Introduction

Natural hazards - traditionally defined as potentially damaging or destructive natural events that might occur in the future - can have a devastating impact on society. The consequences of natural disasters each year include 80,000 deaths, millions homeless, and economic losses of $50 billion-$60 billion. While the general field of risk analysis has made significant progress in recent decades in quantifying the expected physical damage associated with natural events, all countries face decisions on the level of acceptable risk its citizens should face in the built or modified natural environment. Robust building codes, land-use development restrictions, and environmental preservation policies can all lead to reduced risk exposure to natural hazards, but they exact a cost in terms of economic development and immediate amenities.

The premise for the conference is that successful policy in the area of risk management requires the technical expertise of engineers; the legal, cultural, political, environmental and economic expertise of social scientists and legal scholars; and the ethical expertise of philosophers. The goal of the conference is therefore to bring together leading minds in engineering, science, philosophy, law, and psychology to identify foundational directions and approaches to societal risk management of natural hazards.

Specific themes that will be discussed during the conference include: the basis for distinguishing the risks to which a society may be permissibly exposed from those to which it may not be so exposed; the appropriate tradeoff between immediate needs and future potential devastation, including how to balance mitigating low-probability but high-consequence events in light of more immediate and definite needs of society; the extent to which decisions concerning these risks should be publicly debated and decided; the moral and behavioral significance of the source of a risk, or how a risk is created and maintained in the built environment; and the principles that should be used to assess moral and legal responsibilities in mitigating and preparing for risks and in the aftermath of a natural disaster.

The conference features a number of presentation from scholars and practitioners from diverse national and professional backgrounds.

Organizing Committee

Paolo Gardoni
Director, MAE Center: Creating a Multi-hazard Approach to Engineering, and Co-director, Societal Risk Management Program, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign
Associate Professor, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign

Colleen Murphy
Director, Women & Gender in Global Perspectives (WGGP) Program, University of Illinois at Urbana-Champaign
Associate Professor, Department of Philosophy, University of Illinois at Urbana-Champaign

Arden Rowell
Associate Professor and Richard W. and Marie L. Corman Scholar, College of Law, University of Illinois at Urbana-Champaign
Sponsors
Civil and Environmental Engineering (CEE)
CEE Societal Risk Management (SRM) Program
MAE Center
Women and Gender in Global Perspectives (WGGP)
College of Law
Office of Risk Management and Insurance Research (College of Business)
The AXIS Research Center (AXIS Capital)

Conference Location and Facilities
There will be a welcome reception on the evening at April 16, starting at 6:00 PM. The reception will be held in the main lobby of Axis Capital’s Office Building at 1800 S Oak St., Champaign, Illinois (just across the street in front of the I Hotel and Conference Center.)

All of the conference sessions will be held in the Alma Mater Room of the I Hotel and Conference Center, University of Illinois at Urbana-Champaign. Lunches will be in the Humanities Room.
Presentation Time
Each session includes three presentations that bring in different perspectives on a common theme. Each presentation will be limited to 30 minutes. At the end of the three presentations there will be a panel discussion where all three presenters will answer questions and generate a broader discussion.

Edited Volume
The papers presented at the conference will be considered for publication in an edited volume published by a prestigious press. Additional details for the authors, including the deadline to submit the full contribution along with a template and page limit, will be provided shortly following the conference.

Website and Registration
The conference has a dedicated website where additional information and last-minute changes are posted. The link to the conference website is http://mae.cee.illinois.edu/ICSRM.

Members of the public are welcome to attend the conference upon preregistration on the website. There is no fee for attending.
# Conference Program

## Day 1  
**April 17, 2014**

### 8:20 - 9:00 AM  
**Opening Remarks**

**10 min.**

**Paolo Gardoni**  
Director, MAE Center: Creating a Multi-hazard Approach to Engineering, and  
Co-director, Societal Risk Management Program, Department of Civil and  
Environmental Engineering, University of Illinois at Urbana-Champaign  
Associate Professor, Department of Civil and Environmental Engineering,  
University of Illinois at Urbana-Champaign

