

BRUCE L. GOLDEN

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Business Address

Robert H. Smith School of Business  
University of Maryland  
College Park, Maryland 20742  
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**Research Interests**

- \* Network Optimization
- \* Evolutionary Computation/Heuristic Search
- \* OR/OM in Healthcare
- \* Mathematical Programming
- \* Data Mining & Neural Networks
- \* Public Sector Applications
- \* Logistics & Distribution
- \* Applied Operations Research

**Education**

Massachusetts Institute of Technology: Ph.D., Operations Research, 1976

Massachusetts Institute of Technology: S.M., Operations Research, 1974

University of Pennsylvania: B.A., Mathematics (Summa Cum Laude), 1972

**Academic Experience**

University of Maryland:	France-Merrick Chaired Professor, Robert H. Smith School of Business, Spring 1998 to Present
University of Maryland:	Affiliate Professor, Department of Civil Engineering, September 1993 to Present
University of Maryland:	Westinghouse Professor, College of Business and Management, August 1983 to August 1992
University of Maryland:	Full Professor, College of Business and Management, August 1982 to Present
University of Maryland:	Chairman, Faculty of Management Science and Statistics, College of Business and Management, August 1980 to January 1996
University of Maryland:	Tenured Associate Professor, College of Business and Management, August 1979 to August 1982
University of Maryland:	Assistant Professor, College of Business and Management, August 1976 to August 1979
The Johns Hopkins University:	Instructor, Division of Administration and Business, Summer Session, 1980-1983

**Academic Experience - Continued**

Boston University:	Instructor, Mathematics Department, 1974-1975
University of Massachusetts at Boston:	Visiting Lecturer, Economics Department, 1974-1975
Massachusetts Institute of Technology:	Teaching Assistant, Sloan School of Management, 1973

**Consultation Experience (Selected Companies)**

Rohm and Haas Pharmaceutical Company  
 Blue Bell Inc.  
 Amerigas Corporation  
 Mid-Atlantic Toyota  
 Roadnet Systems Corporation  
 National Soft Drink Association  
 Airco Industrial Gases  
 Alleghany Beverage Corporation  
 United Parcel Service  
 Military Airlift Command  
 METS, Inc.  
 Mission Research Corporation  
 American Red Cross  
 DuPont  
 U.S. Army

**Board of Directors**

DISTINCT Management Consultants, Inc.  
 Micro Data Services, Inc.  
 Bowne Distinct, Ltd.

### **Professional Affiliations (Past and Present)**

Operations Research Society of America (ORSA)

The Institute of Management Sciences (TIMS)

Mathematical Association of America (MAA)

Mathematical Programming Society

Large Scale Networks Committee of the IEEE Circuits and Systems Society;  
Chairman, Subcommittee on Operations Research and Network Flows

The American Statistical Association (ASA)

Washington Operations Research/Management Science Council (WORMSC)

American Institute of Industrial Engineers (AIIE)

Transportation Science Section of ORSA

Computer Science Section of ORSA

INFORMS Computing Society

Society for Industrial and Applied Mathematics (SIAM)

International Neural Network Society (INNS)

Institute for Operations Research and the Management Sciences (INFORMS)

American Association for Artificial Intelligence (AAAI)

### **Editorial Board Service**

Editor-in-Chief, Networks (began July 1, 1999)

Editor-in-Chief, INFORMS Journal on Computing (1996-1999)

Editor-in-Chief, ORSA Journal on Computing (1992-1995)

Department Editor (Public Sector Applications), Management Science (1991-2003)

Editor (Management Sciences), American Journal of Mathematical and Management Sciences (1987-2007)

Advisory Editor, Journal of Heuristics

Advisory Editor, International Journal of Smart Engineering System Design (1997-2004)

Advisory Editor, INFORMS Journal on Computing

Associate Editor, Networks (1979-1999)

Associate Editor, Computers & Operations Research

### **Editorial Board Service - Continued**

Editor Emeritus, American Journal of Mathematical and Management Sciences

Editorial Advisory Board, Operations Research/Computer Science Interface (Book Series), Kluwer Academic Publishers

Associate Editor, INFOR (1988-1992)

Area Editor (Distribution, Networks, and Facility Planning), Operations Research (1982-1988)

Associate Editor, Decision Sciences (1984-1990)

Associate Editor, Management Science (1987-1991)

Associate Book Review Editor, Journal of the American Statistical Association (1981-1983)

Book Review Editor, American Journal of Mathematical and Management Sciences (1981-1986)

### **Service at Scholarly Meetings**

Session Chairman, Statistical Optimization, ORSA/TIMS National Meeting, Atlanta (1977)

Co-Chairman, Network Design and Reliability Workshop, ORSA/TIMS National Meeting, Atlanta (1977)

Session Chairman, Computer Science and Operations Research, ACM National Meeting, Washington, D.C. (1978)

Session Chairman, Statistical Optimization, ORSA/TIMS National Meeting, Los Angeles (1978)

Session Chairman, Distribution Management, ORSA/TIMS/AIIE Distribution Conference, Hilton Head Island (1978)

ORSA Delegate to 1978 IFORS Conference in Toronto and Invited Participant

Co-Chairman, NSF-Sponsored Routing and Scheduling Workshop, University of Maryland at College Park (1979)

Session Chairman, Operations Management, N.E. AIDS Meeting, Philadelphia (1980)

Session Co-Chairman, Optimization in Statistics, ORSA/TIMS National Meeting, Washington, D.C. (1980)

Session Co-Chairman, Statistics in Optimization, ORSA/TIMS National Meeting, Washington, D.C. (1980)

Session Chairman, Probabilistic Issues in Deterministic Optimization, ORSA/TIMS National Meeting, Colorado Springs (1980)

**Service at Scholarly Meetings - Continued**

Session Chairman, Operations Research and Network Flows, IEEE International Conference on Circuits and Computers for Large Scale Systems, Port Chester, New York (1980)

Track Chairman, Decision Analysis, N.E. AIDS Meeting, Philadelphia (1980)

Session Chairman, Statistics and Optimization -- The Interface, ORSA/TIMS National Meeting, Toronto (1981)

Session Chairman, Statistics and Optimization B- The Interface, ORSA/TIMS National Meeting, Houston (1981)

Session Chairman, Mathematical Programming II, AIDS National Meeting, Boston (1981)

Track Chairman, Quantitative Methods, N.E. AIDS Meeting, Washington, D.C. (1982)

Session Chairman, Quantitative Methods II, N.E. AIDS Meeting, Washington, D.C. (1982)

Session Chairman, Vehicle Fleet Planning, ORSA/TIMS National Meeting, San Diego (1982)

Session Chairman, Math Programming Based Vehicle Routing and Scheduling Algorithms, ORSA/TIMS National Meeting, Chicago (1983)

Session Chairman, Statistical Optimization, ORSA/TIMS National Meeting, Orlando (1983)

Session Chairman, Solving Real-World Vehicle Routing and Scheduling Problems, ORSA/TIMS National Meeting, San Francisco (1984)

Session Chairman, Mathematical Programming & Networks, SE TIMS Conference, Myrtle Beach (1984)

Mathematical Programming Society Representative at 1984 IFORS Conference in Washington, D.C. and Invited Participant

Cluster Chairman, Vehicle Routing, ORSA/TIMS National Meeting, Dallas (1984)

Session Chairman, Statistics and Optimization, TIMS XXVI International Meeting, Copenhagen (1984)

Session Chairman, Network Scheduling, ORSA/TIMS National Meeting, Boston (1985)

Session Chairman, Optimization on Networks, ORSA/TIMS National Meeting, Atlanta (1985)

Session Chairman, Vehicle Routing and Scheduling 2, Seventh European Congress on Operations Research, Bologna, Italy (1985)

**Service at Scholarly Meetings - Continued**

Session Chairman, Location Problems 3, Seventh European Congress on Operations Research, Bologna, Italy (1985)

Session Chairman, Logistics, Distribution & Inventory I, SE TIMS Conference, Myrtle Beach (1985)

Session Chairman, Vehicle Routing, Mathematical Programming Symposium, Boston (1985)

Session Chairman, Routing Problems, ORSA/TIMS National Meeting, Los Angeles (1986)

Session Chairman, Vehicle Routing: Research and Practice, ORSA/TIMS National Meeting, Miami Beach (1986)

Session Chairman, OR in Fisheries Management, Eighth European Congress on Operations Research, Lisbon, Portugal (1986)

Session Chairman, Routing, ORSA/TIMS National Meeting, New Orleans (1987)

Session Chairman, Microcomputer-Based Decision Modeling, ORSA/TIMS National Meeting, New Orleans (1987)

Session Chairman, Vehicle Routing, ORSA/TIMS National Meeting, Washington, D.C. (1988)

Session Chairman, Urban OR, ORSA/TIMS National Meeting, Denver (1988).

Session Chairman, Lanchester Prize Technical Presentation, ORSA/TIMS National Meeting, Denver (1988)

Session Chairman, Applications of the Analytic Hierarchy Process, ORSA/TIMS National Meeting, Denver (1988)

Session Chairman, Vehicle Routing over Land, Sea, and Air, ORSA/TIMS National Meeting, Vancouver (1989)

Session Chairman, Network Applications, ORSA/TIMS National Meeting, Las Vegas (1990)

Session Chairman, Network Applications, ORSA/TIMS National Meeting, Philadelphia (1990)

Session Chairman, Network Applications, ORSA/TIMS National Meeting, Nashville (1991)

Session Chairman, New Approaches to Hard Combinatorial Optimization Problems, ORSA/TIMS National Meeting, Anaheim (1991)

Session Chairman, Vehicle Routing Strategies, ORSA/CSTS Conference, Williamsburg (1992)

Session Chairman, Network Applications, ORSA/TIMS National Meeting, Orlando (1992)

**Service at Scholarly Meetings - Continued**

Session Chairman, Neural Networks and OR, ORSA/TIMS National Meeting, San Francisco (1992)

Session Chairman, Neural Networks, ORSA/TIMS National Meeting, Chicago (1993)

Session Chairman, Neural Networks, ORSA/TIMS National Meeting, Phoenix (1993)

Session Chairman, Neural Networks, ORSA CSTS Conference, Williamsburg (1994)

Session Chairman, Neuro-Manufacturing II, ANNIE '94 Conference, St. Louis (1994)

Session Chairman, Neuro-Manufacturing V, ANNIE '94 Conference, St. Louis (1994)

Session Chairman, Applications of Neural Networks to Weather Prediction, INFORMS National Meeting, Los Angeles (1995)

Session Chairman, Vehicle Routing, Metaheuristics International Conference, Breckenridge, Colorado (1995)

Session Chairman, Neural Networks 2, INFORMS/CSTS Conference on Computer Science and Operations Research, Dallas (1996)

Session Chairman, Neural Networks 4, INFORMS/CSTS Conference on Computer Science and Operations Research, Dallas (1996)

Session Chairman, Metaheuristics, INFORMS National Meeting, Washington, D.C. (1996)

Session Chairman, Neural Networks & Optimization: Connections, INFORMS National Meeting, Atlanta (1996)

Session Chairman, Neural Networks I, INFORMS National Meeting, San Diego (1997)

Session Chairman, Neural Networks, Joint EURO-INFORMS Meeting, Barcelona (1997)

Session Chairman, Panel Discussion: The Future of Vehicle Routing Research, INFORMS National Meeting, Dallas (1997)

Session Chairman, Learning Algorithms V, ANNIE '97 Conference, St. Louis (1997)

Session Chairman, Software for Linear & Integer Programming, INFORMS National Meeting, Montréal (1998)

Session Chairman, Neural Networks, INFORMS National Meeting, Montréal (1998)

Session Chairman, Evolutionary Programming I, ANNIE '98 Conference, St. Louis (1998)

### **Service at Scholarly Meetings - Continued**

Session Chairman, Statistics & OR: The Interface, INFORMS National Meeting, Seattle (1998)

Session Chairman, Panel Discussion: Metaheuristics - Some New Directions, INFORMS National Meeting, Cincinnati (1999)

Session Chairman, Evolutionary Programming I, ANNIE '99 Conference, St. Louis (1999)

