

**Resumé**  
May 2019

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## Personal Data

Date and Place of Birth: 7 October 1952; Chicago, Illinois, U.S.A.  
Married, three children.  
Immigrated to Israel: August 1978.

## Present Affiliation

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Professor  
Yitzhak Moda'i Chair in Technology and Economics  
Faculty of Mechanical Engineering  
Technion — Israel Institute of Technology  
Haifa 32000 Israel  
Tel: +972-4-829-3262. Fax: +972-4-829-5711.  
Associated with the Technion continuously since 1978.

### **Languages**

English: mother tongue. Hebrew: fluent. German: basic reading.

### **Academic Degrees**

1978 Ph.D. Chemistry                      University of California  
Berkeley, California  
Thesis field: Nuclear physics.  
1978 M.Sc. Nuclear Engineering      University of California  
Berkeley, California.  
1973 B.A.    Beloit College              Beloit, Wisconsin  
Majors in mathematics and chemistry.  
Graduated *cum laude*.  
Elected to Phi Beta Kappa Academic Honor Society.

### **Academic Appointments**

1998 – present    Professor  
Faculty of Mechanical Engineering  
Technion  
Jul–Sep 2017      Visiting Professor, Dept. of Psychology, Australian National University, Canberra  
June 2017          Visiting Scholar, Los Alamos National Laboratory  
Mar–Apr 2017      Visiting Professor, Electrical and Computer Engineering Dept, Rice University, Houston  
Oct '16–Feb '17    Distinguished Visiting Scholar, Leverhulme Visiting Professor,  
Oxford-Martin Visiting Fellow, University of Oxford  
Sept 2016          Visiting Professor, Laboratory of Applied Mechanics  
University of Franche-Comte, Besancon, France.  
Feb 2011            Visiting Professor, University of Massachusetts, Amherst, MA.  
Jan 2011            Visiting Scholar, Los Alamos National Labs.  
Oct–Nov 2010      Texas Instruments C.S. Burrus Visiting Professor  
Electrical and Computer Engineering Dept.  
Rice University, Houston, Texas.  
Aug–Sep 2010      Honorary Visiting Academic  
Australian Centre of Excellence for Risk Analysis  
School of Botany, University of Melbourne, Australia.

July 2010 Visiting Scholar, Department of Mathematical Informatics  
University of Tokyo, Japan.

May–June 2010 Alan Richards Fellow in Mathematics, Grey College  
University of Durham, UK.

April–June 2010 Royal Academy of Engineering Distinguished Visiting Fellowship:  
University of Bristol, Department of Engineering Mathematics.  
University of Sheffield, Department of Mechanical Engineering.  
University of Newcastle-upon-Tyne, School of Civil Engineering and Geosciences.  
University of Durham, Department of Mathematical Sciences.

16–31 Mar 2010 Visiting Professor, University of Franche-Comte.

1–15 Mar 2010 Visiting Professor, University of Helsinki.

November 2008 Visiting Professor  
Laboratory of Applied Mechanics  
University of Franche-Comte, Besancon, France.

2002 – 2003 Visiting Professor  
Woodruff School of Mechanical Engineering and  
School of Civil and Environmental Engineering  
Georgia Institute of Technology.

1989 – 1998 Associate Professor  
Faculty of Mechanical Engineering  
Technion

1992 – 1993 Visiting Professor  
Department of Engineering Science and Mechanics  
Virginia Polytechnic Institute and State University  
Blacksburg Va, USA

1992–1993 Alexander von Humboldt Fellow  
Curt-Risch Institute for Dynamics, Acoustics and Measurement Technology  
University of Hannover, Germany. 1.6–31.8.1992; 1.7–30.9.1993.

1993 Fellow, Japan Society for the Promotion of Science.  
Institute of Industrial Science, University of Tokyo, and  
Dept. of Architecture & Architectural Systems, Kyoto University. 1.7–29.8.2003.

1982 – 1989 Senior Lecturer  
Department of Nuclear Engineering  
Technion

1985 – 1986 Visiting Professor  
Department of Nuclear Engineering  
North Carolina State University  
Raleigh, NC, USA

1980 – 1982 Lecturer  
Department of Nuclear Engineering  
Technion

1978 – 1980 Research Associate

### **Editorial Positions**

1. Editorial Advisory Board member, *Open Economics*, De Gruyter Open, 2016–.
2. Associate editor, *IEEE Journal of Translational Engineering in Health and Medicine*, (Journal of the IEEE Engineering in Medicine and Biology Society). 2012–2016.
3. Editorial Board, *Probabilistic Engineering Mechanics*, April 2000 to February 2007.
4. Guest editor for a special issue on “New directions in Information, Uncertainty and Decision for Mechanical Systems Analysis”, *Mechanical Systems and Signal Processing*, 2001.

### **Awards**

1. Phi Beta Kappa Academic Honor Society, 1973.
2. Alexander von Humboldt Fellowship, 1992–1993.
3. Fellowship of the Japan Society for the Promotion of Science, 2003.

### **Appointments and Technical Positions**

1. Senior Research Fellow, Samuel Neaman Institute, 2018, 2019.
2. Elected member of the Technion Senate steering committee, 1.1.2018–31.12.2019.
3. Ex officio member of the Technion senate, 1.1.2018–31.12.2019.
4. Appointed member of Technion Libraries committee, 1.1.2015–31.12.2016.
5. Elected member of the Technion Senate steering committee for Promotion and Tenure. 22.1.2013–31.12.2014.
6. Appointed member of the steering committee of the Dept of Humanities and the Arts, Technion. 17.2.2013–31.12.2013, 1.1.2014–31.12.2014, 1.1.2015–31.12.2015.
7. Appointed member of the steering committee of the Dept for Technology and Science Education, Technion. 11.11.2012–30.9.2013; 1.10.2013–30.9.2014, 1.10.2014–30.9.2015, 1.10.2015–30.9.2016.
8. Elected member of the Technion Senate Standing Committee on Undergraduate and Graduate Studies, 19.12.2011–31.12.2013, 1.1.2014–31.12.2015.
9. Elected member of the Technion Senate, 23.11.2011–31.12.2013, 1.1.2014–31.12.2015.

10. Elected member of the Technion Senate Standing Committee for Promotion and Tenure, 1.1.2009–31.12.2010.
11. Elected member of the Technion Senate, 8.1.2006–31.12.2007, 1.1.2008–31.12.2009.
12. Elected representative of the Technion professors to the Technion Board of Governors. 2006–2009.
13. 24.4.2001 to 1.10.2001. Assistant for health and safety to the vice-president for administration and finance.
14. 1.7.2000 to 1.10.2001. Head, Technion Radiation Protection Unit.
15. 1.1.95 to 31.12.97. Head, Technion Radiation Protection Unit.
16. 1993–1994, Assistant head, Technion Radiation Protection Unit.
17. Chairman, Technical Committee on Mechanical Engineering. Basic Research Foundation, Israel Academy of Science and Humanities. 1991–1992.
18. Technion representative to the Israel Bureau of Standards. 1991–1993.
19. 1988 – 1989 Head, Technion Radiation Protection Unit.

#### **Brief Visiting Appointments and Invitations**

1. Visiting Scholar, De Nederlandsche Bank, Amsterdam, The Netherlands, 1–7 March, 2009.
2. Visiting Scholar, De Nederlandsche Bank, Amsterdam, The Netherlands, 3–4 March, 2008.
3. Visiting Scholar, Norges Bank, Oslo, Norway, 21–25 May 2007.
4. Visiting Scholar, Norges Bank, Oslo, Norway, October 2005.
5. Fellow, Japan Society for the Promotion of Science. Institute of Industrial Science, University of Tokyo, and Dept. of Architecture & Architectural Systems, Kyoto University. 1 July–29 August, 2003.
6. Visiting Scientist, Center for Nonlinear Studies, Los Alamos National Laboratory, 2–13 June 2003.
7. Visiting Scholar, Federal Reserve Bank of Atlanta, 5–16 May 2003.
8. Visiting Professor, Woodruff School of Mechanical Engineering and School of Civil and Environmental Engineering, Georgia Institute of Technology, August 2002–May 2003.
9. Visiting professor, Department of Systems Design Engineering and Division of Solid Mechanics, University of Waterloo, Waterloo, Ontario, Canada. July–August 1998.
10. Visiting professor, Department of Systems Design Engineering and Division of Solid Mechanics, University of Waterloo, Waterloo, Ontario, Canada. August 1997.

11. Outside examiner for doctoral candidate Frederique Ayer, Laboratory of Applied Mechanics, University of Franche-Comte, Besancon, France. 2 April 1997.
12. Invited Professor, Laboratory of Applied Mechanics, University of Franche-Comte, Besancon, France. September, 1996.
13. Invited scientist to participate in the “Reliability Research Group” at the Curt-Risch Institute for Dynamics, Acoustics and Measurement Technology, University of Hannover, Germany. 5–11 November 1995.
14. Invited Professor, Laboratory of Applied Mechanics, University of Franche-Comte, Besancon, France. July and September, 1995.
15. Invited Professor, Laboratory of Applied Mechanics, University of Franche-Comte, Besancon, France. July, 1994.
16. Alexander von Humboldt Fellow, 1992-1993. Guest scientist at the Curt-Risch Institute for Dynamics, Acoustics and Measurement Technology, University of Hannover, Germany. 1 June – 31 August 1992; 1 July – 30 September 1993.
17. Invited Professor, Laboratory of Applied Mechanics, University of Franche-Comte, Besancon, France. 1 May – 30 June, 1993.
18. Visiting Professor, Department of Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, Virginia. 1 September 1992 – 30 April 1993.
19. Guest scientist at the Curt-Risch Institute for Dynamics, Acoustics and Measurement Technology, University of Hannover, Germany. 25 July – 15 August 1991.
20. Visiting Professor, Department of Nuclear Engineering, North Carolina State University, Raleigh, NC. Academic year 1985–1986.

