

# Industrial Engineering and Management Sciences

Robert R. McCormick School of Engineering and Applied Science  
Northwestern University

2008-2009

## Celebrating our 50th Anniversary

In 1958 modern consumer credit was born as The American Express Company introduced a charge card to compete with the Diners Club card; NASA was created and Explorer was launched; the St. Louis Cardinals' Stan Musial got hit #3000; and at Northwestern University an independent Department of Industrial Engineering was formed by a few faculty from the Mechanical and Industrial Engineering Department. The department was renamed the Department of Industrial Engineering and Management Sciences (IEMS) in 1963.

On October 18 and 19, 2008, IEMS hosted a celebration of its 50th anniversary as a department in conjunction with Northwestern's Homecoming weekend.



Events included a football win against Purdue, an opening ceremony and banquet, and faculty directed workshops. Over eighty faculty, alumni and friends of the department attended the events.

The keynote speaker at the opening ceremony was **Mike Eskew**, former Board Chair and CEO of UPS, who spoke on "The Supply Chain of the 21st Century." The banquet included the presentation of plaques honoring past department chairs (Robert N. Lehrer [1958-1963], Loring G. Mitten [1963-1965, deceased], Gilbert K. Krulee [1965-1970], Arthur P. Hurter [1970-1989], Robert Fourer [1989-1995], Mark S. Daskin [1995-2001], and Ajit Tamhane [2001-2008]), and reminiscences by alumnus **Alan Wasserstrom**, and our own Professors

**Charles Thompson, Bill White** and **Ajit Tamhane**. The first George L. Nemhauser Doctoral Dissertation Award was given to **Frank E. Curtis** for his thesis "Inexact Sequential Quadratic Programming Methods for Nonlinear Constrained Optimization," directed by Professor **Jorge Nocedal**. The Nemhauser award is given annually to the best Ph.D. dissertation by an IEMS graduate in the previous two years, and is named for Professor George Nemhauser of Georgia Tech, who was one of the first Ph.D. *continued on page 5*



## IEMS Welcomes New Faculty Member

The IEMS Department is pleased to welcome **Benjamin Armbruster**, who joined the department in the fall of 2008 as an Assistant Professor. We are delighted to have Prof. Armbruster with us, and are confident he will be a wonderful addition to an already dynamic faculty.

Prof. Armbruster completed his undergraduate degree in Math at the University of

Arizona in Tucson, AZ. He went on to earn his Ph.D. in Management Science and Engineering from Stanford University. His dissertation research focused on modeling the spread of infectious diseases and the cost



Benjamin Armbruster

effectiveness of contact tracing to find infected people. Prof. Armbruster's main research area is health care applications of operations research. He has also worked on optimization problems in radiation treatment planning.

Prof. Armbruster explains his attraction to Northwestern University was based on its "enthusiasm for health care, [proximity to] *continued on page 9*

## IEMSNUs

Letter from the Chair	2
Alumni Awards	3
Office of Student Life	4
Student Awards	4
New Staff Welcomed	9
Faculty Grants & Projects	10

## Mission Statement

Our mission is to be a premier industrial engineering department in research and education. We do this by

- Conducting state-of-the-art research supported by funding from granting agencies and industry;
- Providing outstanding educational experiences to our undergraduate, graduate and professional students through modern curricula, excellent teaching, and

personalized advising and mentoring;

- Recruiting and retaining the best faculty possible;
- Continuously improving our undergraduate and graduate student recruitment and placement; and
- Providing excellent service to all of our constituencies including students, parents, alumni, staff, faculty, university, industry, donors, and research sponsors.

## Letter from the Chair

In July of 2008, thanks to the thoughtful and energetic stewardship of past-chair **Ajit Tamhane**, I assumed the Chair of a department with all indicators pointing up. Ajit has moved on to become Senior Associate Dean for Planning & Graduate Studies, which will bring the same level of care and analysis to the Dean's office.

In this newsletter you will find a great deal of faculty and staff news. We successfully recruited **Benjamin Armbruster**

## IEMS continues to be a leader within McCormick in educating students on entrepreneurship

(Ph.D. Stanford) as a new assistant professor in the area of health care operations. Benjamin's work combines economic analysis with operational modeling to assess the value of standard interventions such as screening and contact tracing for infectious diseases. Combined with **Gordon Hazen's** longstanding contributions to health care decision making; new thrusts by **Mark Daskin** and **Sanjay Mehrotra** who are actively collaborating with faculty from the medical school and clinicians from Evanston Hospital, and creating a course in health care operations; IEMS is positioned to be an important national player in research and education in this re-emerging area for industrial engineering. We also hired three new staff, Adam Cebulski, Terri Pedersen and Adam Langlais, who are profiled in this newsletter.

