

# Decision Making under Deep Uncertainty

Vincent A. W. J. Marchau · Warren E. Walker ·  
Pieter J. T. M. Bloemen · Steven W. Popper  
Editors

# Decision Making under Deep Uncertainty

From Theory to Practice



**OPEN**

 Springer

*Editors*

Vincent A. W. J. Marchau  
Nijmegen School of Management  
Radboud University  
Nijmegen, Gelderland, The Netherlands

Warren E. Walker  
Faculty of Technology,  
Policy and Management  
Delft University of Technology  
Delft, Zuid-Holland, The Netherlands

Pieter J. T. M. Bloemen  
Staff Delta Programme Commissioner  
Ministry of Infrastructure and Water  
Management  
The Hague, The Netherlands

Steven W. Popper  
Pardee RAND Graduate School  
RAND Corporation  
Santa Monica, CA, USA



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# Preface

Making plans for the future involves anticipating changes, especially when making long-term plans or planning for rare events. When these changes are characterized by a high degree of uncertainty, we consider the resulting situation to be “deeply uncertain”—a situation in which the experts do not know or the parties to a decision cannot agree upon “(1) the appropriate models to describe the interactions among a system’s variables, (2) the probability distributions to represent uncertainty about key variables and parameters in the models, and/or (3) how to value the desirability of alternative outcomes.”<sup>1</sup>

Several books have been written in the past that deal with different aspects of decisionmaking under uncertainty (in a broad sense). But, there are none that aim to integrate these aspects for the specific subset of decisionmaking under *deep* uncertainty. This book provides a unified and comprehensive treatment of the approaches and tools for developing policies under deep uncertainty, and their application. It elucidates the state of the art in both theory and practice associated with the approaches and tools for decisionmaking under deep uncertainty. It has been produced under the aegis of the Society for Decision Making under Deep Uncertainty (DMDU: <http://www.deepuncertainty.org>), whose members develop the approaches and tools supporting the design of courses of action or policies under deep uncertainty, and work to apply them in the real world.

The book is intended for use by a broad audience, including students, lecturers, and researchers in the field of decisionmaking under deep uncertainty for various domains, those who commission the application of DMDU approaches and consume the results in the government and the private sectors, and those who carry out such studies. It provides (1) guidance in identifying and applying appropriate approaches and tools to design policies and (2) advice on implementing these policies in the real world. For decisionmakers and practitioners, the book includes realistic examples and practical guidelines that explain what decisionmaking under

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<sup>1</sup>Lempert R. J., S. W. Popper, and S. C. Banks (2003) *Shaping the Next One Hundred Years: New Methods for Quantitative, Long-Term Policy Analysis*, MR-1626-RPC, RAND, Santa Monica, California, pp. 3–4.

deep uncertainty is and how it may be of assistance to them. The approaches and tools described and the problems addressed in the book have a cross-sectoral and cross-country applicability.

The book provides the first synthesis of the large body of work on designing policies under deep uncertainty, in both theory and practice. It broadens traditional approaches and tools to include the analysis of actors and networks related to the problem at hand. And it shows how lessons learned in the application process can be used to improve the approaches and tools used in the design process.

Nijmegen, The Netherlands  
Delft, The Netherlands  
The Hague, The Netherlands  
Santa Monica, USA

Vincent A. W. J. Marchau  
Warren E. Walker  
Pieter J. T. M. Bloemen  
Steven W. Popper

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# About the Editors

**Prof. Vincent A. W. J. Marchau** (Radboud University (RU), Nijmegen School of Management) holds a chair on Uncertainty and Adaptivity of Societal Systems. This chair is supported by The Netherlands Study Centre for Technology Trends (STT). His research focuses on long-term planning under uncertainty in transportation, logistics, spatial planning, energy, water, and security. Marchau is also Managing Director of the Dutch Research School for Transport, Infrastructure and Logistics (TRAIL) at Delft University of Technology (DUT), with 100 Ph.D. students and 50 staff members across six Dutch universities.

**Prof. Warren E. Walker** (Emeritus Professor of Policy Analysis, Delft University of Technology) has a Ph.D. in Operations Research from Cornell University, and more than 40 years of experience as an analyst and project leader at the RAND Corporation, applying quantitative analysis to public policy problems. His recent research has focused on methods for dealing with deep uncertainty in making public policies (especially with respect to climate change), improving the freight transport system in the Netherlands, and the design of decision support systems for airport strategic planning. He is the recipient of the 1997 President’s Award from the Institute for Operations Research and the Management Sciences (INFORMS) for his “contributions to the welfare of society through quantitative analysis of governmental policy problems.”

**Dr. Pieter J. T. M. Bloemen** (Ministry of Infrastructure and Water Management—Staff Delta Programme Commissioner) is the Chief Strategic Officer of the Dutch Delta Programme. He is responsible for the development and application of Adaptive Delta Management. He led the Strategic Environmental Assessment of the Delta Decisions and preferred regional strategies published in 2014. He presently works on the development of a monitoring and evaluation system that matches the adaptive approach of the Delta Programme and is responsible for the first six-yearly review of the Delta Decisions and preferred regional strategies, planned for 2020.

