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VITA

GORDON B. HAZEN

Professor Emeritus

CONTACT INFORMATION

Department of Industrial Engineering and Management Sciences
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PROFESSIONAL HISTORY AND EDUCATION

Professor Emeritus, 2015–present, Department of Industrial Engineering and Management Sciences, Northwestern University

Full Professor, 1999–2015, Department of Industrial Engineering and Management Sciences, Northwestern University

Associate Professor, 1987–1999, Department of Industrial Engineering and Management Sciences, Northwestern University

Assistant Professor, 1980–1987, Department of Industrial Engineering and Management Sciences, Northwestern University.

Ph.D., Industrial Engineering, Purdue University, 1980.

M.S., Statistics, Purdue University, 1975.

B.S., *Summa Cum Laude*, Mathematics, University of North Dakota, 1971.

RESEARCH INTERESTS

Decision analysis methodology, utility and preference theory, medical decision analysis, cost-effectiveness analysis of medical treatment decisions.

PUBLICATIONS

SUBMITTED

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BOOKS

1. G.B. Hazen, *Probability: An Introduction with Applications*. 2005. 559 pages.

PUBLISHED IN REFEREED JOURNALS

2. GB Hazen and CA Magni. Average internal rate of return for risky projects (2021). *The Engineering Economist*, **66**(2), 90-120.
ISSN: 0013-791X , 1547-2701; DOI: 10.1080/0013791X.2021.1894284.
3. E Borgonovo, GB. Hazen, Victor Richmond R. Jose, E Plischke (2021). Probabilistic sensitivity measures as information value. *European Journal of Operational Research* **289** (2021), 595–610.
4. Vikram Kilambi, PhD, Kevin Bui, MS, Gordon B. Hazen, PhD, John J. Friedewald, MD, Daniela P. Ladner, MD/MPH, Bruce Kaplan, MD, and Sanjay Mehrotra, PhD, (2019) “Evaluation of Accepting Kidneys of Varying Quality for Transplantation or Expedited Placement With Decision Trees”. *Transplantation* **103** (5), 980-989.
5. Shuai Xu, MD, MSc; Supriya Immaneni, BA; Gordon B. Hazen, PhD; Jonathan I. Silverberg, MD, PhD, MPH; Amy S. Paller, MD; Peter A. Lio, MD. Cost-effectiveness of Prophylactic Moisturization for Atopic Dermatitis. *JAMA Pediatrics* 2017;171(2).
6. Borgonovo, E., Hazen, G. B. and Plischke, E. (2016), A Common Rationale for Global Sensitivity Measures and Their Estimation. *Risk Analysis*, **36**: 1871–1895.
doi:10.1111/risa.12555.
7. G.B. Hazen, D. Apley, N. Parikh (2017), ANOVA models for Brownian motion. *Communications in Statistics – Theory and Methods* **46**:15, 7642-7660.
<http://dx.doi.org/10.1080/03610926.2016.1158834>.
8. Skaro, Anton I MD, PhD; Hazen, Gordon DPhil; Ladner, Daniela MD, MPH; Kaplan, Bruce MD. “Organ Transplantation: An Introduction to Game Theory”. *Transplantation* **99** (2015) 7, 1316–1320.

9. Chang Y, Gallon L, Jay C, Ho B, Shetty K, Levitsky J, Baker T, Ladner D, Friedewald J, Abecassis M, Hazen G, Skaro AI. “Comparative Effectiveness of Liver Transplant Strategies for End-Stage Liver Disease Patients on Renal Replacement Therapy.” *Liver Transplantation* **20** (2014) 1034-44.
10. G.B. Hazen, “Sensitivity Analysis via Information Density”, *Decision Analysis Today* **33** (2014), 1 (May), 24-29.
11. Detlof von Winterfeldt, Robert Kavet, Stephen Peck, Mayank Mohan, Gordon Hazen, “The Value of Environmental Information without Control of Subsequent Decisions”. *Risk Analysis* **32** (2012) 12, 2113-2132
12. Daniela P. Ladner, MD, MPH, Estella M. Alonso, MD, Zeeshan Butt, PhD, Juan Carlos Caicedo, MD, David Cella, PhD, Amna Daud, MD, MPH, John J. Friedewald, MD, Elisa J. Gordon, PhD, MPH, Gordon B. Hazen, PhD, Bing T. Ho, MD, MPH, Kathleen R. Hoke, BA, Jane L. Holl, MD, MPH, Michael G. Ison, MD, Ray Kang, MS, Sanjay Mehrotra, PhD, Luke B. Preczewski, Olivia A. Ross, MBA, MPH, Pamela H. Sharaf, BS, Anton I. Skaro, MD, PhD, Edward Wang, PhD, Michael S. Wolf, PhD, MPH, Donna M. Woods, EdM, PhD,⁷ and Michael M. Abecassis, MD, MBA, “NUTORC—a transdisciplinary health services and outcomes research team in transplantation”, *Transl Behav Med.* 2012 Dec;2(4):446-458.
13. Colleen L. Jay, MD, Anton I. Skaro, MD, PhD, Daniela P Ladner, MD, MPH, Vadim Lyuksemburg, BS, Raymond Kang, Hongmei Xu, BS, Jane L. Holl, MD, MPH, Michael M. Abecassis, MD, MBA, Gordon B Hazen, PhD,. “Comparative Effectiveness of Donation After Cardiac Death Versus Donation After Brain Death Liver Transplantation: Recognizing Who Can Benefit”, *Liver Transplantation* **18**(6):630-640, 2012.
14. G.B. Hazen and Zhe Li, “Cohort Decomposition for Markov Cost-Effectiveness Models”, *Med Decis Making* **31** (2011) 1 (January/February) 19-34.
15. C L Jay, A I Skaro, D P Ladner, V Lyuksemburg, R Kang, R Xu, G B Hazen, M M Abecassis, “The incremental benefit of donation after cardiac death liver transplantation according to candidate disease severity: a decision analysis“, *Journal of Surgical Research*; **158**(2):204 (2010).
16. Schwartz A, Hazen G, Leifer A, Heckerling PS. (2009), “Development of goal-sensitive health-related utility assessment procedures”, *Medical Decision Making*, **29** (5) 590-598.
17. G.B. Hazen and A. Schwartz (2009), “Incorporating Extrinsic Goals into Decision and Cost-Effectiveness Analyses”, *Medical Decision Making* **29** (5) 580-589.
18. G.B. Hazen (2009), “An Extension of the Internal Rate of Return to Stochastic Cash Flows”, *Management Science* **55** (6) 1030-1034.
19. Schwartz A, Hazen G, Leifer A, Heckerling PS. (2008) “Life goals and health decisions