**Benito Mariñas**  
Interim Head, Department of Civil and Environmental Engineering, University of  
Illinois at Urbana-Champaign  
Ivan Racheff Professor, Department of Civil and Environmental Engineering,  
University of Illinois at Urbana-Champaign

**10 min.**

**Bryan Endres**  
Interim Associate Provost for International Affairs and Interim Director,  
International Programs and Studies, University of Illinois at Urbana-Champaign  
Associate Professor, Department of Agricultural and Consumer Economics,  
University of Illinois at Urbana-Champaign

**10 min.**

**Bob Lawless**  
Associate Dean for Research and Co-director, Program on Law, Behavior and  
Social Science, College of Law, University of Illinois at Urbana-Champaign  
Professor, College of Law, University of Illinois at Urbana-Champaign

### 9:00 - 9:15 AM  
**Group Photo**

### 9:15 - 9:30 AM  
**Break**

### 9:30 - 11:30 AM  
**Session 1  
Risk Assessment 1**

**Chair/Moderator:** Colleen Murphy  
Director, Women & Gender in Global Perspectives (WGGP) Program, University  
of Illinois at Urbana-Champaign  
Associate Professor, Department of Philosophy, University of Illinois at Urbana-  
Champaign

**30 min.**

**Tony Cox**  
President of Cox Associates  
“Intergenerational Justice in Resilience Investments with Uncertain Future  
Preferences and Resources”

**30 min.**

**Gregg Macey**  
Associate Professor, Brooklyn Law School  
“Na-Tech and Real-Time Right-to-Know”

**30 min.**

**Sven Ove Hansson**  
Head of the Division of Philosophy, Royal Institute of Technology, Stockholm  
Professor, Division of Philosophy, Royal Institute of Technology, Stockholm  
“Managing Risks of the Unknown”

