

Workshop Report

Integrated Research
in Risk Analysis and Decision Making
in a Democratic Society

July 17-18, 2002

Arlington, Virginia

National Science Foundation



The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Web Site at:

<http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd.
Arlington, VA 22230
- **For General Information (NSF Information Center):** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

Send an e-mail to: pubs@nsf.gov
or telephone: (301) 947-2722
- **To Locate NSF Employees:** (703) 292-5111

Workshop Report

Integrated Research
in Risk Analysis and Decision Making
in a Democratic Society

July 17-18, 2002
Arlington, Virginia
National Science Foundation

Contents

Acknowledgments	3
-----------------	---

Part One: Background and Executive Summary

I. Background	5
II. Executive Summary	7

Part Two: Purpose and Results

I. Workshop Announcement and Agenda	9
II. Participant List	15
III. Conclusions and Recommendations	16

Appendix: Participant Papers

John Aherne	22
David Asch	24
Vicki Bier	27
Robin Cantor	30
Carl Cranor	34
Susan Cutter	37
Baruch Fischhoff	40
Geoffrey Heal	42
Stephen Hilgartner	44
Hank Jenkins-Smith	45
Ralph Keeney	51
Paul Kleindorfer	54
Howard Kunreuther	58
Peter Orszag	61
Charles Plott	64
David Schkade	68
Paul Slovic	72
Cass Sunstein	75
Peter Szolovits	77
Kathleen Tierney	79
Richard Zeckhauser	83

Acknowledgments

Although the Directorate for Social, Behavioral, and Economic Sciences sponsored this workshop for experts from outside of the National Science Foundation (NSF), colleagues from across NSF helped through their participation as observers at the meeting and by providing valuable advice throughout the organizational and implementation process. We particularly want to thank Howard Kunreuther of the Wharton School at the University of Pennsylvania for organizing the workshop. We also appreciate the willingness of Elizabeth Anderson, Geoffrey Heal, Howard Kunreuther, and Peter Orszag to attend a pre-meeting planning session and to prepare case study materials. Finally, we recognize that the workshop would not have happened at all without its participants. These busy leaders did not merely attend, but prepared pre-meeting papers and worked diligently at the workshop to coalesce their often-brilliant individual insights into a consensus document of conclusions and recommendations. Their accomplishments should have far-reaching consequences for risk analysis and decision making in a democratic society.

This report conveys the views of workshop participants. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Part One

Background and Executive Summary

I. Background

In the last decades of the 20th century, the United States became the beneficiary of – as well as increasingly dependent on – complex, interdependent social and physical structures. Public perceptions of the vulnerabilities caused by the increased complexity and interdependency of our physical, economic, and social communication infrastructures increased sharply in the last year, particularly as a consequence of the terrorist attacks of September 11th. The ongoing threat of additional attacks has further increased public fear and societal concern about the institutions charged with protecting our safety and security. Advancing the scientific analysis of risk and decision making and providing new knowledge and tools for decision makers to deploy are ways of reducing the human casualties, social disruptions, economic losses, and harm to societal values and social decision processes that result from natural and human-induced threats and catastrophes.

In the last 30 years, there have been two striking accomplishments in the risk and decision sciences. First, theoretical and technical advances have led to powerful and sophisticated methods for the quantitative analysis of risk. Second, an increasingly coherent and influential body of empirical research has shed light on how cognitive and emotional processes interact to give rise to decisions and judgments of risk. As a result, the last few decades have witnessed an explosion of innovative empirical, theoretical, and analytic methods and tools for analyzing risks and for making decisions under conditions of uncertainty.

Nevertheless, commission studies (e.g., Presidential Commission on Critical Infrastructure Protection) have noted that unnecessary divisions between risk analysts, decision scientists, and hazards researchers as well as more traditional disciplinary divisions have impeded scientific progress.

In response, the National Science Foundation (NSF) asked Howard Kunreuther of the Wharton School at the University of Pennsylvania to organize a workshop to identify needs and opportunities for integrated scientific research in risk analysis and decision making. Kunreuther

brought together 24 scholars who engaged in a 1½ day dialogue at NSF's Arlington headquarters, July 17-18, 2002. The primary goal of this workshop was to identify obstacles to effective use of existing research findings and tools, to suggest ways of overcoming these obstacles, and to identify crucial areas for future research. The ultimate goal was to help NSF shape a research agenda to improve decisions that involve risk.

In preparation for the workshop, the scholars wrote short papers that they shared through a closed web site. At the workshop, participants reached a number of conclusions and recommendations to NSF. After the workshop, a "conclusions and recommendations" document circulated through e-mail communications. After several iterations, all participants registered approval of the document.

II. EXECUTIVE SUMMARY

Workshop participants reached four basic conclusions:

- Scientists working in numerous disciplines have significantly advanced our capacity for risk analysis and decision making during recent decades.
- The empirical findings and analytic tools produced by decision and risk sciences are not used in policy and other societal decisions as much as they could be. While there are interdisciplinary communities that facilitate interactions among subsets of decision and risk scholars, there is a lack of integration across these sub-communities.
- To advance the basic science and increase the utility of risk analysis and decision science, it is necessary to foster interdisciplinary and multidisciplinary research that includes engineering, information sciences, natural sciences, and social sciences.
- An NSF initiative can build upon a firm foundation by facilitating interdisciplinary research that will make significant advances in risk management—with a special emphasis on the challenges associated with managing risk in a democratic society.

Regarding the new program's structure, the participants agreed that the most effective way to achieve program goals is to fund multidisciplinary centers. In addition to these interdisciplinary centers and individual research grants, the participants proposed that NSF consider innovative institutional arrangements:

- develop one or more handbooks that can be regularly updated
- emulate the successful Brookings Panel on Economic Activity in which top senior scholars choose the best younger scholars to produce research papers on pressing policy questions, published in a time frame and format useful to policy makers
- fund quick response research teams to study sudden and unexpected crises
- organize summer institutes to provide intensive training experiences for graduate students and young scholars
- fund national and international conferences designed to encourage knowledge sharing and collaborative research.
- bring risk and decision researchers together in small forums with those who must make decisions regarding anticipated or active risks

In addition to basic research, the initiative should include:

- a focus on multi-disciplinary and interdisciplinary research
- a training component that includes undergraduate, graduate, postdoctoral, and mid-career training opportunities so that these methods reach practitioners
- close ties with individuals and organizations who evaluate, translate, and transfer research-based knowledge, including users of research and stakeholder groups
- a component that develops networks and partnerships with both public and private entities