- What will people live (or die) for?”, *Medical Decision Making* **28** (2) 209-219.
20. A. Schwartz, J. Goldberg and G.B. Hazen (2008), “Prospect theory reference points and health decisions”, *Judgment and Decision Making* **3**(2), 174-180.
 21. G.B. Hazen (2007), “Adding Extrinsic Goals to the QALY Model”, *Decision Analysis* **4** (1) 3–16.
 22. G.B. Hazen and Min Huang (2006), “Parametric Sensitivity Analysis Using Large-Sample Approximate Bayesian Posterior Distributions”. *Decision Analysis* **3** (4) 208-219.
 23. G.B. Hazen and Min Huang (2006), “Large-Sample Bayesian Posterior Distributions for Probabilistic Sensitivity Analysis”, *Medical Decision Making* **26** (5), 512-534.
 24. G.B. Hazen, “Dynamic Influence Diagrams: Applications to Medical Decision Modeling” (invited), in M.L. Brandeau, F. Sainfort, and W.P. Pierskalla, Eds., *Operations Research and Health Care: A Handbook of Methods and Applications*, Kluwer Academic Publishers, 2004.
 25. G.B. Hazen (2004), “Multiattribute Structure for QALYs”, *Decision Analysis* **1** (4), 205-216.
 26. J.C. Felli and G.B. Hazen (2004), “Javelin Diagrams: A Graphical Tool for Probabilistic Sensitivity Analysis”, *Decision Analysis* **1** (2), 93–107.
 27. G.B. Hazen (2003), “A New Perspective on Multiple Internal Rates of Return”, *The Engineering Economist* **48**, 31-51.
 28. G.B. Hazen (2002) “Stochastic Trees and the StoTree Modeling Environment: Models and Software for Medical Decision Analysis”, *Journal of Medical Systems* **26**, 399-413.
 29. G.B. Hazen (2000), "Preference Factoring for Stochastic Trees" *Management Science* **46**, 389-403.
 30. G.B. Hazen and J. Souderpandian (1999), "Lottery Acquisition versus Information Acquisition: Prices and Preference Reversals" *Journal of Risk and Uncertainty* **18**, 125-136.
 31. J.C. Felli and G.B. Hazen (1999), “Do Sensitivity Analyses Really Capture Problem Sensitivity? An Empirical Analysis Based on Information Value” *Risk, Decision and Policy* **4**, 79-98.
 32. J.C. Felli and G.B. Hazen (1998), "A Bayesian Approach to Sensitivity Analysis", *Electronic Health Economics Letters* Volume 2, No. 4, pp. 14–21. Also in *Health Economics Letters* **8** (1999), 263-268.
 33. G.B. Hazen, J.M. Pellissier and J. Souderpandian (1998), "Stochastic tree models in

- medical decision making", *Interfaces* **28**, 64-80.
34. J.C. Felli and G.B. Hazen (1998), "Sensitivity Analysis and the Expected Value of Perfect Information", *Medical Decision Making* **18**, 95-109. (Errata in volume 21 (2001) 3, p. 254, and volume 23 (2003) 1, p. 97.)
 35. G.B. Hazen and J.M. Pellissier (1996), "Recursive Utility for Stochastic Trees", *Operations Research* **44**, 788-809.
 36. J.M. Pellissier, G.B. Hazen and R.W. Chang (1996), "A Continuous-Risk Decision Analysis of Total Hip Replacement", *Journal of the Operational Research Society* **47**, 776-793.
 37. J.C. Felli and G.B. Hazen (1996), "Information Value and Decision Sensitivity", *Annual Review of Communications* **49**, 243-254.
 38. R.W. Chang, J.M. Pellissier and G.B. Hazen (1996), "A Cost-Effectiveness Analysis of Total Hip Arthroplasty for Osteoarthritis of the Hip", *Journal of the American Medical Association* **275**, 858-865.
 39. J.M. Pellissier and G.B. Hazen (1994), "Implementation of Continuous-Risk Utility Assessment: The Total Hip Replacement Decision", *Socio-Economic Planning Sciences* **28**, 251-276.
 40. G.B. Hazen (1993), "Factored Stochastic Trees: A Tool for Solving Complex Temporal Medical Decision Models," *Medical Decision Making* **13**, 227-236.
 41. R.F. Bordley and G.B. Hazen (1992), "Nonlinear Utility Models Arising from Unmodelled Small World Correlations," *Management Science* **38**, 1010-1017.
 42. G.B. Hazen (1992), "Stochastic Trees: A New Technique for Temporal Medical Decision Modeling," *Medical Decision Making* **12**, 163-178.
 43. G.B. Hazen, W.J. Hopp and J.M. Pellissier (1991), "Continuous-Risk Utility Assessment in Medical Decision Making," *Medical Decision Making* **11**, 294-304.
 44. R.F. Bordley and G.B. Hazen (1991), "SSB and Weighted Linear Utility as Expected Utility with Suspicion," *Management Science* **37**, 396-408.
 45. G.B. Hazen and J.S. Lee (1990), "Ambiguity Aversion in the Small and in the Large for Weighted Linear Utility," *Journal of Risk and Uncertainty* **4**, 177-212.
 46. G.B. Hazen (1990), "Murder of the Likelihood Principle: A Comment," *Journal of Behavioral Decision Making* **3**, 87-89.
 47. G.B. Hazen (1989), "Ambiguity Aversion and Ambiguity Content in Decision Making Under Uncertainty," *Annals of Operations Research* **19**, 415-434.
 48. G.B. Hazen (1988), "Differential Characterizations of Nonconical Dominance in