**30 min.**

**Panel Discussion**

### 11:30 AM - 12:30 PM  
**Lunch**
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Topic</th>
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<tbody>
<tr>
<td>12:30 - 2:30 PM</td>
<td>Session 2</td>
<td><strong>Risk Assessment 2</strong></td>
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<tr>
<td></td>
<td>Chair/Moderator: Arden Rowell</td>
<td>Associate Professor and Richard W. and Marie L. Corman Scholar, College of Law, University of Illinois at Urbana-Champaign</td>
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<td>30 min.</td>
<td>Noreen Sugrue</td>
<td>Coordinator of Health and Policy Initiatives in the Women &amp; Gender in Global Perspectives (WGGP) Program, University of Illinois at Urbana-Champaign</td>
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<td></td>
<td>and Tim McCarthy</td>
<td>Professor, Department of Philosophy and Department of Linguistics, University of Illinois at Urbana-Champaign</td>
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<td></td>
<td></td>
<td>“Risk Assessment and Social Choice”</td>
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<td>30 min.</td>
<td>Adam Hosein</td>
<td>Assistant Professor, Department of Philosophy, University of Colorado, Boulder</td>
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<td>“Rights Theory and Natural Hazards”</td>
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<td>30 min.</td>
<td>Mark Coeckleburgh</td>
<td>Professor, Centre for Computing and Social Responsibility, De Montfort University, UK</td>
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<td>“Vulnerability to Natural Hazards: Philosophical Reflections on the Social and Cultural Dimensions of Natural Disaster Risk”</td>
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<tr>
<td>30 min.</td>
<td>Panel Discussion</td>
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<td>2:30 - 3:00 PM</td>
<td>Break</td>
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<tr>
<td>3:00 - 5:00 PM</td>
<td>Session 3</td>
<td><strong>Future Challenges</strong></td>
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<td>Chair/Moderator: Paolo Gardoni</td>
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<tr>
<td>30 min.</td>
<td>Donald J. Wuebbles</td>
<td>Harry E. Preble Professor, Department of Atmospheric Sciences, University of Illinois at Urbana-Champaign</td>
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<td>“Setting the Stage for Risk Management: Severe Weather under a Changing Climate”</td>
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<td>30 min.</td>
<td>Bruce Ellingwood</td>
<td>Professor, Department of Civil and Environmental Engineering, Colorado State University</td>
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<td>“Managing Risks to Civil Infrastructure Due to Natural Hazards: Communicating Long-term Risks Due to Climate Change”</td>
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<tr>
<td>30 min.</td>
<td>David Rosowsky</td>
<td>Provost and Senior Vice President, University of Vermont</td>
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<td>“Assessing Climate Change Impact on the US East Coast Hurricane Hazard”</td>
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<tr>
<td>30 min.</td>
<td>Panel Discussion</td>
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<tr>
<td>7:00 PM</td>
<td>Dinner</td>
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<tr>
<th>Time</th>
<th>Session</th>
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<th>Chair/Moderator</th>
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<tbody>
<tr>
<td>8:00 -10:00 AM</td>
<td>Session 4</td>
<td>Risk Management 1</td>
<td>Chair/Moderator: Colleen Murphy</td>
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<tr>
<td>30 min.</td>
<td>Doug MacLean</td>
<td>&quot;Is ‘Natural Hazard’ a Moral Concept?&quot;</td>
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<tr>
<td>30 min.</td>
<td>Michael Faber</td>
<td>&quot;Societal Risk Governance – Challenges and Potentials&quot;</td>
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<td>30 min.</td>
<td>Peter Molk</td>
<td>&quot;Insurance as a Tool for Managing Natural Hazard Risk&quot;</td>
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<td>30 min.</td>
<td>Panel Discussion</td>
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<td>10:00 - 10:30 AM</td>
<td>Break</td>
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<tr>
<td>10:30 AM - 12:30 PM</td>
<td>Session 5</td>
<td>Risk Management 2</td>
<td>Chair/Moderator: Arden Rowell</td>
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<tr>
<td>30 min.</td>
<td>Eun Jeong Cha</td>
<td>&quot;Risk-informed Decision Framework for Built-environment: The Application of Epistemic Uncertainty&quot;</td>
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<td>30 min.</td>
<td>Dan Farber</td>
<td>&quot;Measuring the Shadow of Future Disasters: Discounting, Inequality, and Catastrophic Risks&quot;</td>
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<tr>
<td>30 min.</td>
<td>Mahesh D. Pandey</td>
<td>&quot;Efficiency in Risk Management: Societal Perspectives&quot;</td>
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<td>30 min.</td>
<td>Panel Discussion</td>
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<td>12:30 - 1:30 PM</td>
<td>Lunch</td>
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<td>1:30 - 3:30 PM</td>
<td>Session 6</td>
<td>Disaster Management</td>
<td>Chair/Moderator: Paolo Gardoni</td>
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<tr>
<td>30 min.</td>
<td>Sarah K.A. Pfatteicher</td>
<td>&quot;Running from Nature: The Role of Emergency Egress in Disaster Management&quot;</td>
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<td>30 min.</td>
<td>Gordon Woo</td>
<td>&quot;Participatory Decision Making on Hazard Warnings&quot;</td>
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<td>Time</td>
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<td>30 min.</td>
<td>Lisa Sun</td>
<td>Associate Professor, School of Law, Brigham Young University</td>
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<td>“Narrating Disaster”</td>
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<td>30 min.</td>
<td>Panel Discussion</td>
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<td>3:30 - 4:00 PM</td>
<td>Break</td>
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<td>4:00 - 4:30 PM</td>
<td>Closing Remarks</td>
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<td>15 min.</td>
<td>Arden Rowell</td>
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<td>15 min.</td>
<td>Colleen Murphy</td>
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<td>7:00 PM</td>
<td>Dinner</td>
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Conference Organizers and Speakers

Conference Organizers

Paolo Gardoni
Paolo Gardoni is an Associate Professor and Co-director of the Societal Risk Management Program in the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign. He is also the director of the MAE Center, which was established in 1997 by the National Science Foundation as one of three national earthquake engineering research centers. His research interests include reliability, risk and life cycle analysis; decision making under uncertainty; earthquake engineering; performance assessment of deteriorating systems; ethical, social, and legal dimensions of risk; policies for natural hazard mitigation and disaster recovery; and engineering ethics.