Professor **Mark Werwath** was appointed Senior Lecturer in IEMS. Mark has been a Lecturer for 5 years and has taught in the Master of Engineering Management Program for 8 years in the areas of project management and entrepreneurship.

We are pleased to announce that **Irina Dolinskaya** will join us as a new assistant professor next Fall. To learn more about Irina, visit her web page at [www-personal.umich.edu/~dolira/](http://www-personal.umich.edu/~dolira/). Irina will be featured in our next newsletter.

**Dan Apley** was recently appointed editor in chief of the *Journal of Quality Technology*, one of the flagship journals in engineering statistics, and we will use the appointment as a springboard to promote our strengths in engineering statistics.

**Dan** and **Bruce Ankenman** are past Chairs of the Quality, Statistics and Reliability Section of INFORMS, where we have been leaders since its inception, and Ajit is a Fellow of the American Statistical Association. Our goal is to compete for the best graduate students with the top engineering statistics programs.

At the undergraduate level we changed our curriculum to strengthen and deepen the engineering content of our program to better prepare our students

for the "analytics" explosion in business and industry. IEMS continues to be a leader within McCormick in educating students on entrepreneurship: **Mike Marasco** directs the Center for Entrepreneurship and Innovation (CEI), which became the Farley Center for Entrepreneurship and Innovation thanks to a significant gift from entrepreneur and Northwestern University alumnus **James Farley** and his wife, **Nancy**.

One of the center's first initiatives was the two-quarter "NUvention: Medical



Department Chair Barry L. Nelson introducing Mike Eskew at the opening ceremony for the 50th anniversary celebration.

Innovation" course that brought together 82 students from four schools (McCormick, Kellogg School of Management, Northwestern University School of Law and Feinberg School of Medicine) to teach them how to develop medical devices and create a business plan for the idea. CEI raised more than \$230,000 from more than 10 companies and venture capitalists to fund the program, and 11 provisional patents were filed.

I hope you find this newsletter interesting and useful. Suggestions for features are always welcome.

**Barry L. Nelson**, Department Chair

## PhD Class of 2008

Name	Advisor	Employer
Amit Bhandari	John R. Birge	University of Utah
Shane Drew	Tito Homem de Mello	Valparaiso University
Chao Huaite	Seyed MR Iravani	Kutztown University
Min Huang	Gordon Hazen	Merck Pharmaceuticals
Taylan Ilhan	Mark S. Daskin	Quantlab Financial
Robert Lien	Karen R. Smilowitz	Beghou Consulting
Fang Liu	Wallace J. Hopp	Merrill Lynch
Shing Tsai	Barry L. Nelson	National Cheng Kung University
Guangming Zhang	Karen R. Smilowitz	Federal Express

## Distinguished Alumnus Awards

The Department of Industrial Engineering and Management Sciences presented its 2008 Distinguished Alumnus Award to **Alan Wasserstrom**, Owner and CEO of N. Wasserstrom & Sons, on Saturday, May 2. The ceremony was held in conjunction with the annual meeting of the department's advisory board.

Alan Wasserstrom is a BSIE (1962) of Northwestern University. He has been President of N. Wasserstrom & Sons, Inc. a subsidiary of The Wasserstrom Company since 1976. He currently serves on the Industrial Engineering & Management Sciences Alumni Advisory Board leading the capital development of the board. The Distinguished Alumnus Award recognizes Alan's exceptional career and contributions to IEMS.



Alan Wasserstrom (BSIE '62) is presented the 2008 Distinguished Alumnus Award. From left: Sr. Assoc. Dean Ajit Tamhane, Dean Julio Ottino, Alan Wasserstrom, and Prof. Bill White.

