

February 28, 2018

MATTHEW J. SOBEL

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CURRENTLY

Case Western Reserve University:
William E. Umstatter Professor Emeritus of Industrial Economics
Professor Emeritus of Operations, Weatherhead School of Management

HONORS

2014 Distinguished Fellow, MSOM (Manufacturing and Services Operations
Management Society)
2014 Best Paper Award, iFORM (Interface of Finance, Operations, and Risk
Management)
2014 Theodore M. Alfred Distinguished Service Faculty Award
(Case Western Reserve University)
2004 Fellow, INFORMS (Institute for Operations Research and Management Science)
1986 University Lead Award, Society of Manufacturing Engineers
1983 Lanchester Prize Honorable Mention, Operations Research Society of America
Sigma Xi (science)
Alpha Pi Mu (industrial engineering)

RESEARCH (CURRENT)

Coordination of operations with finance
Stochastic optimization
Preference theory and its applications

EDUCATION

Stanford University	Ph.D., Operations Research, 1967
Columbia University	A.M., Mathematical Statistics, 1964
Columbia University	B.S., Industrial Engineering, 1960
Columbia College	A.B., Liberal Arts, Pre-engineering, 1959

LEADERSHIP RESPONSIBILITY

Chair, Department of Economics, Weatherhead School of Management, Case Western Reserve University, 2012 – 2013 (Acting Chair, July –December 2013).

Chair, Department of Operations, Weatherhead School of Management, Case Western Reserve University, 1999-2006.

Dean, W. Averell Harriman School for Management and Policy, State University of New York at Stony Brook, 1992 - 1995; Acting Dean 1991-1992.

Coordinator of management science and operations management (and information systems until 1983), College of Management, Georgia Institute of Technology, 1978 - 1986.

Co-Coordinator of the master's degree Management Science concentration, School of Organization and Management, Yale University, 1976 - 1977.

Coordinator of the stochastic models area in the Ph.D. program, Department of Administrative Science, Yale University, 1975 - 1976.

Director of Graduate Studies, Department of Administrative Sciences, Yale University, 1971 - 1973.

Chief, Plans and Projections Unit, Delaware Estuary Study, Division of Water Supply and Pollution Control, U.S. Public Health Service, HEW, 1962 - 1964.

OTHER ACTIVITIES

Scientific Advisory Board, Center for the Study of the Environment.

Academic Advisory Board founding member, Envir. Sci., Central European University.

Associate Editor, *Operations Research*, *Management Science*, and *Manufacturing and Service Operations Management*.

Organizing committees of national and international meetings.

Chair of committees and offices in professional societies.

Consultation for business firms and government agencies.

Numerous grants and contracts from the U.S. National Science Foundation and other government agencies, nonprofit organizations, and businesses.

Many invited seminars and papers at universities and international meetings.

PREVIOUS POSITIONS

New York University, 1997 – 1998: Visiting Professor of Operations Management and Statistics, Leonard N. Stern School of Business.

State University of New York at Stony Brook, 1986 – 1998: Leading Professor, W. Averell Harriman School for Management & Policy, Dept. of Applied Mathematics & Statistics (College of Eng. & Appl. Sci.), Center for Game Theory in Economics (Department of Economics)

Georgia Institute of Technology, 1977 - 1986: Professor, College of Management and School of Industrial and Systems Engineering.

University of Arizona, 1982 - 1983: Visiting Professor, Dept. of Management Information Systems, College of Business and Public Administration.

Yale University, 1971 - 1977: Associate Professor, tenured, School of Organization and Management (Department of Administrative Sciences until 1974).

Center for Operations Research and Econometrics, Louvain, Belgium, 1970 - 1971: Yale University Junior Faculty Fellow.

Yale University, 1967 - 1971: Assistant Professor, Dept. of Administrative Sciences.

Santa Clara University, 1966 - 1967: Instructor, Dept. of Economics.

University of California, Berkeley 1965 - 1966: Lecturer, Dept. of Statistics, Berkeley Extension.

Stanford Research Institute, 1964 - 1966: Operations Analyst, Industrial Operations Research Group.

U.S. Public Health Service, 1962 - 1964: Engineer, Delaware Estuary Study, Division of Water Supply and Pollution Control.

Western Electric Co., Inc., 1960 - 1962: Operations Analyst, Headquarters Operations Research Group.