## 1 Invited and Public Lectures

1. “As our island of our knowledge grows, so does the shore of our ignorance”, 4th International Workshop on Validation of Computational Mechanics Models, Zurich, 5.11.2019.
2. Strategic planning for multi-site fires: An info-gap analysis, Centre for Environmental Policy, Imperial College London, 3 July 2019.
3. Changing conflicts: Methodological implications for strategic thinking, Changing Character of War Conference: The Conduct of War—Past, Present and Future, Pembroke College, Oxford, 26–28.6.2019.
4. Risk management approach to deal with uncertainty in  $r^*$ , with Jan Willem Van den End (DNB), Joint De Nederlandsche Bank/European Central Bank workshop on the natural rate of interest, DNB, Amsterdam, 16–17.5.2019.

5. Uncertainty and the end of science, Faculty of Education in Science and Technology, Technion, 16.4.2019.
6. Consensus or pluralism in intelligence assessment? A methodological response, International Studies Association Annual conference, Toronto, 27–30.3.2019.
7. Deep uncertainty: Info-gap theory and the method of robustness, Horizon Scanning Forum, Ministry of Intelligence, State of Israel. 13.3.2019.
8. Public risk management: An info-gap approach, Research, Economy and Strategy Division, Ministry of Agriculture and Rural Development, State of Israel. 25.2.2019.
9. Strategic planning under deep uncertainty: An info-gap approach. RAFAEL, 21.1.2019.
10. Making decisions — important ones! — when you don't know what's going on. Administrative staff colloquium, Faculty of Mechanical Engineering, Technion. 19.12.2018.
11. Cascading failures: A preliminary info-gap analysis. International Workshop on Cascading Disasters: Theory, Methods and Empirics Technion, Israel, 28.11.2018.
12. What is info-gap theory? 6th Annual meeting of the Society for Decision Making under Deep Uncertainty, 13-15.11.2018.
13. What strategic planners need to know under deep uncertainty, 6th Annual meeting of the Society for Decision Making under Deep Uncertainty, 13-15.11.2018.
14. Strategic planning for emergency readiness: An info-gap approach (in Hebrew), National Knowledge and Research Center for Emergency Readiness, University of Haifa, 1.11.2018.
15. What strategic planners need to know in the age of uncertainty, Workshop on Strategic Uncertainty in National Security, 26 June 2018, Samuel Neaman Institute, Technion.
16. Strategic planning under severe uncertainty: An info-gap approach, Workshop on Risks & Uncertainties in Systems Engineering, Gordon Center for Systems Engineering, 16.1.2018, Technion, Haifa.
17. Morality, Uncertainty and Policy, Annual Meeting of the Society for Decision Making under Deep Uncertainty, 15–16 November 2017, Oxford University.
18. Info-Gap Demo: Model and Manage Functional Uncertainty, Training Day, Annual Meeting of the Society for Decision Making under Deep Uncertainty, 14 November 2017, Oxford University.
19. Strategic planning in defense and intelligence: An info-gap approach, Strategic & Defence Studies Centre, Australian National University, Canberra, 18.9.2017.
20. The innovation dilemma: Uncertainty and economic policy, Reserve Bank of Australia, Sydney, Australia, 25.8.2017.

21. Does a better model yield a better argument? An info-gap analysis, Workshop on Prediction of Rare Events, Australian National University, Canberra, Australia, 17–18 August 2017.
22. High-consequence decision making in defense, intelligence and government: An info-gap approach, Australian Army Research Centre, Canberra, Australia. 11 August 2017.
23. High-consequence decision making in defense, intelligence and government: An info-gap approach, Terrorism Studies program at Charles Sturt University, Canberra, Australia. 10 August 2017.
24. Innovation, Optimization and their dilemmas: An info-gap perspective, Workshop on Uncertainty and Decision, Decision Sciences Group, HEC Paris, 22–24.5.2017.
25. The innovation dilemma in the age of technology: An info-gap perspective, Dept. of Electrical and Computer Engineering, Rice University, Houston, 7 March 2017.
26. The innovation dilemma: Uncertainty and economic policy, Department of Economics, City University, London, 8.2.2017.
27. Decision making in defense and military affairs: An Info-gap approach, Defence Science and Technology Laboratory (DSTL), Fareham, Hampshire, U.K., 7.2.2017.
28. Fundamental uncertainty and unconventional monetary policy: An info-gap approach, with Jan Willem Van den End, The Netherlands Central Bank, Amsterdam, 26.1.2017.
29. The Innovation dilemma: Uncertainty and economic policy, The Netherlands Central Bank, Amsterdam, 24.1.2017.
30. The Innovation Dilemma: Uncertainty and the Paradox of Universalism, Institute for Risk and Uncertainty, University of Liverpool, Liverpool, UK, 16.1.2017.
31. The Innovation Dilemma: Uncertainty and Economic Policy, Bank of England, London, 14.12.2016.
32. Info-gap theory: Concepts and applications, Interdisciplinary Centre for Conservation Science (ICCS), Department of Zoology, University of Oxford, 8.12.2016.
33. Info-Gap Theory: Concepts and Applications, University of Exeter, Exeter, UK, 2.12.2016.
34. Info-Gap Theory: Concepts and Applications, University College Dublin, Dublin, Ireland, 14 November 2016.
35. Policy for Environmental Change: Info-Gap Response to Uncertainty, Anniversary Seminar Series, Environmental Change Institute, University of Oxford, 2.11.2016.
36. The Innovation Dilemma: Uncertainty and the Paradox of Universalism, University of Durham, Durham, UK, 27.10.2016.
37. Info-Gap Theory and Its Applications: Two Lectures, Electricité de France (EDF) — R&D, Industrial Risk Management Department, Chatou, France, 20.9. 2016.



38. High Consequence Decisions with Severe Uncertainty: An Info-Gap Approach to Policy Prioritization, Director's Colloquium, Los Alamos National Laboratories, 2 February 2016.
39. Managing Innovation Dilemmas in Military Decision Making, 4th session of: Managing and Exploiting Uncertainty: In Light of the Report 'IDF Strategy'. Dado Center for Interdisciplinary Thought, Israel Defense Force, 7.1.2016.
40. The Innovation Dilemma: Uncertainty and Optimization, Department of Biosciences, Group on Ecology, Evolution and Environmental Science, University of Melbourne, 14 August 2015.
41. Clausewitz, Hayek, Popper and the Revolution in Military Affairs: An epistemological critique, Departments of Philosophy and Psychology, joint lecture, Australian National University, Canberra, 6 August 2015.
42. Managing uncertainty in intelligence analysis: An info-gap perspective, CSU Intelligence Studies Program, Canberra, Australia. 5 August 2015.
43. Info-gap theory: Potential applications in library science, Department of Information Science, Bar-Ilan University, 6 May 2015.
44. Operational Introduction Info-Gap Decision Theory (The Gap-Zapper's Guided Tour), Workshop on Decision Analysis for Natural Hazards, Oxford University, 10–11 March 2015.
45. Uncertainty and the paradox of universalism in military strategy, Dept. of Politics and International Relations, University of Reading, 5 March 2015.
46. Uncertainty and deterrence, International Studies Association Annual Conference, 18–21 February 2015, New Orleans.
47. The innovation dilemma: Uncertainty and the paradox of universalism, Dept. of Political Science, Columbia University, 13 Feb 2015.
48. Info-gap approaches to planning for an uncertain future, Ort-Braude, Carmiel, 8 December 2014.
49. Info-gap approaches to planning for an uncertain future, Frontiers of Geosciences Lecture Series, Los Alamos National Laboratories, 25 August 2014.
50. Innovation, uncertainty, and their dilemmas: An info-gap perspective, Conference on model-based design, validation, and monitoring of structures under severe uncertainty, 26–27.6.2014, Besancon, France.
51. Military decisions under severe uncertainty: Application of info-gap theory, Forum for Military and Security Affairs, Tel Aviv, 7.1.2014, (in Hebrew).
52. Some info-gap approaches to planning for an uncertain future, Workshop on Decision Making under Uncertainty, Invited lecture, World Bank, Washington, D.C., 5 November 2013.