## Announcements/Honors/Awards

**Prof. Dan Apley** was appointed Editor in Chief of the *Journal of Quality Technology*.

**Prof. Paul Leonardi's** dissertation received the Gerald R. Miller Outstanding Dissertation Award from the National Communication Association. He also received the Gerardine DeSanctis Dissertation Award from the Organizational Communication and Information Systems Division of the Academy of Management; the Laura Crowell Dissertation Award from the Group Communication Division of the National Communication Association; and the Outstanding Published Paper Award from the Communication and Information Technologies Section of the American Sociological Association.

**Prof. Barry Nelson** delivered one of the keynote addresses at the IERC/IIE Annual Meeting in 2008.

**Prof. Karen Smilowitz** participated in a National Academy of Engineering

Workshop on Engineering, Social Justice, and Sustainable Community Development.

**Prof. Jeremy Staum** received the Meritorious Service Award from the journal *Operations Research*, and was appointed Department Editor for Financial Engineering of *IIE Transactions*

**Prof. Vadim Linetsky** was appointed Associate Editor of the new INFORMS journal *Applied Probability and Operations Research*, and delivered expert testimony on the risk and valuation of

export credit financing and export credit guarantees for civil aircraft at the meeting of the Organization for Economic Cooperation and Development (OECD) in November 2008 in Paris.

**Prof. Sanjay Mehrotra** was appointed Department Editor for Optimization of *IIE Transactions* and Associate Editor for the Optimization Area of *Operations Research*.

**Prof. Mark Daskin** was appointed an associate editor of both *Transportation Science* and *IIE Transactions*.



Dan Apley



Paul Leonardi



Karen Smilowitz



## IEMS Opens New Office of Student Life

The Department of Industrial Engineering and Management Sciences officially opened the new Office of Student Life (OSL) on September 1st, 2008. After a careful review of University, McCormick-wide, and departmental offerings, the department saw a need for an office dedicated to offering innovative and tailored programming for graduate and undergraduate students. The IEMS Department views all aspects of students' scholarship as an integral part of a successful plan for achievement. The OSL takes an expansive view of what it means to provide advising and student support.

The goal of the new office is to provide students with the best Northwestern experience possible by addressing all needs of student life and development. The office aims to provide a holistic student experience through:

- Providing academic advising for degree progress and course registration
- Organizing social and service opportunities for IEMS students
- Providing personal and professional

development opportunities

- Serving as a liaison between students and other departments

A scheduled rollout of programs has been planned for the 2008-2009 academic year. During the fall quarter, a grant funded Professional Development series entitled "Third Thursday Seminar Series" was



initiated and became an instant success. The first session filled the room to capacity with some students choosing to stand so they could participate. Additional programs will include a series of Alumni Networking Nights, a mentorship program, community service initiatives, professional portfolio building workshops, and many more.

The Office of Student Life staff con-

sists of two full-time staff members. **Adam Cebulski** oversees the office and graduate student life. He has been with the department since Fall 2007. Adam C. attended Loyola University Chicago receiving his BS in Psychology with a law concentration. He is currently attending Northwestern University pursuing his MEd in Higher Education Administration and Policy. **Adam Langlais** coordinates initiatives specific to the undergraduate students and has been with the department since Fall 2008. Adam L. was born and raised in West Warwick, Rhode Island. He attended the University of Rhode Island, earning his BA in English Language and Literature.

Since opening, the OSL has been met with great enthusiasm by students, faculty and staff. The office creates an exciting environment for students to experience opportunities to interact with other students in addition to their traditional academic classroom times. This interactive environment provides a student development experience that fosters individual student growth.

For more information on the office or to get involved please visit the website at <http://studentlife.iems.northwestern.edu>.

## Student Excellence Awards

Hurter Academic Excellence Awards were initiated in 2002 to honor Prof. **Arthur Hurter**, who retired in 2001 after 38 years of teaching. He was the department chair for 20 years from 1969 to 1989. The awards are funded from an endowment established by donations from the students and colleagues of Prof. Hurter.

Two awards are given each year – one

to the best graduating senior and the other to the best first year graduate student. The criteria for the award include academic performance, independent project work and leadership. Each award consists of a certificate and a check for \$500.

For the best graduating senior, the award was given to **Josie Musen**. For the best first year graduate student, the award was given to **Yan Jiang** and

### Lingfei Li.

For the last two years we have also given a \$100 award to the best graduate teaching assistant from the same endowment. This year's award was given to two individuals: **Evren Baysal** and **Ira Gerhardt**.