Session Chairman, Diverse Applications of Metaheuristics, INFORMS National Meeting, Salt Lake City (2000)

Session Chairman, Data Mining I, ANNIE =00 Conference, St. Louis (2000)

Session Chairman, Data Mining, INFORMS National Meeting, Miami Beach (2001)

Session Chairman, Data Mining II, ANNIE =02 Conference, St. Louis (2002)

Session Chairman, Heuristics & Algorithms 1, INFORMS Computing Society Conference, Phoenix (2003)

Session Chairman, New Perspectives on Routing and Scheduling, INFORMS National Meeting, Atlanta (2003)

Session Chairman, Morning Session (6/26/05), Route 2005: International Workshop on Vehicle Routing and Intermodal Transportation, Bertinoro, Italy (2005)

Session Chairman, Vehicle Routing Problems 4, The 6<sup>th</sup> Metaheuristics International Conference, Vienna, Austria (2005)

Session Chairman, Genetic Algorithms, INFORMS National Meeting, San Francisco (2005)

Session Chairman, Vehicle Routing, INFORMS National Meeting, San Francisco (2005)

Session Chairman, Supply Chain Management, Odysseus Conference, Altea, Spain (2006)

Session Chairman, Opening Session, Network Optimization Workshop, Saint-Rémy de Provence, France (2006)

Session Chairman, Panel Discussion: OR Entrepreneurship #1, INFORMS National Meeting, Pittsburgh (2006)

Session Chairman, The Traveling Salesman Problem, INFORMS Computing Society Conference, Coral Gables (2007)

Session Chairman, New Directions in Vehicle Routing, INFORMS National Meeting, Seattle (2007)

Session Chairman, Network Design III, INFORMS Telecommunications Conference, College Park, MD (2008)

Session Chairman, Tutorial: Some Future Directions in Vehicle Routing Research, INFORMS National Meeting, Washington D.C. (2008)

### **Service at Scholarly Meetings - Continued**

Session Chairman, Vehicle Routing Variants, INFORMS Computing Society Conference, Charleston (2009)

Session Chairman, Protecting Computer Terminals from Hackers, INFORMS Computing Society Conference, Charleston (2009)

Session Chairman, TSP and VRP, Metaheuristics International Conference, Hamburg (2009)

### **Service to Professional Organizations**

On Board of Directors, Northeast AIDS (1978-1981)

Member, Long Range Planning Committee of ORSA (1980-1983)

Member, Transportation Science Dissertation Prize Committee of ORSA (1980-1982)

Chairman, Transportation Science Dissertation Prize Committee of ORSA (1982)

Council Member, Transportation Science Section of ORSA (1982-1985)

Council Member, Computer Science Section of ORSA (1982-1985)

TIMS Representative, Conference Board of the Mathematical Sciences (1984-1985)

Member, Program Committee, NATO Advanced Study Institute on OR in Fishing (1987-1989)

Tutorials Chairman, Washington, D.C. ORSA/TIMS Conference (1987-1988)

Chairman, 1987 Lanchester Prize Committee (1987-1988)

Technical Co-Chairman, ORSA Conference on Impact of Recent Computer Advances on Operations Research (1987-1989)

Member, IFIP Working Group on Discrete Mathematics (1988-1989)

Member, Program Committee, 2nd International Symposium on the Analytic Hierarchy Process (1990-1991)

Member, Program Committee, ORSA/CSTS Conference on New Developments in their Interfaces (1990-1992)

Member, 1991 Committee for the ORSA Prize for Ongoing Exemplary Use of Operations Research (1990-1991)

Member, ORSA/CSTS Long Range Planning Committee (1990-1991)

Member, Program Coordinating Committee, 15th International Symposium on Mathematical Programming (1992-1994)

Member, Program Committee, ORSA/CSTS Conference on Computer Science and Operations Research (1992-1994)

Member, Organizing Committee, ANNIE '94 Conference (1993-1994)

**Service to Professional Organizations - Continued**

Member, Organizing Committee, ANNIE '95 Conference (1994-1995)

Member, International Advisory Committee, Metaheuristics International Conference (1994-1995)

Member, Program Committee, INFORMS/CSTS Conference on Computer Science and Operations Research (1995-1996)

Member, Organizing Committee, ANNIE '96 Conference (1995-1996)

Member, International Program Committee, 4th International Symposium on the Analytic Hierarchy Process (1996)

Member, Program Committee, International Conference on Information Systems in Logistics and Transportation (1996-1997)

Member, Organizing Committee, ANNIE '97 Conference (1996-1997)

Member, International Advisory Committee, Metaheuristics International Conference (1996-1997)

Member, Program Committee, INFORMS/CSTS Conference on Computer Science and Operations Research (1997-1998)

Member, Organizing Committee, ANNIE '98 Conference (1997-1998)

Member, Advisory Committee, INFORMS/ICS Conference on Computer Science and Operations Research (1999-2000)

Member, Program Committee, Metaheuristics International Conference '99 (1998B1999)

Member, Organizing Committee, ANNIE '99 Conference (1998-1999)

Council Member, INFORMS Computing Society (1998-2001)

Judge, Third OR/MS Knowledge Bowl, INFORMS National Meeting, Cincinnati (1999)

Member, Organizing Committee, ANNIE 2000 Conference (1999-2000)

Member, Best Theory Paper Committee for ANNIE '99 Conference (1999)

Member, Search Committee for Editor of Interactive Transactions of OR/MS (1999-2000)

Member, Organizing Committee, ANNIE 2001 Conference (2000-2001)

Member, Organizing Committee, ANNIE 2002 Conference (2001-2002)

Member, Search Committee for Editor of Transportation Science (2001-2002)

Member, Best Application Paper Committee for ANNIE '02 Conference (2002)

Member, Organizing Committee, ANNIE 2003 Conference (2002-2003)

Member, Organizing Committee, ANNIE 2004 Conference (2003-2004)

### **Service to Professional Organizations - Continued**

Co-Chair, INFORMS Computing Society Conference held in Annapolis, Maryland in January 2005

Member, Selection Committee, INFORMS Prize for the Teaching of OR/MS Practice, 2004

Chair, Selection Committee, INFORMS Prize for the Teaching of OR/MS Practice, 2005

Member, Organizing Committee, ANNIE 2005 Conference (2004-2005)

Member, INFORMS Fellows Selection Committee, 2005

Member, Organizing Committee, ANNIE 2006 Conference (2005-2006)

Member, Advisory Board, INFORMS Computing Society Conference to be held in Coral Gables, Florida, 2007

Chair, OR Entrepreneurship Cluster, INFORMS National Meeting in Pittsburgh, 2006

Member, Editor Search Committee for the INFORMS Journal on Computing, 2005, 2006, 2007

Member, INFORMS Fellows Selection Committee, 2006

Member, Program Committee, Metaheuristics International Conference in Montreal (2006-2007)

Member, INFORMS Fellows Selection Committee, 2007

Member, Organizing Committee, ANNIE 2007 Conference (2006-2007)

Co-Chair, INFORMS Telecommunications Conference held in College Park, Maryland in March 2008

Member, International Program Committee, Metaheuristics International Conference in Hamburg, Germany (2008-2009)

Member, Program Committee, INFORMS Computing Society Conference to be held in Charleston, SC, 2009

Member, Organizing Committee, ANNIE 2008 Conference

Member, Program Committee, Stochastic Local Search (SLS) Workshop, Brussels, Belgium, September 2009

Member, Advisory Board of "MetaNet" -- a consortium of four European Universities dedicated to training Ph.D. students in metaheuristics and optimization

### **Other Professional Activities**

External Reviewer, Ph.D. Dissertation, Hoon-Liong Ong, University of Waterloo (1981)

Sponsor, Ph.D. Student, Filip Gheysens, University of Ghent (1982)

### Other Professional Activities - Continued

Reviewer, ORSA Publications in Operations Research Series (PORS)

Reviewer, Kent Publishing Company and Duxbury Press

Reviewer, National Science Foundation Research Proposals

Referee, Wide variety of journals

Seminars given at Johns Hopkins, the University of Miami, the Ecole Polytechnique (Montreal), the National Bureau of Standards, M.I.T., the Exxon Applied Math Round Table, the University of Pennsylvania, the University of Virginia, the University of Pittsburgh, Carnegie-Mellon University, the Ohio State University, the University of Colorado, the Pennsylvania State University, AT&T Laboratories, The Imperial College of London, Coventry University, the University of Iowa, and elsewhere

### Honors and Awards

- \* Phi Beta Kappa, 1972
- \* University of Maryland General Research Board Award, 1977
- \* Transportation Science Section of ORSA 1976 Dissertation Competition, Honorable Mention, 1977
- \* University of Maryland Alumni Association International -- College of Business and Management Alumni Chapter Outstanding Faculty Award, 1981
- \* 1981 National Meeting of the American Institute for Decision Sciences Best Theoretical/Empirical Research Paper Award for the paper "A Curve-Fitting Experiment in Estimating Optimal Solution Values to Traveling Salesman Problems" (more than 625 papers were submitted)
- \* Provost Award for Curriculum Development Work Involving the Micro-computer, 1984
- \* University of Maryland General Research Board Semester Research Award, 1985
- \* Innovative Teaching Grant from the Division of Behavioral and Social Sciences, 1985
- \* University of Maryland General Research Board Award, 1991
- \* The 1994 Thomas L. Saaty Prize for Applied Advances in the Mathematical and Management Sciences (this prize was established in 1981 and has been awarded each year since to contributions of exceptional merit appearing in the American Journal of Mathematical and Management Sciences)
- \* Plenary Lecture, Optimization Days, Montreal, May 1995
- \* Outstanding Service Award from the College of Business and Management, 1995
- \* Plenary Lecture, Symposium on Combinatorial Optimization, London, March 1996

**Honors and Awards - Continued**

- \* Selected as one of five University of Maryland Distinguished Faculty Research Fellows, Inaugural Class, 1996-1998
- \* Selected as a Lilly-Center for Teaching Excellence Teaching Fellow, 1998-1999
- \* Named the France-Merrick Chaired Professor of Management Science, Spring 1998
- \* Invited Tutorial, INFORMS International Conference, Tel Aviv, June 1998
- \* Invited by the Royal Swedish Academy of Sciences to nominate candidates for the 1999 Nobel Prize in Economics, 1998-1999
- \* Invited to present IMC Corporate Knowledge Seminar, R.H. Smith School of Business, College Park, April 1999
- \* Invited to represent the University of Maryland (along with seven others) at the American Association for Higher Education 1999 Summer Academy at Snowmass Village, Colorado, July 1999
- \* Invited by the Royal Swedish Academy of Sciences to nominate candidates for the 2000 Nobel Prize in Economics, 1999-2000
- \* Received an INFORMS Service Award for eight years of valued editorial service
- \* Selected as one of six University of Maryland Distinguished Scholar-Teacher Award Recipients, 2000-2001
- \* Invited by the Royal Swedish Academy of Sciences to nominate candidates for the 2001 Nobel Prize in Economics, 2000-2001
- \* Invited Tutorial, CORS Conference, Toronto, June 2002
- \* Invited to be the first Mid-American Energy Speaker in Transportation at the University of Iowa, March 2003
- \* The 2003 INFORMS Prize for the Teaching of OR/MS Practice
- \* Plenary Lecture, INFORMS/M.I.T. Conference, Boston, April 2004
- \* Invited Tutorial, INFORMS/CORS Conference, Banff, May 2004
- \* Selected as an INFORMS Fellow, September 2004
- \* Invited Tutorial, INFORMS National Meeting, Denver, October 2004
- \* Elected to the INFORMS Fellows Selection Committee, December 2004
- \* Invited to be the ConocoPhillips Distinguished Speaker at Oklahoma State University, October 2005
- \* Invited as Distinguished Speaker to present two lectures at the 31<sup>st</sup> Lunteren Conference on the Mathematics of Operations Research, Lunteren, The Netherlands, January 2006
- \* Received the 2005 INFORMS Computing Society Prize

### Honors and Awards - Continued

- \* Received the INFORMS Computing Society Certificate of Appreciation for organizing the 2005 ICS Annapolis Conference, 2005
- \* Received the 2005 Thomas L. Saaty Prize for the best applied paper published in the American Journal of Mathematical and Management Sciences
- \* Invited to be a Plenary Speaker at the Metaheuristics International Conference, held in Montreal in June 2007
- \* Invited to be a Distinguished Speaker at BAE Systems Advanced Information Technologies (in Boston) in March 2006
- \* Invited to present a lecture in the University of Maryland Civil Engineering Department Distinguished Speaker Series, April 2006
- \* Invited to be a Plenary Speaker at EUROGEN 2007, held in Jyväskylä, Finland in June 2007
- \* Invited to be a Plenary Speaker at the School on Graph Theory, Algorithms, and Applications, held in Erice, Sicily in September 2008
- \* Invited Tutorial, INFORMS National Meeting, Washington, D.C., October 2008
- \* The article "Measuring the Research Contribution of Management Academics using the Hirsch-index" by J. Mingers appeared in the Journal of the Operational Research Society in 2008. In it, the author argues that the h-index is a good measure of publication quality and quantity. He goes on to compare 30 INFORMS Fellows with respect to h-index and other measures. There are many familiar names on the list, but, Bruce Golden is ranked first.
- \* Invited to present a Plenary Lecture at the Vehicle Routing Workshop in Molde, Norway in September 2009
- \* Invited to present a Plenary Lecture at the Workshop on Transportation and Logistics in Santiago, Chile in December 2009
- \* Invited to present a Keynote Lecture at a special conference on Methods and Applications of Metaheuristics in Guangzhou, China in December 2009

### Theses

1. "A Minimum-Cost Multicommodity Network Flow Problem Concerning Imports and Exports," M.I.T. Masters Thesis, February 1974.
2. "Large-Scale Vehicle Routing and Related Combinatorial Problems," M.I.T. Ph.D. Thesis, June 1976.