53. Model-based planning for an uncertain future: Info-gap theory and some applications, Engineering Management and Systems Engineering Department, The George Washington University, Washington, D.C., 4 November 2013.
54. Strategic implications of military decisions under uncertainty, National Security Studies Center, University of Haifa, 29 October 2013.
55. Info-gap theory: Making decisions under uncertainty in managing safety and reliability, (in Hebrew), Society of Safety Engineers, Annual Meeting, Eilat, Israel, 28 October 2013.
56. Info-gap analysis and design of mechanical systems: A tutorial, invited lecture, IMAC-XXXI (Intl. Modal Analysis Conference), Garden Grove, CA, 11–14 February 2013.
57. Info-gap methods for environmental monitoring and management, Los Alamos National Laboratory, Los Alamos NM, 6 February 2013.
58. Survival Under Uncertain Competition: Info-Gap Applications to Ecology and Conservation, 6 December 2012, Dept. of Biology, University of California, Riverside.
59. Prediction and Planning Under Severe Uncertainty: Potential Applications of Info-Gap Theory to the Energy Sectors, 19 November 2012, Tahal Group, Tel Aviv.
60. Model-Based Planning for an Uncertain Future: An Info-Gap Approach, 12 September 2012, NASA-Langley Research Center, Hampton, Virginia.
61. Model-Based Planning for an Uncertain Future: An Info-Gap Approach, 4 September 2012, San Francisco Section of the American Society of Civil Engineers, East Bay Municipal Utility District, Oakland CA.
62. Why reliability analysis is difficult and some thoughts on how to proceed, 2 July 2012, Workshop on Reliability Engineering: 40 Years of the Rafael Reliability Center.
63. Model-based design and planning: An info-gap approach, Rafael, 17 May 2012.
64. Info-gap robust-satisficing and the probability of survival, Department of Evolutionary and Environmental Biology, University of Haifa, 9 May 2012.
65. Planning for an unknown future: Info-gap approach to managing uncertainties, (in Hebrew), The Manufacturers Association of Israel, Technion, 30 April 2012.
66. Uncertainty and the End of Science, Dept of Physics, Technion, 19 April 2012.
67. Why Environmental Planning is so Difficult, and What to Do About it, Dept of Environmental Engineering, Technion, 18 April 2012.
68. Info-gap theory and its applications, Josef Ressel Centre for Optimisation under Uncertainty, University of Applied Sciences, Dornbirn, Austria, 27 Feb 2012.

69. No-Failure Design and Disaster Recovery: Lessons from Fukushima, invited plenary lecture, Israel Nuclear Society Conference, Dead Sea, Israel, 22 Feb 2012.
70. Info-Gap Analysis and Design of Structures: A Tutorial, invited lecture, IMAC-XXX Conference & Exposition on Structural Dynamics, Jacksonville, Florida, January 30–February 2, 2012.
71. Redundancy and Robustness, Or, When is Redundancy Redundant? 1st Israel Structural Integrity Group (ISIG) Symposium, 11.1.2012, Tel Aviv University.
72. Uncertainty Quantification: An Info-Gap Approach to Design and Decision, Int'l Workshop on Validation of Computational Solid Mechanics Models, 18–20 October 2011, Shanghai, China.
73. Model-Based Planning for an Uncertain Future: An Info-Gap Approach, plenary lecture, Japan Conference on Structural Safety and Reliability, JCROSSAR2011, Tokyo, 12–14 October 2011.
74. Info-Gaps and Decisions Under Severe Uncertainty: Theory and Applications, Advanced Technical Center-Israel, General Motors-Research & Development, 20 September 2011, Herzliya, Israel.
75. Info-Gaps and Decisions Under Severe Uncertainty: Theory and Applications, IBM Research Analytics Department, Haifa, Israel, 28 March 2011.
76. Models and Forecasts Under Severe Uncertainty: Info-Gap Approaches, Dept. of Resource Economics, University of Massachusetts, Amherst, 22 February 2011.
77. Economic Puzzles and Policies: Info-Gap Approaches, Dept. of Economics, University of New Hampshire, 18 February 2011.
78. Info-Gaps and Strategic Planning: Theory and Applications, Applied Biomathematics, Setauket, NY, 15 February 2011.
79. Info-Gaps and Strategic Planning: Theory and Applications, Dept. of Electrical and Computer Engineering and Dept of Systems Engineering and Operational Research, George Mason University, Fairfax, VA, 9 February 2011.
80. Information-Gap Approaches for Models and Forecasts Under Severe Uncertainty, Sandia National Laboratories, Albuquerque, NM, 25 January 2011.
81. Why Design and Planning is so Difficult, and What to Do About it, Center for Nonlinear Studies, Los Alamos National Laboratory, 24 January 2011.
82. Models and Forecasts Under Severe Uncertainty: Info-Gap Approaches, Strategic Computing Center, Los Alamos National Laboratory, 13 January 2011.
83. Economic Puzzles and Policies: Info-Gap Approaches, Dept of Economics, Rice University, Houston, 3 December 2010.
84. Info-Gaps and Strategic Planning: Theory and Applications, Texas A&M University, College Station, 15 November 2010.

85. Why design and planning is so difficult, and what to do about it, Rice University, Houston, 26 October 2010.
86. Info-gap Economics: An Overview of Policy Analysis, Dept of Economics, University of Houston, 13 October 2010.
87. Economic and Public Policy Formulation: Applications of Info-gap Theory, RAND Corporation, Santa Monica CA, 27 Sept 2010.
88. Info-Gap Theory: An Overview of Policy Analysis, Dept of Economics, Monash University, Melbourne, Australia, 15 Sept 2010.
89. Info-Gap Theory in Ecology: New Directions for Modelling, Inference and Planning, ACERA, Australian Centre for Excellence in Risk Analysis, 20 August 2010.
90. Info-Gap Theory and Its Applications in Engineering Modelling and Design, Institute of Industrial Science, The University of Tokyo, 22 July 2010.
91. Forecasting with Poor Data and Models: An Info-Gap Approach, Third Workshop on Game-Theoretic Probability and Related Topics, 21–23 June 2010, Royal Holloway, University of London, Egham, Surrey, UK.
92. Why design and planning is so difficult, and what to do about it. A tour of info-gap decision theory, Grey College, Durham University, 15 June 2010.
93. Info-gap Theory for Modelling and Managing Ecological Processes, Symposium on Populations under Pressure (PuP), Imperial College London, Silwood Park Campus, 9–11 June 2010.
94. Robust-Satisficing and the Probability of Survival, Dept of Mathematical Sciences, Durham University, 2 June 2010.
95. Info-gap Theory and Its Applications in Engineering Modelling and Design, 24 May 2010, Rolls-Royce, Derby, U.K.
96. Info-gap Theory: Overview and Application to Fault Diagnosis, BAE Systems, Filton, UK, 12 May 2010.
97. Info-Gap Theory for Strategic Planning Under Severe Uncertainty: Applications to Pollution Control Policy, Informatics Seminar Series, University of Exeter. 11 May 2010.
98. Robust-Satisficing and the Probability of Survival, Dept of Mechanical Engineering, University of Sheffield, 22 April 2010.
99. Info-gap Theory for Strategic Planning Under Severe Uncertainty: Applications to Climate Change Policy, 7 April 2010, Bristol Environmental Risk Research Centre (BRISK), Bristol University.

100. Info-gap Theory and Its Applications in Ecology and Biological Conservation, 19 March 2010, Dept. Biological and Environmental Sciences, University of Helsinki.
101. Info-gap Theory: Overview of Modelling, Inference, and Design, March 2010, Department of Bacteriology and Immunology, Haartman Institute, University of Helsinki.
102. Info-Gap Theory and Applications: Four Lectures, Dept. of Mathematical Informatics, University of Tokyo. 4 August 2009.
103. Value at Risk, Info-Gaps, and Engineering Decision Making, Tyndall Centre for Climate Change Research, School of Civil Engineering and Geosciences, University of Newcastle-upon-Tyne. 13 July 2009.
104. An Overview of Info-Gap Theory for Design and Strategic Planning Under Severe Uncertainty, Iltam, Herzlya. 2 June 2009. In Hebrew.
105. *Six Lectures on Info-Gap Theory: Decisions Under Severe Uncertainty*, University of Franche-Comte, Besancon, France, October, November, 2008.
106. *Robust-Satisficing in Engineering Design*, ASME Engineering Systems Design Analysis Conference (ESDA 2008), Haifa, Israel, July 7–9, 2008.
107. *Info-Gap Economics: An Overview*, Research Forum on “Risk and Uncertainty in Monetary Policy”, Centre for Central Bank Studies, Bank of England, London, 9–11 June 2008.
108. *Survival under Uncertainty: Is Optimization Really a Successful Strategy*, The Prof. Yuval Neeman Symposium on Science, Technology and Security, University of Tel Aviv, 29 May 2008.
109. *Info-Gap Modelling of Mechanical Systems: Why More is Less*, Non-deterministic Methods in Applied Mechanics and Engineering, Leuven, March 31–April 2, 2008.
110. *Can We Augment the Probability-vs.-Severity Risk Matrix?* NATO Advanced Research Workshop on Resilience in Crises, Belgrade, Serbia, 28.11-2.12.2007.
111. *Info-gap theory for strategic planning under severe uncertainty*, Workshop on Uncertainty and Surveillance, Hobart, Australia, 12 August 2007.
112. *Info-Gap Methods for Decision Support*, Keynote address, Annual Meeting of the Society for Risk Analysis, Hobart, Australia, 21 August 2007.
113. *Coleman-Cohen Distinguished Lectures:*
  - (a) *Parameter Estimation and Model-Based Decisions under Uncertainty: An Info-Gap Perspective*, School of Civil Engineering and Geosciences, University of Newcastle-upon-Tyne, U.K., 9 July 2007.
  - (b) *Why More is Less: Info-Gap Explanation for Robust-Satisficing Behavior*, Institute for Advanced Study, Durham University, U.K., 12 July 2007.