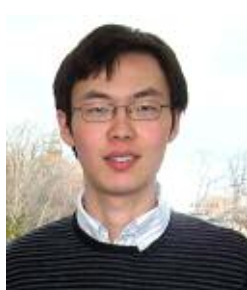
Congratulations to all award winners!



Josie Musen



Yan Jiang



Lingfei Li



Evren Baysal



Ira Gerhardt

## Celebrating our 50th Anniversary

*continued from page 1*

graduates of the department in 1961. Workshops on “IEMS Applications in Healthcare,” by Professors **Mark Daskin** and **Bill White**, and “NUvention: Bringing the Real World into the Classroom,” by Professors **Mike Marasco** and **Ed Voboril**, took place on Sunday morning.

## IEMS is one of the premier departments at Northwestern, always among the top 5 to 10 in the US News & World Report rankings

The 50th anniversary provided an opportunity to reflect on the accomplishments of the department. IEMS is one of the premier departments at Northwestern, always among the top 5 to 10 in the US News & World Report rankings. It graduates the second largest number of Bachelors degrees in McCormick and places its Ph.D.s in the best universities and industrial research positions in the world. The department has always been forward-looking: In the 1960’s when many IE departments were still teaching Taylor’s methods of time and motion study, the IEMS faculty was already focusing on systems methodologies, operations research and the use of emerging computing technology in decision-making.

Over the years, IEMS faculty have made fundamental contributions in diverse areas such as engineering management, factory physics, supply chain management, web-based optimization technologies and simulation of complex systems. As engineering has moved away from traditional manufacturing applications and toward the service sector and information and knowledge-based technologies, IEMS has been agile enough to shift its focus into new areas such as financial engineering, health care, transportation, and humanitarian relief. The next 50 years look as promising as the past 50.



Dean Julio Ottino introduced Mr. Eskew.



The keynote speaker at the opening ceremony was Mike Eskew, former Board Chair and CEO of UPS, who spoke on “The Supply Chain of the 21st Century.”



Mike Eskew makes a point at the whiteboard.



# 50th Anniversary Reception and Banquet



Ajit Tamhane, Noshir Contractor



Peter Eck, Jane Geurtin, Stephanie Gravenor



Charles Thompson, Ken Porrello



Top, L to R; Tom Brody, Alex Facklis, Diego Klabjan,  
Bottom, L to R; Bob Agnew, Terry Harris, Ritu Singh, Raymond Zenkich



Top, L to R; Dan Apley, Bob Fourer, Sandra Benedet, Peter Eck,  
Jane Geurtin, Stephanie Gravenor, Bottom, L to R; Jan Apley, Bill White,  
Jane White



Top, L to R; Tito Homem-de-Mello, Babette Levy, Mark Daskin,  
Sanjay Mehrotra, Parina Mehrotra, Bottom, L to R; Jeremy Staum,  
Kristin Linetsky, Vadim Linetsky



Top, L to R; Scott Jantz, Gabo Lopez-Calva, Jorge Nocedal,  
Susan Bedard, Noshir Contractor, Frank Curtis,  
Bottom, L to R; Molly Grubert, Tyler Akeson, Karen Smilowitz





Top, L to R; Peggy Utterback, Alan Wasserstrom, Jim Utterback, Art Hurter, Bottom, L to R; Bonnie Garrett, Dick Garrett, Florence Hurter



Top, L to R; Michael Marasco, Lesli Marasco, Ed Voboril, Melanie Voboril, Bottom, L to R; Ken Porrello, Lori Nurenberg, Sherry McFall



Top, L to R; Mike Pedersen, Beth Abbott, Bryan Abbott, Bottom, L to R; Terri Pedersen, Adam Langlais, Adam Cebulski



Top, L to R; Barbara Ankenman, Bruce Ankenman, Ajit Tamhane, Meena Tamhane, Jeanne Nelson, Bottom, L to R; Seyed Irvani, Sonya Lim, Barry Nelson



Top, L to R; Vicki Santer, Jesse Hercules, Joe Martinich, Steve Riehs, Vicki Boone, Bottom, L to R; Charles Thompson, Kathleen Flaherty, Hugo Vandersypen



Ken Fox, Susan Fox, Jan Werwath, Mark Werwath



# 50th Anniversary Workshops



Prof. Sanjay Mehrotra



Tingting Jiang, IEMS Graduate Student



Prof. Mark Daskin



Alan Wasserstrom



Kathleen Flaherty



Joe Martinich



50th Anniversary workshop presentation by Prof. Mark Daskin



## IEMS Welcomes Three New Staff Members

The IEMS Department would like to introduce three new faces that have joined the department staff over the past year. Adam Cebulski and Adam Langlais join us as the Student Life Coordinators in the IEMS Office of Student Life, and Terri Pedersen is the new Program Assistant in the Main Office.