### Publications (See Appendices)

**Presentations at Scholarly Meetings (No Proceedings Published)**

1. "A Minimum-Cost Multicommodity Network Flow Problem Concerning Imports and Exports," presented at ORSA/TIMS Joint National Meeting, San Juan, Puerto Rico, Fall 1974.
2. "Vehicle Routing Problems: Formulations and Heuristic Solution Techniques," presented at ORSA/TIMS Joint National Meeting, Chicago, Spring 1975.
3. "Approaches to the Cutting Stock Problem," presented at ORSA/TIMS Joint National Meeting, Las Vegas, Fall 1975.
4. "Implementing Vehicle Routing Algorithms" (with T.L. Magnanti and H.Q. Nguyen), presented at ORSA/TIMS Joint National Meeting, Las Vegas, Fall 1975.
5. "Shortest Path Algorithms: A Comparison," presented at ORSA/TIMS Joint National Meeting, Philadelphia, Spring 1976.
6. "Large-Scale Vehicle Routing and Related Combinatorial Problems" (with T.L. Magnanti), presented at ORSA/TIMS Joint National Meeting, Miami, Fall 1976.
7. "Traveling Salesman Algorithms," presented at ORSA/TIMS Joint National Meeting, San Francisco, Spring 1977.
8. "Statistical Evaluation of Heuristic Algorithms," presented at ORSA/TIMS Joint National Meeting, Atlanta, Fall 1977.
9. "Algorithms for Vehicle Routing When Demands are Probabilistic" (with W. Stewart), presented at ORSA/TIMS Joint National Meeting, Atlanta, Fall 1977.
10. "Shortest Paths Via Heuristic Search" (with M. Ball), presented at ORSA/TIMS Joint National Meeting, Atlanta, Fall 1977.
11. "Approximating  $e$  Via Cayley's Formula," presented at the Mathematical Association of America (Maryland-DC-Virginia Section), Spring Meeting, University of Maryland at College Park, April 1977.
12. "A Model for the Blocking of Trains" (with L. Bodin, A. Schuster, and W. Romig), presented at the International Symposium on Travel Supply Models, Montreal, Canada, November 1977.
13. "Estimation and Approximation of the Length of the Optimal Traveling Salesman Tour" (with L. Bodin), presented at ORSA/TIMS Joint National Meeting, New York, Spring 1978.
14. "A Network Application in Finance" (with M. Liberatore and C. Lieberman), presented at ORSA/TIMS Joint National Meeting, New York, Spring 1978.
15. "A Decomposition Algorithm for Stochastic Vehicle Routing" (with W. Stewart), presented at ORSA/TIMS Joint National Meeting, Los Angeles, Fall 1978.
16. "On How a Team Can Beat Two Possibly Better Teams" (with J.R. Yee), presented at ORSA/TIMS Joint National Meeting, Los Angeles, Fall 1978.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

17. "Vehicle Routing and Scheduling: Theory and Practice" (with L. Bodin), presented at the American Association for the Advancement of Science Annual Meeting, Washington, D.C., February 1978.
18. "Solving Large Traveling Salesman Problems Approximately by Exploiting Sparsity" (with L. Bodin), presented at the ORSA/TIMS/AIIE Distribution Conference, Hilton Head Island, February 1978.
19. "Integer and Heuristic Programming," presented at the IFORS (International Federation of Operations Research Societies) Conference, Toronto, Canada, June 1978.
20. "The Traveling Salesman Problem and Some Variants" presented at the Mathematical Association of America (Maryland-DC-Virginia Section) Fall Meeting, United States Naval Academy, November 1978.
21. "A Survey of Dynamic Routing Models" (with L. Bodin), presented at IEEE Workshop on Communication and Transportation Networks, New York City, May 1978.
22. "Capacitated Arc Routing Problems" (with R. Wong), presented at ORSA/TIMS Joint National Meeting, New Orleans, Spring 1979.
23. "A Statistical Analysis of Suicide Factors for the Washington, D.C. Population" (with S. Gottlieb, F. Alt, and J. Kleinman), presented at ORSA/TIMS Joint National Meeting, New Orleans, Spring 1979.
24. "A Fleet Acquisition-Routing Problem" (with L. Bodin, M. Ball, and A. Assad) presented at the Annual CORS Conference, Montebello, Quebec, May 1979.
25. "Some Unsolved Variants of the Traveling Salesman Problem" (with A. Assad), presented at the Mathematical Association of America (Maryland-DC-Virginia Section) Spring Meeting, George Mason University, April 1979.
26. "A Report on Future Directions in Routing and Scheduling of Vehicles and Crews" (with M. Ball, L. Bodin, and S. Gass), presented at the Tenth International Symposium on Mathematical Programming, Montreal, Canada, August 1979.
27. "A General Approach to Stochastic Vehicle Routing" (with W. Stewart), presented at ORSA/TIMS Joint National Meeting, Milwaukee, October 1979.
28. "The Railroad Blocking Problem" (with L. Bodin and L. Berman), presented at TIMS XXIV International Meeting, Hawaii, June 1979.
29. "Vehicle Routing and Scheduling" (with L. Bodin and C. Orloff), presented at International Workshop on Routing and Scheduling of Vehicles and Crews, University of Maryland at College Park, June 1979.
30. "Large Scale Network Optimization" (with M. Ball and L. Bodin), presented at Workshop on Large-Scale Systems--The Commonality and Diversity, Texas Tech University, Lubbock, Texas, April 1979.
31. "Current and Future Directions in Network Optimization" (with L. Bodin and M. Ball), presented at the NSF Workshop on Research Directions in Operational Science, Washington, D.C., July 1979.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

32. "The Subscriber Bus Routing Problem" (with W. Stewart), presented at ORSA/TIMS Joint National Meeting, Washington, D.C., Spring 1980.
33. "Scheduling Players in Team Competitions: A Computational Study" (with A. Assad and J. Yee), presented at ORSA/TIMS Joint National Meeting, Washington, D.C., Spring 1980.
34. "A General Approach to Stochastic Vehicle Routing" (with W. Stewart), presented at the Mathematical Association of America (Maryland-DC-Virginia Section) Spring Meeting, University of Richmond, April 1980.
35. "Determining Optimal Fleet Size and Mix in Distribution-Routing Problems" (with A. Assad and L. Levy), presented at ORSA/TIMS Joint National Meeting, Colorado Springs, Fall 1980.
36. "Multi-Fleet Node Routing" (with T. Magnanti), presented at Joint US/USSR Seminar on Large-Scale Network, Distribution, and Production Problems of Industry and Enterprises, University of Maryland at College Park, October 1980.
37. "Stochastic Vehicle Routing: A Comprehensive Approach" (with W. Stewart), presented at ORSA/TIMS Joint National Meeting, Toronto, Spring 1981.
38. "Tutorial on Routing and Scheduling of Vehicles and Crews" (with L. Bodin, M. Ball, and A. Assad), presented at ORSA/TIMS Joint National Meeting, Toronto, Spring 1981.
39. "Some Network Analysis Techniques in Finance" (with K. Keating), presented at Symposium on Network Flows, Johns Hopkins University, August 1981.
40. "New Directions in Routing and Scheduling Problems" (with L. Bodin, M. Ball, and A. Assad), presented at WORMSC Symposium on Operations Research/Management Science in the 1980s, Washington, D.C., November 1981.
41. "Garage Location for an Urban Mass Transit System" (with M. Ball, A. Assad, L. Bodin, and F. Spielberg), presented at Symposium on Frontiers in Transportation Equilibrium and Supply Models, Montreal, Canada, November 1981.
42. "Using Statistics in the Analysis of TSP Heuristics" (with W. Stewart and A. Assad), presented at ORSA/TIMS Joint National Meeting, Detroit, Spring 1982.
43. "On the Analysis of Network Algorithms" (with E. Baker), presented at Thirteenth Southeastern Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, Florida, February 1982.
44. "An Expected Utility Approach to the Ranking of Heuristics" (with A. Assad and E. Wasil), presented at ORSA/TIMS Joint National Meeting, San Diego, Fall 1982.
45. "Planning a Distribution System in the Presence of Routing and Inventory Subproblems" (A. Assad, M. Dror, and R. Dahl), presented at ORSA/TIMS Joint National Meeting, San Diego, Fall 1982.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

46. "Comparing Approximate Algorithms for the Traveling Salesman Problem" (with W. Stewart), presented at the International Symposium on Mathematical Programming, Bonn, West Germany, August 1982.
47. "Location of Garages in Urban Mass Transit Planning" (with M. Ball, A. Assad, and L. Bodin), presented at the Fifth European Congress on Operations Research, Lausanne, Switzerland, July 1982.
48. "Educational Programs in Operations Research/Management Science," participant in panel session at ORSA/TIMS Joint National Meeting, Detroit, Spring 1982.
49. "Locating Facilities in Urban Mass Transit Planning" (with M. Ball, A. Assad, and L. Bodin), presented at ORSA/TIMS Joint National Meeting, San Diego, Fall 1982.
50. "Some New Algorithms for the Fleet Size and Mix Vehicle Routing Problem" (with F. Gheysens and A. Assad), presented at ORSA/TIMS Joint National Meeting, Chicago, Spring 1983.
51. "Mathematical Formulations and Solution Strategies for the Inventory Routing Problem" (with M. Dror, M. Ball, and L. Bodin), presented at ORSA/TIMS Joint National Meeting, Chicago, Spring 1983.
52. "Ranking Heuristics for Combinatorial Optimizations Problems" (with A. Assad and E. Wasil), presented at ORSA/TIMS Joint National Meeting, Chicago, Spring 1983.
53. "Scheduling and Routing in Large Scale Networks" (with A. Assad and M. Ball), presented at WORMSC Tutorial, Washington, D.C., March 1983.
54. "Vehicle Routing and Scheduling Research at the University of Maryland," presented at Cornell University Scheduling and Routing Workshop, Ithaca, New York, June 1983.
55. "Optimization by Simulated Annealing--A Preliminary Computational Study for the TSP" (with C. Skiscim), presented at the Summer School on Combinatorial Optimisation, Dublin, Ireland, July 1983.
56. "An Overview of Techniques for Solving the Fleet Size and Mix Vehicle Routing Problem" (with F. Gheysens and A. Assad), presented at ORBEL 2, Brussels, Belgium, December 1983.
57. "Vehicle Scheduling and Routing: State of the Art" (with L. Bodin, A. Assad, and M. Ball), presented at WORMSC Symposium, Washington, D.C., October 1983.
58. "A Multiple Depot Location and Multiple Depot, Multiple Vehicle Routing Problem" (with D. McLain and L. Bodin), presented at ORSA/TIMS Joint National Meeting, Orlando, Fall 1983.
59. "Simulated Annealing for Combinatorial Optimization: An Evaluation of Alternative Density Functions" (with C. Skiscim), presented at ORSA/TIMS Joint National Meeting, Orlando, Fall 1983.
60. "Comparing Heuristic Procedures on the Basis of Accuracy" (with E. Wasil and A. Assad), presented at ORSA/TIMS Joint National Meeting, Orlando, Fall 1983.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