Ph.D. DISSERTATIONS SUPERVISED

Colin Bell (1969; Microsoft Corporation)

Arun P. Sanghvi (1973; Senior Consultant, RCG/Hagler, Bailly, Inc., Washington, D.C.).

Wayne Winston (1975; Professor Emeritus, Graduate School of Business, Indiana University).

Roy Mendelsohn (1976; Supervisory Research Operations Analyst, U.S. National Marine Fisheries Service).

Annie Thomas (1977).

Paul Zipkin (1977; T. Austin Finch Sr. Professor Emeritus, Fuqua School of Business, Duke University).
Mordechai Henig (1978; Professor Emeritus, Faculty of Management, University of Tel Aviv, retired).
Mokrane Bouakiz (1985; Senior Analyst, AT&T).
Kun-Jen Chung (1985; Distinguished Professor, Chung Yuan Christian University (Taiwan); Retired Dean and Professor, National Taiwan University of Science and Technology).
Madhvi Shinde (1991)
Charu Sinha (1994; Assistant Professor, Chapman University).
Susan Monroe (1994; Head, Operations Analysis Grp., Weyerhaeuser Fine Papers Division).
Sr. Joan Harnett (1997; Associate Professor, Manhattan College).
Atrayee Bhattacharjee (2002).
Volodymyr Babich (co-advisor) (2003; Lapeyre Family Term Associate Professor, Georgetown University)
HuiChen Chiang (2003; Associate Professor; Ming Chuan University (Taiwan))
Jiang Zhang (2004; Associate Professor, Adelphi University)
Yuanjie He (co-advisor) (2005; Associate Professor, California State University, Pomona)
Qiaohai (Joice) Hu (2005; Assistant Professor, University of Missouri, St. Louis)
Vera Tilson (2006; Associate Professor, University of Rochester)
Danko Turcic (2008; Associate Professor, Washington University)
Ludmila Zheltova (2009)
Wei Wei (2012; PNC Bank, Cleveland)

BOOKS PUBLISHED

Stochastic Models in Operations Research, Volume I: Stochastic Processes and Operating Characteristics (with Daniel P. Heyman), McGraw-Hill, New York, 1982.

Stochastic Models in Operations Research, Volume I: Stochastic Processes and Operating Characteristics (with Daniel P. Heyman), Dover Publications, Mineola, NY, 2004.

Stochastic Models in Operations Research, Volume II, Stochastic Optimization (with Daniel P. Heyman), McGraw-Hill, New York, 1984.

Japanese translation, Elsevier Science Publishers, Amsterdam through Tuttle-Mori Agency, Inc., Tokyo, 1995.

Stochastic Models in Operations Research, Volume II, Stochastic Optimization (with Daniel P. Heyman), Dover Publications, Mineola, NY, 2004.

Handbook of Operations Research and Management Science, Volume 2: Stochastic Models, Co-Editor (with Daniel P. Heyman), sponsored by INFORMS, Elsevier-North Holland, Amsterdam, 1990.

PAPERS AND CHAPTERS BY TOPIC

<u>Economics</u>	<u>Environmental Management</u>	<u>Optimization & Stochastic Models</u>	<u>Operations Management</u>
80b, 80c, 80d, 81a, 82c, 92b, 93a, 97a, 04a, 10a,10b, 10c, 11a, 12b, 13a	64a, 65a, 65b, 71c, 75b, 75c, 75d, 76a, 80b, 80c, 89a, 95b, 95c, 99a, 07b	69a, 71b, 73b, 74b, 75a, 76b, 77a, 80a, 80d, 81a, 82a, 82b, 85a, 87a, 87b, 90a, 90b, 90c, 91a, 94b, 10a, 10b, 12a, 13d, 13e, 16a, 17b, 17c	69b, 69c, 70a, 70b, 70c, 71a, 73a, 74a, 92a, 95a, 95e, 98a, 01a, 02a, 02b, 04a, 04b, 05a, 07a, 08a, 09a, 10a, 10c, 11a, 11b,12b, 12a, 13b,13e, 16a, 18a

AVAILABLE AT SSRN

[17b] “Easy Affine Markov Decision Processes: Theory” (with J. Ning), available at <https://ssrn.com/abstract=2959096>

[17c] “Easy Affine Markov Decision Processes: Algorithms and Applications” (with J. Ning), available at <https://ssrn.com/abstract=29987868>

REFEREED BOOK CHAPTERS

[11a] “Production/Inventory Management and Capital Structure” (with Q. Hu and L. Li), pp. 327-362 in *Handbook of Integrated Risk Management in Global Supply Chains*, co-edited by P. Kouvelis, O. Boyabatli, L. Dong, and R. Li, John Wiley & Sons, Inc., New York, NY, 2011.