**Adam Cebulski** has been with the department since the Fall of 2007. He is originally from Chicago, IL. He received his BS in Psychology with a law concentration from Loyola University Chicago. While working at Northwestern, Adam is pursuing his MEd in Higher Education Administration and Policy. Previously, he held the Executive Director position for the 2007 National GLBTQ Leadership Conference for Jesuit Colleges and Universities.



Adam Cebulski



Terri Pedersen



Adam Langlais

**Terri Pedersen** holds her BS in Elementary Education from Concordia College and her MS in Education Administration from Northern Illinois University. In many ways, this is a third career for Terri. She began as an elementary school teacher in rural Minnesota and suburban Illinois. After getting married, she moved with her husband to California to raise their three children. Terri began her career at Northwestern in the Fall of 2008, and the department is thrilled to have her on board.

**Adam Langlais** was born and raised in West Warwick, Rhode Island. He attended the University of Rhode Island, where he received his BA in English Language and Literature. After graduating, Adam spent some time in New York City interning at Sony Pictures. He has recently relocated

to Chicago to pursue educational and employment opportunities, and began his career at Northwestern in the Fall of 2008.

Welcome to the department all!

## New Faculty

*continued from page 1*

Chicago, and the department's reputation for collegiality." Prof. Armbruster attributes his enjoyment of being a professor to "the freedom to work on important problems and the opportunity to excite students."

Prof. Armbruster also serves as an Advisor for first-year students in the IEMS Undergraduate program. He seeks to bring a sense of enthusiasm to his students' experience at NU, and will also work towards involving undergrads in research projects. Prof. Armbruster has already made a great impression on students and faculty. We look forward to his continuing contributions to the department.

## In Memoriam: June Wayne

The IEMS Department invites you to join us in remembering our friend and former staff member, June Wayne, who passed away on February 12, 2009. June served as the Graduate Secretary for 30 years (1970 - 2000). Everyone knew how much she enjoyed working with the students and faculty. She will be missed by friends and family. We wish to extend our heartfelt sympathy to her family.

## Bruce Ankenman Named Director of Undergraduate Programs at the Segal Design Institute

Prof. **Bruce Ankenman** has been appointed as the Director of Undergraduate Programs at the Segal Design Institute. In addition to his role as Associate Professor in the IEMS Department, he is also the Director of the Master of Engineering Management (MEM) Program and the Director of the Manufacturing and Design Engineering (MaDE) program.

The Segal Design Institute is committed to the exploration of human-centered design, which "takes into account human abilities, needs, and desires." This form of study, "design thinking," involves "breaking out of the normal confines, solving the fundamental issues, not the symptoms... a powerful approach to innovation and

problem-solving in the diverse contexts of engineering, business, medicine, and communication."

There are a number of undergraduate programs available through the Segal Design Institute. Engineering Design and Communication (EDC) is a two-quarter course sequence for first-year engineering students to introduce them to "teamwork, design process, and audience-oriented communication through a series of team projects for real clients." The Certificate in Engineering Design (CED) is a program that "enables undergraduate students to develop design knowledge and skills that will provide them a competitive edge in their careers." In addition to these two options, the BS degree in Manufacturing

and Design Engineering (MaDE) is a great opportunity for students interested in

product and process design, manufacturing systems, and manufacturing management.

Ankenman's research interests include applied statistical methods, engineering design and development,



Prof. Bruce Ankenman

quality improvement and quality control, and statistical design of industrial and simulation experiments.