- Multiple Objective Decision Making," *Mathematics of Operations Research* **13**, 1 (Feb) 174-189.
49. G.B. Hazen (1987a), "Subjectively Weighted Linear Utility," *Theory and Decision* **23**, 261-282.
 50. G.B. Hazen (1987b), "Does Rolling Back Decision Trees Really Require the Independence Axiom?," *Management Science* **33**, 6 (June) 807-809.
 51. G.B. Hazen (1986), "Partial Information, Dominance, and Potential Optimality in Multiattribute Utility Theory," *Operations Research* **34** 2 (Mar) 296-310.
 52. G.B. Hazen and T.L. Morin (1984), "Steepest Ascent Algorithms for Nonconical Multiple Objective Programming," *Journal of Mathematical Analysis and Applications* **100**, 1 (Apr) 188-221.
 53. G.B. Hazen and T. L. Morin (1983) "Nonconical Optimality Conditions: Some Additional Results", *Journal of Optimization Theory and Applications* **41**, 4 (Dec) 619-623.
 54. G.B. Hazen (1983), "Preference Convex Unanimity in Multiple Criteria Decision Making," *Mathematics of Operations Research* **8**, 4 (Nov) 505-516.
 55. G.B. Hazen and with T. L. Morin (1983), "Optimality Conditions in Nonconical Multiple Objective Programming," *Journal of Optimization Theory and Applications* **40**, 1 (May) 25-60.
 56. V. Akileswaren, G.B. Hazen and T. L. Morin (1983), "Complexity of the Project Sequencing Problem," *Operations Research* **31**, 4 (July), 772-778.
 57. G.B. Hazen and A. A. B. Pritsker (1980), "Formulas for the Variance of the Sample Mean in Finite State Markov Processes," *Journal of Statistical Computation and Simulation* **12**, 25-40.

PUBLISHED CONFERENCE PROCEEDINGS

58. G.B. Hazen and J. Sounderpandian (1999), "Preference Summaries for Stochastic Tree Rollback", pp. 109-120 in *Beliefs, Interactions and Preferences in Decision Making* edited by Mark J. Machina and Bertrand Munier, Kluwer Academic Publishers, Dordrecht, Netherlands.
59. G.B. Hazen and J. Sounderpandian (1997), "Stochastic Trees and Medical Decision Making", in *Economic and Environmental Risk and Uncertainty: New Models and Methods*, Robert Nau, Erik Gronn, Mark Machina, Olvar Bergland (eds), Kluwer Academic Press, Dordrecht, Netherlands.
60. R.F. Bordley and G.B. Hazen (1992b), "Intertemporal Risk-Aversion and Calibration Uncertainty May Explain Violations of the Independence Axiom," in *Decision Making*

Under Risk and Uncertainty: New Models and Empirical Findings, J. Geweke (Ed.), Kluwer Academic Publishers, Dordrecht, The Netherlands.

61. G.B. Hazen (1992b), "Decision Versus Policy: An Expected Utility Resolution of the Ellsberg Paradox," in *Decision Making Under Risk and Uncertainty : New Models and Empirical Findings*, J. Geweke (Ed.), Kluwer Academic Publishers, Dordrecht, The Netherlands.
62. R.W. Chang, G.B. Hazen, J. Felli, J.T. Schousboe, and L.M. Manheim (1992) "The Economic Implications of the Prevention of Gouty Attacks", *Clin Res* 40: 371A.
63. G.B. Hazen (1985), "Partial Preference Information and First Order Differential Optimality: An Illustration," pp. 153-157 in *Proceedings of the VIth International Conference on Multiple-Criteria Decision Making (MCDM)*, Y. Y. Haimes and V. Chankong (Eds.), Springer-Verlag.
64. G.B. Hazen, T. L. Morin and A. H. El-Abiad (1980), "Pathology of Generation Planning Evaluation Indices," abstract in *IEEE Transactions PAS* 99, p. 1319; full paper in *IEEE Power Engineering Society Winter Meeting 1980*, Text of "A" Papers, No. A 80 017-4, pp. 1-7.

UNPUBLISHED MANUSCRIPTS

65. G.B. Hazen. "Augmenting Cohort Analysis to Compute (Co-)Variances: Implications for Strength of Cost-Effectiveness". January 2021.
66. G.B. Hazen. "Uncertainty Aversion under Subjective Expected Utility with Multiple Impacts". August 2015.

PROFESSIONAL ACTIVITIES

Decision Analysis Area Editor for *Operations Research* (2006 through 2011)

Editorial Board, *Decision Analysis* (2003 to present)

Editorial Board, *Medical Decision Making* (1999 – 2009)

Associate Editor for *Operations Research*. (1994 to 2005).

Associate Editor for *Naval Research Logistics* (1999 to 2005)

Associate Editor for *Management Science* (1989 – 94).

Scientific Review Committee (abstract reviews) for 24th Annual Meeting of the Society for Medical Decision Making, 2002 (Baltimore).

Panel Member, Operations Research Program, Division of Civil, Mechanical and Manufacturing Innovation, National Science Foundation, Spring 2010.

Panel Member, Decision Risk and Management Science Program, Division of Social and Economic Sciences, National Science Foundation, 1994 – 97.

Council member, Special Interest Group on Decision Analysis, Operations Research Society of America, 1990 – 93.

Referee, *Management Science*, *Operations Research*, *Journal of Optimization Theory and Applications*, *IEEE Transactions on Engineering Management*, *IEEE Transactions on Systems, Man, and Cybernetics*, *Journal of Behavioral Decision Making*, *Opsearch*, *Mathematics of Operations Research*, National Science Foundation.

Session Chair "Model Structuring and Sensitivity", (Decision Analysis Cluster) ORSA/TIMS Joint National Meeting, Detroit, Fall 1994.

Administrative chair, TIMS/ORSA Joint National Meeting, Chicago, May 1993.

Session Cluster Organizer for the Decision Analysis Special Interest Group, TIMS/ORSA Joint National Meeting, Chicago, May 1993: Organized 10 sessions.

