE Bldg., Ann Arbor, MI 48019-2117, shihang@umich.edu

Dimensional variation is one of the major issues in the new production launch. The issue is more critical for RMSs due to its frequent reconfiguration and launch for new products. We present the SOV methodology in modeling, analysis and root cause diagnostics for multistage machining processes.

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Tuncel, Levent MD25
Tung, Yu-Chi MC22
Turmel, Claude TE14
Turner, J. Scott TA31
Turner, Lynn SC19
Turnquist, Mark A. MC17
Uchida, Tetsuya TE34
Ugray, Zsolt MA20
Ukovich, Walter MA10
Ulusoy, Gunduz MA27
Upton, David MD35
Urban, Timothy L. SC39
Usher, John S. TA27, WA27
Usman, Syed MA24
Usowicz, Thaddeus W. SA28
Uster, Halit SB37
Vairaktarakis, George L. MA11, SD33, TA10
Vakili, Pirooz MD39
Valeeva, Aida F. MA21
Valenzuela, Christine L. MA21, MD21
Valenzuela, Jorge SB40
Valverde, L. James SD08
Vamanan, Mayur MC41
van de Kerchove, Virginie TA16
van de Velde, Steef L. MC10, SD11, TA10
van den Akker, Marjan TA10
Van der Laan, SD42
van der Meer, Robert TC28
van der Wal, Jan SA40
van Hoesel, Stan SD11
van Houtum, Geert-Jan MD26
Van Mieghem, Jan A. TD10

Van Nieuwenhuyse, Inneke SD33
van Norden, Linda SD11
Van Oyen, Mark P. SA04, TD04
Van Roy, Benjamin SD05
van Ryzin, Garrett J. SC09, WA03, WB12
Van Vyve, Mathieu P. MC33
Van Wassenhove, Luk N. TE03
Vance, Pamela H. SC13
Vandaele, Nico J. MC04, SD33, TE33
Vanderbei, Robert J. MD25, SA25
Vanhoucke, Mario MC27
Vargas, Vicente A. MC03
Vasilyeva, Lidiya I. SD21, WB04
Vazacopoulos, Alkis SC31, SD45
Vazquez, Harold MC38
Veatch, Michael H. MA40
Vecchietti, Aldo SB31
Vedapudi, Manu SC14
Veerkar, Viswanthan SC14
Vega, Benjamin TE13
Vega, J. Marcos Moreno TA21
Ventosa, Mariano SA29, SD29
Vepsalainen, Ari P. TE32
Vera, Jorge R. MC37
Vereen, Bradley TA29
Verma, Arun SA43
Vernon, Mary TD14
Verter, Vedat MD12, SC13
Vickson, Raymond G. SC36, SD36
Vidal, Carlos J. SC13
Vikas, Shree MC29
Vilkinas, Tricia MA35
Villalobos, J. Rene MD15, TE13
Villalobos, Maria Cristina SB25
Villas-Boas, J. Miguel MD40
Villavicencio, Jorge U. TA17
Vincke, Philippe G. H. MD16
Viswanadham, N. TC13
Vizvari, Bela TA11
Vladimirsk, Yefim SD31
Vlahos, Kiriakos TD29
Vlahovich, Vladimir TD22
Vohra, Rakesh V. MC09
Vokurka, Robert J. SC16
Volk, Robert J. SC01
Von Winterfeldt, Detlof SA01, SB01
Vossen, Thomas MC14
Waescher, Gerhard SA21
Wagelmans, Albert P. M. SC17
Wagner, Janet M. WA22
Wagner, Michael SC25
Wake, Daniel D. MC41
Walczak, Darius MA14
Walker, Gordon B. SA42
Walker, Randall L. WA27
Wallenius, Hannele E. MC16
Wallenius, Jyrki MC16
Waller, S. Travis TA06, TC06, WB15
Walls, Michael R. TA01, TD01
Walsh, Megan TD04
Walter, Zhiping SA18
Wan, Yi MC41
Wang, Ben S. WB27
Wang, Boshing WA23
Wang, Chung-Hsiao SC38
Wang, David L. SA35
Wang, Haibo TD31
Wang, John MC40
Wang, Li-Chih TA08
Wang, Meimei TD33
Wang, Ming Y. SA38
Wang, Pearl Y. MA21
Wang, Qian MC41
Wang, Renyou SB37
Wang, Shaojun SA36, TA15
Wang, Sheng-Pen TA34
Wang, Shoou-Jiun TD34
Wang, Siqun SB10
Wang, Yanfeng MD39
Wang, Yun TA07
Wang, Yunzeng MA03
Ward, Amy L. SC05
Waring, Colleen G. TD28
Wasil, Jr., Edward A. MA31
Watkins, Jr., David W. TD16
Watson, Noel MA03
Watts, Tim SA19
Weaver, R. D. TA28
Webster, Scott T. MA33, MC13
Wei, Kwok-Kee TE23
Wei, Wenbin TA34
Wein, Lawrence M. SA03, TC05
Weiser, Mark SA31
Welch, William J. MC42
Weng, Wenlong SA08, SB34
Weng, Z. Kevin MC13, MD34
Werker, Greg SD30
Wesolowsky, George O. TD21
Westbrook, Robert A. MD24
Weyant, John P. SA08, SB34
Whinston, Andrew B. WA26
White, Chelsea C. TD20
Whitman, Peter C. SD41
Whitney, Daniel E. SA14
Wichmann, Georg MC21
Wiecek, Margaret M. TE11
Wilemon, David MC39, TE15
Wiley, Mark MC45
Wiley, Victor D. SB20
Wilhelm, M. R. SD24
Willems, Sean P. TD03
Williams, Albert SC10
Williams, Gerald H. TA46
Williams, Ruth J. MD05, WA05
Williamson, Craig SD41
Willis, John B. TD09
Willmot, Gordon E. MC26
Wilson, Amy R. SD22
Wilson, Dan TE24
Wilson, George R. MA15, SC36
Wilson, James R. MA23
Wilson, John G. MA14
Wilson, Robert B. MA29
Winch, Janice K. SD33
Wise, Gregory TC34
Wisnowski, James W. TE27
Wognum, P. M. SA19
Wojcik, Aleksander TD20
Wolfram, Catherine SC29
Wolkowicz, Henry MD25
Womeodu, Robin J. MC43
Wong, Richard T. MC32
Woodaman, Ronald F. SA23
Woodruff, David L. SA20
Worthington, Dave J. SA40
Wortman, M. A. SD40
Wright, Ronald H. TC07
Wu, C. F. Jeff TA14, TC14
Wu, Jia Hao SC06
Wu, Peiling SC36
Wu, Rongwen SD05
Wu, S. David MD04, MD13, SB13
Wu, Wenji MD06
Wu, Zhengping WA29
Wunderling, Roland TE30
Wurgaft, Hernan MC41, SD08
Wurl, Robin C. SC40
Xia, Mu TA18
Xiao, Baichun SA09
Xu, Henry MA13
Xu, Hongtao MC37
Xu, Liqun SB08
Xue, Jue TA17
Xue, Mei TE46
Yafeh, Yishay SD32
Yamaguchi, Toshikazu TD46
Yamauchi, Harold M. SD41
Yan, Houmin MC36, SA10, WA29
Yanasse, Horacio H. MA37, SB21
Yang, Baiyu TD06
Yang, Deli TD23
Yang, Jian TD19, WA11
Yang, Sang-Chin WA27
Yang, Taho WA13
Yang, Ta-Hui TA06
Yang, Tsu-Kuang WA23
Yano, Candace A. TE26
Yao, David D. MA26, SD26
Yao, Dong-Qing SD19
Yao, Li WA29
Yasai-Ardekani, Masoud MA31
Yaskov, G. SC21
Yassine, Ali A. MD19
Yasuda, Kazuhiko SB19
Yavuz, Serdar TA09
Ye, Hengqing MC40
Ye, Nong MD15, TC22
Yen, Jin-Ru WB15
Yen, Joyce SA17
Yeo, Kunmin MC32
Yildirim, A. Emre SD25
Yildirim, Mehmet B. SA06
Yildirim, Yildiray SC08
Yoon, Byung-Un TD15
Yoshimoto, Kazuho K. SA33, TE34
Yost, Kirk SB42
Younes, Hamdouch SB28
Yu, Bin SA03
Yu, Gang MA02, SA11
Yu, Jeong Whon TC06
Yu, Shun-Zheng MA05
Yu, Wenci TC10
Yu, Wooyeon SA24
Yuan, Ya X. SA38
Yue, Xiaohang MC36
Yuksel, Banu WA26
Yun, Ye Boon TD46
Yurtsever, Tanju MD23
Zabinsky, Zelda B. SB42, WB25
Zahedi, Fatemeh Mariam MA31
Zaheer, Akbar SA32
Zaitsev, Alexander MC16
Zak, Eugene J. SC21
Zanakis, Stelios H. SC16
Zank, Gail M. SC16
Zannier, Lia WA23
Zappe, Christopher J. SA07
Zarbnisky, Eric J. TD09
Zaretsky, Marina MA25
Zaric, Gregory S. MA22
Zarrabi, Mariam MC29
Zavala, Edmundo T. SD20
Zbaracki, Mark J. SB32
Zeelenberg, Marcel SD01
Zeevi, Assaf J. MC40
Zeleny, Milan SD16
Zeng, Amy Z. TE18
Zeng, Jianchao TA25
Zenger, Todd R. SA32
Zeni, Richard H. TC17
Zenios, Stefanos MA22
Zenzen, Fran TE27
Zhang, Chuck WB27
Zhang, Ding MC06, SA39, SC08
Zhang, Guoqing TA17
Zhang, Hao TA05
Zhang, Jun TE33
Zhang, Jun J. TD03
Zhang, Pengcheng MD06
Zhang, Qin SC39
Zhang, Rachel Q. TA03
Zhang, Shuzhong SD25, TC10
Zhang, Wen SB33
Zhang, Xiaoning TA30
Zhang, Yin SA25, SB25
Zhao, Guohao TC29
Zhao, Wei MD15
Zhao, Yanli MC34
Zhao, Yao SD15, TC04
Zhao, Yong SB06
Zheng, Harry MD37
Zheng, Yu-Sheng MA03
Zhenxin, Yu TC15
Zhou, P. TC24
Zhou, Xuesong SD06
Zhou, Ying TE23
Zhou, Yongpin MD03, TC26, TE05
Zhu, Dan TA30
Zhu, Joe MD46, TC46
Zhu, Kenny Q. TE34
Zhu, Liang MC34
Ziagos, John SA01
Ziai, Reza TC19
Zijm, W. H. M. MC04, MD26
Ziliaskopoulos, Athanasis TA06, TC06, TE06, WB15, WB17
Zimmerman, Randal J. SD41, TC02
Zipkin, Paul SC15, TE03
Zobel, Christopher W. TC07
Zobian, Assef SB29
Zoghby, Jeriad M. MC08, TA33
Zozaya-Gorostiza, Carlos A. TC22
Zuo, Yijun MD15