- (c) *Why We Design to Spec: Info-Gap Explanation for Satisficing Design Requirements*, Workshop on Uncertainty Modelling, Durham University, U.K., 13 July 2007.
  - (d) *From Technological Design to Quantum Uncertainty: Info-Gaps and Indeterminism*, Department of Mechanical Engineering, University of Sheffield, U.K., 16 July 2007.
  - (e) *From Technological Design to Quantum Uncertainty: Info-Gaps and Indeterminism*, University of Bristol, U.K., 19 July 2007.
114. *Policy Evaluation Under Uncertainty: The Info-Gap Robustness Strategy*, NATO Advanced Research Workshop on “Resilience to crises: Putting risk science and information technology to work,” Prague, 10–12 March 2007.
  115. *Info-Gap economics: Knightian uncertainty, modelling and monetary policy*, Research Dept., Central Bank of The Netherlands, March 2007.
  116. *Info-Gap economics: Knightian uncertainty, modelling and financial risk management*, Warwick Business School, University of Warwick, 28 February 2007.
  117. *Allocating Security Expenditures under Knightian Uncertainty: an Info-Gap Approach*, Michael Ben-Gad, Yakov Ben-Haim and Dan Peled, Economics of National Security, Samuel Neaman Institute, 14 December 2006, Herzlia, Israel.
  118. *Info-Gap Theory: Clinical Decisions Under Severe Uncertainty*, with Dr. Cliff Dacso. Methodist Hospital Research Institute, Houston, Texas, 14 September 2006.
  119. *Info-Gap Theory: Modelling and Managing Severe Uncertainty*, University of Houston, 11 September 2006.
  120. *Estimating an uncertain probability distribution*, International Workshop on Soft Methods in Probability and Statistics, SMPS, Bristol, UK, 5–7 September 2006.
  121. *Info-gap economics: Knightian uncertainty, modelling and policy*, Faculty of Economics & Commerce, The University of Melbourne, 24 July 2006.
  122. *Info-Gap Theory and Applications in Biological Conservation and Resource Management*, Australian Bureau of Agricultural and Resource Economics (ABARE), Canberra, 20 July 2006.
  123. *How to Evaluate and Manage Risk When We Don't Know Probabilities*, Plenary lecture, Conference of the Australian and New Zealand Chapters of the Society for Risk Analysis, Melbourne, Australia, 17–19 July 2006.
  124. *Info-Gap Forecasting and the Advantage of Sub-Optimal Models*, Mathematics and Statistics of Complex Systems (MASCOS), University of Melbourne, Australia, 14 July 2006.
  125. *Robust Monetary Policy Under Knightian Uncertainty*, Farooq Akram, Yakov Ben-Haim, Øyvind Eitheim and Ragnar Nymoem, Oslo Workshop on Monetary Policy, Norwegian School of Management, 8 June 2006.

126. *Fault Detection with Uncertain Priors*, 47th AIAA Structures, Structural Dynamics, and Materials (SDM) Conference, Newport, Rhode Island, 1–4 May 2006.
127. *Ellsberg, Foraging and Forecasting: The Advantage of Sub-Optimal Models*, Faculty of Mechanical Engineering, Technion, 27 March 2006.
128. *Info-gap economics: Knightian uncertainty, modelling and policy*, Central Bank of Norway (Norges Bank), Oslo, 24 October 2005.
129. *Info-gap theory for engineering analysis and design*, Workshop on Info-Gap Analysis of Engineering Systems, University of Newcastle-upon-Tyne, U.K., 29–30 September 2005.
130. *The fallacy of best-model design: Info-gap analysis of epistemic uncertainty in engineering*, Department of Mechanical Engineering, University of Sheffield, U.K., 23 September 2005.
131. *The fallacy of best-model design: Info-gap analysis of complex dynamics*, Department of Civil Engineering, University of Bristol, U.K., 20 September 2005.
132. *Info-gap analysis of preparedness and response to bio-terrorism*, University of Massachusetts, Amherst, 15 September 2005.
133. *Why the best engineers should study humanities*, Penn State Great Valley, 13 September 2005.
134. *'Good' is Better than 'Best': Strategic Decisions With Uncertain Scientific Models*, Research Institute, Penn State Great Valley, 12 September 2005.
135. *Clinical Decision Making Under Conditions of Severe Uncertainty*, The Methodist Hospital, Houston Texas, 8 September 2005.
136. *To Satisfice, Windfall or Maximize? That is the Question*, European Economic Association 20th Annual Congress, Amsterdam, 24–27 August 2005.
137. *Info-Gap Robust-Satisficing Monetary Policy: Modelling and Managing Ignorance*, International Conference on Policy Modeling, Ecomod 2005, Istanbul, 29 June–1 July, 2005.
138. *Panel on prevention of risk of terrorist attacks*, International Conference on Structural Safety and Reliability, ICOSSAR, Rome, 19–22 June 2005.
139. *Info-gap decision theory for nature-reserve selection*, Specialist's Workshop on Eco-System Management of Madagascar, University of Helsinki, 20–23 May 2005.
140. *Model-Based Decisions Under Severe Uncertainty*, Mathematics and Statistics of Complex Systems (MASCOS), University of Melbourne, Australia, 25 February 2005.
141. *What Should We Optimize? The Info-Gap Case For Sub-Optimal Models And Structures*, School of Civil Engineering and Geosciences, University of Newcastle-upon-Tyne, U.K., 16 December 2004.

142. *Info-gap reliability of structures based on erroneous models and noisy data*, Pseudospectra and Structural Dynamics, University of Bristol, U.K., 15 December 2004.
143. *Design and Evaluation of Measurements With Info-Gap Uncertainty*, Israel-Italy Bi-National Conference on Measurements and Uncertainty Evaluation in Coordinate Measuring Machine (CMM) and Scanners and their Implication on Design and Reverse Engineering, 29–30 November 2004. Technion.
144. *What Should We Optimize? The Info-Gap Case For Sub-Optimal Models And Structures*, Laboratory of Applied Mechanics, University of Franche-Comte, Besançon, France. September 2004.
145. *What Should We Optimize? The Info-Gap Case For Sub-Optimal Models And Structures*, Faculty of Mechanical Engineering, Technion, 19 April 2004.
146. *Info-Gap Theory For Environmental Monitoring*, Workshop on Environmental Monitoring, National Center for Environmental Analysis and Synthesis (NCEAS), Santa Barbara. 21–26 March 2004.
147. *Model Estimation and Forecasting with Info-Gap Decision Theory*, Workshop on Environmental Monitoring, National Center for Environmental Analysis and Synthesis (NCEAS), Santa Barbara. 21–26 March 2004.
148. *Info-gaps and Equity Premia*, Research Department, Federal Reserve Bank of Atlanta, 29 March 2004.
149. *An Info-gap Explanation of the Equity Premium Puzzle*, Department of Economics, University of Haifa, 4 March 2004.
150. *Info-gap Decision Theory: Why Ecologists Should Care*, Department of Botany, University of Melbourne, Australia. 2 September 2003.
151. *Info-gap Decision Theory for Design and Planning*, Department of Architecture, University of Tokyo, 22 July 2003.
152. *The Micro-economics of Information-gaps*, Department of Economics, University of Tokyo, 15 July 2003.
153. *Info-gap Decision Theory for Modelling and Managing Uncertain Dynamic Systems*, Graduate School of Environment and Information Sciences, Yokohama National University, 9 July 2003.
154. *Info-gap Decision Theory for Design and Planning*, Institute of Industrial Science, University of Tokyo, 7 July 2003.
155. *Home Bias in Financial Markets: Robust Satisficing with Info-Gaps*, with Karsten Jeske, Federal Reserve Bank of Atlanta, 2 May 2003.<sup>1</sup>

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<sup>1</sup>Yakov Ben-Haim and Karsten Jeske, 2003, Home-bias in financial markets: Robust satisficing with info-gaps, Federal Reserve Bank of Atlanta, Working Paper Series, 2003-35, Dec. 2003. SSRN abstract and full paper at: <http://ssrn.com/abstract=487585>.