Session Chair, Decision Analysis Cluster, TIMS/ORSA Joint National Meeting, Nashville, May 1991.

Associate Editor for Naval Research Logistics Quarterly 35 (1988) 6 (Dec) special issue on Multiple Criteria Decision Making.

Session Cluster Organizer for Multicriteria Optimization, ORSA/TIMS Joint National Meeting, St. Louis, November 1987.

Session Chair, Multicriteria Decision Making, TIMS/ORSA Joint National Meeting, New Orleans, May 1987.

Session Chair, Multi-Criteria Optimization, TIMS/ORSA Joint National Meeting, Chicago, April 1983.

Session Chair, Multi-Objective Programming, TIMS/ORSA Joint National Meeting, Detroit, Michigan, April 1982.

Member, Operations Research Society of America, The Institute of Management Sciences, Society for Industrial and Applied Mathematics, Society for Medical Decision Making.

AWARDS

Operations Research 2004 Meritorious Service Award. In recognition of timely and high-quality work as a Referee and Associate Editor for *Operations Research* during 2004 (September 2005).

Operations Research 2003 Meritorious Service Award. In recognition of timely and high-quality work as a Referee and Associate Editor for *Operations Research* during 2003 (August 2004).

Operations Research 2002 Meritorious Service Award. In recognition of timely and high-quality work as a Referee and Associate Editor for *Operations Research* during 2002 (October 2003).

Operations Research 2001 Meritorious Service Award. In recognition of timely and high-quality work as a Referee and Associate Editor for *Operations Research* during 2001 (September 2002).

Operations Research 2000 Meritorious Service Award. In recognition of timely and high-quality work as a Referee and Associate Editor for *Operations Research* during 2000.

Operations Research 1997 Meritorious Service Award. In recognition of timely and high-quality work as a Referee and Associate Editor for *Operations Research* during 1997.

1996 *Publication Award* from the Decision Analysis Society of INFORMS received October 26, 1998 for the paper "Recursive Utility for Stochastic Trees" by G.B. Hazen and J.M. Pellissier, *Operations Research* **44** (1996) 788–809.

Operations Research 1996 Meritorious Service Award. In recognition of timely and high-quality work as a Referee and Associate Editor for *Operations Research* during 1996.

Choice Under Uncertainty, edited by Peter C. Fishburn and Irving H. LaValle received the 1991 Decision Analysis Publication Award. I was one of the contributing authors.

Associated Student Government Faculty Honor Roll, Northwestern University, 1990-91.

LECTURES AND CONFERENCE PAPERS

Bradley D Allen, Mark L Schiebler, Hans-Ulrich Kauczor, Jürgen Biederer, Timothy J Kruser, Nisha A Mohindra, David D Odell, James C Carr, and Gordon B Hazen, "Markov Model of Lung Cancer Screening Demonstrates Equivalent Lung Cancer Detection using either Lung MRI or Low-Dose CT Screening Strategies", Joint Annual Meeting ISMRM-ESMRMB, June 16-21 2018, Paris.

Gordon Hazen, "Portable, Transparent Markov Modeling for Medical Cost-Effectiveness", ORAHS, University of Bath, England, August 2017.

Gordon Hazen, "Transparent and Portable Markov Modeling for Medical Cost-Effectiveness", INFORMS Healthcare Rotterdam, July 2017.

Gordon Hazen, "Transparent Markov Modeling for Medical Decision Making", INFORMS

Computing, Austin TX, January 2017.

Gordon Hazen, “Liver Transplant Waitlist Equilibria via Stochastic Games”, INFORMS Healthcare Nashville, July 2015.

Gordon Hazen, “Prescriptive modeling of ambiguity aversion: Is it necessary?”, INFORMS San Francisco, November 2014.

Gordon Hazen, “What you might not know about information value”, INFORMS Minneapolis, October 2013.

Gordon Hazen, Zhe Li, Anton Skala, James Schummer, “Stochastic Game Models for the Liver Transplant Waitlist”, INFORMS Minneapolis, October 2013.

“Should National Policymakers Augment Marginal Liver Transplants: A Population Game Approach”, Zhe Li, MS, Anton Skaro, MD PhD, James Schummer, PhD, Gordon Hazen, PhD Poster Session, American Transplant Congress, Seattle, Washington, May 2013.

Joshua Cahan BA, Talia Baker MD, Neehar Parikh MD, Michael Abecassis MD, Gordon Hazen PhD “Simulating Hepatocellular Carcinoma Growth: A Report on Progress Towards a Comprehensive Decision Analysis Model” Rosalind Franklin University of Medicine and Science All School Research Consortium, March 20, 2013.

Neehar D. Parikh MD, Talia Baker MD, Daniela P. Ladner MD, Anton Skaro MD, Joshua Cahan, Riad Salem MD, Laura Kulik MD, Mary Mulcahy MD, Michael Abecassis MD, Gordon Hazen PhD. “A Probabilistic Model of the Natural History of Hepatocellular Carcinoma”. 63rd Annual Meeting of the American Association for the Study of Liver Diseases, Boston Massachusetts, November 9-13, 2012.

Gordon Hazen, Daniel Apley, Neehar Parikh MD, Talia Baker MD. “Random Effects ANOVA for Testing Heterogeneity of Brownian Motion Cancer Growth”, INFORMS Annual Meeting, Phoenix, Arizona, 2012.

Zhe Li, Gordon Hazen, James Schummer, Anton Skaro MD. “Population Games in Liver Transplant Society”. INFORMS Annual Meeting, Phoenix Arizona, 2012.

Neehar Parikh MD, Talia Baker MD, Gordon Hazen, Daniela Ladner, MD “A Probabilistic Model of the Natural History of Hepatocellular Carcinoma”, 2012 Annual Meeting, American Association for the Study of Liver Diseases, November 9-13, 2012, Boston, MA

Gordon Hazen, “Markov versus Medical Markov Modeling – Contrasts and Refinements”, Texas A&M University, February 2012 (invited).