Sunday 08:30-10:00

SA01 Panel: Government Applications of Decision Analysis
SA02 Representation & Solution of Asymmetric Decision Problems
SA03 Supply Chain Management
SA04 Planning & Assignment of Workers
SA05 Analysis & Control of Communications Networks
SA06 Road Pricing
SA07 Constructive Methods for Dealing with Special Classroom Issues
SA08 Financial Engineering
SA09 Airline Revenue Management
SA10 Scheduling Manufacturing/Service Systems
SA11 Recent Advances in Airline Optimization
SA12 Strategic Issues in Supply Chain Management
SA13 Information Coordination in Logistics
SA14 EPD Mini-Cluster: Web/IT Driven Product Development I
SA15 Inventory & Coordination
SA16 Multiple Objective Programming
SA17 Theory & Computation
SA18 Electronic Commerce
SA19 Strategic Management of Technology
SA20 Extensions & Applications of Heuristic Search
SA21 Session I
SA22 Resource Utilization in Health Care
SA23 Web-Based Simulation
SA24 Facilities Design
SA25 Nonlinear Programming Algorithms for Semidefinite Programming
SA26 Modeling Queues with Power-Tailed Interarrival and/or Service Distributions: In Honor of Carl Harris
SA27 Panel: The Academic Job Search for PhD Students
SA28 The Internet & Social Science Applications
SA29 Auctions & Bidding in the Electric Power Industry
SA30 Connecting Modeling Languages with other Systems
SA31 Technologies in Supply Chain Management
SA32 Trust & Governance in Interorganizational Relations
SA33 Flexible Manufacturing Systems
SA34 Decision Analysis I
SA35 Forecasting I
SA36 Inventory Management I
SA37 Optimization Techniques I
SA38 NLP I
SA39 Marketing I
SA40 Queueing Systems
SA41 DEA Applications in Accounting
SA42 Firm Capabilities, Firm Evolution & Industry Dynamics
SA43 Risk Management I

Sunday 10:15-11:45

SB01 Practitioners' Award Competition
SB02 New Directions in Behavioral Research
SB03 System Dynamics in Operations Management
SB04 Logistics Modeling & Analysis
SB05 Tutorial: Moment Problems & their Applications in Probability Theory, Finance, Stochastic Networks & Combinatorial Opt.
SB06 Sequential & Combined Travel Forecasting Models
SB07 Skills Assessment for OR/MS
SB08 Financial Management I
SB09 Applications of Revenue Management I
SB10 Innovations & Applications of Integer Programming
SB11 Combinatorial Optimization Algorithms in Computer Network Applications
SB12 Technology Supply Chains
SB13 Panel: Research Directions in Manufacturing Logistics
SB14 EPD Mini-Cluster: Industry-Academia Panel
SB15 Tutorial: Coordinating Production, Distribution & Pricing Decisions in the Supply Chain
SB16 Tutorial: Preference Function Modeling
SB17 Network Flows: Recent Advances in Networks
SB18 Applying Marketing Science to E-Commerce
SB19 Technology Operations & Information Systems: ERP Systems
SB20 Tabu Search Applied to Military Logistics Problems
SB21 Session II
SB22 Modeling Health Care Operations
SB23 Simulated Annealing Applications
SB24 Material Handling Systems Integration
SB25 Nonlinear Programming, Integer Programming & Interior-Point Algorithms
SB26 Queueing Models
SB27 Panel: The Industry Job Search for PhD Students
SB28 Networks & Graphs
SB29 Modeling Price Formation & Market Power in Competitive Electricity Markets I
SB30 Carl Harris Memorial Session: Optimization in Computational Biology
SB31 Recent Advances in Nonlinear Mixed Integer Optimization
SB32 The Institutional Foundations of Markets
SB33 Production Planning I
SB34 Decision Analysis II
SB35 Forecasting II
SB36 Inventory Management II
SB37 Optimization Techniques II
SB38 NLP II
SB39 Marketing II
SB40 Reliability
SB41 Forecasting Accounting Numbers
SB42 Dantzig Dissertation Award Finalist Presentations
SB43 Risk Management II
SB46 COIN Installfest for Linux: A Hands-On Workshop using Open Source Software for OR