156. *What Should We Optimize? The Info-Gap Case For Sub-Optimal Models And Structures*, Civil Engineering Department, University of Waterloo, 28 April 2003.
157. *Info-gap Decision Theory for Design and Planning. Or: Why 'Good' is Preferable to 'Best'*, Systems Design Engineering Department, University of Waterloo, 25 April 2003.
158. *Safety and Uncertainty Assessment: The Info-gap Approach*, U.S. National Institute of Standards and Technology, Gaithersburg, MD, 2 April 2003.
159. *What Should We Optimize? The Info-Gap Case For Sub-Optimal Models And Structures*. Aerospace and Mechanical Engineering, University of Notre Dame, 18 March 2003.
160. *Info-gap Decision Theory for Design and Planning. Or: Why 'Good' is Preferable to 'Best'* RAND Corporation, Santa Monica, CA. 21 February 2003.
161. *Info-gap Theory: Why Ecologists Should Care*. National Center for Ecological Analysis and Synthesis (NCEAS), University of California at Santa Barbara. 20 February 2003.
162. *What Should We Optimize? The Info-Gap Case For Sub-Optimal Models And Structures*. Aerospace Systems Design Laboratory, Georgia Institute of Technology, 11 February 2003.
163. *The Rationality of Information-gaps*. Cognitive Science Colloquium, Georgia Tech. 24 January 2003.
164. *Info-gap Analysis of System Identification: On the Antagonism Between Performance and Robustness*. Workshop on Predictability of Complex Phenomena, DOE/MICS-NSF/DMS, Santa Fe, NM, 16-18 December 2002.
165. *What Should We Optimize? The Info-Gap Case For Sub-Optimal Models And Structures*. Structural Engineering, Mechanics and Materials Group, School of Civil and Environmental Engineering, Georgia Tech, 19 November 2002.
166. *Info-gap Analysis of Economic Policy*. Federal Reserve Bank of Atlanta. 15 November 2002.
167. *Info-gap Decision Theory for Design and Planning. Or: Why 'Good' is Preferable to 'Best'*. Engineering Systems Division, MIT. 5 November 2002.
168. *What Should We Optimize? The Info-Gap Case For Sub-Optimal Models And Systems*. Mechanical Engineering Colloquium, Woodruff School of Mechanical Engineering, Georgia Tech, 22 October 2002.
169. *The Micro-economics of Information-gaps*. School of Economics, Ivan Allen College, Georgia Institute of Technology. 18 October 2002.
170. *Info-gap Decision Theory for Design and Planning. Or: Why 'Good' is Preferable to 'Best'*. Systems Realization Laboratory. Woodruff School of Mechanical Engineering. Georgia Tech. 7 October 2002.

171. *Uncertainty, Probability and Information-gaps*. Epistemic Uncertainty Workshop, Sandia National Laboratories, Albuquerque, NM, 6–7 August, 2002.
172. *Info-gap decision theory: Application to economic analysis and planning*. Science, Technology and Economics Working Group, S. Neaman Institute, Technion—Israel Institute of Technology. Venue: Eitan Berglas School of Economics, Tel Aviv University, 21 March, 2002.
173. *Common knowledge, coherent uncertainties and consensus*. Centre for the Analysis of Risk and Regulation, London School of Economics, 5 March 2002.
174. *Info-gap reliability: A non-probabilistic theory*, Dept. of Mechanical Engineering, University of Wales, Swansea, U.K. 27 February 2002.
175. *Info-gap decision theory: Applications in economics and management*. Fuqua School of Business, Duke University, Durham, NC. 7 Sept. 2001.
176. *Info-gap decision theory: Decisions under severe uncertainty*, Dept. of Nuclear Engineering, North Carolina State University, Raleigh, NC. 6 Sept. 2001.
177. *Info-gap robustness: Non-probabilistic theory of reliability*, Dept. of Civil Engineering, Georgia Institute of Technology, Atlanta, 4 Sept. 2001.
178. *Four lectures on Info-Gap Decision Theory*, Los Alamos National Laboratory, Los Alamos, USA, 29–31 August, 2001:
- (a) Info-gap decision theory: Decisions under severe uncertainty.
  - (b) Info-gap robustness: Non-probabilistic theory of reliability.
  - (c) Info-gap decision theory: Applications in economics and management.
  - (d) Value judgments in decisions with uncertainty.
179. Two lectures on Info-Gap Decision Theory, Department of Systems Design Engineering, University of Waterloo, Waterloo, Ontario, Canada. 4 July 2001:
- (a) Applications in Economics and Management.
  - (b) Value judgments and analogical reasoning in engineering.
180. Info-Gap Decision Theory: Applications in Economics and Management. Department of Operational Research, London School of Economics, 13 June 2001.
181. Info-Gap Decision Theory: Applications in Economics and Management. Department of Industrial Engineering, Tel Aviv University, 15 May 2001.
182. Why the best engineers should study humanities. Forum for the study of teaching at the Technion. 25 March 2001.
183. Robust non-probabilistic reliability in monitoring. University of Hannover, Germany. October 2000.

184. Information-gap uncertainty and technological decision-making. Laboratory of Applied Mechanics, University of Franche-Comte, Besançon, France. February 2000.
185. Value judgments and analogical reasoning in engineering. Faculty of Mechanical Engineering. Technion. January 2000.
186. Information-gap uncertainty and technological decision-making, Center for Rationality and Interactive Decision Theory, Hebrew University, Jerusalem. 12 December 1999.
187. The value of knowledge in engineering analysis and design. Faculty of Aerospace and Ocean Engineering. 16 April 1999. Virginia Polytechnic Institute, Blacksburg, VA.
188. Economic implications of information-gap uncertainty. Seminar on Risk, Uncertainty and Decision, University of Paris-I. 1 March 1999.
189. The value of knowledge in engineering analysis and design. Laboratory of Solid Mechanics, Ecole Polytechnique, Paris. 25 February 1999.
190. The value of knowledge in engineering analysis and design. Faculty of Engineering. Tel Aviv University. 18 January 1999.
191. Economic implications of information-gap uncertainty. Joint seminar in Economics, Business Administration and Mathematics. Tel Aviv University. Date: 19 January 1999.
192. Robust reliability in structural monitoring and fault diagnosis. Institute for Construction, Technical University of Braunschweig, Braunschweig, Germany. November 1998.
193. Three lectures on: Strategic decisions with uncertainty. Department of Systems Design Engineering, University of Waterloo, Waterloo, Ontario, Canada. July 1998.
194. Self-organizing systems with uncertainty: An economic model. Workshop on Modelling and Reality. Clausthal-Zellerfeld, Germany. 27-30 July 1998.
195. Uncertainty in the Age of Information: Axioms and Implications of Non-Probabilistic Uncertainty in Engineering, Economics and Management. Edelstein Center for History and Philosophy of Science, Medicine and Technology, Hebrew University of Jerusalem. 27 May 1998.
196. Intuitions of uncertainty: Models and implications for structural reliability and regulation. U.S. National Institute for Standards and Technology (NIST). Gaithersburg, Maryland, USA. 13 February 1998.
197. Robust rationality and decisions under uncertainty in economics and management. Department of Management Science, University of Waterloo, Waterloo, Ontario, Canada. 9 February 1998.
198. Reliability of mathematical models in mechanical decisions: Survey. Invited talk at the International Modal Analysis Conference, Santa Barbara, California. February 2–5, 1998.

199. Decisions From Uncertain Evidence. Seminar Series in Statistics, Faculty of Industrial Engineering, Technion. 16 November 1997.
200. Robust Reliability of Mechanical Systems, Department of Systems Design Engineering and Division of Solid Mechanics, University of Waterloo, Waterloo, Ontario, Canada. 14 August 1997.
201. Decisions From Uncertain Evidence, Department of Systems Design Engineering and Division of Solid Mechanics, University of Waterloo, Waterloo, Ontario, Canada. 11 August 1997.
202. Robust Reliability of Mechanical Systems and Structures, George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia. 23 July 1997.
203. Models of Uncertainty: Intuitions, Axioms and Inference Schemes, Laboratory of Applied Mechanics, University of Franche-Comte, Besancon, France. 2 April 1997.
204. Robust Reliability of Mechanical Systems. Design and Technology Development Division, Israel Electric Corporation, Haifa, Israel. 18 February 1997.
205. Reliability of Mathematical Models in Mechanical Decision Processes, Final Seminar of the Research Group on "Reliability of Modelling and Computation in Applied Mechanics", University of Hannover, Germany. 26 November 1996.
206. (1) Fault diagnosis in uncertain dynamical systems. (2) Selective sensitivity in system identification and model-order reduction. Department of Nuclear Engineering, Korea Advanced Institute for Science and Technology. 8 November 1996.
207. Fault diagnosis in uncertain dynamical systems. Korea Advanced Energy Research Institute. 9 November 1996.
208. Selective sensitivity in system identification and model order reduction. Korea Advanced Energy Research Institute. 11 November 1996.
209. Reliability of model-based decisions with uncertain evidence. Korea Advanced Energy Research Institute. 12 November 1996.
210. Robust Reliability in the Mechanical Systems and Structures, Laboratory of Applied Mechanics, University of Franche-Comte, Besancon, France. 20 September 1996.
211. The Restless Frontier: Uncertainty and the Age of Information, Laboratory of Applied Mechanics, University of Franche-Comte, Besancon, France. 26 September 1996.
212. Robust Reliability in the Mechanical Sciences, Israel Society for Quality, Israel Institution for Standards, Tel Aviv, Israel, 17 July 1996.
213. The Restless Frontier: Uncertainty and the Age of Information, Department of Mechanical Engineering, University of Wales, Swansea, U.K., 1 July 1996.