Colleen Murphy
Colleen Murphy is an Associate Professor of Philosophy and Director of the Women and Gender in Global Perspectives Program at the University of Illinois at Urbana-Champaign. Her work addresses the ethical dimensions of risk.

Arden Rowell
Arden Rowell is an associate professor of law at the University of Illinois. Her work addresses the regulation of risk and uncertainty, focusing particularly on the intertemporal impacts of regulation, the distribution of environmental harms, and the quantification of the costs and benefits of public policies.

Conference Speakers

Eun Jeong Cha
Eun Jeong Cha is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign. Her research interests are in risk-informed decision making for buildings and other infrastructure exposed to natural and man-made hazards with a focus on life cycle analysis, the role of risk acceptance attitudes, and extended life spans of civil infrastructure projects in planning, design, maintenance and replacement for a sustainable development.
**Mark Coeckelbergh**
Mark Coeckelbergh is Professor of Technology and Social Responsibility at the Centre for Computing and Social Responsibility, De Montfort University, UK and teaches at the Department of Philosophy, University of Twente, The Netherlands. He is also co-Chair of the IEEE Robotics & Automation Society Technical Committee on Robot Ethics. Previously he was Managing Director of the 3TU Centre for Ethics and Technology. His publications include Growing Moral Relations (Palgrave Macmillan 2012), Human Being @ Risk (Springer 2013), and numerous articles on ethics and technology. His research interests include philosophy of risk, environmental philosophy and financial ethics.

**Tony Cox**
Dr. Tony Cox is President of Cox Associates (www.cox-associates.com), a Denver-based applied research company specializing in quantitative risk analysis and advanced analytics. He holds a Ph.D. in Risk Analysis (1986) and an S.M. in Operations Research (1985), both from M.I.T. Dr. Cox is a member of the National Academy of Engineering and of the National Academies Board of Mathematical Sciences and their Applications; a lifetime Fellow of the Society for Risk Analysis; an Edelman Laureate of the Institute for Operations Research and Management Science; and the recipient of many prizes and awards recognizing outstanding real-world accomplishments in these and related fields. He is also Clinical professor of Biostatistics and Informatics at the University of Colorado Health Sciences Center, and Editor-in-Chief of Risk Analysis: An International Journal.

**Bruce Ellingwood**
Dr. Ellingwood received his undergraduate and graduate education at the University of Illinois at Urbana-Champaign. He held professional research and administrative positions at the National Bureau of Standards (now NIST), Johns Hopkins University and the Georgia Institute of Technology prior to joining Colorado State University. His main research and professional interests involve the application of probability and statistics to structural engineering, particularly in structural reliability theory and probabilistic risk assessment. He is internationally recognized as an authority on structural load modeling, reliability and risk analysis of engineered facilities, and as a leader in the technical development and implementation of probability based codified design standards for building structures. He is Editor of Structural Safety, and serves on five other editorial boards. He is a member of the National Academy of Engineering, a Distinguished Member of ASCE and an Inaugural Fellow of the Structural Engineering Institute.

**Daniel Farber**
Daniel Farber is the Sho Sato Professor of Law at the University of California, Berkeley, as well as being Faculty Co-director of the Center for Law, Energy, and the Environment. He teaches and writes about constitutional law and environmental law. He is a Life Member of the American Law Institute and a Fellow of the American Academy of Arts and Sciences. Professor Farber received a B.A. in philosophy (minoring in mathematics) with high honors in 1971 and an M.A. in sociology in 1972, both from the University of Illinois. In 1975 he earned his J.D. from the University of Illinois, where he was a member of the Order of the Coif, editor in chief of the “University of Illinois Law Review,” a Harno Scholar and class valedictorian. After graduating, Professor Farber clerked for Judge Philip W. Tone of the U.S. Court of Appeals for the 7th Circuit and for Justice John Paul Stevens of the U.S. Supreme Court. He was appointed to the Berkeley faculty in 2001. He has written extensively about risk regulation, environmental law, and disaster issues.
Michael Havbro Faber
Michael Havbro Faber is professor in Risk and Safety and the head of the department of civil engineering at the Technical University of Denmark, DTU. His research is directed on engineering decision making with focus on applied Bayesian decision theory, life safety, management of catastrophic risks, risk assessment, Bayesian uncertainty modelling, structural reliability and risk based assessment and maintenance. Michael H. Faber is actively involved in several international committees, including: The Joint Committee on Structural Safety; the International Forum on Engineering Decision Making; the WEF GAC on Catastrophic Risks and the OECD High Level Risk Forum.