Sunday 13:15-14:45

SC01 Medical Decision Making
SC02 Decision Analysis Arcade
SC03 Supply Contracts & Information
SC04 Inventory Policies with Demand Curves
SC05 Analysis & Control of Queueing Systems
SC06 Enhancing Travel Forecasting Models
SC07 Helping Handicapped Students Overcome the Unique Challenges they Face in OR/MS Courses
SC08 Financial Management II
SC09 Pricing & Revenue Management
SC10 Optimization & Scheduling I
SC11 Boolean Methods in Discrete Optimization
SC12 Research & Industry Reviews: SCM Best Practices
SC13 Implementations of Supply Chain Design
SC14 EPD Mini-Cluster: Web/IT Driven Product Development II
SC15 Panel: Supply Chain Management - Everything Including the Kitchen Sink
SC16 Weighting & Ranking Decision Methods
SC17 Network Flows: Applications in Transportation
SC18 Issues in Internet Marketing
SC19 Electronic Business: Issues & Trends
SC20 Metaheuristics for Vehicle Routing
SC21 Session III
SC22 Roundtable: E-Commerce in Health Care
SC23 Simulation & Optimization using Spreadsheets
SC24 Virtual Environments for Manufacturing Systems Design
SC25 Nonlinear Programming & Applications
SC26 Telecommunication Systems
SC27 Tutorial: Breaking the Mold: Using Commercial Software & Experiential Learning to Teach the First MS Course

SC28 What Defines the Success of OR Applications in the Railroad Industry I
SC29 Modeling Price Formation & Market Power in Competitive Electricity Markets II
SC30 Web-Based Tactical Applications of OR I
SC31 Tutorial: XPRESS-MP: A Fully Integrated Optimization System
SC32 Evolutionary Perspectives on Firm Strategy
SC33 Production Planning
SC34 Decision Analysis III
SC35 Information Systems I
SC36 Logistics Management I
SC37 Optimization Techniques III
SC38 Industry Applications II
SC39 Marketing III
SC40 Statistics & Quality Control
SC41 Tutorial: The Roundtable Presents - Small Business Innovative Research Grants & How to Win Them
SC42 No Title Supplied
SC43 Risk Management III
SC45 Software Demonstration I
SC46 COIN Installfest for Windows: A Hands-On Workshop using Open Source Software for OR

Sunday 15:00-16:30

SD01 Marketing & Decision Making
SD02 Computation & Graphic Layout
SD03 Pricing, Incentives & Channel Policies
SD04 MSOM Fellows
SD05 Computational Finance
SD06 Travel Models for Planning & Evaluation
SD07 Improving Intuition through Interactive Models
SD08 Business Applications
SD09 Applications of Revenue Management II
SD10 Optimization & Scheduling II
SD11 Combinatorial (Bundle) Auctions
SD12 SCM: Innovative Solutions, Global Decisions
SD13 Recent Advances in Manufacturing Scheduling
SD14 Airline Schedule Planning
SD15 Collaboration & Competition in Supply Chain Management
SD16 Topics in Multicriteria Decision Making
SD17 Network Flows: Freight Applications
SD18 The Web: Consumers, Sites & Marketing Strategies
SD19 Forecast-Facilitated Operations in Supply Chains
SD20 Tabu Search in Design Problems
SD21 Session IV
SD22 Health Care Quality & Long-Term Care
SD23 Tutorial: Statistical Analysis of Simulation Output
SD24 Application of Simulation in Material Handling Systems Design
SD25 Sensitivity Analysis in Convex Optimization
SD26 Stochastic Decision Processes
SD27 Negotiation to Win-Win
SD28 What Defines the Success of OR Applications in the Railroad Industry II
SD29 Modeling Generation & Transmission Planning in Electricity Markets
SD30 Web-Based Tactical Applications of OR II
SD31 OR Modeling in Engineering Designs: Lectures in Honor of Carl M. Harris
SD32 Political Institutions & Firm Strategy
SD33 Production Planning III
SD34 Decision Analysis IV
SD35 Information Systems II
SD36 Logistics Management II
SD37 Optimization Techniques IV
SD38 Industry Applications II
SD39 Quality Management & Statistics I
SD40 Stochastic Processes
SD41 The Daniel H. Wagner Prize for Excellence in OR
SD42 Journal of Quality Technology Papers Presentations
SD43 Research & Educational Issues in Management of Technology
SD45 Software Demonstration II

Monday 08:15-09:45

MA01 The Balanced Scorecard
MA02 Tutorial: Applying Advanced Integrated Real-Time DSSs to Help Airlines Move to the Next Level of Efficiency
MA03 Models of Supply Chain Coordination
MA04 Manufacturing-Marketing Interface
MA05 Probabilistic Models in Networks
MA06 Transit Applications of Operations Research
MA07 Models For & About Education
MA08 Panel: E-Business Strategy & Technology Developments in Practice
MA09 Uncertainty & Forecasting Techniques in Revenue Management
MA10 Real-Life Scheduling Models
MA11 Algorithm Design for Discrete Optimization Problems
MA12 Purchasing & Supplier Selection
MA13 Manufacturing Logistics Scheduling & Routing
MA14 Airline Marketing & Planning
MA15 Service Parts Reengineering at IBM
MA16 Applications of Multicriteria Tools in Single & Multiple Decision Maker Environments
MA17 Tutorial: Integrated Supply Chain Planning for Semiconductor Industries
MA18 E-Business: Strategy & Policy
MA19 Innovative Management of Manufacturing Capacity
MA20 New Advances & Applications of Scatter & Tabu Search
MA21 Session V
MA22 Clinical Applications of MS/OR
MA23 Simulation Input & Output Analysis
MA24 Warehousing & Distribution
MA25 On the Efficient Solution of Mathematical Programming Problem Classes
MA26 Stochastic Models in Supply Chain Applications
MA27 Project Management I
MA28 Freight Applications
MA29 Market Mechanisms for Competitive Electricity
MA30 Tutorial: INFORMS Computing Society Spring 2000 Prize
MA31 Computer Science & Internet Applications
MA32 Telecommunication Systems I
MA33 Production & Scheduling I
MA34 Decision Support Systems I
MA35 Information Systems III
MA36 Operations Management I
MA37 Optimization Techniques V
MA38 Industry Applications III
MA39 AI in Health Care
MA40 Applied Probability I
MA41 Operational Issues in Global Supply Chain Execution
MA42 Six Sigma Methods Development & Applications to Manufacturing Processes
MA43 Linking Technology Transfer & Enterprise Equity
MA45 Software Demonstration III
MA46 Transportation

Monday 10:00-11:00

MP44 Plenary: The Integrated Supply Chain as an Enabler of E-Business Transformation

Monday 13:15-14:45

MC01 Integrating Real Options & Decision Analysis
MC02 Tutorial: Dynamic Resource Management - Problems, Models & Algorithms

MC03 Retail Inventory
MC04 Queueing Applications in Manufacturing
MC05 Tutorial: Traffic Modeling for Queues & its Impact on Performance Analysis
MC06 Sustainable Transportation Networks
MC07 INFORMS Case Competition 2000: Finalists 1 & 2
MC08 Marketing Issues in E-Business
MC09 Auction Strategy in Revenue Management
MC10 Panel: Research Opportunities in Scheduling Theory & Applications
MC11 Computational Integer Programming
MC12 Global Supply Chain Management
MC13 Issues in Supply Chain Coordination
MC14 Airline Operations & Infrastructure
MC15 Tutorial: Digital Business Community - Supply Chains to Market Places
MC16 Multi-Dimensional Online Auction Design: A Multiple Criteria Perspective
MC17 Pricing, Information & Flexibility in Supply Chain Management
MC18 Consumer Trust in Internet Stores
MC19 Dynamic Models of Product Development
MC20 Ensemble Methods for Data Mining
MC21 Session VI
MC22 Technical & Allocative Efficiency of Health Care Providers using DEA
MC23 Ranking & Selection for Simulation
MC24 Gaining a Competitive Advantage through Distribution
MC25 Complementarity & Applications
MC26 Analysis of Queueing Systems
MC27 Project Management II
MC28 Railroad Empty Equipment Distribution Systems
MC29 Application of Optimization in the Energy Industry
MC30 Telecommunication & Generalized Network Optimization Algorithms
MC31 Open Source Software for Operations Research
MC32 Telecommunication Systems II
MC33 Production & Scheduling II
MC34 Multicriteria Decision Making I
MC35 Information Systems IV
MC36 Operations Management II
MC37 Integer Programming I
MC38 Public Programs/Processes
MC39 New Product Development I
MC40 Applied Probability II
MC41 Supply Chain Optimization
MC42 Value Function Approximation in Continuous-State Stochastic Dynamic Programming
MC43 Taking it to the Streets: Health Technology Diffusion
MC45 Software Demonstration IV
MC46 Tutorial: Mining Spatial Data