214. Robust Reliability in the Mechanical Sciences, Department of Mechanical Engineering, University of Liverpool, U.K., 5 July 1996.
215. Robust reliability of structures. Departement Acoustique et Mechanique Vibratoire, Electricité de France, Clamart, France. 22 September 1995.
216. Robust reliability in mechanical systems. Institute for Applied Mathematics, University of Kaiserslautern, Kaiserslautern, Germany. 13 September 1995.
217. Non-probabilistic analysis of reliability based on expansion of convex models, presented at the Institute for Risk Analysis and the Department of Civil Engineering, University of Waterloo, Canada. February 1995.
218. Convex models of uncertainty in reliability, presented at the Curt-Risch Institute for Dynamics, Acoustics and Measurement Technology, University of Hannover, Germany. October 1994.
219. Selectively sensitive identification of structures, presented at the Department of Engineering Science and Mechanics, Virginia Polytechnic Institute, Blacksburg, Virginia. February 1994.

## 2 Info-Gap Courses and Workshops

Website for further information: <https://info-gap.technion.ac.il/workshops/>

1. Info-Gap Theory for Financial Risk Analysis and Decision Making: A Program for Self-Study. Developed for Cardano, Rotterdam, Netherlands, 2017.
2. Info-Gap Theory and Its Applications in Engineering: A 4-Day Workshop, UNICAMP, Sao Paulo, Brazil, 26-29 June, 2017.
3. Info-Gap Theory and its Applications: A 4-Day Workshop, Rice University, March 2017.
4. Info-Gap Theory and Its Applications in Engineering: A 3-Day Course, University of Franche-Comte, Besancon, France. 14-16 September 2016.
5. Info-Gap Theory and Its Applications: A One-Day Workshop, East Bay Municipal Utility District, Oakland, CA, 29 January 2016.
6. Info-Gap Theory and Its Applications: A 4-day workshop, 17–20 August 2015, Charles Sturt University, Wagga Wagga, Australia.
7. Info-Gap Theory and Its Applications in Engineering Analysis and Design Under Uncertainty: A 4-Day Workshop, NASA-Langley Research Center, Hampton, Virginia, 10–13 September 2012.
8. Info-Gap Theory and Its Applications: A 4-Day Workshop, East Bay Municipal Utility District, Oakland, CA, 4–7 September 2012.

9. Info-Gap Theory and Its Applications: A 4-Day Workshop, Josef Ressel Centre for Optimisation under Uncertainty, University of Applied Sciences, Dornbirn, Austria, 27 February – 1 March 2012.
10. Risk, Robustness, and Info-Gaps, Society for Risk Analysis, Annual Meeting, Charleston, South Carolina, Sunday, December 4, 2011, 8:30am – 5:30pm.
11. Info-Gap Theory and Its Applications in Design and Strategic Planning: A 3 Day Workshop, Los Alamos National Laboratory, Los Alamos, NM, 22–24 August 2011.
12. Info-Gap Theory and Its Applications in Design and Strategic Planning: A 4 Day Workshop, Sandia National Laboratories, Sandia, NM, 15–18 August 2011.
13. Uncertainty Quantification: An Info-Gap Approach to Design and Decision, 30 January 2011, preceding the IMAC XXIX: A Conference and Exposition on Structural Dynamics, January 31 – February 3, 2011, Jacksonville, Florida.
14. Info-Gap Theory and Its Applications in Design and Strategic Planning: A 4 Day Workshop, Los Alamos National Laboratory, Los Alamos, NM, 19–28 January 2011.
15. Info-Gap Theory and its Applications, Electrical and Computer Engineering Dept., Rice University, October–November 2010.
16. Info-Gap Economics: Modeling, Forecasting, and Policy, Department of Economics, University of Houston, October–November 2010.
17. Info-Gap Theory and Its Applications in Design and Strategic Planning. Dept of Mathematics, Durham University, Durham, U.K. 17–20 May 2010.
18. Info-gap Theory: Applications in Reliability. Iltam, Association of Industrial Users of Advanced Technology, Daniel Hotel, Herzlya, 21.10.2009.
19. Info-Gap Theory and Applications: Four Lectures, Dept. of Mathematical Informatics, University of Tokyo. 4 August 2009.
20. 6 Lectures on Info-Gap Theory and Its Applications in Engineering, November, 2008, University of Franche-Comte, Besancon, France.
21. 5-Day Workshop on Info-Gap Theory and Its Applications in Biological Conservation, September, 2008, University of Queensland, Brisbane, Australia.
22. Risk and Uncertainty in Monetary Policy, Centre for Central Bank Studies, Bank of England, London, June, 2008. This conference included a half-day session on info-gap theory for monetary policy.
23. 5-Day Workshop on Info-Gap Theory and Its Applications in Reliability Demonstration and Assessment, March, 2008, RAFAEL.

24. 1-Day Workshop on Info-Gap Theory and Its Applications in Biological Conservation, 2 August 2007, University of Melbourne.
25. Workshop on Info-Gap Theory and Imprecision, The Department of Mathematical Sciences, Durham University, UK, 13–14 July 2007.
26. Workshop on Info-Gap Applications in the Life Sciences, University of Houston, 11–15 Sept. 2006.
27. Managing Financial Risks with Uncertainty. Breakfast workshop at the New South Wales Trade and Investment Centre, Sydney, Australia. 25 July 2006.
28. Managing Financial Risks with Uncertainty. Breakfast workshop at the Centre of Excellence for Mathematics and Statistics of Complex Systems (MASCOS), University of Melbourne. 22 November 2005
29. Workshop on Info-Gap Applications in Technology, University of Newcastle-upon-Tyne, 29–30 Sept. 2005.

### **3 Conferences Organized**

1. Managing and Exploiting Uncertainty: In Light of the Report 'IDF Strategy'. Dado Center for Interdisciplinary Thought, Israel Defense Force, 7.1.2016. Chair, organizing committee.
2. SAMO 2016, Sensitivity Analysis and Model Output, Sante Fe, NM, Spring or Fall 2016, international scientific committee.
3. Military Decision: Foundations, Implications, Relevance. Dado Center for Interdisciplinary Thought, Israel Defense Force, 14.12.2014. Chair, organizing committee.
4. ICVRAM 2014, International Conference on Vulnerability and Risk Analysis and Management, 13–16.7.2014, international scientific committee.
5. Model-based design, validation, and monitoring of structures under severe uncertainty, 26–27.6.2014, Besancon, France. Organizing committee.
6. Workshop on Decisions Under Severe Uncertainty, Polak Auditorium, Coler Visitors Center, Technion, 21 January 2013. Co-organizer with Ido Erev.
7. ISIPTA 2011: 7th International Symposium on Imprecise Probability: Theories and Applications, 25–28 July 2011, University of Innsbruck, Innsbruck, Austria. Program committee.
8. ICVRAM 2011: 1st International Conference on Vulnerability and Risk Assessment and Management, April 11–13, 2011, University of Maryland, College Park. Program committee.
9. 6th International Symposium on Imprecise Probability: Theories and Applications (ISIPTA 2009), Durham University, 14–18 July 2009. Program committee.

10. IUTAM Symposium on The Vibration Analysis of Structures with Uncertainties, 6–10 July, 2009, Saint Petersburg, Russia. Scientific committee.
11. 2nd International Conference on Uncertainty in Structural Dynamics, 15–17 June, 2009, University of Sheffield, UK. Scientific Committee.
12. NATO Advanced Research Workshop on Resilience in Crises, Paris, 7–9 April, 2008. Co-director.
13. Non-deterministic Methods in Applied Mechanics and Engineering, Leuven, March 31–April 2, 2008. Scientific Committee.
14. Workshop on Robust Multi-Criteria Decision Analysis, 12–17 August 2007, Hobart, Tasmania, Australia. Organizing committee.
15. 1st International Conference on Uncertainty in Structural Dynamics, 11–13 June, 2007, University of Sheffield, UK. Scientific Committee.
16. Workshop on Info-Gap Applications in the Life Sciences, University of Houston, 10–15 September 2006. Organizing committee.
17. International conference on: Science and Engineering Education for Leadership, Technion, Haifa, Israel. 28 March 2001. Organizing committee.
18. 28th Israel Mechanical Engineering Conference, 14–15 June 2000. Beer-Sheva Israel. Organizing committee.
19. 27th Israel Mechanical Engineering Conference, 19–20 May 1998. Technion, Haifa, Israel. Editorial chairman.
20. Uncertainty: Models and Measures. Lambrecht, Germany. Co-organizer with Prof. H.G. Natke, University of Hannover, Germany. Funded by Volkswagen Stiftung. 22–24 July 1996.
21. James H. Belfer Memorial Symposium on Modelling of Structures and Mechanical Systems. 8–10 May 1995. Faculty of Mechanical Engineering, Technion. Co-organizer with Prof. A. Shitzer.
22. Workshop on Identification and Diagnosis of Mechanical Structures, 17–19 November 1993, Besancon, France. Co-organizer with Prof. G. Lallement.

## 4 Funded Projects

1. Robust readiness for surprises in a crisis: Multi-site fires and earthquakes, 1.1.2019–31.12.2020. NIS153,000. National Knowledge and Research Center for Emergency Readiness, University of Haifa.
2. System identification and rapid failure detection, Intel Corp, US, 1.1.2012–1.10.2012. \$45,000. Co-PI with Prof. Miriam Zacksenhouse.