Sven Ove Hansson
Sven Ove Hansson is professor in philosophy and Head of the Division of Philosophy, Royal Institute of Technology, Stockholm. He is editor-in-chief of Theoria and the book series Outstanding Contributions to Logic (Studia Logica Library). He is also member of the editorial boards of Synthese, Studia Logica, and the Journal of Philosophical Logic, member of the scientific editorial board of Philosophy & Technology, and area editor of the book series Logic, Argumentation & Reasoning.

Adam Hosein
Adam Hosein is an Assistant Professor of Philosophy at the University of Colorado, Boulder. He works mainly in ethics, political philosophy, and the philosophy of law. Some topics he has recently published on include distributive justice, immigration, campaign finance, and the ethics of harming. His interests in risk management include questions about the fair distribution of risk and whether the state should weigh risks of harming its own citizens more heavily than risks of failing to aid them.

Gregg Macey
Gregg Macey focuses his work primarily in the realms of environmental regulation, organization theory, and urban planning. He joined the faculty of Brooklyn Law School in 2010, where he is an Associate Professor of Law. He has held a variety of academic positions over the course of his career. He was a Visiting Assistant Professor at Fordham Law School between 2008 and 2010. He was a lecturer in the University of Virginia's School of Architecture, a Dillard Fellow at the University of Virginia School of Law, a Voorhees Instructor at the Massachusetts Institute of Technology, and a Research Fellow at Harvard Law School's Program on Negotiation. He has written articles for journals such as the Virginia Environmental Law Journal, Journal of Policy Analysis and Management, Cornell Law Review, Utah Law Review, Georgetown Law Journal, Environmental Law, Environmental Management, MIT Journal of Planning, and Brigham Young University Law Review. He has also served as an attorney and consultant with a variety of organizations, including Kirkland & Ellis LLP, E2 Inc., and the Consensus Building Institute. He has a Ph.D. in urban planning from MIT and a JD from the University of Virginia.
Douglas MacLean
Douglas MacLean is Professor of Philosophy at the University of North Carolina at Chapel Hill. His research and teaching are in ethics and political philosophy. The main focus of his research for many years has been on how we measure and evaluate risks to society and, more specifically, how analytic techniques of risk assessment reflect or fail to reflect social values.

Timothy McCarthy
Timothy G. McCarthy is Professor of Philosophy and Linguistics at the University of Illinois at Urbana-Champaign. Trained as a mathematician, he received his Ph.D. in Philosophy from Johns Hopkins in 1979. His research interests lie mainly in mathematical logic, Philosophy of logic and mathematics and metaphysics. He is interested in the problem of risk from the standpoint of decision theory and the theory of social choice.

Peter Molk
Professor Molk is a Visiting Assistant Professor at the University of Illinois College of Law. His research focuses on issues in insurance law and organizational design. His current work examines how insurers and regulators interact and respond to one another, particularly in the context of correlated risk, and how insurance can be used as a tool to manage catastrophic risk resulting from natural and other disasters.

Mahesh Pandey
Dr. Mahesh Pandey is currently a Professor and an Industrial Research Chair in Risk and Life Cycle Management of engineering systems. Dr. Pandey is leading a large research program for developing risk informed decision making tools for nuclear industry. This program has been funded (over 5 M$ in last 10 years) by an alliance of the Canadian Government, universities and nuclear utilities. The key areas of research are stochastic modeling, system reliability analysis, multi-hazard aggregation and societal risk management.