[10a] “The Trojan Horse of Time-Risk Preference Representations,” *Risk and Optimization in an Uncertain World: Tutorials in Operations Research 2010*, pp. 99-115, John J. Hasenbein ed., Institute for Operations Research and the Management Sciences, Hanover, MD, 2010.

[08a] “Risk Pooling,” pp.155-174 in *When Intuition Fails: Insights From Basic Operations Management Models and Principles*, D.Chhajed and T. Lowe (eds.), Springer, New York, 2008.

REFEREED PAPERS PUBLISHED OR ACCEPTED

[18a] “Production and Capacity Management with Internal Financing” (with J. Ning), *Manufacturing and Service Operations Management*, Vol. 20, No. 1, 147-160, 2018.

[16a] “Optimality of the Fastest Available Server” (with C. Sinha and W. P. Millhiser), *Queueing Systems*, Vol. 84, No. 3, 237-263, 2016.

[13a] "Discounting Axioms Imply Risk Neutrality," *Annals of Operations Research*, Vol. 208, Issue 1, 417-432, 2013.

[13b] "Control of Dividends, Capital Subscriptions, and Physical Inventories" (with L. Li and M. Shubik), *Management Science*, Vol. 59, No. 5, 1107-1124, 2013.

[12a] "Optimality of Myopic Policies for Dynamic Lot-Sizing Problems in Serial Production Lines with Random Yields and Autoregressive Demand" (with V. Babich), *Operations Research*, Vol. 60, No. 6, 1537-1550, 2012.

[12b] "Interchanging Backorder Costs and Fill Rate Constraints in Inventory Models" (with J. Zhang), *International Journal of Mathematics in Operational Research*, Vol.4, No.4, 453 – 472, 2012.

[11b] "Computationally Simple and Unified Approach to Finite- and Infinite-Horizon Clark-Scarf Inventory Model" (with C. Sinha and V. Babich), *IIE Transactions*, Vol. 43, No. 1, 207-219, 2011.

[10c] "Financially Optimal Inventory Policies with Nonlinear Replenishment Costs" (with J. Zhang), *Asia Pacific Journal of Operations Research*, Vol. 27, No. 4 pp. 477-492, 2010.

[10b] "Homogeneous Markov Decision Processes" (with W. Wei), *Operations Research*, Vol. 58, No. 4, Part 2, pp. 1235-1246, 2010.

[09a] "Scheduling Projects with Stochastic Activity Durations to Maximize EPV" (with V. Tilson and J. Szmerekovsky), *European Journal of Operational Research*, Vol. 198, No. 3, pp. 697-705, 2009.

[07a] "Echelon Base-Stock Policies are Financially Sub-Optimal" (with Q. Hu), *OR Letters*, Volume 35, pp. 561-566, 2007.

[07b] "Forecasting Effects of Global Warming on Biodiversity" (with Botkin, Henrik Saxe, D.B., Arafjo, Miguel, Richard Bradshaw, Peter Chesson, Margaret B Davis, Terry Dawson, Julie Etterson, Daniel Faith, Antoine Guisan, Simon Ferrier, Peter Kareiva, Chris Margules, Mark New, and David R. B. Stockwell), *Bioscience*, Vol. 57, 227-236, 2007.

[05a] "Manufacturing Lead-Time Rules: Customer Retention vs. Tardiness Costs," (with S. A. Slotnick), *European Journal of Operations Research*, Vol. 163, No. 3, 825-856, 2005.

[04a] "Pre-IPO Operational and Financial Decisions," (with V. Babich) *Management Science*, Volume 50, No. 7, pp. 935-948, 2004.

[04b] "Fill Rates of Single-Stage and Multi-Stage Supply Systems," *Manufacturing and Service Operations Management*, Volume 6, No. 1, pp. 41-52, 2004.

[02a] "New Product Innovation with Multiple Features and Technology Constraints" (with K. A. Paulson Gjerde and S. A. Slotnick), *Management Science*, Volume 48, pp. 1268-1284, 2002.