## Faculty Research Grants and Projects

Faculty	Project Title	Funding Agency
Ankenman	Clothes Care Research Center Proposal to GE Appliance: CCRC Investigation of Clothes Care with Reduced Energy	GE
Ankenman, Nelson	Fuel Injector Production line Simulation for Delphi	Delphi Corporation
Apley	A Bayesian Treatment in Uncertainty in Simulation-Based Methods for Enhancing Process and Product Robustness	NSF
Apley	Collaborative Research: Blind Discovery of Variation Sources for Visualization by Multidisciplinary Teams	NSF
Apley	Predictive Modeling of Time-to-Delinquency for Credit Risk Analysis	Discover Financial Services
Contractor	Analysis, Visualization & Interpretation to Evaluate Redes En Accion: National Hispanic/Latino Cancer Network	University of Texas Health Science Center at San Antonio
Contractor	CMS-ITR for National Priorities	NSF
Contractor	Collaborative Research: Social Networking Tools to Enable Collaboration in the Tobacco Surveillance, Epidemiology, and Evaluation Network (TSEEN)	NSF
Contractor	DHB Virtual Worlds: An Exploratorium for Theorizing and Modeling the Dynamics of Group Behavior	NSF
Contractor	Virtual Worlds: An Exploration for Theorizing and Modeling the Dynamics of Group Behavior	U.S. Army Research Institute for the Behavioral and Social Sciences
Contractor	Network for Computational Nanotechnology	Purdue University
Contractor	Population Sciences and Behavioral Medicine on caBIG	NCI
Contractor	CI-KNOW Cyberinfrastructure Tools to Enable Knowledge Network Discovery, Diagnosis and Design	NSF
Contractor	Mapping, Understanding and Enabling the Digital Media Learning (DML) Knowledge Networks: an Exploratory Investigation	The John D. and Catherine T. MacArthur Foundation
Contractor	Northwestern University Clinical and Translational Sciences Institute (NU-CATS)	NIH/NCCR
Daskin, Chopra	Risk Management in Supply Chain Design and Operations	NSF
Fourer	Detection and Transformation Algorithms for Optimization Software	NSF
Hazen	Collaborative Research: Adding Extrinsic Goals to the QALY Model	NSF
Hopp	Integrated Product and Supply Chain Design	NSF
Homem-de-Mello, Mehrotra	Optimization Algorithms for Problems with Stochastic Dominance Constraints	NSF



## Faculty Research Grants and Projects

Faculty	Project Title	Funding Agency
Homem-de-Mello, Daskin, Smilowitz	Yield Management Opportunities at Carry Transit	Superior Bulk Logistics
Homem-de-Mello	Collaborative Research: Model Accuracy and Learning in Revenue Management and Dynamic Pricing	NSF
Iravani, Hopp	GOALI: Principles of White Collar Workforce Management	NSF
Iravani	Collaborative Research: A Design Methodology for Operational Flexibility	NSF
Iravani, Smilowitz	Design and Control Principles of Non-Profit Supply Chains	NSF
Klabjan	Approximate Dynamic Programming in Complex Multi-Echelon Inventory and Production Systems	NSF
Klabjan	Integrated Airline Recovery Decision Support System	Sabre
Linetsky	High-Performance Computational Methods for Continuous-Time Markov Processes in Financial Engineering	NSF
Linetsky	Unified Modeling of Corporate Debt, Equity Derivatives, and Credit Derivatives	Moody's
Linetsky	Time Changes of Markov Processes: Applications in Financial Mathematics	NSF
Mehrotra	Methods for Solving Mixed Integer Programs Using Adjoint Lattices	NSF
Mehrotra	Mixed Integer Programming Using Lattices	ONR
Nelson	Collaborative Research: QNATS – The Queueing Network Approximator for Time-Dependent System	NSF
Nelson, Hopp	Strategic Decision Making Support Over the Manufacturing Life Cycle	GM
Nocedal	Active-Set and Interior Algorithms for Non-Linear Optimization	NSF
Nocedal	Parallel Algorithms for Nonlinear Optimization	Intel
Nocedal	Nonlinear Optimization and Applications	DOE
Nocedal	Nonlinear Optimization: Algorithms	NSF
Smilowitz	CAREER: Strategies to Improve Goods Movement: Operational Choice in Routing	NSF
Smilowitz	Sloan Industries Fellowship	Sloan
Smilowitz	Improved Operations at Coyote Logistics: Solving the Network	Coyote Logistics, LLC
Staum, Nelson	Simulating Coherent Risk Measures	NSF
Tamhane	Decision Rules for Multiple Endpoints in Clinical Trials	NIH
Tamhane	A Statistical Modeling Approach to Some Problems in Data Mining for Multivariate Binary Data	NSA

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