Monday 15:00-16:30

MD01 Decision Analysis Society Awards Presentation
MD02 Tutorial: Theoretical Foundations of Systems Engineering
MD03 Research Related to Telephone Call Centers
MD04 Supply Chain Applications in E-Commerce
MD05 Dynamic Control for Stochastic Networks I
MD06 Advanced Traffic Control Applications
MD07 INFORMS Case Competition 2000: Finalists 3 & 4
MD08 Online Auctions
MD09 Tutorial: Revenue Management & Dynamic Pricing
MD10 Complex Scheduling Problems
MD11 Branch & Cut Algorithms
MD12 Designing the Supply Chain
MD13 Game Theoretic Models for Manufacturing Logistics
MD14 Advances in Stochastic Integer Programming
MD15 Scalable Statistical Techniques for Quality Assurance
MD16 PROMETHEE MCDA Outranking Method
MD17 Supply Chain Operational Strategies
MD18 Industry Standards in E-Commerce Supply Chains
MD19 Product Development Process Management
MD20 Optimization in Data Mining
MD21 Session VII
MD22 Recent Issues in Medicare Payment Systems
MD23 Operational Modeling in Semiconductor Wafer Fabrication
MD24 Modeling Retail Operations
MD25 Advances in Cone-Linear Optimization
MD26 Queueing & Inventory I
MD27 Stochastic Inventory Models
MD28 Threats to Life & Limb
MD29 Price Volatility & Probabilistic Methods in the Energy Market
MD30 Data Mining Applications
MD31 Applying Optimization Technologies: Lectures of GMU Students Honoring Carl M. Harris
MD32 Telecommunication Systems III
MD33 Flowshop Scheduling
MD34 Multicriteria Decision Making II
MD35 Information Systems V
MD36 Operations Management III
MD37 Linear Programming & Applications
MD38 Semiconductor Industry
MD39 New Product Development II
MD40 Structural Models of Retail Competition
MD41 OR Applications
MD42 Statistical Quality Control with Complex-Structured Data & Processes
MD43 Best Dissertation Award Winners 2000
MD45 Software Demonstration V
MD46 Data Envelopment Analysis I

Monday 16:45-17:45

ME44 Plenary: Improving Performance & Flexibility at Jeppesen: The World's Leading Aviation Information Company

Tuesday 08:15-09:45

TA01 Decision Analysis at Schlumberger
TA02 Tutorial: Multi-Agent Systems
TA03 Supply Chain Management
TA04 Value of Information in Dynamic Environments
TA05 Stability of Queueing Networks
TA06 Dynamic Traffic Assignment
TA07 Initiatives in Management & Information Technology Pedagogy
TA08 Electronic Commerce & Supply Chain Integration
TA09 Military Applications I
TA10 New Directions in Scheduling
TA11 Advances in IP Methods & Applications I
TA12 E-Business: An Enabler for the Supply Chain
TA13 Strategic Operations Planning
TA14 Tutorial: Modern Experimental Design I: Planning & Analysis
TA15 Supply Chain Management I
TA16 PROMETHEE Software & Applications
TA17 Optimization Techniques VI
TA18 Novel Market Mechanisms & Applications in E-Commerce
TA19 Aligning Project Management with Strategy
TA20 Strategic Planning I
TA21 Facilities Planning & Design
TA22 Cost Effectiveness & Hospital Efficiency
TA23 Bidding: Combinatorial Auctions
TA24 Panel: Strategic Global Standards Management - A New Imperative in Technology Management Instruction
TA25 Lectures in Honor of Carl M. Harris: Optimization in Medical Diagnosis & Treatment

TA26 Issues in Rail Operations
TA27 Panel: Reliability Education - Present & Future
TA28 Modeling Regulated Performance
TA29 Operations Management IV
TA30 E-Commerce Security & Trust Issues
TA31 Computing Issues in Quality & Reliability Research
TA32 Organization Theory I
TA33 Job Shop Scheduling
TA34 Economics I
TA46 Data Envelopment Analysis II
TA47 Software Demonstration VI

Tuesday 10:00-11:00

TO44 Omega Rho Distinguished Lecture: The World is Coming our Way: OR/MS Opportunities in E-Commerce

Tuesday 13:00-14:30

TC01 Environmental Applications of Decision Analysis
TC02 DEA I
TC03 Service Delivery Channel Design & Management
TC04 Joint Forecasting in Supply Channels
TC05 Tutorial: Some Mathematical Models of Cancer Treatment
TC06 Dynamic Transportation Modeling
TC07 Using Visual Basic to Teach OR/MS: Beyond Spreadsheets
TC08 ERP Requirements Definition in a Complex Environment
TC09 Military Applications II
TC10 Scheduling & Dynamic Programming
TC11 Applications of Mixed-Integer Programming
TC12 Information Technology & Supply Chains
TC13 Data Mining & Optimization of Supply Chains
TC14 Tutorial: Modern Experimental Design II: Parameter Design for Variation Reduction & Quality Improvement
TC15 Supply Chain Management II
TC16 Group Aggregation in AHP
TC17 Transportation Forecasting
TC18 E-Commerce I
TC19 OR Models in Industry
TC20 Strategic Planning II
TC21 Location Analysis I
TC22 Innovation & Entrepreneurship I
TC23 Bidding: Auctions in Context
TC24 Estimation & Prediction Policies for Traffic Management I
TC25 Complementarity Problems
TC26 Call Center-Related Research
TC27 Quality Control Research
TC28 Evaluating Critical Services
TC29 Environment & Natural Resources I
TC30 Optimization & Modeling for Human Experts
TC31 Artificial Intelligence I
TC32 Organization Theory II
TC33 Machine Scheduling
TC34 Economics II
TC46 Panel: Data Envelopment Analysis Applications in E-Commerce Activities
TC47 Software Demonstration VII

Tuesday 14:45-16:15

TD01 Decision Analysis & Portfolio Applications
TD02 DEA II
TD03 Current Issues in Supply Chain Management
TD04 Planning & Control in Flexible Workforce Systems
TD05 Dynamic Control for Stochastic Networks II
TD06 Transportation Network Design & Optimization
TD07 Panel: Best Cases
TD08 Product Data Integration
TD09 Military Applications III
TD10 E-Commerce in Logistics & Supply Chain Management
TD11 Advances in IP Methods & Applications II
TD12 Optimization Issues in Supply Chains
TD13 Logistics Network Design & Analysis
TD14 Flexible Automation Issues I
TD15 Management of Technology I
TD16 Stochastic Programming Applications
TD17 Forecasting Applications
TD18 E-Commerce II
TD19 Integer Programming II
TD20 Logistics I
TD21 Location Analysis II
TD22 Innovation & Entrepreneurship II
TD23 Auctions/Competitive Bidding
TD24 Estimation & Prediction Policies for Traffic Management II
TD25 Intelligent Math Programming Software
TD26 Optimization in Finance
TD27 Reliability Research I
TD28 Auditing & Performance Measurement
TD29 Environment & Natural Resources II
TD30 Novel Applications in the Energy Industry
TD31 Artificial Intelligence II
TD32 Production & Scheduling III
TD33 Stochastic Scheduling
TD34 Economics III
TD46 Data Envelopment Analysis III
TD47 Software Demonstration VIII