[02b] "Delivery Guarantees and the Interdependence of Marketing and Operations," (with S. Chatterjee and S. A. Slotnick), *Production and Operations Management*, Volume 11, pp. 393-410, 2002.

[01a] "Inventory Policies for Systems with Stochastic and Deterministic Demand," (with R. Zhang), *Operations Research*, Volume 49, No. 1, pp., 157-162, 2001.

[97a] "Risk-Sensitive Dynamic Market Share Attraction Games" (with G. E. Monahan), *Games and Economic Behavior*, Vol. 20, pp. 149-160, 1997.

[95a] "Lot Sizes in Serial Manufacturing with Random Yield," *Probability in the Engineering and Informational Sciences*, Vol. 9, pp. 151-157, 1995.

[95b] "A Reservoir Hydroelectric System: Exactly and Approximately Optimal Policies (with B. Lamond and S. Monroe)," *European Journal of Operational Research*, Vol. 81, pp. 535-542, 1995.

[95c] "Exact and Approximate Solutions of Affine Reservoir Models" (with B. F. Lamond), *Operations Research*, Vol. 43, pp. 771-780, 1995.

[94b] "Mean-Variance Tradeoffs in an Undiscounted MDP," *Operations Research*, Vol. 42, pp. 175-183, 1994.

[93a] "Dynamic Market Share Attraction Games" (with G. E. Monahan), *Games and Economic Behavior*, Vol. 6, pp. 130-149, 1993.

[92a] "Inventory Control with an Exponential Utility Criterion" (with M. Bouakiz), *Operations Research*, Vol. 40, pp. 603-608, 1992.

[92b] "On Matching Book: A Problem in Banking and Corporate Finance" (with M. Shubik), *Management Science*, Vol. 38, pp. 827-839, 1992.

[91a] "Linear Programming Solutions of the Truncated Moment Problem," *Computers and Operations Research* (with K-J. Chung), Vol. 18, pp. 477-485, 1991.

[90a] "Throughput Maximization in a Loss Queueing System with Heterogeneous Servers," *Journal of Applied Probability*, Vol. 27, pp. 693-700, 1990.

[90b] "Higher Order and Average Reward Myopic-Affine Dynamic Models," *Mathematics of Operations Research*, Vol. 15, pp. 299-310, 1990.

- [90c] "Myopic Solutions of Affine Dynamic Models," *Operations Research*, Vol. 38, pp. 847-853, 1990.
- [89a] "A Multi-Reservoir Model with a Myopic Optimum," pp. 309-315 in *Dynamic Programming for Optimal Water Resources Systems Analysis*, A. O. Esogbue ed., Prentice-Hall, Englewood Cliffs, NJ., 1989.
- [87a] "Queueing Theory," *The New Palgrave*, J. Eatwell, M. Milgate, and P. Newman eds., Vol. 4, pp. 29-32, Macmillan, London, 1987.
- [87b] "Discounted MDP's: Distribution Functions and Exponential Utility Maximization," (with K-J Chung), *SIAM Journal of Control & Optimization*. Vol. 25, No. 1, pp.49-62, 1987.
- [85a] "Maximal Mean/Standard Deviation Ratio in an Undiscounted MDP," *Operations Research Letters*, Vol. 4, No. 4, pp.157-159, 1985.
- [82a] "The Variance of Discounted Markov Processes," *Journal of Applied Probability*, Vol. 19, No. 2, pp.794-802, 1982.
- [82b] "The Optimality of Full-Service Policies," *Operations Research*, Vol. 30, No. 4, pp.636-649, 1982.
- [82c] "Stochastic Fishery Games with Myopic Equilibria," in *The Economics of Renewable Resource Management*, ed. by L. J. Mirman and D. J. Spulber, Elsevier-North Holland Publishing Co., pp.259-268, 1982.
- [81a] "Myopic Solutions of Markov Decision Processes and Stochastic Games," *Operations Research*, Vol. 29, No. 5, pp.995-1009, 1981.
- [80a] "Simple Inequalities for Multiserver Queues," *Management Science*, Vol. 26, pp.951-953, 1980.
- [80b] "Capital Accumulation and the Optimization of Renewable Resource Models," (with R. Mendelsohn), *Journal of Economic Theory*, Vol. 23, pp.243-260, 1980.
- [80c] "Stochastic Games, Oligopoly Theory, and Competitive Resource Allocation," (with M. Shubik), pp.89-104, *Dynamic Optimization and Mathematical Economics* edited by P. T. Liu. Plenum Publishing Corp., New York 1980.
- [80d] "Ordinal Sequential Games," *Économies et Sociétés*, Vol. XIV, pp.1571-1582, 1980.
- [77a] "Simply Solved Stochastic Games," *Systèmes Dynamiques et Modèles Économiques*, Editions du CNRS, Paris, pp.141-148, 1977.