61. "Analysis and Solution of a Large-Scale, Real-World Inventory Routing Problem," presented at Large-Scale Interconnected Systems Conference, Burr Oak Lodge, Athens, Ohio, October 1983.
62. "Workshop on Routing and Scheduling of Vehicles and Crews" (with A. Assad, L. Bodin, and M. Ball), 8-hour workshop presented at ORSA/TIMS Joint National Meeting, Orlando, Fall 1983.
63. "Implementing an Integrated Computerized System for Fuel Delivery" (with A. Assad, R. Dahl, and L. Levy), presented at ORSA/TIMS Joint National Meeting, San Francisco, Spring 1984.
64. "Optimization by Simulated Annealing--A Statistical Evaluation of Parameter Sensitivity" (with C. Skiscim), presented at TIMS XXVI International Meeting, Copenhagen, June 1984.
65. "Selected Applications of an Expected Utility Approach for Ranking Alternative Methods" (with E. Wasil and A. Assad), presented at TIMS XXVI International Meeting, Copenhagen, June 1984.
66. "Recent Advances in Methods for Routing Problems" (with L. Bodin), presented at IFORS '84 Meeting, Washington, D.C., August 1984.
67. "An Integrated Optimization-Based Distribution System for a Large Commercial Firm" (with A. Assad, R. Dahl, and L. Levy), presented at ORSA/TIMS Joint National Meeting, Dallas, Fall 1984.
68. "The Capacitated Chinese Postman Problem: Some New Results" (with W.L. Pearn and A. Assad), presented at ORSA/TIMS Joint National Meeting, Boston, Spring 1985.
69. "Vehicle Routing Software for Microcomputers: A Survey" (with L. Bodin), presented at ORSA/TIMS Joint National Meeting, Boston, Spring 1985.
70. "Heuristics and Lower Bounds for the Capacitated Chinese Postman Problem" (with A. Assad and W.L. Pearn), presented at Seventh European Congress on Operations Research, Bologna, Italy, Summer 1985.
71. "Routing with Vehicle Type/Site Dependency Constraints" (with B. Nag and A. Assad), presented at Seventh European Congress on Operations Research, Bologna, Italy, Summer 1985.
72. "The Orienteering Problem" (with L. Levy and R. Vohra), presented at Mathematical Programming Symposium, Boston, Summer 1985.
73. "Workshop on Vehicle Routing and Scheduling" (with A. Assad, L. Bodin, and M. Ball), 8-hour workshop presented at ORSA/TIMS Joint National Meeting, Atlanta, Fall 1985.
74. "The Orienteering Problem" (with L. Levy and R. Vohra), presented at ORSA/TIMS Joint National Meeting, Atlanta, Fall, 1985.
75. "Vehicle Routing in the Presence of Compatibility Constraints" (with A. Assad and B. Nag), presented at ORSA/TIMS Joint National Meeting, Los Angeles, Spring, 1986.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

76. "The Vehicle Routing Problem with Backhauling: An Integrated System for Decision Support" (with D. Casco and E. Wasil), presented at ORSA/TIMS Joint National Meeting, Los Angeles, Spring, 1986.
77. "Computing k-Shortest Paths in Euclidean Networks Efficiently" (with C. Skiscim), presented at ORSA/TIMS Joint National Meeting, Los Angeles, Spring, 1986.
78. "A Microcomputer-Based Decision Support System for Multi-Species Fishery Management" (with B. Rothschild and A. Assad), presented at Second Symposium on Analytic Techniques for Energy, Natural Resources, and Environmental Planning, Philadelphia, Spring, 1986.
79. "K-Shortest Paths in Euclidean Networks: Computational Results" (with C. Skiscim), presented at Eighth European Congress on Operations Research, Lisbon, Portugal, Summer, 1986.
80. "Microcomputer-Based Tools for Multi-Species Fishery Management" (with B. Rothschild and A. Assad), presented at Eighth European Congress on Operations Research, Lisbon, Portugal, Summer, 1986.
81. "Algorithms for Solving a Vehicle Routing Problem with Site/Vehicle Compatibility Constraints" (with B. Nag and A. Assad), presented at ORSA/TIMS Joint National Meeting, Miami Beach, Fall, 1986.
82. "Microcomputer-Based Vehicle Routing in the Soft Drink Industry" (with E. Wasil), presented at ORSA/TIMS Joint National Meeting, Miami Beach, Fall, 1986.
83. "Solving K-Shortest Path Problems and Variants Efficiently" (with C. Skiscim), presented at ORSA/TIMS Joint National Meeting, New Orleans, Spring, 1987.
84. "Features and Applications of Micro-Based Decision Modeling Software" (with E. Wasil), presented at ORSA/TIMS Joint National Meeting, New Orleans, Spring, 1987.
85. "Evaluating the Performance of Micro-Based Nonlinear Optimization Software" (with E. Wasil), presented at ORSA/TIMS Joint National Meeting, St. Louis, Fall, 1987.
86. "Finding the K Most Vital Links in a Network" (with R. Vohra), presented at ORSA/TIMS Joint National Meeting, St. Louis, Fall, 1987.
87. "Ranking Outstanding Sports Records" (with E. Wasil), presented at ORSA/TIMS Joint National Meeting, St. Louis, Fall, 1987.
88. "A Stochastic Model for Prediction of Adult Population Size in Fisheries Management" (with H. Trivedi), presented at American Fisheries Society Annual Meeting, Winston-Salem, September, 1987.
89. "A Multi-Faceted Heuristic for the Orienteering Problem" (with Q. Wang and L. Liu), presented at Regional Science Association Annual Meeting, Baltimore, November, 1987.
90. "An Efficient Heuristic Algorithm for a Generalization of the TSP" (with L. Iollo, L. Levy, and G. Storchi), presented at Italian Association of Operations Research Meeting, Milan, Italy, September 1987.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

91. "Vehicle Routing with Backhauls: Algorithms and Real-World Practice" (with D. Casco and E. Wasil), presented at ORSA/TIMS Joint National Meeting, Washington, D.C., Spring, 1988.
92. "A Deliberate Planning Algorithm for the Military Airlift Command" (with H. Rappoport, L. Bodin, R. Dahl, and D. Feshbach), presented at ORSA/TIMS Joint National Meeting, Washington, D.C., Spring, 1988.
93. "Controlled Rounding of Three-Dimensional Tabular Data" (with J. Kelly, A. Assad, and E. Baker), presented at ORSA/TIMS Joint National Meeting, Denver, Fall, 1988.
94. "A Categorized Review of AHP Applications" (with E. Wasil), presented at ORSA/TIMS Joint National Meeting, Denver, Fall, 1988.
95. "An Algorithm for Deliberate Planning" (with H. Rappoport, L. Bodin, R. Dahl, D. Feshbach, and L. Levy), presented at ORSA/TIMS Joint National Meeting, Denver, Fall, 1988.
96. "Vehicle Routing and Scheduling: The Impact of New Technologies" (with A. Assad, M. Ball, and L. Bodin), 8-hour workshop presented at ORSA/TIMS Joint National Meeting, Denver, Fall, 1988.
97. "Controlled Rounding of Tabular Data for the Census Bureau," presented at M.I.T. Symposium on Recent Developments in Mathematical Programming, Cambridge, April, 1988.
98. "Canonical Fishery Management System II" (with B. Rothschild and C. Stagg), presented at American Fisheries Society Annual Meeting, Toronto, September, 1988.
99. "Using Analytic Hierarchy Process Decision Analysis to Develop Management Information for Maryland's River Herring and Blue Crab Fisheries" (with G. DiNardo and D. Levy), presented at American Fisheries Society Annual Meeting, Toronto, September, 1988.
100. "Enhancements to a Deliberate Planning Algorithm for the Military Airlift Command" (with H. Rappoport, L. Levy, and D. Feshbach), presented at ORSA/TIMS Joint National Meeting, Vancouver, Spring, 1989.
101. "Time Dependencies in the Deliberate Planning Algorithm for the Military Airlift Command" (with H. Rappoport, L. Levy, and D. Feshbach), presented at ORSA/TIMS Joint National Meeting, New York, Fall, 1989.
102. "A Computer Simulation Model to Study Operational Issues Relating to Red Cross Bloodmobiles" (with J. Brennan), presented at ORSA/TIMS Joint National Meeting, New York, Fall, 1989.
103. "An LP Model for Enhancing the Productivity of the Chesapeake Bay Oyster Fishery" (with Q. Wang, S. Bashyam, E. Wasil, B. Rothschild, and A.-L. Chai), presented at ORSA/TIMS Joint National Meeting, New York, Fall, 1989.
104. "Controlled Rounding of Tabular Data: An Overview" (with J. Kelly and A. Assad), presented at ORSA/TIMS Joint National Meeting, New York, Fall, 1989.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

105. "An Airlift Planning Algorithm for MAC" (with H. Rappoport, L. Levy, and K. Toussaint), presented at WORMSC Symposium, Washington, D.C., Fall, 1989.
106. "Solving Controlled Rounding Problems Efficiently" (with J. Kelly and A. Assad), presented at US/USSR Seminar on Large-Scale Optimization, College Park, Maryland, January 1990.
107. "A Transportation Problem Estimator for the MAC Deliberate Planning Problem" (with L. Levy and H. Rappoport), presented at ORSA/TIMS Joint National Meeting, Las Vegas, Spring, 1990.
108. "Cell Suppression of Tabular Data for the Census Bureau" (with J. Kelly and A. Assad), presented at ORSA/TIMS Joint National Meeting, Las Vegas, Spring, 1990.
109. "A Density-Dependent Model for Predicting Adult Population Size to Help Manage a Fishery" (with Q. Wang, H. Trivedi, and E. Wasil), presented at ORSA/TIMS Joint National Meeting, Las Vegas, Spring, 1990.
110. "An Airlift Planning Algorithm for the Military Airlift Command (MAC)" (with H. Rappoport, L. Levy, and K. Toussaint), presented at ORSA/TIMS Joint National Meeting, Las Vegas, Spring, 1990.
111. "Cell Suppression of Tabular Data" (with J. Kelly and A. Assad), presented at US/USSR Seminar on Large-Scale Optimization, Moscow, June 1990.
112. "Successful Applications of Operations Research Models to Natural Resource Decision Problems" (with E. Wasil), presented at ORSA/TIMS Joint national Meeting, Philadelphia, Fall, 1990.
113. "Cell Suppression Using Sliding Protection Ranges" (with J. Kelly and A. Assad), presented at ORSA/TIMS Joint National Meeting, Philadelphia, Fall, 1990.
114. "Large-Scale Controlled Rounding" (with J. Kelly and A. Assad), presented at ORSA/TIMS Joint National Meeting, Nashville, Spring, 1991.
115. "An Algorithm for Airlift Allocation and Scheduling" (with H. Rappoport, L. Levy, K. Toussaint, and K. Thomas), presented at ORSA/TIMS Joint National Meeting, Nashville, Spring, 1991.
116. "A Comprehensive Review of OR Modeling Efforts in The Management of Natural Resources" (with E. Wasil), presented at ORSA/TIMS Joint National Meeting, Nashville, Spring, 1991.
117. "A Neural Net Model for Cell Suppression" (with L. DeSilets, R. Kumar, and Q. Wang), presented at ORSA/TIMS Joint National Meeting, Anaheim, Fall, 1991.
118. "Modeling Salinity Dynamics in the Chesapeake Bay" (with E. Wasil, Q. Wang, and G. DiNardo), presented at ORSA/TIMS Joint National Meeting, Anaheim, Fall, 1991.
119. "A Transportation Problem Formulation for the MAC Airlift Planning Problem" (with H. Rappoport, L. Levy, and K. Toussaint), presented at ORSA/CSTS Conference, Williamsburg, January, 1992.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