3. Surveillance of emerging animal diseases, US Dept of Agriculture and University of Massachusetts, Amherst, \$52,393, 1.10.2008–30.9.2010.
4. Info-gap analysis of time-triggered systems with uncertainty, General Motors, \$56,646. 1.1–30.9.2008.
5. Info-gap algorithms for detecting cardiac events, Abramson Center for the Future of Health, Houston, Texas. \$32,930. 2007–2008. With Prof. Miriam Zacksenhouse.
6. Medical decisioning with info-gaps. Baylor College of Medicine and the Jewish Institute for Medical Research of Houston. \$33,880.49. 2005.
7. Practical methodology for risk management in infra-structure projects in the early planning stage. Israel Electric Corporation, with Prof. Avy Shtub. IS100,000. 1999–2000.
8. Assessment and suppression of vibration in rotor systems, 1995, Henri Gutwirth Research Grant, with Prof. S. Braun and Prof. M. Darlow, \$3000.
9. Vibrodiagnostics of Robotic Gear Mechanisms. 1991–1994, \$36,000. Immigration Ministry, Ministry of Science, Wolfson Fund.
10. Medical Diagnosis of Plantar Pressure by Image Analysis. Technion VPR Fund—Dent Charitable Trust—Non-Military Research Fund. 1993–1994 Joint research with Dr. Victor Bialik, Faculty of Medicine, Technion, and Dr. Aharon Liberson, Department of Orthopedics, Benei Zion Hospital. \$5000.
11. Probabilistic and Set-Theoretic Treatments of Uncertainty in Applied Mechanics: Convex Models. Funded by the Technion–Niedersachsen Research Cooperation Program, 1989–1991. DM140,000.
12. Convex Models of Malfunction Diagnosis in High Performance Aircraft. Funded by U.S. Airforce, 1988–1989, \$30,100. AFOSR-88-0209.
13. Natural Iodine Removal Mechanisms in a Nuclear Reactor Containment Building Following an External Accident. Funded by the Israel Atomic Energy Commission, 1979–1983. \$30,000.
14. Chief researcher in theoretical project on thermodynamic aspects of nuclear reactors. Funded by the Israel Electric Corporation, 1982.
15. Researcher in experimental analysis of potassium extraction system, using radioactive tracers. Funded by Israel Chemical Corporation, 1978 – 1979.

## 5 Research Activities

**Summary. Info-gap theory** is a method for analysis, planning, modeling, decision or design under uncertainty. The future may differ from the past, so our models may err in ways we cannot know. Our data may lack evidence about surprises: catastrophes or windfalls. Our scientific and technical

understanding may be incomplete. These are info-gaps: incomplete understanding of the system being managed as it bears on decisions to be made. Info-gap theory provides decision-support tools for modelling and managing severe uncertainty. Three ideas are central in an info-gap analysis: robustness to uncertainty, satisfying critical requirements, and exploiting favorable opportunities. I initiated info-gap theory and develop its foundations and applications over many years.

Following are specific topics in which I am engaged.

1. **Decision and inference from uncertain evidence.** Decision-support for strategic situations fraught with severe uncertainty. Engineering analysis and design, strategic planning, environmental management, medical as well as economic and social decision-making problems.
2. **Reliability of mechanical systems.** I have developed a non-probabilistic theory of robust reliability based on information-gap models of uncertainty. Without using measure functions such as probability densities, an info-gap model of uncertainty quantifies the disparity between what is known and what needs to be known for an optimal decision. The robust reliability of a system is the greatest info-gap which the system can tolerate without failure.
3. **Medical decision support.** Info-gap theory is being used in developing decision-support systems for chronically ill patients, and for formulating and evaluating public health policy.
4. **Fault and failure analysis.** Fault diagnosis problems are technologically important instances of decision-making under severe uncertainty. Fatigue lifetimes subject to highly uncertain load history have been modelled with info-gap theory.
5. **Biological conservation.** Strategies for protecting endangered species, for preserving biodiversity, and for enhancing other important environmental attributes, are based on ecological models which are subject to severe uncertainties. Info-gap theory provides a useful tool for formulating and evaluating strategies for biological conservation.
6. **Modelling uncertain dynamic systems.** Analysts in many fields construct mathematical models for analysis and design of systems. These models must be verified by measurement. Ambiguities and model uncertainties, as well as measurement error, complicate the verification process. Info-gap theory has proven useful in up-dating models from measurements.
7. **Economics.** Strategic decisions in economics. Home-bias and equity-premium puzzles have been studied from the perspective of info-gap decision making. Info-gap decision strategies have been applied to problems in monetary policy, resource economics, financial economics, and to the economics of national security. Info-gap theory has been applied to develop micro-economic models of demand and of competitive markets.
8. **Military intelligence.** Analysis and exploitation of intelligence requires modeling and managing deep uncertainty that results from limited collection capabilities and deception by the adversary. Info-gap theory has been applied to in this domain.
9. **National security.** Strategic and operational decisions in military planning and implementation face deep uncertainties about the adversary's intentions and capabilities, as well as those of

one's own side. Info-gap theory provides practical tools for prioritizing options for force build-up, strategic planning, and operational deployment.

10. **Preparedness against terrorism.** Info-gap theory has been applied in designing public preparedness strategies against bio-terrorism. Uncertainties in epidemiological models is represented and robust-satisficing strategies are identified.
11. **Management.** Info-gap methods have been developed for project planning and task-scheduling subject to uncertain durations and expenditures.
12. **Epistemology of uncertainty.** Axioms of info-gap uncertainty, and the epistemology of decision-making under severe uncertainty, are areas of interest.

## 6 Teaching Experience

Teaching Experience at the Technion unless otherwise indicated.

- 1989 – present Linear Systems (undergraduate).  
Statics (undergraduate).  
Strength of Materials (undergraduate).  
Introduction to Mechanical Reliability (undergraduate).  
Risk Assessment and Reliability Analysis of Systems (graduate).  
Structural Failure and Reliability (undergraduate and graduate).
- 2002 Risk Assessment and Reliability Analysis of Systems (graduate).  
Woodruff School of Mechanical Engineering, and  
School of Civil Engineering  
Georgia Institute of Technology  
Atlanta, Georgia
- 1995 Technical Mechanics, Tzur Industrial University, Tefen, Israel.
- 1978 – 1989 Nuclear Reactor Control (upper level).  
Spatial Randomness: Measurement and Design (grad.)  
Malfunction Control (grad.)  
Fundamentals of Radiation Engineering (lower level).  
Introduction to Nuclear Engineering (lower level).
- 1985 – 1986 Spatial Randomness: Measurement and Design (grad.)  
Department of Nuclear Engineering  
North Carolina State University  
Raleigh, NC, USA
- 1978 – 1983 Supervise final research projects of students.  
from Bosmat Technical High School.
- 1979 Course in Introductory Physics  
Israel Air Force Technical High School  
Haifa

- 1978 – 1979 Part of teaching team for course in Nuclear Science for High School students.
- 1973 – 1978 Teaching assistant in chemistry  
University of California  
Berkeley, California

## 7 List of Publications

### 7.1 Thesis

1. Equilibrium in the reaction of 175 and 252 MeV  $^{20}\text{Ne}$  with  $^{197}\text{Au}$ , James B. Moulton, Ph.D. Thesis, Department of Chemistry, University of California, Berkeley, California, (1978).

### 7.2 Original Books

1. Yakov Ben-Haim, 1985, *The Assay of Spatially Random Material*, Kluwer Academic Publishers, Dordrecht, Holland. Series on Mathematics and Its Applications, 318 pages.
2. Yakov Ben-Haim and Isaac Elishakoff, 1990, *Convex Models of Uncertainty in Applied Mechanics*, Elsevier Science Publishers, Amsterdam, 221 pages.
3. Yakov Ben-Haim, 1996, *Robust Reliability in the Mechanical Sciences*, Springer-Verlag, Berlin, 233 pages.
4. Yakov Ben-Haim, 2006, *Info-Gap Decision Theory: Decisions Under Severe Uncertainty*, 2nd edition, Academic Press, London. First edition: 2001.
5. Yakov Ben-Haim, 2010, *Info-Gap Economics: An Operational Introduction*, Palgrave-Macmillan.
6. Yakov Ben-Haim, *The Dilemmas of 'Wonderland': Decisions in the Age of Information*, Oxford University Press, September 2018.

### 7.3 Edited Book

1. H.G. Natke and Y. Ben-Haim, eds., 1997, *Uncertainty: Models and Measures*, Proceedings of a Volkswagen Foundation Workshop. Akademie-Verlag, Berlin.

### 7.4 Book Chapters

1. Yakov Ben-Haim, 2005, Info-gap Decision Theory For Engineering Design. Or: Why 'Good' is Preferable to 'Best', appearing as chapter 11 in *Engineering Design Reliability Handbook*, Edited by Efstratios Nikolaidis, Dan M.Ghiocel and Surendra Singhal, CRC Press, Boca Raton.