- [76a] "Stability in Ecosystems: Semantics, Models, and Reality," (with D. B. Botkin), pp.239-250 in *The Biological Significance of Environmental Impacts*, ed. by R. K. Sharma, J. B. Buffington and J. T. McFadden, U.S. Nuclear Regulatory Commission, Washington, D.C., 1976.
- [76b] "Bayesian Games as Stochastic Processes," (with A. P. Sanghvi), *International Journal of Game Theory*, Vol. 5, Issue 1, pp.1-22, 1976.
- [75a] "Ordinal Dynamic Programming," *Management Science*, Vol. 21, No. 9, pp.967-975, 1975.
- [75b] "Reservoir Management Models," *Water Resources Research*, Vol. 11, No. 6, pp.767-776, 1975.
- [75c] "Stability in Time Varying Ecosystems," (with D. B. Botkin), *American Naturalist*, Vol. 109, No. 970, pp.625-646, 1975.
- [75d] "The Complexity of Ecosystem Stability," (with D. B. Botkin), pp.144-150 in *Ecosystem Analysis and Prediction*, ed. by S. A. Levin, Soc. for Indust. Appl. Math., Philadelphia, Pa. 1975.
- [74a] "Dynamic Oligopoly with Inventories," (with A. P. Kirman), *Econometrica*, Vol. 42, No. 2, pp.279-288, 1974.
- [74b] "Optimal Operation of Queues," *Mathematical Methods in Queueing Theory*. (ed.) A. B. Clarke, Springer-Verlag, pp.231-261, 1974.
- [73a] "Queueing Processes at Competing Service Facilities," *Management Science*, Vol. 19, No. 9, pp.985-1000, 1973.
- [73b] "Continuous Stochastic Games," *Journal of Applied Probability*, Vol. 10, pp.597-604, 1973.
- [71a] "Production Smoothing with Stochastic Demand II: Infinite Horizon Case," *Management Science*, Vol. 17, No. 11, pp.724-735, 1971.
- [71b] "Noncooperative Stochastic Games," *Annals of Mathematical Statistics*, Vol. 42, No. 6, pp.1930-1935, 1971.
- [71c] "Chebyshev Optimal Waste Discharges," *Operations Research*, Vol. 19, No. 2, pp.308-322, 1971.
- [70a] "Employment Smoothing (Capital Accumulation) with Production for Stochastic Demand," *Management Sciences*, Vol. 16, No. 5, pp.340-349, 1970.
- [70b] "Making Short-Run Changes in Production When the Employment Level is Fixed," *Operations Research*, Vol. 18, No. 1, pp. 35-51, 1970.

[70c] "Smoothing Start-Up and Shut-Down Costs: Concave Case," *Management Science*, Vol. 17, No. 1, pp.78-91, 1970.

[69a] "Optimal Average Cost Policy for a Queue with Start-Up and Shut-Down Costs," *Operations Research*, Vol. 17, No. 1, pp.145-162, 1969.

[69b] "Smoothing Start-Up and Shut-Down Costs in Sequential Production," *Operations Research*, 1969.

[69c] "Production Smoothing with Stochastic Demand I: Finite Horizon Case," *Management Science*, Vol. 16, No. 3, pp.195-207, 1969.

[65a] "Effect of Temperature on the Deoxygenation of a Polluted Estuary," (with D. Stolltenberg), *Journal of the Water Pollution Control Federation*, Vol. 37, No. 12, pp.1705-1715, 1965.

[65b] "Water Quality Improvement Programming Problems," *Water Resources Research*, Vol. 1, No. 4, pp.477-487, 1965.

[64a] "Estuarine Water Quality Management and Forecasting," (with R. V. Thomann, Jr.), *Journal of the Sanitary Engineering Division*, ASCE, Vol. 90, No. SA5, pp.9-36, 1964.