120. "A New Heuristic for the Period Routing Problem" (with I.-M. Chao and E. Wasil), presented at ORSA/TIMS Joint National Meeting, Orlando, Spring, 1992.
121. "Cell Suppression Strategies for Three-Dimensional Tables" (with R. Kumar and A. Assad), presented at ORSA/TIMS Joint National Meeting, Orlando, Spring, 1992.
122. "A Modified Hopfield Neural Network for Cell Suppression" (with Q. Wang and X. Sun), presented at ORSA/TIMS Joint National Meeting, Orlando, Spring, 1992.
123. "A Neural Network Model for the Wire Bonding Process" (with Q. Wang, X. Sun, E. Wasil, L. DeSilets, S. Luco, and A. Peck), presented at ORSA/TIMS Joint National Meeting, Orlando, Spring, 1992.
124. "Data Security in Three-Dimensional Tables Using Sliding Protection Levels" (with R. Kumar and A. Assad), presented at ORSA/TIMS Joint National Meeting, San Francisco, Fall, 1992.
125. "Applications of Neural Networks to Natural Resource Management" (with E. Wasil), presented at ORSA/TIMS Joint National Meeting, San Francisco, Fall, 1992.
126. "Application of Neural Networks to Data Security in Three-Dimensional Tables of Economic Data" (with R. Kumar and A. Assad), presented at ORSA/TIMS Joint National Meeting, Chicago, Spring, 1993.
127. "Solving Multi-Depot Vehicle Routing Problems Effectively" (with I.-M. Chao and E. Wasil), presented at ORSA/TIMS Joint National Meeting, Chicago, Spring, 1993.
128. "A Neural Network Model for the Wire Bonding Process: Part 2" (with X. Sun, Q. Wang, O. Kwon, and E. Wasil), presented at ORSA/TIMS Joint National Meeting, Phoenix, Fall, 1993.
129. "Solving Routing Problems Using Elastic Networks" (with A. Vakhutinsky), presented at ORSA/TIMS Joint National Meeting, Phoenix, Fall, 1993.
130. "Computational Experimentation with Neural Network Models for the Wire Bonding Process" (with X. Sun, O. Kwon, E. Wasil, Q. Wang, S. Luco, and A. Peck), presented at ORSA/CSTS Conference, Williamsburg, January, 1994.
131. "Neural Networks vs. Discriminant Analysis for Predicting Wire Bonding Failure Modes" (with X. Sun, O. Kwon, E. Wasil, and A. Peck), presented at ORSA/TIMS Joint National Meeting, Boston, Spring, 1994.
132. "A Neural Network Approach to the Orienteering Problem" (with Q. Wang, X. Sun, and J. Jia), presented at 15<sup>th</sup> International Symposium on Mathematical Programming, Ann Arbor, August, 1994.
133. "Using Neural Networks to Predict Hurricane Activity" (with O. Kwon, E. Wasil, and R. Gordon), presented at INFORMS National Meeting, Los Angeles, Spring, 1995.
134. "Accelerating a Neural Network Solution to the Traveling Salesman Problem" (with A. Vakhutinsky), presented at INFORMS National Meeting, Los Angeles, Spring, 1995.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

135. "Optimization via Neural Networks," presented at Optimization Days, Montreal, May, 1995. (Plenary Lecture)
136. "Designing and Reporting on Computational Experiments with Heuristics" (with R. Barr, J. Kelly, M. Resende, and W. Stewart), presented at Metaheuristics International Conference, Breckenridge, Colorado, July, 1995.
137. "Multi-level Routing Problems: Heuristics, Test Problems, and Solutions" (with I.-M. Chao and E. Wasil), presented at Metaheuristics International Conference, Breckenridge, Colorado, July, 1995.
138. "A General Approach to Solving Multi-level Routing Problems" (with I.-M. Chao and E. Wasil), presented at INFORMS National Meeting, New Orleans, Fall, 1995.
139. "Neural Networks and Combinatorial Optimization," presented at Symposium on Combinatorial Optimization (CO96), London, March, 1996. (Plenary Lecture)
140. "A Fine-Tuned Learning Approach to Optimization" (with S. Coy, G. Runger, and E. Wasil), presented at INFORMS National Meeting, Atlanta, Fall, 1996.
141. "Modeling First-Day Returns of Initial Public Offerings with Neural Networks" (with S. Robertson, G. Runger, and E. Wasil), presented at INFORMS National Meeting, San Diego, Spring, 1997.
142. "A Fine-Tuned Learning Approach to Neural Networks" (with S. Coy, G. Runger, and E. Wasil), presented at Joint EURO-INFORMS Meeting, Barcelona, July, 1997.
143. "A Neural Network Solution to the Generalized Orienteering Problem" (with Q. Wang and X. Sun), presented at INFORMS National Meeting, Dallas, Fall, 1997.
144. "The Future of Vehicle Routing Research," presented at INFORMS National Meeting, Dallas, Fall, 1997.
145. "Predicting the Success of Nations in the Summer Olympics Using Neural Networks" (with E. Condon and E. Wasil), presented at INFORMS National Meeting, Montreal, Spring, 1998.
146. "Some Future Directions in Vehicle Routing Research," presented at INFORMS International Conference, Tel Aviv, June 1998.
147. "An Experimental Design Based Method for Finding Effective Parameter Settings for Heuristic Methods" (with S. Coy, G. Runger, and E. Wasil), presented at INFORMS National Meeting, Seattle, Fall, 1998.
148. "Data Analysis for the New Millennium: Data Mining, Genetic Algorithms, and Visualization," presented at the Fourth IMC Leveraging Corporate Knowledge Seminar, R.H. Smith School of Business, College Park, April 1999.
149. "Smoothing Metaheuristics," presented at INFORMS National Meeting, Cincinnati, Spring, 1999.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

150. "Using Genetic Algorithms to Design Intelligent Decision Trees" (with Z. Fu, S. Lele, S. Raghavan, and E. Wasil), presented at INFORMS National Meeting, Philadelphia, Fall, 1999.
151. "Dynamic Multidimensional Fitness Functions for Genetic Algorithms for Classification Trees" (with Z. Fu, S. Lele, S. Raghavan, and E. Wasil), presented at INFORMS National Meeting, Salt Lake City, Spring, 2000.
152. "Solving the Traveling Salesman Problem with Demon Algorithms & Variants" (with J. Pepper and E. Wasil), presented at INFORMS National Meeting, Salt Lake City, Spring, 2000.
153. "Algorithms, Logistics, and the New Economy," Distinguished Scholar-Teacher Lecture, R.H. Smith School of Business, College Park, October 2000.
154. "Visualizing Data with Adjacency Measures" (with S. Raghavan, E. Condon, S. Lele, and E. Wasil), presented at INFORMS National Meeting, San Antonio, Fall, 2000.
155. "An Example of Visualization in Data Mining," presented at Netcentricity Symposium, University of Maryland, College Park, March 2001.
156. "A Visualization Model Based on Adjacency Data" (with S. Raghavan, E. Condon, S. Lele, and E. Wasil), presented at EURO 2001, Rotterdam, The Netherlands, July 2001.
157. "A Discrete Optimization Approach to Data Visualization" (with S. Raghavan, R. Abbiw-Jackson, S. Lele, and E. Wasil), presented at INFORMS National Meeting, Miami Beach, Fall 2001.
158. "A Visualization Model Based on Adjacency Data" (with E. Condon, S. Lele, S. Raghavan, and E. Wasil), presented at INFORMS National Meeting, Miami Beach, Fall 2001.
159. "An Evolutionary Approach to the Multi-Level Capacitated Minimum Spanning Tree Problem" (with I. Gamvros and S. Raghavan), presented at the INFORMS Telecom 2002 Conference, Boca Raton, March 2002.
160. "An Evolutionary Approach to the Multi-Level Capacitated Minimum Spanning Tree Problem" (with I. Gamvros and S. Raghavan), presented at the International Symposium on Combinatorial Optimization (CO 2002), Paris, April 2002.
161. "Some Examples of Visualization in Data Mining," presented at CORS Meeting, Toronto, June 2002.
162. "Heuristics for the Multi-Level Capacitated Minimum Spanning Tree (MLCMST) Problem" (with I. Gamvros and S. Raghavan), presented at INFORMS National Meeting, San Jose, Fall 2002.
163. "Metaheuristics for the New Millennium," presented at the First Mid-American Energy Speaker Series in Transportation, Henry B. Tippie College of Business, University of Iowa, Iowa City, March 2003.
164. "Heuristic Search for the Generalized Minimum Spanning Tree Problem" (with D. Stanojevic and S. Raghavan), presented at INFORMS National Meeting, Atlanta, Fall 2003.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

165. "Solving the Minimum Labeling Spanning Tree Problem" (with E. Wasil and Y. Xiong), presented at INFORMS National Meeting, Atlanta, Fall 2003.
166. "Improved Heuristics for the Multi-Level Capacitated Minimum Spanning Tree Problem" (with I. Gamvros and S. Raghavan), presented at INFORMS National Meeting, Atlanta, Fall 2003.
167. "Analysis of the Noisy Euclidean Traveling Salesman Problem" (with F. Li and E. Wasil), presented at INFORMS National Meeting, Atlanta, Fall 2003.
168. "The Prize-Collecting Generalized Minimum Spanning Tree Problem" (with S. Raghavan and D. Stanojevic!), presented at INFORMS Telecom 2004 Conference, Boca Raton, March 2004.
169. "The Minimum Labeling Spanning Tree Problem: Heuristic and Metaheuristic Approaches," presented at the Italian Operations Research Workshop in Honor of Paolo Carraresi, Pisa, March 2004.
170. "Visualization in Operations Research," presented at MIT/ORC 50<sup>th</sup> Anniversary Celebration, Cambridge, Massachusetts, April 2004.
171. "Generating and Solving Very Large-Scale Vehicle Routing Problems" (with F. Li and E. Wasil), presented at CORS/INFORMS Joint Meeting, Banff, May 2004.
172. "Some Recent Developments in the Analytic Hierarchy Process," presented at CORS/INFORMS Joint Meeting, Banff, May 2004.
173. "Some Recent Developments in the Analytic Hierarchy Process," presented at the Maryland Transportation Initiative Distinguished Speaker Series, College Park, Maryland, June 2004.
174. "Heuristic Search for Network Design" (with I. Gamvros, S. Raghavan, and D. Stanojevic!), presented at INFORMS National Meeting, Denver, Fall 2004.
175. "Some Advice on the Teaching of OR/MS," presented at the Future Academician Colloquium, INFORMS National Meeting, Denver, Fall 2004.
176. "Achieving Controlled Tabular Adjustment Using Genetic Algorithms" (with X. Wang and E. Wasil), presented at INFORMS Computing Society Conference, Annapolis, January 2005.
177. "The Split Delivery Vehicle Routing Problem: A New Heuristic and Benchmark Problems" (with S. Chen and E. Wasil), presented at Route 2005: International Workshop on Vehicle Routing and Intermodal Transportation, Bertinoro, Italy, June 2005.
178. "Improved Metaheuristics for the Minimum Labeling Spanning Tree Problem" (with Y. Xiong and E. Wasil), presented at the 6<sup>th</sup> Metaheuristics International Conference, Vienna, Austria, August 2005.
179. "The Minimum Labeling Spanning Tree Problem and Some Variants," presented at Department of Mathematics and Statistics, University of Maryland, Baltimore County, September 2005.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