Tuesday 16:30-18:00

TE01 Risk Management
TE02 DEA III
TE03 Pricing & Competitive Issues in Inventory Management
TE04 Remanufacturing Strategy & Competition
TE05 Analysis & Control of Flexible Service Networks
TE06 Incident Detection & Management
TE07 Spreadsheet Models & Management Science Principles
TE08 Electronic Commerce: Trends & Development
TE09 Inventory Models & Management
TE10 Tutorial: Sensitivity Analysis for Scheduling Problems
TE11 Approximations, Linearizations & Cutting Planes
TE12 Recent Innovations in Supply Chain Management & Electronic Commerce
TE13 Manufacturing & Logistics: Industrial Challenges
TE14 Flexible Automation Issues II
TE15 Management of Technology II
TE16 Stochastic & Global Optimization Models
TE17 OR in Sport, Leisure & the Arts
TE18 Models for Supply Chain Management
TE19 Logistics II
TE20 Modeling Systems & Languages
TE21 Location Analysis III
TE22 Health Applications I
TE23 Simulation I
TE24 Combinatorial Applications in Telecommunication
TE25 Computational Advances in Global & Nonlinear Integer Programming
TE26 Issues in Service Capacity Planning
TE27 Reliability Research II
TE28 Panel: Can We Discard the Economic Model in DEA Studies?
TE29 Quality Management & Statistics II
TE30 Tutorials: CPLEX Power Tools
TE31 Artificial Intelligence III
TE32 Production & Scheduling IV
TE33 Manufacturing Systems
TE34 Vehicle Routing
TE46 Data Envelopment Analysis IV

Wednesday 08:30-10:00

WA02 Analytic Hierarchy Processes
WA03 Horizontal Competition in Supply Chains

WA04 Combinatorial Methods for Manufacturing I
WA05 Dynamic Control & Performance for Stochastic Networks
WA10 OR Applications for the NYC Government Budget
WA11 Dynamic Routing
WA12 The Effectiveness of Component Commonality
WA13 Facility Design & Material Handling
WA15 Decision Support Systems II
WA16 Multistage Stochastic Programming
WA17 Transportation Management
WA18 Ensuring Quality in the Supply Chain
WA21 Location Analysis IV
WA22 Health Applications II
WA23 Simulation II
WA24 Operations Research in Telecommunications
WA25 Advances in Global Optimization
WA26 Queueing & Inventory II
WA27 New Developments in Reliability
WA29 Operations Management V

Wednesday 10:15-11:45

WB02 Risk Analysis
WB03 Dynamic Lot-Size Models
WB04 Combinatorial Methods for Manufacturing II
WB05 Numerical Applied Probability Methods: In Honor of Carl M. Harris
WB10 Combine Heuristics with Math Programming Models for Operational Planning
WB11 Optimization in Computational Biology
WB12 Economics & Operations
WB13 Iterated Constructive Heuristics
WB15 Transportation Modeling
WB17 Transportation Management II
WB23 Simulation III
WB25 Stochastic Methods in Global Optimization
WB27 Advanced Quality & Reliability Research & Implementations

INFORMS Future Meetings Calendar

May 20 - 22, 2001

INFORMS Conference:
Optimizing the Extended Enterprise in the New Economy
Hyatt Regency La Jolla
San Diego, CA

Contact: Terry Cryan, INFORMS; terry.cryan@informs.org

June 17 - 20, 2001

INFORMS International Hawaii
Outrigger Wailea Resort
Maui, Hawaii

Chair: Kathryn E. Stecke, University of Michigan,
701 Tappan St., Rm. 5206, Ann Arbor, MI 48109-1234;kstecke@umich.edu

July 5 - 8, 2001

2001 Marketing Science Conference
University of Mainz
Mainz, Germany

Chair: Oliver Heil, University of Mainz; oliverheil@aol.com

July 25 - 27, 2001

Applied Probability Society Conference
Grand Hyatt, New York, NY
Co-Sponsors: Columbia University
The Center for Applied Probability

Chair: Karl Sigman, Columbia University,
500 West 120th St., MC 4704, New York, NY 10027; sigman@ieor.columbia.edu

November 4 - 7, 2001

INFORMS Annual Meeting, Miami Beach Fall 2001
Fontainebleau Hilton

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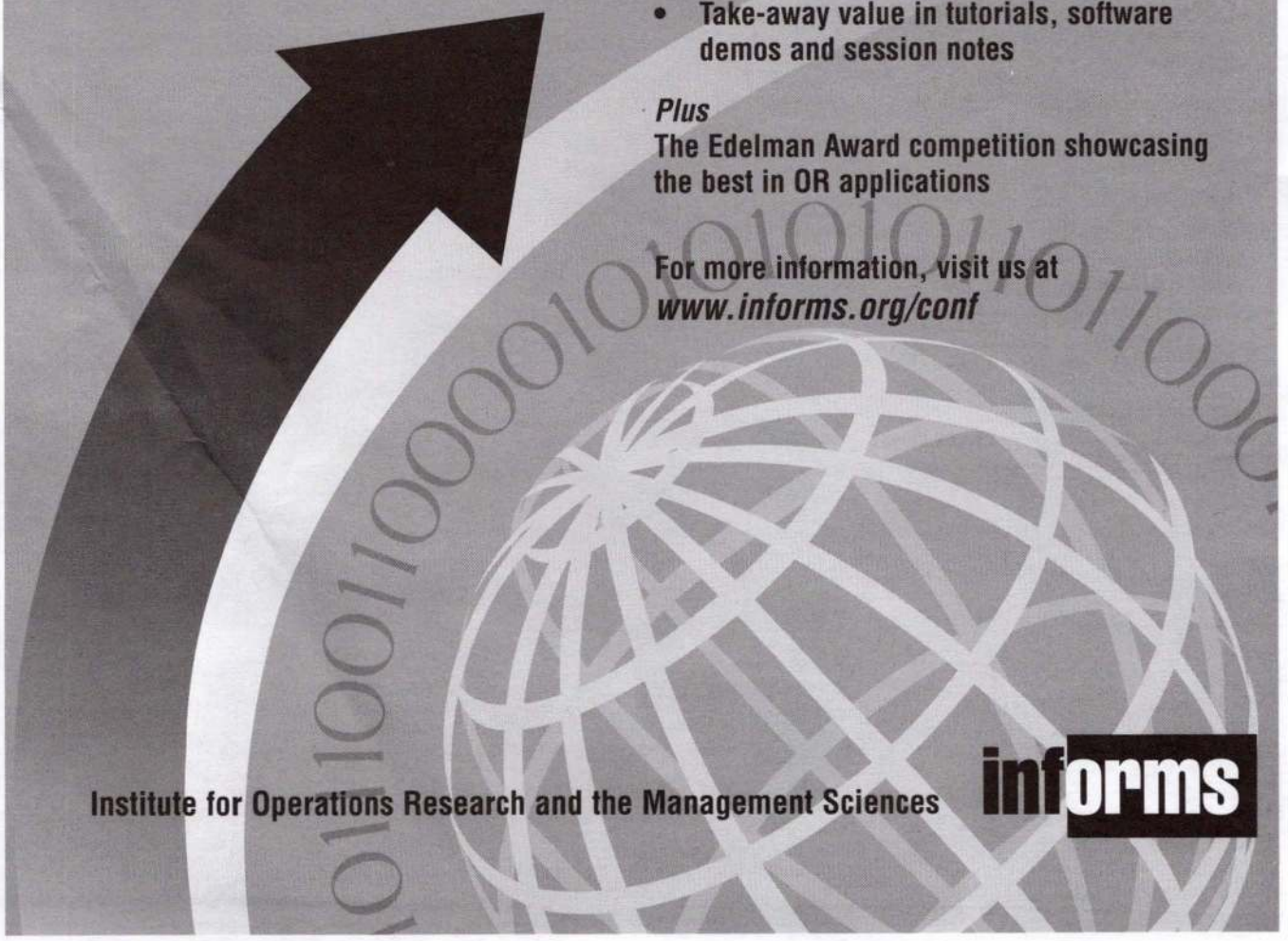
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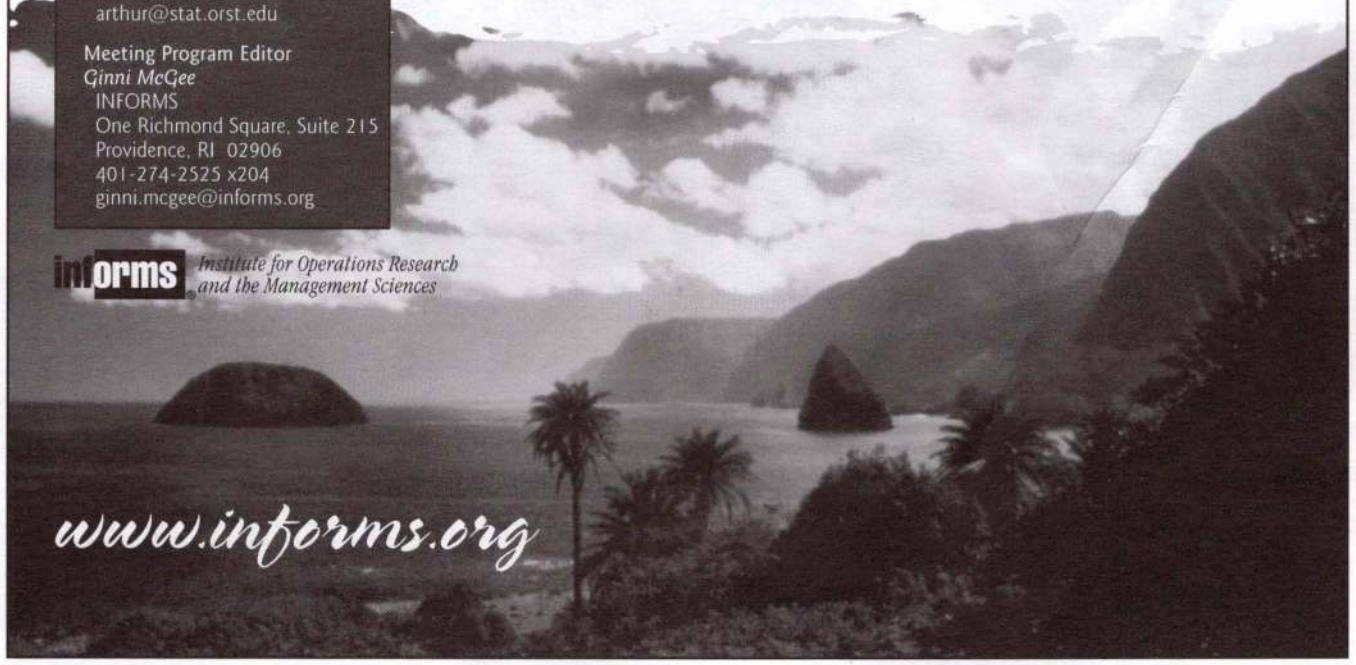
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For the New Attendee:

How to Get the Most Value From an INFORMS Meeting

Welcome to the INFORMS Meeting. We describe how you can get the most value from an INFORMS meeting and from this program. It is designed for first-time attendees at an INFORMS meeting but others should also find it useful. INFORMS meetings and this program can be confusing and the INFORMS and local meetings committees want the meeting to be a rewarding experience for you.

Why People Attend

The primary activity at an INFORMS meeting is to present professional work. We offer suggestions on how to get the most value out of the sessions. There are other reasons to attend the meeting and we describe how to make the meeting as valuable as possible for these purposes, which may include:

- networking with colleagues;
- recruitment;
- meeting with colleagues in a specialty (subdivision);
- displaying or exploring exhibits;
- meeting with a small number of colleagues on a specific topic;
- learning from other types of sessions, i.e., tutorials and panels;
- other activities, i.e., plant tours.

Networking

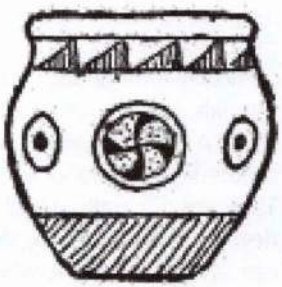
- **Informal Discussions:** Networking is probably the major reason why many people attend an INFORMS meeting. The major means of networking are informal discussions in the common areas between sessions, during the lunch break and after the daily set of sessions. There are usually one or two areas at the conference where attendees mingle, usually near the registration area or near the exhibits. Our members will often spend time in these areas for the simple purpose of finding colleagues. Other networking locations are around the coffee break locations.

- **General Reception:** Another major means to network is at the General Reception on Monday night, the major social meeting of conference. Generally, at least half of the attendees come to the general reception. Hors d'oevres are served buffet style and cash bars are set up with ample space to mingle and speak with friends and colleagues.

- **Business Meetings:** The business meetings are yet another means to network. These are the meetings of INFORMS subdivisions. Within these subdivisions, members develop strong professional relationships. The subdivision business meetings are held Sunday, Monday and Tuesday after the regular sessions and are a combination of business and socializing. The meetings provide an excellent way to meet colleagues with mutual interests and to join the "loop" of the subdivision. Many INFORMS members belong to more than one subdivision.

- **Exhibits:** The exhibit hall offers the chance to see recent publications and software. Vendors are eager to provide promotional copies and support to academics that may be thinking about using their materials in their courses.

Program



Of course, the most important part of an INFORMS meeting is the professional program, and it is important to understand how the sessions and program are put together. Most meetings have a professional theme that many of the sessions are aligned with. Building on this theme, the local committee puts together a professional program based on three primary types of sessions: invited sessions, sponsored sessions and contributed sessions. Invited sessions are planned by the local programming committee and can be geared towards the theme of the meeting. Sponsored sessions are organized by the subdivisions; these can also be considered invited in that a session chair appointed by the committee invites each speaker. Finally, contributed sessions consist of papers submitted by authors directly to the INFORMS office in response to the Call for Papers. All papers are accepted for these sessions.

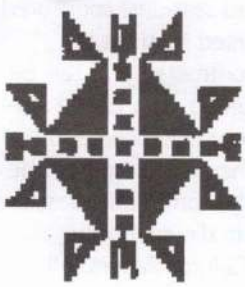
Invited sessions are organized into groups of sessions known as clusters. The clusters are generally related topics and are the basis from which the meeting planners develop the professional program. These clusters are in turn related to the theme. The clusters are of interest to attendees as they define topic areas that they may be interested in. To facilitate planning, individual sessions from these clusters are scheduled in one or more tracks. A track is a collection of sessions that meet in the same room throughout the conference. To find out more about the availability of sessions in a cluster, refer to the Master Track Schedule to determine the days and times during which a cluster is scheduled and the number(s) of track(s) containing the cluster of interest.

While there are many sessions at the conference, popular sessions such as some tutorials may fill up quickly. It is best to arrive early. The technical sessions are also an excellent place to network, as there is time after each session to speak

with presenters and request papers. It is a good idea to bring an ample supply of business cards with you.

Master Track Schedule (Matrix)
The Master Track Schedule is an overall view of the program. Tracks are listed in the left-hand column; regular session times are listed across the top. Each regular session lasts approximately 90 minutes. There is one track per room. There can be one or more cluster topic per track. One can see from the track schedule what tracks and their corresponding topics might be of interest. While a track might consist of more than one topic and some related topics can appear in different tracks, the tracks are a useful way to navigate the program.