TECHNICAL REPORTS AND REFEREED CONFERENCE PROCEEDINGS

"Risk-Sensitive Dynamic Market Share Attraction Games: An Extended Abstract," with George E. Monahan, pp. 37-44 in Dynamic Competitive Analysis in Marketing, S. Jørgensen and G. Zaccour (eds.), Springer-Verlag, Berlin, 1996.

"Bounded Lot Sizes in Production Lines Facing Random Demand," Proceedings of the 1996 MSOM Conference (at the Amos Tuck School of Business Administration, Dartmouth College, Hanover, NH) INFORMS [Institute for Operations Research and the Management Sciences], pp. 52-57, 1996.

Status and Future of Salmon of Western Oregon and Northern California (with D. B. Botkin, K. Cummins, T. Dunne, H. Regier, L. Talbot, and L. Simpson), 671 pages, The Center for the Study of the Environment, Santa Barbara, CA, May 1995.

"Lot Sizes in Multistage Manufacturing," Facing the Challenges of Manufacturing, I. Kao and E. Pak eds., Symposium on Manufacturing Science and Technology, Dept. of Mechanical Engineering, SUNY Stony Brook, pp. 8-15, 1995.

"Simple Optimal Work Order Releases in Multistage Manufacturing," (with Charu Sinha), Proceedings of the First Conference of the ORSA Technical Section on Manufacturing

Management (at the Graduate School of Industrial Administration, Carnegie Mellon University, Pittsburgh, PA, June 27-28, 1994), ORSA [Operations Research Society of America], pp. 13-18, 1994.

DETAILS ON PREVIOUS LEADERSHIP RESPONSIBILITY

1. *Dean, W. Averell Harriman School for Management and Policy, State University of New York at Stony Brook.*

The School was the Harriman College of Urban and Policy Sciences until 1986 when its emphasis became business management. An undergraduate program began in 1988 and in 1992 the School's focus became management of high technology businesses. The School improved significantly although revenues from New York State funds stayed constant (adjusted for inflation) between 1991 and 1995.

1991-1995 Highlights

- Master's degree enrollment increased 40% (1992-1995).
- Created an executive master's degree program (Technology Management).
 - 25% of Harriman School revenue during 1996-1997.
- Undergraduate majors increased 170% (retained 3.0 GPA prerequisite).
- One-half of the faculty nationally recognized for research excellence:
 - Peter Drucker Prize, Sloan Foundation Fellows, Fullbright Fellow, Edelman Prize Honorable Mention, National Science Foundation grants.
- Research funding (includes SBDC) increased 170% to \$41,000/faculty member.
 - Industrial funding increased from 0 to 26% of the total.
- Created the first placement staff position late in 1992.
 - At least 95% placement of master's graduates in 1993, 1994, and 1995.
- Created an Office of External Relations.
- Initiated annual alumni reunion and newsletter.
- Numerous newspaper articles and television and radio interviews.
- Small Business Development Center was ranked best of 32 NY State SBDCs.
- Half of the graduate students were women.
- Among undergraduate majors, U.S. citizens of color increased from 2% to 13%.
- Percentage of tenured faculty who are women rose from 0% to 20%.

2. *Coordinator of management science and production and operations management, College of Management, Georgia Institute of Technology:*

This position involved leading the development and monitoring of undergraduate and graduate curricula, recruiting faculty, and securing external research funding. Most courses and curricula segments improved dramatically and peacefully. Staffing changed from four annual crises to an annual plan which emerged from a faculty consensus. Concentrations in undergraduate, master's and Ph.D. programs were clearly articulated.

The campus community in operations research changed from three hostile factions (Industrial and Systems Engineering, Mathematics, and Management) to a single cooperative group. There were joint faculty appointments, jointly listed courses, joint research programs, and campus-wide seminar series. The activities on campus and in the College became nationally visible and high in quality.

3. *Director of Graduate Studies, Dept. of Administrative Sciences, Yale University:*

This revolving position included responsibility for all details of the M.S. and Ph.D. programs. It entailed student recruitment, admission, financial support, monitoring academic progress, job placement, staffing graduate courses, negotiations with the Graduate School and, occasionally, with other professional schools and Yale College. Vigorous efforts to recruit women and minority students led to dramatic increases in their numbers in the graduate programs. Simultaneously, the overall numbers and quality of incoming students grew although fewer Yale fellowship dollars were made available. Aggregate student support was increased by vigorously soliciting faculty to procure research grants.