180. "The Minimum Labeling Spanning Tree Problem and Some Variants," presented at the William S. Spears School of Business, Oklahoma State University, Stillwater, October 2005.
181. "The Split Delivery Vehicle Routing Problem," presented at the Katz Graduate School of Business, the University of Pittsburgh, Pittsburgh, October 2005
182. "Solving the Concave Cost Supply Scheduling Problem Using a Genetic Algorithm" (with X. Wang and E. Wasil), presented at INFORMS National Meeting, San Francisco, Fall 2005.
183. "The Label-Constrained Minimum Spanning Tree Problem" (with Y. Xiong and E. Wasil), presented at INFORMS National Meeting, San Francisco, Fall 2005.
184. "A New Heuristic and Test Problems for the Vehicle Routing Problem with Split Deliveries" (with S. Chen and E. Wasil), presented at INFORMS National Meeting, San Francisco, Fall 2005.
185. "Solving the Open Vehicle Routing Problem: New Heuristic and Test Problems" (with F. Li and E. Wasil), presented at INFORMS National Meeting, San Francisco, Fall 2005.
186. "Solving the Bin Packing Problem with a Weight Annealing Heuristic: A Computational Study" (with K.-H. Loh and E. Wasil), presented at INFORMS National Meeting, San Francisco, Fall 2005.
187. "Heuristic Approaches for a TSP Variant: The Meter Reading Shortest Tour Problem" (with J. Dong, M. Chen, and N. Yang), presented at INFORMS National Meeting, San Francisco, Fall 2005.
188. "The Split Delivery Vehicle Routing Problem: A Review and a New Approach," presented at the University of North Carolina, Chapel Hill, North Carolina, December 2005.
189. "The Minimum Label Spanning Tree Problem: Some Genetic Algorithm Approaches," presented at the 31<sup>st</sup> Conference on the Mathematics of Operations Research, Lunteren, The Netherlands, January 2006.
190. "The Split Delivery Vehicle Routing Problem: Using Mixed Integer Programming within a Heuristic Framework," presented at the 31<sup>st</sup> Conference on the Mathematics of Operations Research, Lunteren, The Netherlands, January 2006.
191. "The Minimum Label Spanning Tree Problem: Illustrating the Utility of Genetic Algorithms," presented at BAE Systems Distinguished Speaker Series, Boston, March 2006.
192. "The Minimum Label Spanning Tree Problem: Illustrating the Power and Flexibility of Genetic Algorithms," presented in the Dept. of Civil & Environmental Engineering, Distinguished Speaker Series, University of Maryland, College Park, April 2006.
193. "Solving the Concave Cost Supply Scheduling Problem Using a Genetic Algorithm" (with X. Wang and E. Wasil), presented at Odysseus 2006, Altea, Spain, May 2006.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

194. "Weight Annealing Heuristics for Solving the Two-Dimensional Bin Packing Problem" (with K-H. Loh and E. Wasil), presented at INFORMS International Conference, Hong Kong, June 2006.
195. "The Split Delivery Vehicle Routing Problem: Applications, Algorithms, Test Problems, and Computational Results" (with S. Chen and E. Wasil), presented at 21<sup>st</sup> European Conference on Operational Research, Reykjavik, Iceland, July 2006.
196. "Solving the Concave Cost Supply Scheduling Problem" (with X. Wang and E. Wasil), presented at 21<sup>st</sup> European Conference on Operational Research, Reykjavik, Iceland, July 2006.
197. "The Consistent Vehicle Routing Problem" (with C. Groer and E. Wasil), presented at UPS, Timonium, Maryland, August 2006.
198. "A Guided Tour of Several New and Interesting Routing Problems" (with E. Wasil), presented at Network Optimization Workshop, Saint - Remy de Provence, France, August 2006.
199. "Tuning a Parametric Clarke - Wright Heuristic for Vehicle Routing through a Genetic Algorithm" (with M. Battarra and D. Vigo), presented at AIRO2006, Cesena, Italy, September 2006.
200. "Weight Annealing Heuristics for Solving Bin Packing Problems" (with K.-H. Loh and E. Wasil), presented at INFORMS National Meeting, Pittsburgh, Fall 2006.
201. "Mining Data with Classification Trees, Discrete Optimization Models, and Sammon Maps" (with Z. Fu, S. Lele, S. Raghavan, and E. Wasil), presented at INFORMS National Meeting, Pittsburgh, Fall 2006.
202. "New Developments in the Computerized Routing of Meter Readers over Street Networks" (with R. Shuttleworth and E. Wasil), presented at INFORMS National Meeting, Pittsburgh, Fall 2006.
203. "A Genetic Algorithm for Solving the Euclidean Non-Uniform Steiner Tree Problem" (with I. Frommer), presented at INFORMS Computing Society Conference, Coral Gables, January 2007.
204. "The Generalized Traveling Salesman Problem: A New Genetic Algorithm Approach" (with J. Silberholz), presented at INFORMS Computing Society Conference, Coral Gables, January 2007.
205. "The Colorful Traveling Salesman Problem" (with Y. Xiong and E. Wasil), presented at INFORMS Computing Society Conference, Coral Gables, January 2007.
206. "Solving the Maximum Cardinality Bin Packing Problem with a Weight Annealing-Based Algorithm" (with K-H. Loh and E. Wasil), presented at INFORMS Computing Society Conference, Coral Gables, January 2007.
207. "Maximizing Cardiac Surgery Throughput Using a Simulation Model" (with C. Price, E. Wasil, T. Babineau, and B. Griffith), presented at the 18<sup>th</sup> Annual POMS Conference, Dallas, May 2007.
208. "The Balanced Billing Cycle Vehicle Routing Problem" (with C. Groer and E. Wasil), presented at ROUTE 2007, Jekyll Island, Georgia, May 2007.

**Presentations at Scholarly Meetings (No Proceedings Published) – Continued**

209. "Analyzing Post-Operative Bed Mix at a Major Hospital" (with C. Price, T. Babineau, B. Griffith, and E. Wasil), presented at Operations Research in Healthcare Conference, M.I.T., May 2007.
210. "The Billing Cycle Vehicle Routing Problem" (with C. Groer and E. Wasil), presented at EUROGEN 2007, Jyväskylä, Finland, June 2007.
211. "Metaheuristics and Combinatorial Optimization: Some Ideas, Insights, and Observations," presented at MIC 2007, Montréal, June 2007.
212. "The Computerized Routing of Meter Readers over Street Networks: New Technologies Turn Old Problems into New Opportunities" (with R. Shuttleworth and E. Wasil), presented at 22<sup>nd</sup> European Conference on Operational Research, Prague, July 2007.
213. "The Probabilistic Arc Routing Problem" (with S. Chen, R. Wong, and H. Zhong), presented at INFORMS National Meeting, Seattle, Fall 2007.
214. "Balanced Billing Cycles and Vehicle Routing of Meter Readers" (with C. Groer and E. Wasil), presented at INFORMS National Meeting, Seattle, Fall 2007.
215. "Capacity Management in a Cardiac Surgery Line" (with T. Babineau, B. Griffith, M. Harrington, and E. Wasil), presented at INFORMS National Meeting, Seattle, Fall 2007.
216. "Solving the Close-enough Traveling Salesman Problem" (with W. Mennell and E. Wasil), presented at INFORMS National Meeting, Seattle, Fall 2007.
217. "Using a Genetic Algorithm and Mixed Integer Program to Solve Concave Cost Supply Scheduling Problems" (with X. Wang and E. Wasil), presented at INFORMS National Meeting, Seattle, Fall 2007.
218. "Comparison of Heuristics for Solving the GMLST Problem" (with J. Silberholz, N. Cornick, A. Hall, R. Sahajpal, Y. Chen, and I. Yahav), presented at INFORMS Telecommunications Conference, College Park, MD, March 2008.
219. "Solving the Close Enough Traveling Salesman Problem" (with W. Mennell and E. Wasil), presented at INFORMS Telecommunications Conference, College Park, MD, March 2008.
220. "The Label-Constrained Minimum Spanning Tree Problem" (with Y. Xiong, E. Wasil, and S. Chen), presented at INFORMS Telecommunications Conference, College Park, MD, March 2008.
221. "Maximizing Cardiac Surgery Throughput at a Major Hospital" (with C. Price, E. Wasil, T. Babineau, and B. Griffith), presented at the 17<sup>th</sup> International Conference on Health Sciences Simulation, Ottawa, April 2008.
222. "Reducing Boarding in a Post-Anesthesia Care Unit" (with C. Price, M. Harrington, and E. Wasil), presented at MSOM Conference, College Park, MD, June 2008.
223. "The Consistent Vehicle Routing Problem" (with C. Groer and E. Wasil), presented at MSOM Conference, College Park, MD, June 2008.

**Presentations at Scholarly Meetings (No Proceedings Published) - Continued**

224. "Balanced Billing Cycles and Vehicle Routing of Meter Readers" (with C. Groer and E. Wasil), presented at School on Graph Theory, Algorithms, and Applications, Erice, Sicily, September 2008.
225. "The Consistent Vehicle Routing Problem" (with C. Groer and E. Wasil), presented at School on Graph Theory, Algorithms, and Applications, Erice, Sicily, September 2008.
226. "Metaheuristics and Combinatorial Optimization," presented at School on Graph Theory, Algorithms, and Applications, Erice, Sicily, September 2008.
227. "Tutorial: Some Future Directions in Vehicle Routing Research" (with C. Groer and E. Wasil), presented at INFORMS National Meeting, Washington, D.C., October 2008.
228. "Operating Room Scheduling Heuristics to Improve Post-operative Patient Flow" (with C. Price, E. Wasil, T. Babineau, M. Harrington, and R. Konewko), presented at INFORMS National Meeting, Washington, D.C., October 2008.
229. "A Weight Annealing Algorithm for Solving Two-dimensional Bin Packing Problems" (with K-H. Loh and E. Wasil), presented at INFORMS Computing Society Conference, Charleston, January 2009.
230. "Solving the Maximum Cardinality Bin Packing Problem" (with K-H. Loh and E. Wasil), presented at INFORMS Computing Society Conference, Charleston, January 2009.
231. "The Split Delivery Vehicle Routing Problem with Minimum Delivery Amounts" (with D. Gulczynski and E. Wasil), presented at INFORMS Computing Society Conference, Charleston, January 2009.
232. "The Effective Application of a New Approach to the Generalized Orienteering Problem" (with J. Silberholz), presented at INFORMS Computing Society Conference, Charleston, January 2009.
233. "From Greedy to Global: New Results on the Close Enough Traveling Salesman Problem" (with W. Mennell and E. Wasil), presented at INFORMS Computing Society Conference, Charleston, January 2009.
234. "The Generalized Covering Salesman Problem" (with M. Salari, Z. Naji Azimi, S. Raghavan, and P. Toth), presented at 23<sup>rd</sup> European Conference on Operational Research, Bonn, July 2009.
235. "The Cost-Constrained Minimum Label Spanning Tree and Label-Constrained Minimum Spanning Tree Problems" (with Z. Naji Azimi, M. Salari, S. Raghavan, and P. Toth), presented at 23<sup>rd</sup> European Conference on Operational Research, Bonn, July 2009.
236. "Variable Neighborhood Search for the Cost Constrained Minimum Label Spanning Tree and Label Constrained Minimum Spanning Tree Problems" (with M. Salari, Z. Naji Azimi, S. Raghavan, and P. Toth), presented at Metaheuristics International Conference, Hamburg, July 2009.
237. "Heuristic Procedures for the Generalized Covering Salesman Problem" (with Z. Naji Azimi, M. Salari, S. Raghavan, and P. Toth), presented at Metaheuristics International Conference, Hamburg, July 2009.

238. "The Effective Application of a New Approach to the Generalized Orienteering Problem" (with J. Silberholz), presented at Metaheuristics International Conference, Hamburg, July 2009.
239. "Generalized Covering Salesman Problem" (with Z. Naji-Azimi, M. Salari, S. Raghavan, and P. Toth), presented at AIRO2009, Siena, Italy, September 2009.

### **Service to University of Maryland**

Chairman, Management Science and Statistics Workshop, 1976-1980.