Sarah Pfatteicher
Dr. Sarah Pfatteicher is Associate Dean for Academic Affairs in the College of Agricultural and Life Sciences at the University of Wisconsin-Madison where she is also Research Professor of Civil and Environmental Engineering and a member of the Holtz Center for Science and Technology Studies. As associate dean, she serves as the designated academic officer for the college, overseeing academic programs and student services. Her research emphasis is in engineering ethics and education, and disaster prevention and response. Both of these topics are covered in her recent book, Lessons amid the Rubble: an Introduction to Post-Disaster Engineering and Ethics (Hopkins, 2010).
David Rosowsky
David V. Rosowsky is Provost and Senior Vice President of the University of Vermont. He served previously as Dean of Engineering at RPI in Troy, New York and as Head of the Zachry Department of Civil Engineering at Texas A&M University, where he also held the A.P. and Florence Wiley Chair in Civil Engineering. A recognized expert in structural reliability, design for natural hazards, stochastic modeling of structural and environmental loads, and probability-based codified design, Dr. Rosowsky has authored or co-authored more than 140 papers in peer-reviewed journals and more than 150 papers appearing in conference proceedings. He has supervised more than 20 Masters and Doctoral students. He is the recipient of the ASCE Walter L. Huber Research Prize, the T.K. Hseih Award from the Institution of Civil Engineers (UK), and the ASCE Norman Medal. He is a registered Professional Engineer, and holds the rank of Fellow of the American Society of Civil Engineers.

Noreen Sugrue
Noreen M. Sugrue is Assistant Professor and Coordinator of Health and Policy Initiatives in the Women and Gender in Global Perspectives program at the University of Illinois at Urbana-Champaign. Her broad research focus is health and social welfare policy. Specifically, her research centers on inequality and policy related to skilled labor migration, healthcare labor issues, access, to care, and changes in delivery and care. Her interest in risk is in redefining what constitutes relevant data and how professionals use expert and non-expert data to change behaviors and achieve desired outcomes.

Lisa Grow Sun
Lisa Grow Sun graduated summa cum laude from Harvard Law School. After law school, she clerked for the Honorable J. Michael Luttig, United States Court of Appeals for the Fourth Circuit, and then for the Honorable Justice Anthony M. Kennedy, United States Supreme Court. Sun now teaches disaster law, constitutional law, and torts at the J. Reuben Clark Law School, Brigham Young University. Her research centers on the intersection of law and natural disasters. She is a coauthor of the definitive disaster law textbook, Disaster Law and Policy, with Dan Farber, Jim Chen, and Rob Verchick.

Gordon Woo
Gordon Woo is a catastrophist at Risk Management Solutions (RMS), specializing in mathematical modeling of extreme risks, with a particular focus on catastrophe insurance. Apart from his scientific papers, he is the author of two books, published by Imperial College Press: ‘The Mathematics of Natural Catastrophes’, and ‘Calculating Catastrophe’. Top mathematics graduate of Cambridge University, he completed his PhD in theoretical physics at MIT as a Kennedy Scholar, and was a member of the Harvard Society of Fellows. He is currently an adjunct professor at the Institute of Catastrophe Risk Management at Nanyang Technological University, Singapore.
Donald J. Wuebbles
Donald J. Wuebbles is the Harry E. Preble Professor of Atmospheric Science at the University of Illinois. He is an expert in numerical modeling of atmospheric physics and chemistry and has authored over 400 scientific articles, relating mostly to atmospheric chemistry and climate issues. Dr. Wuebbles has been a lead author on a number of national and international assessments related to concerns about climate change and the effects of human activities on stratospheric and tropospheric ozone. Dr. Wuebbles and colleagues received the 2005 Stratospheric Ozone Protection Award from the U.S. Environmental Protection Agency. He has been honored by being selected a Fellow of three major professional science societies and shares in the 2007 Nobel Peace Prize for his work with the international Intergovernmental Panel on Climate Change.
Notes
Throughout the world each year, natural disasters kill approximately 80,000 people, render millions homeless, and result in economic losses of $50 billion-$60 billion (WB and UN joint report).

Mitigation pays back at a ratio of over 1:5; for every dollar spent, more than $5 are saved, not including measures of human suffering (World Bank, 2008).

There is a need for interdisciplinary research that advances risk determination, risk evaluation and risk management for natural and man-made hazards, and disaster response and recovery.