2. Yakov Ben-Haim, 2007, Peirce, Haack and Info-gaps, pp.150–164 in *Susan Haack, A Lady of Distinctions: The Philosopher Responds to Her Critics*, edited by Cornelis de Waal, Prometheus Books, Amherst, New York.
3. Izuru Takewaki and Yakov Ben-Haim, 2007, Info-gap robust design of passively controlled structures with load and model uncertainties, appearing in *Structural Design Optimization Considering Uncertainties*, Yiannis Tsompanakis, Nikkos D. Lagaros and Manolis Papadrakakis, editors. Taylor and Francis Publishers.
4. Yakov Ben-Haim, 2014, Order and Indeterminism: An info-gap perspective, in *Error and Uncertainty in Scientific Practice*, Marcel Boumans, Giora Hon, and Arthur Petersen, editors, Pickering & Chatto Publishers, London.
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## 7.10 Abstracts and Short Papers

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3. Yakov Ben-Haim and Amos Notea, Assay of aqueous uranium by radioisotope X-ray fluorescence spectrometry, Israel Nuclear Society Annual Conference, Beer Sheva, Dec. 1978.
4. Yakov Ben-Haim, X-ray fluorescence analysis of trace elements in multi-component solutions, Israel Nuclear Society Annual Conference, Haifa, Dec. 1979.
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## 7.11 Technical Reports

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2. Yakov Ben-Haim and Ezra Elias, Investigation of natural iodine removal mechanisms in a nuclear reactor containment building, First year final report. Prepared for the Israel Atomic Energy Commission, Sept. 1980. Research project number 170-078. 80 pages.
3. Yakov Ben-Haim and Ezra Elias, Investigation of natural iodine removal mechanisms in a nuclear reactor containment building following an external accident, Two-year final report. Prepared for the Israel Atomic Energy Commission, Sept. 1981. Research project number 170-078. 170 pages.
4. Yakov Ben-Haim, The effect of stochastic processes on the thermal-hydraulic behaviour of nuclear reactors, Prepared for the Israel Electric Corp., Jan. 1982. Research project number 170-073. 43 pages.
5. Yakov Ben-Haim, Natural iodine removal mechanisms in a nuclear reactor containment building following an external accident, Final report. Prepared for the Israel Atomic Energy Commission, July, 1983. Research project number 170-078. 176 pages.
6. Yakov Ben-Haim, Convex models of malfunction diagnosis in high performance aircraft, Prepared for the United States Air Force under grant number AFOSR-88-0209, May 1989. Research project number 170-110.

## 8 On-line talks

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2. <https://www.oxfordmartin.ox.ac.uk/videos/view/615>  
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4. <https://www.youtube.com/watch?v=SIRvva8Ei58>  
Conversation with Yakov Ben-Haim, Casey Helgeson and Christian Gollier, HEC Paris, 23.5.2017.

## 9 Graduate Students and Post-Docs

### Graduate Students: Ph.D. Degree

1. Uzi Vulkan, Global optimization in the adaptive borehole assay of uranium. Ph.D., completed in 1988.
2. Myung-Chun Lee, Assay of spatially random radioactive material in a long rod. Ph.D. (North Carolina State University, Raleigh), completed in 1988.
3. Yaakov Saraf, Info-gap detection of anomalies. Ph.D. Completed, October 2006.
4. Lior Davidovitch, Profiling: Strategic Interactions Under Severe Uncertainty, Ph.D. Completed April 2009.

### Graduate Students: M.Sc. Degree

1. Zvi Covaliu, Isolation of small malfunctions in a PWR nuclear power plant. M.Sc., completed in 1987.
2. Ariel Talmor, Adaptive assay of pulmonary aerosols of plutonium. M.Sc. (Ben-Gurion University, Beer Sheva), completed in 1988.
3. Osnat Katzanek, Experimental study of design optimization of diagnosis of control-actuator failure in a thermal-hydraulic system. M.Sc. Completed in 1992.
4. Dror Armon, Adaptive diagnosis of cracks in beams, Started: Spring 1990 (Second advisor: Prof. Shimon Braun). M.Sc. Completed 1992.
5. Avi Rubinstein, Adaptive Diagnosis of External Forces on a Beam. M.Sc. Completed 1992.
6. Boris Bernstein, Automatic control of multiplicative failures in a thermal-hydraulic system. M.Sc. Completed 1993.
7. Yotam Freund, Selectively sensitive identification of the topology of linear elastic systems. M.Sc. Completed 1997.
8. Atzmon Ofri, Modelling and control of flexible structures, M.Sc. Completed 1997. (Second adviser: Prof. Tanhum Weller, Faculty of Aerospace Engineering.)
9. David Daley, The effect of muscle fatigue on the damping of shocks to the skeleton during running. Department of Biomedical Engineering. M.Sc. Second advisor. Completed Spring 1998.
10. Sary Regev, Applicable methodology of risk management in hi-tech engineering projects. M.Sc. Faculty of Industrial Engineering. First advisor: Prof. Avy Shtub. Completed Spring 2001.

11. Arkady Gurevitch, Reliable design of a non-linear mechanical device with an uncertain model. M.Sc. Interdisciplinary Committee for Quality Assurance and Reliability. Completed Spring 2002.
12. Faina Aranovich, Risk assessment in preliminary project planning under severe uncertainty. M.Sc. Faculty of Industrial Engineering. First advisor: Prof. Avy Shtub, Faculty of Industrial Engineering. Completed Spring 2002.
13. Michal Mor, Resource allocation and contingent branching: An information-gap approach. M.Sc. First advisor: Prof. Yosi Ben-Asher, Faculty of Aerospace Engineering. Completed Spring 2002.
14. Carmit Keren, Info-Gap Bayesian Classification. First advisor: Dr. Miriam Zacksenhouse. M.Sc. Completed April 2009.
15. Itay Sisso, Info-gap approach to multi-unmanned aerial vehicles control under severe uncertainty. M.Sc. First advisor: Dr. Tal Shima, Faculty of Aerospace Engineering. Completed 2009.
16. Michael Sambur, Analysis of the newsvendor problem with info-gap decision theory, M.Sc., First advisor: Prof. Yale Herer, Faculty of Industrial Engineering. Completed 2010.
17. Yehuda Moran, Info-Gap Approach for Micro UAV Helicopter Motion Planning under Severe Uncertainty, M.Sc., First advisor: Dr. Tal Shima, Faculty of Aerospace Engineering. Completed 2010.
18. Mark Shamsonov, Estimating Uncertain Probability Distributions using Info-Gap Theory, M.Sc. With Prof. Miriam Zacksenhouse. Completed Spring 2011.
19. Guy Shuster, Design of a vehicle suspension system under uncertainty. M.Sc., First advisor: Prof. Oleg Gendelman. Completed Spring 2011.
20. Yativ Shechter, MSc, Info-gap robustness analysis of the design of a heavy machine gun barrel with load uncertainty. Completed 2015.
21. Dori Nissenbaum, MSc, Non-invasive robust safety evaluation for dynamic aircraft components under severe uncertainty: A military implementation. Completed 2015.
22. Orel Shahir, MSc., Analysis of stress concentration around a hole with uncertain shape, based on info-gap theory. Completed 2015.
23. Valery Davidov, MSc., An info-gap approach to allocating intercepting missiles against attacking rockets and missiles. Completed 2015.
24. Oded Fraid, MSc, Info-gap analysis of cascading failures in networks. Completed 2016.
25. Josh Weiss, MSc., Penetration by projectiles of solid barriers with uncertainties. Completed 2016.

26. Dan Mamet, Analysis of uncertainty in Operation Overlord (Invasion of Normandy, June 1944) using info-gap theory, Bar Ilan University, additional adviser.
27. Philip Ochman, An Info-Gap Approach to Crack Tip Plastic Zone Shapes.

#### **Graduate Students: M.E. Degree**

1. Michal Yeduvin. Reliability analysis based on road-test data of I.D.F. Rio M-813 Trucks. Completed 1997.
2. Ariel Daniels. Decision algorithms in testing of eddy current devices. Completed 1998.
3. Yoseph Rabinovitch. Barrel-jump in cannon fire of tanks. Completed Fall 1998.
4. Rony Galamidi. Robust reliability of project management based on information-gap models of uncertainty. Completed Spring 1999.
5. Ofer Hayun. Evaluation and control of the process reliability of a sub-station planning project in the Israel Electric Corporation. Completed Spring 2000.
6. Rony Ben-Shimon. Risk management of a sub-project in the planning and implementation of a super-high-voltage line. Completed Spring 2000.
7. Yakov Zamstein, Assessment and management of risks in maintenance of power generating units. Completed: Fall 2000.
8. Ronen Holtzman, Risk assessment in assembly of an air cooled condenser in a combined cycle project. Completed: Fall 2000.
9. Eitai Farbman, Risk assessment in assembly of a heat recovery steam generator in a combined cycle project. Completed: Fall 2000.
10. Ziv Dvir, Risk assessment in projects in the Israeli Airforce. Completed Spring 2001.
11. Sharon Ben-Porat, Examination of the info-gap approach to risk assessment in the technology and logistics division of the IDF. Completed Spring 2001.
12. Alon Shachar. Assessment and management of risks in turbo-generator maintenance projects. Completed Spring 2001.
13. Nuriel Ronen, Risk assessment in data systems for the Israeli Customs Service. Completed Spring 2001.
14. Nir Haimov, Assessment of info-gap risks in technological development schedules. Completed Fall 2002.
15. Lior Kotik, Info-gap robustness and opportunity analysis of reactive armor in a neighboring-cassette event. Completed Spring 2002.

16. Tsafirir Daraby, Risk assessment of accelerated thermal aging using the info-gap method. Completed Spring 2011.

#### **Post-Doctoral Fellows**

1. Dr. Danielle Denes dos Santos Carstens, Brazil.