Member, Graduate Committee in the College of Business and Management, 1977-1979

Member of Interdisciplinary Applied Mathematics Faculty, Chairman and Member of Numerous Student Advisory Committees, 1977-

Chairman, Task Force on Research Grants and Contracts, 1978-1979

Member, Research Committee in the College of Business and Management, 1978-1980

Member, Search Committee - Associate Dean, 1979

Member, MBA Revision Task Force, 1979-1980

Member, Academic Council of Division of Social and Behavioral Sciences, 1979-1980

Member, Applied Mathematics Graduate Committee, 1979-1981

Member, Committee to Organize and Fine-Tune the Master of Science Program in Management Science and Statistics, 1979-1982

Member, Search Committee for Computer Science Center Director, 1980

Member, General Research Board Awards Task Force, 1980

Chairman, Faculty of Management Science and Statistics, 1980-1995

Fundraiser, Raised in excess of \$5,000 for the College as Chairman

Editor, Management Science and Statistics Working Paper Series, 1980-1993

Member, Search Committee - Assistant Dean, 1982

Candidate Review Committee Chairman (Dr. Gene Carter), 1985

Member, Committee to Review the Department of Government and Politics, 1985-1986

Speaker, Executive Development Programs, 1985-1987

Supervisor, Numerous Independent Study Courses

Member, Ph.D. Thesis Committees, Computer Science, Civil Engineering, and Electrical Engineering Departments, and Center for Environmental and Estuarine Studies

**Service to University of Maryland - Continued**

Member of DBA/Ph.D. Committees, College of Business and Management

Member, Search Committee - Two Positions in Manufacturing, 1989

Member, General Research Board Year Award Committee, 1989

Member, Research Subcommittee of BMGT Strategic Planning Committee, 1990

Chairman, Campus-wide Conflict of Interest/Commitment Committee, 1990

Member, College-wide Budget Reduction Committee, 1990

Chairman, Search Committee - Associate Dean, 1991

Member, Search Committee - Dean, 1991-1992

Member, Search Committee - Ph.D. Director, 1993

Chairman, Search Committee - Associate Dean, 1994

Member, Faculty Services Reengineering Committee, 1995

Chairman, College-wide Salary Review Committee, 1996

Member, Graduate Committee of Applied Mathematics, 1996-1998

Chairman, Strategic Review Committee on the Role of Information Technology in the Maryland Business School, 1996-1997

Member, Academic Planning Advisory Committee (APAC), 1997-2000

Member, Search Committee - Statistician, 1997-1998

Member, Search Committee - Telecommunications & OR, 1997-1998

Member, Selection Committee - 1998-2000 Distinguished Faculty Research Fellow Awards, 1998

Candidate Review Committee Chairman (Dr. Donald Riley), 1998

Member, Search Committee - IS Chair, 1998-1999

Member, Endowed Chairs Committee, 1998-

Member, Selection Committee for 1999-2000 Lilly-CTE Fellows, 1999

Chair, Search Committee - Management of Technology, 1999-2000

Member, Steering Committee, Center for Knowledge and Information Management, 1999-2000

Member, Undergraduate Research Focus Group, 2000

Chair, Search Committee - Data Analysis, 2000-2001

Member, Selection Committee for 2001-2002 Lilly-CTE Fellows, 2001

Candidate Review Committee Chairman (Dr. G. Anandalingam), 2001

**Service to University of Maryland - Continued**

Chair, Selection Committee for Abraham Golub Memorial Dissertation Proposal Prize, 2001

Chair, Third Year Review Committee for Dr. Samer Faraj, 2001

Member, Applied Math and Scientific Computation Graduate Committee, 2001-2003

Member, Campus-wide Committee to prepare the Biotechnology Industry Center Proposal for the Sloan Foundation, 2001

Chair, Search Committee - Data Analysis, 2001-2002

Chair, Selection Committee for Abraham Golub Memorial Dissertation Proposal Prize, 2002

Chair, College-wide Salary Review Committee, 2002

Candidate Review Committee Member (Dr. Paul Tesluk), 2002

Candidate Review Committee Member (Dr. Craig Carter), 2002

Member, College-wide Ph.D. Oversight Committee, 2002-

Member, Selection Committee for 2003-2004 Distinguished Scholar-Teacher Awards, 2002

Member, Selection Committee for Kirwan Undergraduate Education Award, 2003

Chair, Selection Committee for Abraham Golub Memorial Dissertation Proposal Prize, 2003

Candidate Review Committee Member (Dr. Tim Pollock), 2003

Chair, Selection Committee for Abraham Golub Memorial Dissertation Proposal Prize, 2004

Candidate Review Committee Chairman (Dr. S. Raghavan), 2004

Candidate Review Committee Member (Dr. Violina Rindova), 2004

Chair, Selection Committee for Abraham Golub Memorial Dissertation Proposal Prize, 2005

Chair, Selection Committee for Abraham Golub Memorial Dissertation Proposal Prize, 2006

Member, Organizing Committee, Operations Research in the 21<sup>st</sup> Century: A Symposium in Honor of Saul Gass on his 80<sup>th</sup> Birthday, 2005-2006

Served as mentor to John Silberholz at Montgomery Blair High School in the Intel Competition in Science and Math, where John won 1<sup>st</sup> place in the computer science division, 2005-2006

Candidate Review Committee Chairman (Dr. W. Jank), 2006

### **Service to University of Maryland - Continued**

Chair, Selection Committee for Abraham Golub Memorial Dissertation Proposal Prize, 2007

Candidate Review Committee Member (Dr. Wedad Elmaghraby), 2007

Chair, Selection Committee for Abraham Golub Memorial Dissertation Proposal Prize, 2008

Chair, Selection Committee for Abraham Golub Memorial Dissertation Proposal Prize, 2009

Member, Provost's Advisory Committee on Living-Learning and Special Programs, 2009

Member, Search Committee - Operations Management, 2009-2010

### **Contracts and Grants**

Co-Principal Investigator (with L. Bodin), Contract from the Urban Mass Transportation Administration to analyze the subscription scheduling problem for dial-a-ride systems and to study the stochastic bus routing and scheduling problem, \$40,000, 1977-1979.

Co-Principal Investigator (with S. Gass and L. Bodin), "Workshop to Investigate Future Directions in Routing and Scheduling of Vehicles and Crews," NSF Grant, \$20,000, 1979.

Co-Principal Investigator (with L. Bodin), Grant from Urban Mass Transportation Administration of DOT to write a "State-of-the-Art Review on the Routing and Scheduling of Vehicles and Crews," \$35,000, 1980-1981.

Project Director, Grant from Westinghouse Defense and Electronic Systems Center to study reliability and microcomputer-based expert systems, \$27,000, 1984-1985.

Investigator (with B. Rothschild), Grant from the Agency for International Development to study Multiple-Species Fishery Management, \$500,000, 1985-1989.

Project Director, Grant from Westinghouse Defense and Electronic Systems Center to develop a microcomputer-based availability and costing model, \$15,000, 1986.

Principal Investigator, Contract from the Bureau of the Census to apply network and combinatorial optimization algorithms to confidentiality protection problems, \$177,000, 1987-1992.

Investigator (with B. Rothschild), Contract with Maryland Department of Natural Resources to study enhancement of oyster production in the Chesapeake Bay, \$100,000, 1989-1990.

Principal Investigator, Grant from Westinghouse Defense and Electronic Systems Center to apply neural networks to wirebonding process control, \$25,000, 1991-1992.

**Contracts and Grants - Continued**

Investigator (with G.L. Chang), Contract from the Federal Highway Administration to study dynamic traffic assignment for IVHS, \$200,000, 1990-1992.

Principal Investigator, Grant from Westinghouse Defense and Electronic Systems Center to apply neural networks to wirebonding process control (second year of support), \$30,000, 1992-1993

Principal Investigator, Grant from Westinghouse Defense and Electronic Systems Center to apply neural networks to wirebonding process control (third year of support), \$20,000, 1993.

Principal Investigator, Grant from the Chubb Group of Insurance Companies to apply neural networks to hurricane prediction, \$2750 (student support), 1993.

Principal Investigator, Grant from the University of Maryland Total Quality Research Program to develop a template for applying neural networks to process manufacturing at Westinghouse, \$4000, 1993-1994.

Principal Investigator, Grant from the Chubb Group of Insurance Companies to apply neural networks to hurricane prediction, \$5500 (student support), 1994.

Principal Investigator, Grant from Westinghouse Defense and Electronic Systems Center for implementation of wirebond quality prediction using neural networks, \$9,000, 1994.

Investigator (with A. Haghani), Contract from the Federal Highway Administration to apply neural networks to traffic light synchronization, \$430,000, 1994-1995.

Principal Investigator, Grant from Westinghouse Defense and Electronic Systems Center to continue with the implementation of wirebond quality prediction using neural networks, \$20,000, 1994-1995.

Principal Investigator, Dingman Center Summer Research Grant to obtain better predictions of the degree of underpricing of initial public offerings, \$5000, 1995-1996.

Principal Investigator, College of Business and Management Summer Research Grant to apply fine-tuned learning to enhance prediction and forecasting, \$5000, 1996-1997.

Principal Investigator, College of Business and Management Summer Research Grant to study the intelligent application of metaheuristics to the vehicle routing problem, \$7000, 1997-1998.

Principal Investigator, College of Business and Management Summer Research Grant to study future directions in vehicle routing research, \$8000, 1998.

Principal Investigator, Confidentiality/Data Exchange Agreement with a prominent "Rent-A-Car" company to apply data mining techniques to massive data sets, 1998-2000.

### Courses Taught at the University of Maryland

BMGT 231 - Business Statistics I  
 BMGT 332 - Operations Research for Management Decisions  
 BMGT 698 - MBA Group Field Projects  
 BMGT 734 - Management Science and Computer Laboratory  
 BMGT 735 - A Second Course in Management Science  
 BMGT 828 - Current Topics in Operations Research and Management Science  
 BMGT 831 - Management Science II, Network Optimization  
 BMGT 833 - Management Science IV, Integer Programming  
 BUDT 725 - Models and Applications in Operations Research  
 BMGT 808U - Quantitative Modeling for Hospital Operations and Management  
 BUDT 758B - Operations Management in Health Services Organizations  
 GEMS 296 - Team Project Seminar I  
 GEMS 297 - Team Project Seminar II  
 GEMS 396 - Team Project Seminar III  
 GEMS 397 - Team Project Seminar IV

### Thesis Supervision

1.	Larry J. Levy	M.S.	"The Fleet Mix Vehicle Routing Problem" August 1980
2.	William R. Stewart	Ph.D.	"New Algorithms for Deterministic and Stochastic Vehicle Routing Problems" March 1981
3.	Karen D. Keating	M.S.	"Applications of Network Analysis in Finance: Cash Flow Management and Asset Diversification" April 1981
4.	James S. DeArmon	M.S.	"A Comparison of Heuristics for the Capacitated Chinese Postman Problem" April 1981
5.	Moshe Dror	Ph.D.	"The Inventory Routing Problem" August 1983
6.	Edward A. Wasil	Ph.D.	"Evaluating the Performance of Alternative Solution Methods for Combinatorial Optimization and Other Decision Problems" January 1984
7.	Wen-Lea Pearn	Ph.D.	"Solving the Capacitated Arc Routing Problem" May 1984

**Thesis Supervision - Continued**

- |     |                               |       |  |
|-----|-------------------------------|-------|--|
| 8.  | Barindra Nag                  | Ph.D. | "Vehicle Routing in the Presence of Site/Vehicle Dependency Constraints"<br>December 1986                        |
| 9.  | Chris S. Skiscim              | M.S.  | "Solving k-Shortest and Constrained Shortest Path Problems Efficiently"<br>June 1987                             |
| 10. | John E. Brennan               | M.S.  | "A Simulation Modeling Analysis of a Mobile Blood Collection Operation in the Red Cross"<br>May 1989             |
| 11. | Jayasree K.<br>Suryanarayanan | M.S.  | "Linear Placement with Multidimensional Scaling"<br>June 1989  |
| 12. | Michael Silberholz            | M.S.  | "A Simulation Model of Work Rules at Marine Container Terminals"<br>August 1989                                  |
| 13. | Douglas Levy                  | M.S.  | "The Analytic Hierarchy Process: Applications to Natural Resource and Environmental Management"<br>December 1989 |
| 14. | James P. Kelly                | Ph.D. | "Confidentiality Protection in Two and Three-Dimensional Tables"<br>April 1990                                   |
| 15. | Qiwen Wang                    | Ph.D. | "Applications of Operations Research to Fisheries Management"<br>July 1990                                       |
| 16. | Susan Imber                   | M.S.  | "Applications of Linear Programming and the Analytic Hierarchy Process to Fisheries Management"<br>July 1990     |
| 17. | Daniel O. Casco               | Ph.D. | "The Backhaul Problem and Related Topics in Vehicle Routing"<br>January 1991                                     |
| 18. | Jennifer Michaels             | M.S.  | "A Simulation Study of Donor Scheduling Systems for the American Red Cross"<br>April 1991                        |
| 19. | Katherine J.<br>Toussaint     | M.S.  | "Exchange Heuristics to Improve the Clarity of Base/Time Plots"<br>August 1991                                   |
| 20. | Lenore DeSilets               | M.S.  | "Applications of Neural Networks to Marine Ecology and Statistical Confidentiality"<br>August 1991               |
| 21. | John B. Nocito                | M.S.  | "Heuristic Solutions to the Two-Player Orienteering Problem"<br>April 1993                                       |
| 22. | Ram Kumar                     | Ph.D. | "Data Integrity and Security Issues in Publishing Tabular Economic Data"<br>July 1993                            |