Gordon Hazen, Robert Kavet, Mayank Mohan, Detlot von Winterfeldt, “The value of information with and without control”, INFORMS Annual Meeting, Charlotte, North Carolina, November 2011.

Zhe Li, Gordon Hazen, James Schummer, Anton Skaro, “Stochastic Game Models on Organ

Acceptance in Liver Transplant”, INFORMS Annual Meeting, Charlotte, North Carolina, November 2011.

“Perspectives on Decision Analysis Paper Submissions in *Operations Research*”, Decision Analysis: Visions for the Future. National Science Foundation – Decision Risk and Management Science (DRMS) Workshop, Menlo Park, California, October 2011.

“Aspects of Medical Decision Making”, Decision Analysis: Visions for the Future. National Science Foundation – Decision Risk and Management Science (DRMS) Workshop, Menlo Park, California, October 2011.

“Transplant Censoring and the Natural History Of MELD via EM Estimation”, Gordon Hazen, Zhi Li, Anton Skaro MD, *33rd Annual Meeting of the Society for Medical Decision Making*, October 22-26, 2011, Chicago.

“The Natural History of MELD”, Gordon Hazen, Zhe Li, *INFORMS Healthcare 2011*, Montreal, Canada, June 2011.

“The Societal Impact of Augmenting Donation after Cardiac Death Livers – Evaluating the Queue”, Anton I. Skaro, Toukam Ngoufanke, Colleen L. Jay, Daniela P. Ladner, Vadim Lyuksemburg, Michael M. Abecassis, Gordon B. Hazen, *American Transplant Congress*, Philadelphia, May 2, 2011

“The Societal Impact of Augmenting Donation after Cardiac Death Livers – Evaluating the Queue”, Anton I. Skaro, Toukam Ngoufanke, Colleen L. Jay, Daniela P. Ladner, Vadim Lyuksemburg, Michael M. Abecassis, Gordon B. Hazen, *Seventh Annual Lewis Landsberg Research Day*, Northwestern University, April 7, 2011.

“The Natural History of MELD”, Northwestern University Transplant Outcomes Research Collaborative Seminar Series, July 19, 2010.

“Impact of regional transplant rate disparities on modeling MELD progression for liver transplants”, Northwestern University Transplant Outcomes Research Collaborative Seminar Series, June 7, 2010.

“MELD Modeling for Liver Allocation”, Northwestern University Transplant Outcomes Research Collaborative Seminar Series, May 10, 2010.

Colleen Jay, Anton Skaro, Daniela Ladner, Vadim Lyuksemburg, Raymond Kang, Gordon Hazen, Michael Abecassis. The incremental Benefit of Donation after Cardiac Death Liver Transplantation According to Candidate Disease Severity: A Decision Analysis. Presented at Association for Academic Surgery/Society of University Surgeons: Academic Surgical Congress: San Antonio, TX; February 3-5, 2010.

Yaojen Chang, Colleen Jay, Edward Wang, Vadim Lyuksemburg, Daniela Ladner, Jane Holl, Gordon Hazen, Larry Manheim, Michael Abecassis, Anton Skaro. Evaluation of Candidate Guidelines for Combined Liver and Kidney (CLK) Transplantation – A Comparative Effectiveness Analysis. Presented at American Association for the Study of Liver Diseases

(AASLD): The Liver Meeting; Boston, MA; October 29 – November 2, 2010.

“Cohort Decomposition for Medical Cost-Effectiveness”, with Zhe Li, *31st Annual Meeting of the Society for Medical Decision Making*, Hollywood (Los Angeles) California, October 2009.

“Life Goals: A Challenge for Quality Measurement in Medical Cost-Effectiveness Analyses”, (Invited) Institute for Healthcare Studies Seminar Series, Northwestern University, January 2009.

“Trading life and health for goals”, Schwartz A, Leifer A, Hazen G, Heckerling, P. *Society for Judgment and Decision Making*, Chicago, IL, November 2008.

"Incorporating Extrinsic Goals Into Decision And Cost-Effectiveness Analyses", *30th Annual Meeting of the Society for Medical Decision Making*, Philadelphia, October 2008.

“Incorporating Extrinsic Goals into Decision and Cost-Effectiveness Analyses” (Invited), *Lectures in Industrial Engineering and Management Sciences*, Northwestern University, September 30, 2008.

“Life Goals: A Challenge for Quality Measurement in Medical Decision Making” (Invited), *Systems Engineering & Operations Research in Health Care*, Mayo Clinic, Rochester Minnesota, September 2008.

“Incorporating Extrinsic Goals Into Cost-effectiveness Analyses”, (Invited) Robert H. Lurie Comprehensive Cancer Center, Northwestern University, July 2008.

“Incorporating Extrinsic Goals Into Cost-effectiveness Analyses for Technology Assessment”, with Min Huang, *INFORMS Annual Meeting*, Seattle, 2007.

“Internal Rate of Return for Random Cash Flows”, *INFORMS Annual Meeting*, Seattle, 2007.

“Averaging Standard-gamble or Time-tradeoff Utilities Across Health Attributes is Incoherent”, *INFORMS Midwest Regional Conference*, Evanston IL, August 2007.

"Life goals and health decisions – what will people live (or die) for?" Schwartz A, Leifer, A, Hazen G, Heckerling, P. *Society for Judgment and Decision Making annual meeting*, Houston, TX, November 2006.

“Extending Medical Preference Models to Include Lifetime Goals”, *INFORMS Annual Meeting*, Pittsburgh, November 2006.

“Panel Discussion: Decision Analysis: Foundations in Mathematics, Science, and Engineering”, *INFORMS Annual Meeting*, Pittsburgh, November 2006.

“Population Equilibrium Methods for Medical Decision Making”, presented by Min Huang, *INFORMS Annual Meeting*, Pittsburgh, November 2006.

“Adding Extrinsic Goals to the QALY Model: Incorporating Goals That Are Not Time Modulated”, *Chicago Center of Excellence in Health Promotion Economics – Health Economics*

Workshop, October 2006.