4. *Chief, Plans and Projection Unit, Delaware Estuary Study, Division of Supply and Pollution Control, U.S. Public Health Service (currently EPA, Department of Interior).*

A small group of engineers was supervised in operations research, engineering, and statistical analyses for a regional water quality improvement project. The Study's methodology and implementation tactics have influenced professional practice and have become classical pedagogical fare in public administration, environmental law, and civil engineering.

INFORMATION ON POSITIONS BEFORE 1967

University of Santa Clara: part-time teaching of undergraduate courses in economics.

University of California: part-time teaching of courses in probability and statistics.

Stanford Research Institute: part-time member of a group of operations research consultants. There were numerous projects in business and the public sector which designed and implemented systems for controlling financial and physical resources.

Western Electric Co., Inc.: member of corporate headquarters management science consultants. Design and implement systems in manufacturing, purchasing, finance, and national defense.

ACADEMIC SERVICE

Case Western Reserve University

Chair and Acting Chair, Department of Economics

Chair, Faculty Senate Research Committee

Chair, Department of Operations (previously Department of Operations Research & Operations Management)

Action Learning Committee, Weatherhead School of Management

Ph.D. Task Force, Weatherhead School of Management

President's Committee to Recruit a Dean of the Weatherhead School of Management

President's Committee to Recruit a Dean of the Case School of Engineering

Chair, Weatherhead School Appointments Committee

E-Business Advisory Board

University Advisory Committee on Research Computing

SUNY Stony Brook

Dean, W. Averell Harriman School for Management & Policy;
President's Task Force on Regional and Public Service;
President's Task Force on Federal Funding;
Chair of Search Committee for Associate Vice President for Development;
Chair of Search Committee for Dean of Social and Behavioral Sciences;
President's Ad Hoc Committee on Non-Academic Administration;
Search Committee for Chair of Mechanical Engineering;
Search Committee for Director of Institute for Decision Sciences;
Executive Committee of Search for Chair of Applied Mathematics and Statistics;
Executive Committee of Dept. of Applied Mathematics and Statistics;
Chair of Harriman School faculty search committees;
Originator and coordinator of campus operations research seminar;
Coordinate development of Harriman School Ph.D. proposal;
Provost's Environmental Sciences Task Force;
Committee on coordinating collections among SUNY System University libraries;
Executive Committee of College of Engineering and Applied Sciences;
Council to Promote Stony Brook.

Georgia Institute of Technology

Coordinator of management science, operations management, and info. systems;
Curriculum Committee (member and chair); Dean's Council; College Council;
Originator of campus seminar series: Applied Probability, Stochastic Optimization
Frequently taught courses in Industrial and Systems Engineering;
Computer Instruction Committee (College of Management);
Steering Committee, Institute Program in Computer-Integrated Manufacturing Sys.

Yale University

Director of Graduate Studies;
Coordinator of two Ph.D. areas: Stochastic Models and Interdisciplinary Applications of the
Administrative Sciences;
Director of Undergraduate Studies in Yale College interdepartmental major in Administrative Sciences,
Mathematics and Statistics;
Co-Coordinator of the master's degree concentration in Management Science;
Manage invited speakers' Workshop in Operations Research/Management Science;
Yale College Faculty; Yale Graduate Faculty; Fellow, Timothy Dwight College;
Member of approximately 30 Ph.D committees in Administrative Sciences, Anthropology, Engineering,
and Forestry;
Inst. for Social and Policy Studies seminars on "Quantitative Approaches to Environmental Quality."

PROFESSIONAL SOCIETY ACTIVITIES

MSOM Distinguished Fellow, 2014.

INFORMS Fellow, 2004.

Chair, 2004 Excellence in Expository Writing Award Committee, INFORMS

Chair, 1994 Lanchester Prize Committee, INFORMS.

Associate Editor of Management Science and Operations Research.

Chair, Program of Visiting Lecturers in Operations Research/Management Science sponsored by NSF, TIMS, and ORSA (latter two merged to form INFORMS).

Publications Committee, Institute of Management Science.

Chair many sessions and organize clusters at many national and international meetings.

Papers invited (more than 200) and delivered at universities and national and international meetings.

U.S. representative to NATO Meeting on Education and Training in Operations Research.

Committee on Joint Information Processing, Institute of Management Science and Operations Research Society of America (precursor to the merger that created INFORMS)

Atlanta chapter of the Institute of Management Science, various offices.

Referee many journal papers and proposals to government agencies.