**Thesis Supervision - Continued**

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|-----|---------------------|-------|--|
| 23. | I-Ming Chao         | Ph.D. | "Algorithms and Solutions to Multi-level Vehicle Routing Problems"<br>July 1993  |
| 24. | Xiaoyun Sun         | Ph.D. | "Neural Network Models for the Wire Bonding Process"<br>December 1994  |
| 25. | Ohseok Kwon         | Ph.D. | "Neural Network Models for Prediction, Estimation, and Optimization: Algorithms and Applications"<br>October 1995                            |
| 26. | Steven J. Robertson | M.S.  | "Modeling Initial Public Offerings with Artificial Neural Networks"<br>May 1996  |
| 27. | Edward M. Condon    | M.S.  | "Predicting the Success of Nations in the Summer Olympics Using Neural Networks"<br>December 1997  |
| 28. | Andrew R. Beiderman | M.S.  | "Solving the Vehicle Routing and Traveling Salesman Problems with Elastic Nets: Models, Algorithms, and Computational Results"<br>April 1998 |
| 29. | Steven P. Coy       | Ph.D. | "Fine-Tuned Learning: A New Approach to Improving the Performance of Local Search Heuristics"<br>May 1998                                    |
| 30. | Kimberly A. Hopkins | M.S.  | "Modeling Initial Public Offerings using Artificial Neural Networks"<br>November 1998  |
| 31. | Joshua W. Pepper    | M.S.  | "A Computational Study of Annealing-Based Heuristics for the Traveling Salesman Problem"<br>June 1999  |
| 32. | Joseph Callender II | M.S.  | "Identifying Potential Telecommunications Markets Using Regression Models"<br>December 1999  |
| 33. | Zhiwei Fu           | Ph.D. | "Using Genetic Algorithms to Develop Intelligent Decision Trees"<br>June 2000  |
| 34. | James Richardson    | M.S.  | "Ranking the Greatest Active Sports Records Using the Analytic Hierarchy Process"<br>July 2000   |
| 35. | Kimberly A. Ozga    | M.S.  | "An Empirical Study of Interestingness Measures for Classification Rules"<br>July 2001   |

**Thesis Supervision - Continued**

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|-----|-----------------------------|-------|---|
| 36. | Matthew P. Feist            | M.S.  | "Improving the Performance of Sammon Maps by the Use of Smoothing Functions and Principal Coordinate Analysis Starting Solutions"<br>December 2001                  |
| 37. | Ioannis Gamvros             | M.S.  | "The Multi-Level Capacitated Minimum Spanning Tree Problem"<br>December 2002  |
| 38. | Roselyn M.<br>Abbiw-Jackson | Ph.D. | "Discrete Optimization Models in Data Visualization"<br>November 2004   |
| 39. | Brian Alford                | M.S.  | "Two Applications Involving the Analytic Hierarchy Process"<br>November 2004  |
| 40. | Haiyan Li                   | Ph.D. | "Data Visualization of Asymmetric Data Using Sammon Mapping and Applications of Self-Organizing Maps"<br>December 2004  |
| 41. | Ian Frommer                 | Ph.D. | "Modeling and Optimization of Transmission Networks"<br>April 2005  |
| 42. | Todd Retchless              | M.S.  | "Ranking U.S. Army Generals of the Twentieth Century using the Group Analytic Hierarchy Process"<br>June 2005   |
| 43. | Yupei Xiong                 | Ph.D. | "The Minimum Labeling Spanning Tree Problem and Some Variants"<br>July 2005   |
| 44. | Feiyue Li                   | Ph.D. | "Modeling and Solving Variants of the Vehicle Routing Problem: Algorithms, Test Problems, and Computational Results"<br>August 2005                                 |
| 45. | Kok - Hua Loh               | Ph.D. | "Weight Annealing Heuristics for Solving Bin Packing and Other Combinatorial Optimization Problems: Concepts, Algorithms, and Computational Results"<br>August 2006 |
| 46. | Si Chen                     | Ph.D. | "A Study of Four Network Problems in Transportation, Telecommunications, and Supply Chain Management"<br>July 2007  |
| 47. | Xia Wang                    | Ph.D. | "Applications of Genetic Algorithms, Dynamic Programming, and Linear Programming to Combinatorial Optimization Problems"<br>September 2008                          |
| 48. | Chris Groer                 | Ph.D. | "Parallel and Serial Algorithms for Vehicle Routing Problems"<br>December 2008  |

**Thesis Supervision - Continued**

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|-----|-----------------|-------|---|
| 49. | Carter Price    | Ph.D. | "Applications of Operations Research Models to Problems in Health Care"<br>January 2009   |
| 50. | Namrata Cornick | M.S.  | "The Vehicle Routing Problem with Demand Ranges"<br>May 2009  |
| 51. | William Mennell | Ph.D. | "Heuristics for Solving Three Routing Problems: Close-Enough Traveling Salesman Problem, Close-Enough Vehicle Routing Problem, Sequence-Dependent Team Orienteering Problem"<br>August 2009 |

9/2/09

APPENDICES--PUBLICATIONS\*A. Books and Edited Volumes

1. Editor (with L. Bodin) B Proceedings of the International Workshop on Current and Future Directions in the Routing and Scheduling of Vehicles and Crews, Networks, 11 (2), 93-232, 1981.
2. Editor (with A. Assad and S. Zanakis) B Statistics and Optimization: The Interface, American Journal of Mathematical and Management Sciences, 4 (1&2), 1-198, 1984.
3. Editor (with A. Assad and E. Wasil) B Microcomputers in Operations Research and Management Science, Computers & Operations Research, 13 (2/3), 105-366, 1986.
4. Editor (with A. Assad) B Vehicle Routing with Time-Window Constraints: Algorithmic Solutions, American Journal of Mathematical and Management Sciences, 6 (3&4), 251-428, 1986.
5. Editor (with A. Assad) B Vehicle Routing: Methods and Studies, North-Holland, Amsterdam, 1988.
6. Editor (with E. Wasil and P. Harker) B The Analytic Hierarchy Process: Applications and Studies, Springer-Verlag, Heidelberg, 1989.
7. Editor (with R. Sharda, E. Wasil, O. Balci, and W. Stewart) -- Impact of Recent Computer Advances on Operations Research, North-Holland, Amsterdam, 1989.
8. Editor (with E. Wasil) B Public Sector Applications of the Analytic Hierarchy Process, Socio-Economic Planning Sciences, 25(2), 87-165, 1991.
9. Editor (with H.A. Eiselt) B Location Modeling in Practice: Applications, Theory, & History, American Journal of Mathematical and Management Sciences, 12(1), 1-87, 1992.
10. Editor (with R. Wong) - Vehicle Routing over Land, Sea, and Air, Interfaces, 22(3), 1-111, 1992.
11. Editor (with E. Wasil) B Operations Research and Fisheries Management, American Journal of Mathematical and Management Sciences, 12(2&3), 95-245, 1992.
12. Editor - Vehicle Routing Problems and Variants, American Journal of Mathematical and Management Sciences, 13(3&4), 245-410, 1993.
13. Editor (with E. Wasil) B The Analytic Hierarchy Process, Computers & Operations Research, 30(10), 1419-1497, 2003.
14. Editor (with S. Raghavan and E. Wasil) B The Next Wave in Computing, Optimization, and Decision Technologies, Springer, New York, 2005.
15. Editor (with F. Alt and M. Fu) - Perspectives in Operations Research: Papers in Honor of Saul Gass' 80<sup>th</sup> Birthday, Springer, New York, 2006.
16. Editor (with S. Raghavan and E. Wasil) - The Vehicle Routing Problem: Latest Advances and New Challenges, Springer, New York, 2008.

\* Abstracts, Newsletter Articles, Consulting Reports, Foreign Language Publications, and Unpublished Technical Reports are not included.

A. Books and Edited Volumes- continued

17. Editor (with S. Raghavan and E. Wasil) - Telecommunications Modeling, Policy, and Technology, Springer, New York, 2008.
18. Editor (with E. Dudewicz, D. Carpenter, Z. Govindarajulu, S. Mishra, M. Mulekar, J. Romeu, and K. Shimizu) - FSDD-II: Fitting Statistical Distributions to Data, Volume 2, Proceedings of the Symposium on Fitting Statistical Distributions to Data at Auburn University, American Sciences Press, Columbus, Ohio, 2008.
19. Editor (with M. Carter and E. Wasil) - Applications of Management Science and Operations Research Models and Methods to Problems in Health Care, Interfaces, 39(3), 183-287, 2009.

B. Journal Articles and Book Chapters

1. "Counting Trees in a Certain Class of Graphs" (with D.J. Kleitman), The American Mathematical Monthly, 82(1), 40-44, 1975.
2. "A Minimum-Cost Multicommodity Network Flow Problem Concerning Imports and Exports," Networks, 5(4), 331-356, 1975.
3. "Approaches to the Cutting Stock Problem," AIIE Transactions, 8(2), 265-274, 1976.
4. "Shortest Path Algorithms: A Comparison," Operations Research, 24(6), 1164-1168, 1976.
5. "Modeling and Optimization for Transportation Systems Planning and Operations" (with N. Gartner and R. Wong), in Large Engineering Systems (A. Wexler, ed.), Pergamon Press, Oxford, 198-213, 1977.
6. "Implementing Vehicle Routing Algorithms" (with T.L. Magnanti and H.Q. Nguyen), Networks, 7(2), 113-148, 1977.
7. "Deterministic Network Optimization -- A Bibliography" (with T.L. Magnanti), Networks, 7(2), 149-183, 1977.
8. "A Statistical Approach to the TSP," Networks, 7(3), 209-225, 1977.
9. "Evaluating a Sequential Vehicle Routing Algorithm," AIIE Transactions, 9(2), 204-208, 1977.
10. "Shortest Paths with Euclidean Distances: An Explanatory Model" (with M. Ball), Networks, 8(4), 297-314, 1978.
11. "Point Estimation of a Global Optimum for Large Combinatorial Problems," Communications in Statistics, B7(4), 361-367, 1978.
12. "Transportation Planning: Network Models and Their Implementation" (with T.L. Magnanti), Studies in Operations Management (A.C. Hax, ed.), 465-518, 1978.
13. "A Problem in Network Interdiction," Naval Research Logistics Quarterly, 25(4), 711-713, 1978.
14. "Interval Estimation of a Global Optimum for Large Combinatorial Problems" (with F. Alt), Naval Research Logistics Quarterly, 26(1), 69-77, 1979.
15. "A Framework for Probabilistic Vehicle Routing" (with J.R. Yee), AIIE Transactions, 11(2), 109-112, 1979.

B. Journal Articles and Book Chapters - Continued

16. "Models and Solution Techniques for Cash Flow Management" (with M. Liberatore and C. Lieberman), Computers & Operations Research, 6(1), 13-20, 1979.
17. "A Note on Determining Operating Strategies for Probabilistic Vehicle Routing" (with J.R. Yee), Naval Research Logistics Quarterly, 27(1), 159-163, 1980.
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