Special Sessions
The program includes a number of special sessions. A plenary presentation is given on a topic of broad interest to the membership and is the only presentation scheduled for a particular time period. Every meeting also has a number of tutorials, usually with a single speaker, devoted to a single topic. A tutorial gives an overview of the topic with a focus on the state-of-the-art knowledge or practice in the area. They are generally popular and well attended. A panel is developed to topics for discussion with several experts. They can involve any topic where the interaction will be useful to attendees.



Session Codes
The main body of the program lists the details of the tracks in chronological order. Each session is identified by a code to identify the day, session time and slot. A paper is referred to by this code and indicates the order it is to be presented in the session. For example, MA02.3 is the Monday session, time slot A, track 02 and the third presentation. This code appears directly before the paper title and is also used to identify presentations in the Participant Index at the back of the program.

In the body of the program, sessions are listed by day and time with the title of the session, the sponsor or cluster, the type of session and the room where the session is held. The session chair's name, affiliation, mailing address and email address are then indicated, followed by the title and authors of each presentation. The lead author's information will include affiliation, mailing address and email address and co-authors are listed by name only.

Front Material
Many of the special sessions, such as the tutorials and plenary or keynote presentations, are described in further detail in the front material pages. It is useful to review this material. The front material also contains subdivision meeting schedules, details about the host city and hotel and information on the social functions. A hotel floor plan is included in the final program; this is crucial in navigating your way through the meeting.

Indexes
The program includes a participant index listing the speakers alphabetically and giving the session codes for each of their presentations. There is also a program index listing each session title for it's particular session time.

Addendum
Be aware that there are a number of late changes to the program. The final program is sent to the printer several weeks before the meeting to allow time for printing and shipping to the meeting site. Additions, changes and withdrawals received after the final program is printed are listed in chronological order in the addendum that is distributed with registration materials.

INFORMS Online
The preliminary program is available online ONLY and is updated regularly until the meeting. This allows the flexibility of a longer time frame to accept papers and to continuously add to the program. The meetings programs are available on INFORMS Online (http://www.informs.org). You can identify specific sessions and print them out in an individual, customized program, search sessions using keywords and in general, map out your particular meeting plans at a more sophisticated level. It is important to try to plan as much as possible before you arrive at the meeting. Like many other endeavors, the value you get out of a meeting will depend on the effort you put into it. To this end, we recommend reviewing the program and technical sessions in advance. Navigating the meeting will then be an easy task.

INFORMS Annual Meeting
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Miami Beach 2001



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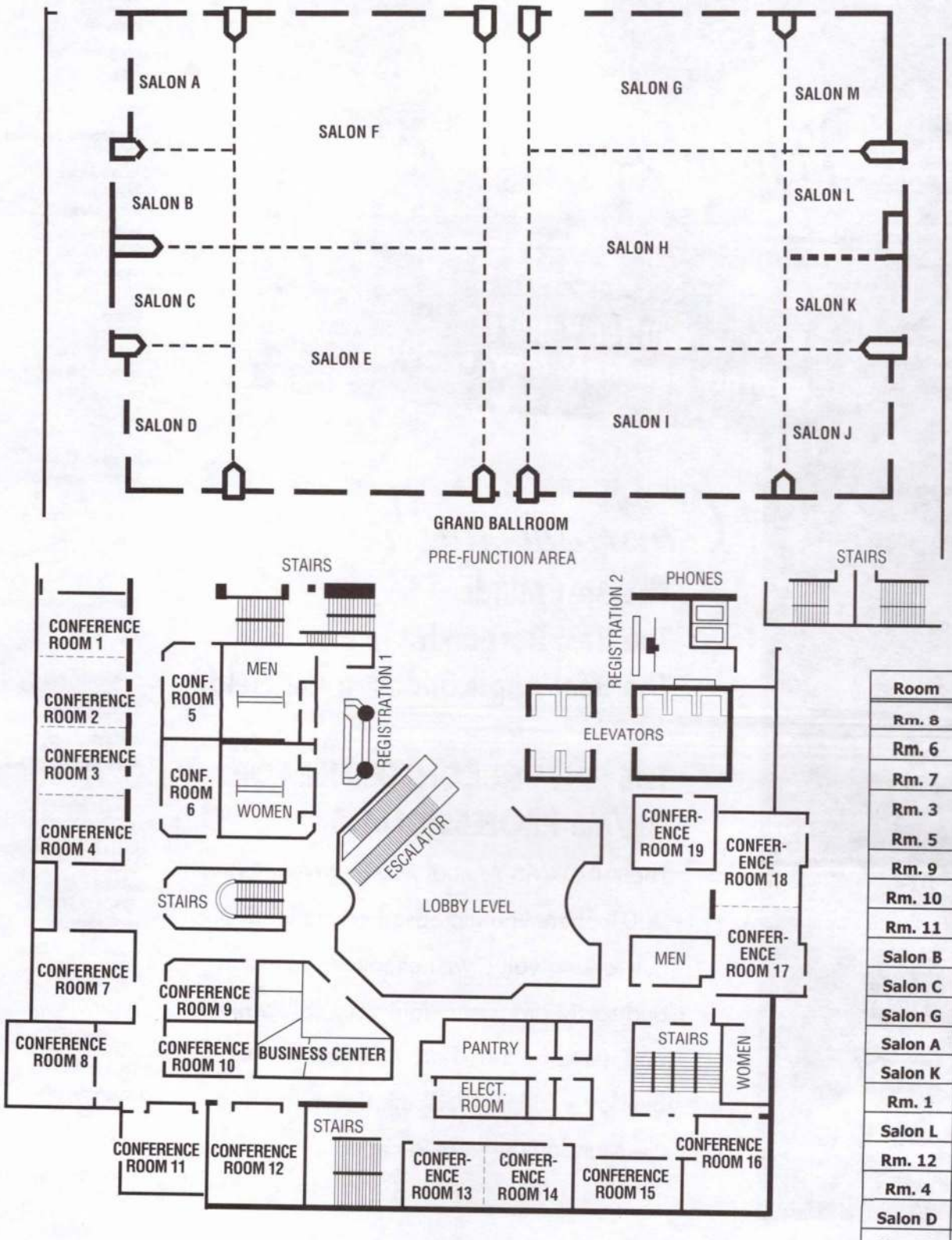
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informs

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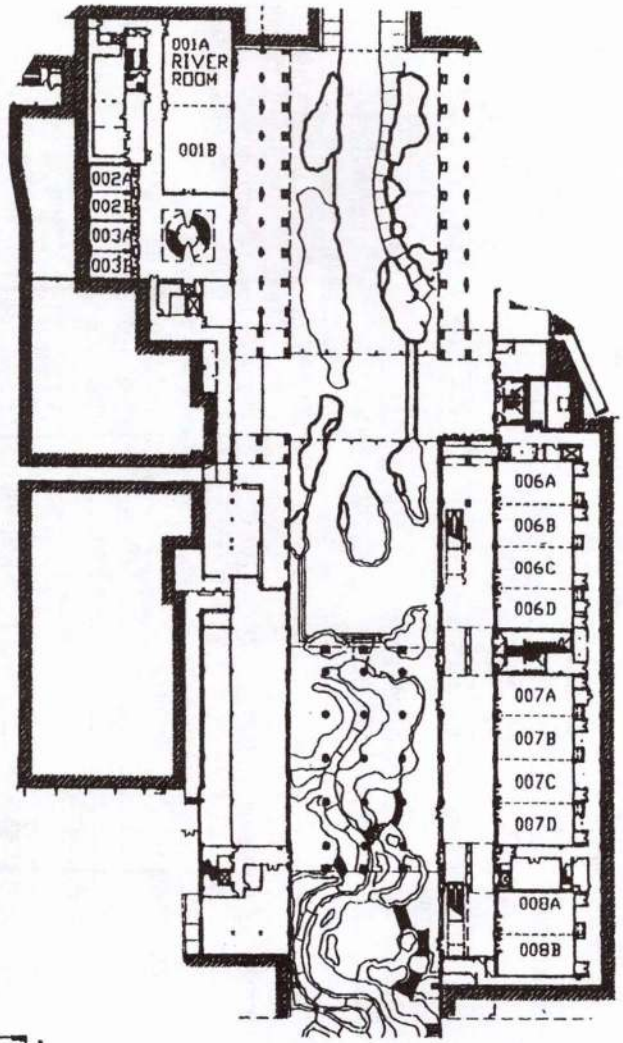
Marriott Rivercenter Hotel Floor Plans