“Markov Chain Population Models for Medical Decision Making”, presented by Min Huang, INFORMS Annual Meeting, San Francisco, November 2005.

“Equilibrium Population Methods for Markov Models of Health Interventions”, with Min Huang, *27th Annual Meeting of the Society for Medical Decision Making*, San Francisco, October 2005.

“A Recipe For Incoherence: Averaging Time-Tradeoff Or Standard-Gamble Utilities Across Health Attributes”, *26th Annual Meeting of the Society for Medical Decision Making*, Atlanta, October 2004.

“Bayesian Posterior Distributions For Probabilistic Sensitivity Analysis”, *26th Annual Meeting of the Society for Medical Decision Making*, Atlanta, October 2004.

“Parametric Sensitivity Analysis For Cancer Survival Models Using Large-Sample Normal Approximations To The Bayesian Posterior Distribution”, *26th Annual Meeting of the Society for Medical Decision Making*, Atlanta, October 2004.

“Extending The Qaly Model To Incorporate Goals That Are Not Time Modulated”, Plenary Session, *26th Annual Meeting of the Society for Medical Decision Making*, Atlanta, October 2004.

“Multiattribute Structure for QALYs”, *Society for Medical Decision Making Annual Meeting*, Chicago, October 2003.

"Factored Stochastic Tree Modeling for Medical Decision Making", G.B. Hazen, Department of Bioinformatics and Biostatistics, School of Public Health and Information Sciences, University of Louisville, Louisville, Kentucky (invited), March 2003.

“StoTree: Excel-based software for formulating and solving stochastic tree models for medical decision analysis”, G.B. Hazen, Department of Bioinformatics and Biostatistics, School of Public Health and Information Sciences, University of Louisville, Louisville, Kentucky (invited workshop), March 2003.

“Stochastic Tree Modeling for Effectiveness and Cost-Effectiveness”, (short course) G.B. Hazen, *Society for Medical Decision Making Annual Meeting*, Baltimore, October 2002.

“Ovarian Cancer Screening in Average and High-Risk Women: Effectiveness Accounting for Quality of Life”, G.B. Hazen, D.G. Dobrez, *Society for Medical Decision Making Annual Meeting*, October 2001. Abstract in *Medical Decision Making* **21** (2001), 523.

"Stochastic Trees in Medical Decision Modeling", (invited) INFORMS Salt Lake City, May 2000.

"Decision Analysis - Where Do we Go From Here?", (invited) panel discussion, INFORMS Philadelphia, November 1999.

"Patient Values in the Treatment of Ductal Carcinoma in Situ", GB Hazen, M Morrow, ER

Venta, *Society for Medical Decision Making Annual Meeting*, Reno, Nevada, October 1999.
Abstract in *Medical Decision Making* **19** (1999), 534.

"Factored stochastic tree modeling for medical decision making", GB Hazen, JM Pellissier and RW Chang, Harvard School of Public Health (invited), March 1999.

"A Cost-Effectiveness Modeling Effort For Arthritic Joint Replacement Decisions", GB Hazen, JM Pellissier, RW Chang, *Society for Medical Decision Making Annual Meeting*, Boston, October 1998.

"Effects of Future Costs on the Cost-Effectiveness of Life Extension and Quality of Life Improvement Among the Elderly", D. Meltzer, G. Hazen, M. Johanesson, I. Abdalla, R. Chang, A. Elstein, A. Schwartz. , *Society for Medical Decision Making Annual Meeting*, Boston, October 1998.

"History-Remembering Utility Rollback for Stochastic Tree Models", G.B. Hazen and Jay Sounderpandian, INFORMS Dallas, October 1997.

"State-Trajectory Preference Summaries for Stochastic Tree Rollback", G.B. Hazen and J. Sounderpandian, 8th International Conference on the Foundations and Applications of Utility, Risk and Decision Theory, Mons, Belgium, July 1997.

"Bayesian Sensitivity Analysis", George Mason University, April 16, 1997.

"Why Not Bayesian Sensitivity Analysis?", G.B. Hazen, 35th Annual Bayesian Research Conference, Los Angeles, February 20-22, 1997

"Stochastic Tree Modeling", G.B. Hazen, J. Sounderpandian and J.M Pellissier, INFORMS Atlanta, November 1996.

"Do Sensitivity Analyses Really Capture Problem Sensitivity: An Empirical Analysis Based on Information Value", J.C. Felli and G.B. Hazen, INFORMS Atlanta, November 1996.

"Indifference Need Not Determine One's Risk Attitude Parameter", INFORMS New Orleans, October 1995.

"The Implications Of New Technology On The Cost-Effectiveness Of Total Joint Replacement" with James M. Pellissier and Rowland W. Chang, Society for Medical Decision Making annual meeting, Tempe, Arizona, October 1995.

"Expected value of perfect information as a sensitivity analysis tool", with James Felli, TIMS/ORSA Joint National Meeting, Detroit, October 1994.

"Coxian mortality factors for stochastic tree modeling" with James M. Pellissier, Society for Medical Decision Making annual meeting, Cleveland, October 1994.

"Risk-Sensitive Stochastic Tree Models For Temporal Medical Decisions", TIMS/ORSA Joint National Meeting, Boston, April 1994.

"Stochastic Trees and Medical Decision Making", FUR VII, Norwegian School of Management, Oslo, Norway, June 1994.

"Recursive Utility for Stochastic Trees," Fuqua School of Business, Duke University, Durham, North Carolina, October 1993.

"A Cost-Effectiveness Analysis Of Total Hip Arthroplasty For Osteoarthritis Of The Hip", with Rowland W. Chang and James M. Pellissier, *Clinical Research* **41** No. 235A, National Meeting, Washington D.C., April 1993.

"Recursive Utility for Stochastic Trees," TIMS/ORSA Joint National Meeting, Chicago, May 1993.

"Aggregation Error in Fault Tree Modeling," ORSA/TIMS Joint National Meeting, San Francisco, November 1992.

"Stochastic Trees and Stochastic Factoring in Medical Decision Modeling," Society for *Medical Decision Making* Annual Meeting, Rochester, October 1991.