He is Visiting Researcher at IHE Delft Institute of Water Education (Chair Group Flood Resilience) since January 2015 and works on a Ph.D. thesis on the governance of the adaptive approach.

**Dr. Steven W. Popper** (RAND Corporation) is a RAND Senior Economist and Professor of science and technology policy in the Pardee RAND Graduate School. His work on macrotransitions led to an invitation by President Vaclav Havel to advise the government of Czechoslovakia, participation in an OECD delegation on the first foreign visit to one of the secret cities of the former Soviet Union, and consultation to the World Bank on issues of industrial restructuring in Hungary and in Mexico. His work on micro-level transition focuses on innovation. From 1996 to 2001, he was the Associate Director of the Science and Technology Policy Institute, providing analytic support to the White House Office of Science and Technology Policy and other executive branch agencies. He has taught planning under deep uncertainty at the Pardee RAND Graduate School, the India School of Business, and the Shanghai Climate Institute. He is co-developer of the Robust Decision-Making (RDM) approach. He is an elected Fellow of the American Association for the Advancement of Science, served as chair of the AAAS Industrial Science and Technology section, and is the founding chair for education and training of the Society for Decision Making under Deep Uncertainty.

# List of Contributors

**Dayasiri Atapattu** Greater Wellington Regional Council, Wellington, New Zealand

**Leon Basdekas** Black and Veatch, Colorado Springs, CO, USA

**Yakov Ben-Haim** Technion—Israel Institute of Technology, Haifa, Israel

**Pieter J. T. M. Bloemen** Staff Delta Programme Commissioner, Ministry of Infrastructure and Water Management, The Hague, The Netherlands

**Evan Bloom** RAND Corporation, Santa Monica, CA, USA

**Casey Brown** University of Massachusetts, Amherst, MA, USA

**Graeme Campbell** Greater Wellington Regional Council, Wellington, New Zealand

**Michel-Alexandre Cardin** Imperial College London, London, UK

**Richard de Neufville** Massachusetts Institute of Technology, Cambridge, MA, USA

**Jordan R. Fischbach** RAND Corporation, Santa Monica, CA, USA

**Pieter Grinwis** Member of the Municipal Council of The Hague and Policy Officer for the ChristenUnie in the Dutch Senate and the House of Representatives, The Hague, The Netherlands

**David G. Groves** RAND Corporation, Santa Monica, CA, USA

**Marjolijn Haasnoot** Water Resources and Delta Management, Deltares, Delft, The Netherlands;  
Faculty of Physical Geography, Utrecht University, Utrecht, The Netherlands

**Floris Hammer** Independent consultant, specializing in executing technical programmes and projects in complex political environments, The Hague, The Netherlands

**François M. Hemez** Lawrence Livermore National Laboratory, Livermore, CA, USA

**Jan H. Kwakkel** Faculty of Technology, Policy and Management (TPM), Delft University of Technology, Delft, The Netherlands

**Judy Lawrence** Victoria University of Wellington, Wellington, New Zealand

**R. J. Lempert** Rand Corporation, Santa Monica, CA, USA

**Vincent A. W. J. Marchau** Nijmegen School of Management, Radboud University, Nijmegen, The Netherlands

**Laura McKim** Greater Wellington Regional Council, Wellington, New Zealand

**Edmundo Molina-Perez** Tecnológico de Monterrey, Monterrey, Mexico

**Steven W. Popper** Pardee RAND Graduate School, RAND Corporation, Santa Monica, CA, USA

**Mehdi Ranjbar-Bourani** University of Science and Technology of Mazandaran, Behshahr, Iran

**Patrick Ray** University of Cincinnati, Cincinnati, OH, USA

**Kim Smet** University of Ottawa, Ottawa, Canada

**Jesse Sowell** Department of International Affairs, The Bush School of Government & Public Service, Texas A&M University, College Station, TX, USA

**Scott Steinschneider** Cornell University, Ithaca, NY, USA

**Adolf Stroombergen** Infometrics Consulting, Wellington, New Zealand

**Jos van Alphen** Staff Delta Programme Commissioner, Ministry of Infrastructure and Water Management, The Hague, The Netherlands

**Kendra L. Van Buren** Los Alamos National Laboratory, Los Alamos, NM, USA

**Jan-Willem G. M. van der Pas** Municipality of Eindhoven, Eindhoven, The Netherlands

**Maarten J. van der Vlist** Rijkswaterstaat, Ministry of Infrastructure and Water Management, The Hague, The Netherlands

**Warren E. Walker** Faculty of Technology, Policy & Management, Delft University of Technology, Delft, The Netherlands

**Andrew Warren** Water Resources and Delta Management, Deltares, Delft, The Netherlands

**Sungwook Wi** University of Massachusetts, Amherst, MA, USA

**David Yates** National Center for Atmospheric Research, Boulder, CO, USA