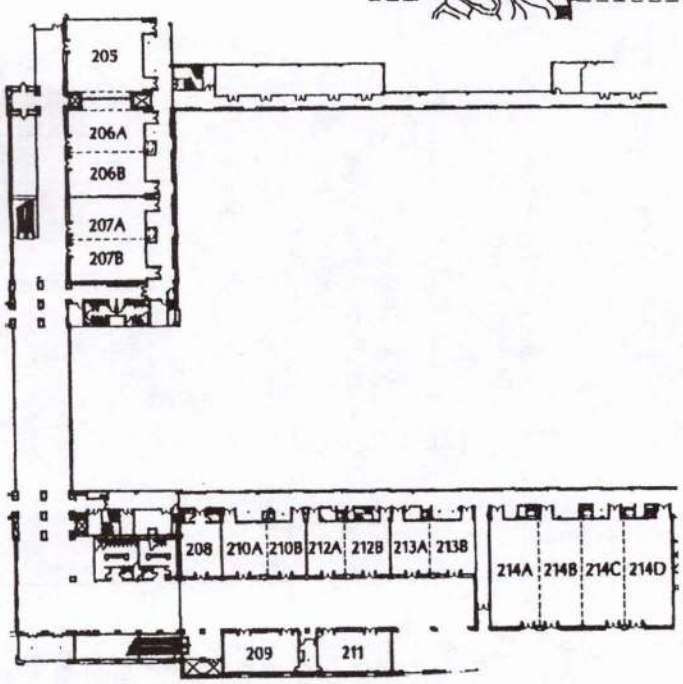
Room	Track
Rm. 8	6
Rm. 6	7
Rm. 7	9
Rm. 3	19
Rm. 5	20
Rm. 9	32
Rm. 10	33
Rm. 11	34
Salon B	35
Salon C	36
Salon G	37
Salon A	38
Salon K	39
Rm. 1	40
Salon L	41
Rm. 12	42
Rm. 4	43
Salon D	45
Rm. 17	47

Convention Center Floor Plans

River Level



Room	Track
207A	1
207B	2
205	3
206A	4
206B	5
214C	8
210B	10
211	11
212A	12
212B	13
213A	14
213B	15
214A	16
214B	17
214D	18
209	21
210A	22
208	23
006A	24
006B	25
006C	26
006D	27
007A	28
007B	29
007C	30
007D	31
216	46



Concourse: 2nd Level

San Antonio Master Track Schedule

		SUNDAY				MONDAY			TUESDAY				WEDNESDAY	
Track	**Room**	**SA**	**SB**	**SC**	**SD**	**MA**	**MC**	**MD**	**TA**	**TC**	**TD**	**TE**	**WA**	**WB**
		8:30-10:00	**10:15-11:45**	**1:15-2:45**	**3:00-4:30**	**8:15-9:45**	**1:15-2:45**	**3:00-4:30**	**8:15-9:45**	**1:00-2:30**	**2:45-4:15**	**4:30-6:00**	**8:30-10:00**	**10:15-11:45**
1	207A	Decision Analysis				Decision Analysis			Decision Analysis					
2	207B	Decision Analysis				Tutorials				DEA			AHP	Risk Analysis
3	205					MSOM								Dynamic Models
4	206A					MSOM								Comb. Mfg
5	206B					Applied Probability								
6	▲ Rm. 8					Transportation Science								Transportation
7	▲ Rm. 6					Education								
8	214C	Finance			Bus. Apps.	E-Business			E-Business & Enterprise Integration					
9	▲ Rm. 7	Revenue Management						Tutorial	Military Applications			Inventory Mgmt.		
10	210B					Scheduling								
11	211					Integer Programming								
12	212A					Logistics and Supply Chain Management							Inventory Management	
13	212B					Manufacturing & Logistics								
14	213A	Product Development			Aviation Applications			Int. Prog.	Tutorials		FMS			
15	213B	Quantitative Models in Supply Chain Management					Tutorial	Scalable Stats.	Supply Chain Mgmt.		Mgmt. of Technology		DSS	Transport. Model
16	214A	MCDM									Stochastic Programming			
17	214B	Optimization: Network Flows					Optimization: Performance of Supply Networks			Forecasting		OR in Sport	Transportation Mgmt.	
18	214D	E-Commerce										Supply Chains		
19	▲ Rm. 3	Technology Innovations & Operations					Product Development							
20	▲ Rm. 5	Tabu & Scatter Search				Computational Intelligence			Strategic Planning			Model. Lang.		
21	209	SICUP							Facilities Plng.	Location Analysis				
22	210A	Health Applications								Innovation/Entrepreneurship		Health Apps.		
23	208	Simulation							Bidding		Auctions		Simulation	
24	006A	Material Handling				Warehousing & Distribution		Retail Ops.	Product./Train.	Telecommunications				
25	006B	Optimization: Nonlinear Programming				Optimization: LP & Complementarity						Optimization: Global Optimization		
26	006C	Stochastic Models & Applications						Queueing/Inv.	OR/MS in the Service Industries					
27	006D	Job Search		Tutorial	WORMS	Project Management		Inventory	Reliability & Quality Control					
28	007A	Social Science	Networks/Graphs	RASIG					Public Programs & Processes					
29	007B	Energy - Electricity Markets							Ops. Mgmt.	Environment/Natural Res.			Ops. Mgmt.	
30	007C	Computing Society												
31	007D	Computing Society								Artificial Intelligence				
32	▲ Rm. 9	Technology Management				Telecomunications			Organization Theory		Production & Scheduling			
33	▲ Rm. 10	FMS	Production Planning			Production & Scheduling			Scheduling			Mfg. Systems		
34	▲ Rm. 11	Decision Analysis				DSS	MCDM		Economics			Vehicle Routing		
35	▲ Salon B	Forecasting		Information Systems										
36	▲ Salon C	Inventory Management		Logistics Management		Operations Management								
37	▲ Salon G	Optimization Techniques					Int. Prgrm.	LP & Apps.						
38	▲ Salon A	NLP		Industry Applications			Pub. Prgrm.	Semi. Ind.						
39	▲ Salon K	Marketing				Comp. Intell.	New Product Development							
40	▲ Rm. 1	Queueing	Reliability	Stats/Quality	Stoch. Proc.	Applied Probability		Struct. Models						
41	▲ Salon L	Accounting		Roundtable	Wagner Prize	CPMS OR in Practice								
42	▲ Rm. 12	Dantzig Diss.				QSR								
43	▲ Rm. 4	Risk Management				Technology Management								
45	▲ Salon D	Software Demonstrations												
46	216		COIN INSTALLFEST			Transport.	Tutorial		DEA					
47	▲ Rm. 17								Software Demonstrations					

▲ = Marriott All other rooms in Convention Center

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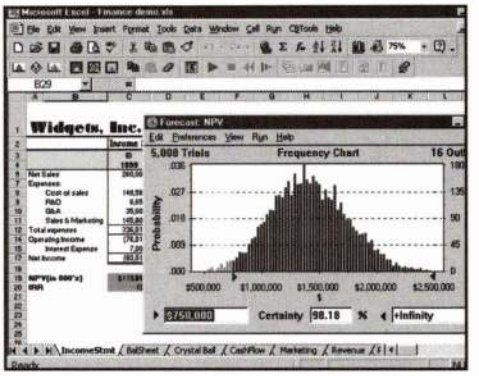
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