"Ambiguity Aversion as Risk Aversion in a Policy Setting," TIMS/ORSA Joint National Meeting, Nashville, May 1991.

"Risk-Sensitive Markov Decision Processes," TIMS/ORSA Joint National Meeting, Nashville, May 1991.

"Decision versus Policy: An Expected Utility Resolution of the Ellsberg Paradox," Fifth International Conference on the Foundation and Applications of Utility, Risk, and Decision Theories, Duke University, June 1990.

"SSB and Weighted Linear Utility as Expected Utility with Suspicion," with Robert F. Bordley, Fifth International Conference on the Foundation and Applications of Utility, Risk, and Decision Theories, Duke University, June 1990.

"Intertemporal Risk-Aversion and Calibration Uncertainty May Explain Independence Violations," with Robert F. Bordley, Fifth International Conference on the Foundation and Applications of Utility, Risk, and Decision Theories, Duke University, June 1990.

"Local Ambiguity Attitude and Increasing Ambiguity Aversion," TIMS/ORSA Joint National Meeting, Las Vegas, May 1990.

"EU Theory and Calibration Uncertainty Imply Elation/Disappointment", with Robert F. Bordley, TIMS/ORSA Joint National Meeting, Las Vegas, May 1990.

"SSB and Weighted Linear Utility with Suspicion," with Robert F. Bordley, Southern Economic Association, Orlando, Florida, November 1989.

"SSB and Weighted Linear Utility as Expected Utility with Suspicion," with Robert Bordley, Seminar, Department of Industrial and Operations Engineering, University of Michigan, April 26, 1989.

"Comparing Ambiguity Attitudes in Decision Making Under Uncertainty," Seminar, Department of Industrial and Operations Engineering, University of Michigan, October 12, 1988.

"Comparing Ambiguity Attitudes in Decision Making Under Uncertainty," ORSA/TIMS Joint National Meeting, Denver, October 1988.

"Subjectively Weighted Linear Utility," TIMS/ORSA Joint National Meeting, New Orleans, May 1987.

"The Economic Implications of the Prevention of Gouty Attacks with Allopurinol," with J. T. Schousboe, L. M. Manheim, and R. W. Chang, Eighth Annual Meeting of the Society for *Medical Decision Making*, Chicago, October 1986.

"The Economic Implications of the Prevention of Gouty Attacks with Probenecid or Allopurinol," with J. T. Schousboe, L. M. Manheim, and R. W. Chang, American Rheumatism Association Regional Meeting, Chicago, October 1986.

"Dominance and Potential Optimality when Utility is Partially known," TIMS/ORSA Joint National Meeting, Los Angeles, April 1986.

"Concave Dominance, Potential Optimality and Proper Efficiency," TIMS/ORSA Joint National Meeting, Los Angeles, April 1986.

"Quasiconcave Dominance: Properties and Uses," TIMS/ORSA Joint National Meeting, Boston, April 1985.

"Differential Characterizations of Nonconical Dominance in Multiple Objective Decision Making," Sixth International Conference on Multiple Criteria Decision Making, Cleveland, Ohio, June 1984.

"Partial Information, Dominance, and Potential Optimality in Multiattribute Utility Theory," ORSA/TIMS Joint National Meeting, Orlando, November 1983.

"Kuhn-Tucker Conditions in Conical and Nonconical Multiple Objective Programming," ORSA/TIMS Joint National Meeting, San Diego, October 1982.

"Optimality Conditions in Nonconical Multiple Objective Optimization," with T. L. Morin, ORSA/TIMS Joint National Meeting, Houston, October 1981.

"Differential Optimality for Unanimity Orders in Multicriteria Decision Making," TIMS/ORSA Joint National Meeting, Chicago, April 1983.

"Steepest Ascent Algorithms for Nonconical Multiple Objective Programming," with T. L. Morin, TIMS/ORSA Joint National Meeting, Detroit, Michigan, April 1982.

"Dynamic Programming Software," with T. L. Morin, TIMS/ORSA Joint National Meeting, Detroit, Michigan, April 1982.

"Informational Bounding: A General Approach to the Multicriteria Decision Problem," with T.

L. Morin, ORSA/TIMS Joint National Meeting, Colorado Springs, November 1980.

"Dynamic Programming Software Packages," with T. L. Morin, TIMS/ORSA Joint National Meeting, Washington, D.C., May 1980.

"Pathology of Generation Planning Evaluation Indices," with A. H. El-Abiad and T. L. Morin, IEEE Power Engineering Society Winter Meeting, December 1979.

"Formulas for the Variance of the Sample Mean in Finite State Markov Processes," 1977 Winter Simulation Conference, Gaithersburg, Maryland.

SPONSORED RESEARCH

Co-Investigator on "Comprehensive Cardiac Structure-Function Analysis in Heart Transplantation" National Heart, Lung, and Blood Institute of the NIH (NHLBI), Grant Number 1R01HL117888, 02/04/2014 – 01/31/2018, Principal Investigators Michael Markl, PHD, James Carr, MD, Department of Radiology, Feinberg School of Medicine.

"Strategic Liver Allocation by Stochastic Game Models – Competition vs. Cooperation", Agency for Healthcare Research and Quality, June 2012 – May 2013, \$28,439, Zhi Li (graduate student) Principal Investigator.

"Optimal Maintenance Policies for a Fleet of Gas Turbine Engines", Honeywell International Inc, October 2008 – December 2010, \$128,000.

"Collaborative Research: Adding Extrinsic Goals to the QALY Model", National Science Foundation, July 2005 – June 2008, \$165,630.

Co-PI, "Measurement & Use of Utilities in Ovarian Cancer CEA", National Cancer Institute, August 2001 – July 2004, \$1,237,448 (20% time year 1, 10% years 2 and 3).

Gordon B. Hazen and Monica Morrow, Co-PI, "A Continuous-Risk Decision Aid for Ductal Carcinoma In Situ", Illinois Department of Public Health, July 2000 – June 2001, \$71,100.

Gordon B. Hazen and Enrique R. Venta, co-P.I.s "A Decision Analysis Program to Aid in the Treatment of Ductal Carcinoma in Situ", Northwestern Memorial Foundation, October 1996, \$25,000.

Gordon B. Hazen, P.I., "A Unified Information-Value Approach to Sensitivity Analysis," Decision, Risk and Management Science Program of the National Science Foundation, Grant No. SBR-9515161, April 1996 – March 1999, \$195,611.

Rowland W. Chang, P.I., James M. Pellissier and Gordon B. Hazen, "Total Hip Arthroplasty Decision making: Risk Attitudes and Values of Patients, Rheumatologists and Orthopaedic Surgeons", with Illinois Chapter of the Arthritis Foundation, September 1994 - August 1995 (extended to August 1996), \$20,000.

Gordon B. Hazen, P.I., "Collaborative Research: Bayesian Aggregation Error in Fault Trees," Decision, Risk and Management Science Program of the National Science Foundation, Grant No. SES-9112854, August 1992 - July 1994, \$69,924.

Gordon B. Hazen, P.I., "Stochastic Trees: Modeling and Preference Applications to *Medical Decision Making*," Decision, Risk and Management Science Program of the National Science Foundation, Grant No. SES-9112854, August 1991 - July 1993, \$104,388.

Rowland W. Chang, P.I. and Gordon B. Hazen., "Polymyalgia Rheumatica: A Decision Analytic Approach," Illinois Chapter of the Arthritis Foundation, January 1984 - December 1985, \$10,000.

Gordon B. Hazen, P.I., "Research Initiation: Deterministic Dominance Approaches for Multiple Objective Optimization," National Science Foundation Grant No. ECS-8105965, June 1981 through November 1983, \$45,682.

RESEARCH SUPERVISION

Zhe Li, Ph.D June 2013, "Stochastic Game Models for Organ Acceptance in Liver Transplant".

Min Huang, Ph.D, July 2007, "Markov Chain Population Models in Medical Decision Making"

Chen-Wen Shen, Ph.D. December 2002, "The Marginalization Method for Belief Updating in Bayesian Networks."

James Felli, Ph.D. August 1995, "The Expected Value of Perfect Information as an Alternative to Sensitivity Analysis in Multiparametric Decision Problems." (now Assistant Professor, Defense Resources Management Institute, Naval Postgraduate School, Monterey, California).

James Pellissier, Ph.D. May 1991, "Risk Assessment in Medical Markov Models." (formerly Associate Professor, Loyola Business School, Loyola University Chicago; now Medical Research Analyst, Merck Pharmaceuticals, Blue Bell, Pennsylvania).

Roberto de la Llata, Ph.D. August 1988, "Multiobjective Linear Programming and Admissibility." (now Professor, Ingeniería Industrial y Textil, Escuela de Ingeniería, Universidad de las Américas, San Andrés Cholula, Puebla 72820, México).

Jia-Sheng Lee, Ph.D. December 1987, "Decision Analysis with Ambiguous Probability."

Susan Hook, M.S. December 1987, "Decision Analytic Applications of the SWLU model."

Graduate Student Examination Committees (after Sept 2010 only)

- Tingting Zhang, August 11, 2014. Dissertation defense.
- Ashley Davis, May 24, 2013, dissertation defense.

- Jian Hu, May 26, 2011. Dissertation defense.
 - Luis Carlos Chavez Bedoya Mercado, September 15, 2011. Dissertation defense.
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COURSES TAUGHT

Northwestern University

IE 202	Probability (1980,1983-1999, 2001-05, 2008-2013)
IE 303	Statistics (1980-1984,1986,1987, 1994)
IE 306	Decision Analysis (1987,1990-1994, 1996, 1998, 2000, 2012)
IE 313	Deterministic Models in Operations Research (1985)
IE 315	Stochastic Models in Operations Research (1987-1993, 1997, 2001, 2002, 2005)
IE 391	Senior Design Project (1995-2008)
IE D30	Systems Analysis (1980-1982)
IE 445	Decision and Risk Analysis (alternate years, 1983 -1999)
IE 448	Probabilistic Reasoning in Expert Systems (1989,1991,1993, 1995, 1997, 1999)
IE D56	Dynamic Programming (1980,1982,1984-1986,1991)
IE 460-1	Stochastic Processes (1992)
IE D74	Multidimensional Measurement and Evaluation (1980)
IE D75	Multiple Criteria Decision Making (1981,1985,1987)
IE 488	Economics and Decision Analysis (1999–2013)
PH 444	Medical Cost-Effectiveness Projects

University of Michigan

IOE460	Decision Analysis (1988)
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UNIVERSITY ACTIVITIES

Office of Research Integrity Inquiry Committee 2007

IEMS Graduate Program Chair, 2003 – 2007, 2008-2010

Science/Engineering Committee for Minority Affairs: School Visits Committee Co-chair, 2005 – 2006.

Departmental representative, McCormick Promotion and Tenure Committee, 2002 – 2003

IEMS Graduate Committee, 2002 – present

Ad Hoc committees, 2000, 2001, 2002, 2004, 2007

Technological Institute Safety Committee, 1999 – 2003

IEMS Undergraduate Committee, 2001–2003

IEMS Faculty Advisor, ETH Zurich study abroad program

Chair, IEMS Recruiting Committee, 2000

Faculty Coordinator, IEMS Honors Program, 2001–2003.

Faculty Advisor, IIE Student Chapter, 2000–2001.
Member, McCormick Junior Faculty Review Committee, 1998 – 2001
Member, IEMS Recruiting Committee, 1998
Coordinator, IEMS Department Seminar Series, 1994-98
Member, Program Review Committee, IEMS Department, 1996-97
Member, UFRPDAP (University Faculty for Reappointment, Promotion and Tenure Denial Appeal Panel), 1994-1997, 2009
Member, Graduate Committee, IE/MS Department, 1980-1988
Member, Center for Health Services and Policy Research, 1984-present
Member, Teaching Awards Committee 1982,1983.
Chair, Recruiting Committee, IE/MS Department, 1989.
Member, Science-Engineering Library Faculty Advisory Committee, 1990-92, 1996