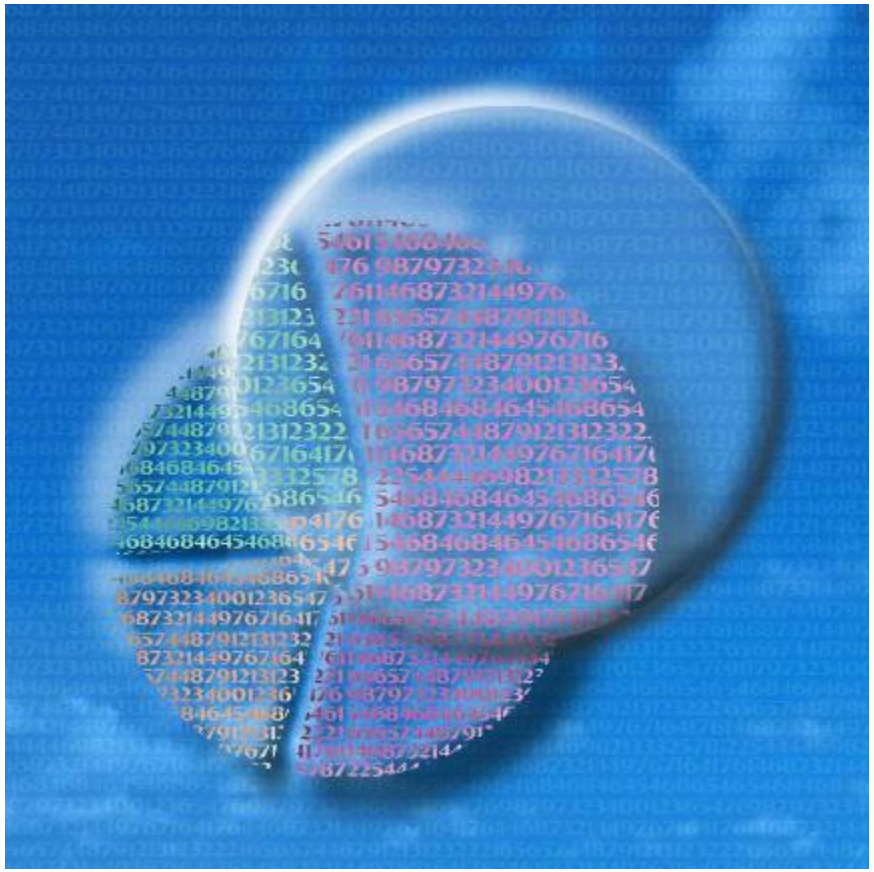


Responsible quantification

Or the license not to Quantify

Andrea Saltelli

Centre for the Study of the Sciences and the Humanities (SVT) – University of Bergen (UIB)
&
Institut de Ciència i Tecnologia Ambientals (ICTA) –Universitat Autonoma de Barcelona (UAB)

Responsible Research and Innovation (RRI): The Problematic Quest for “Right” Impacts

March 10-11, 2016, Donostia-San Sebastian

HOME CV ARTICLES VIDEOS PAPERS IN PROGRESS REPORTS CHAPTERS PRESENTATIONS CONTACTS CONFERENCES

RESOURCES PERSONAL SCIENCE ON THE VERGE

Presentations

Welcome to the home page of Andrea Saltelli

Caeteris are never paribus

Where to find this presentation

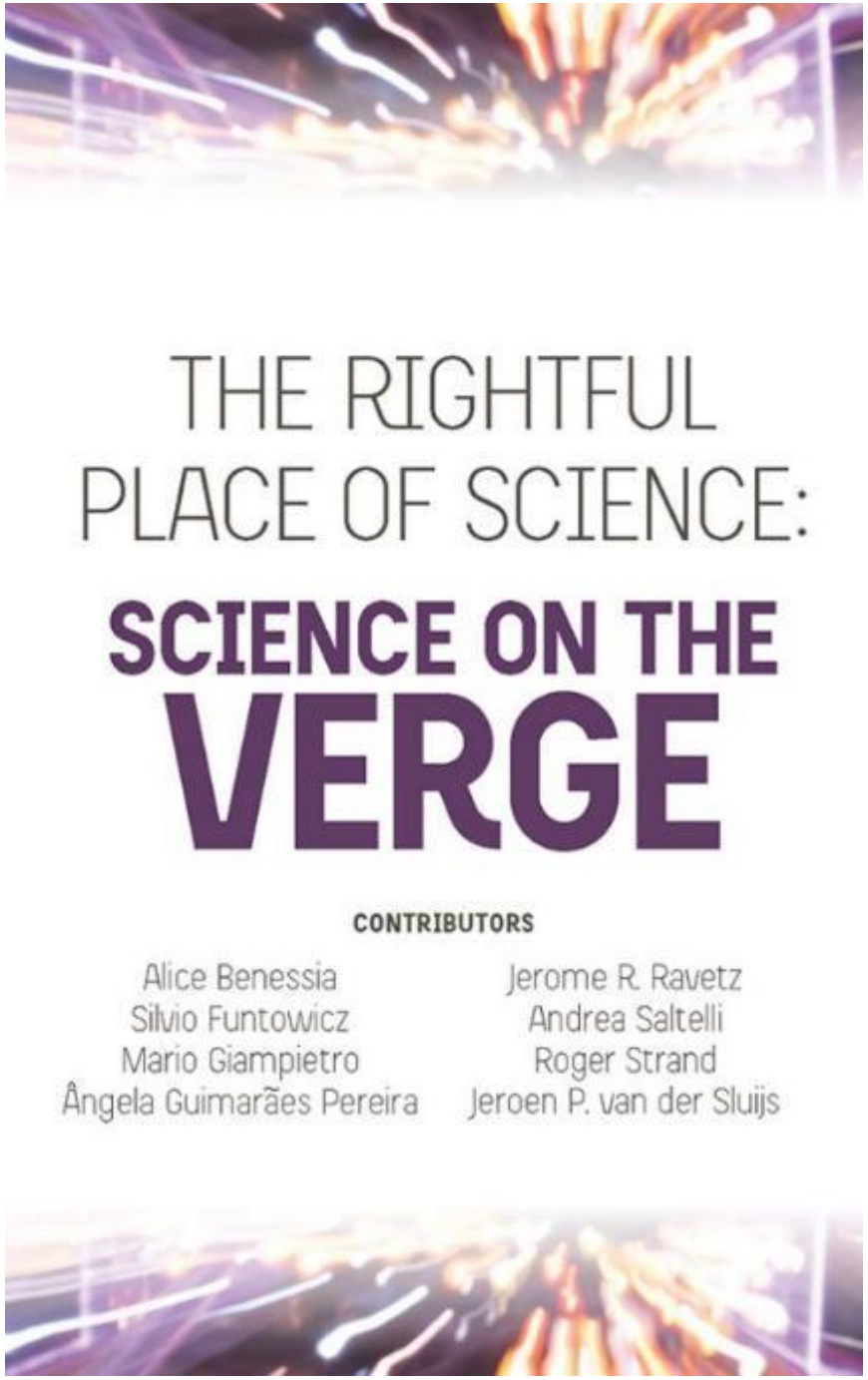
andrea.saltelli@uib.no

sensitivity analysis,
sensitivity auditing,
science for policy,
impact assessment

Published by the Consortium for Science, Policy and Outcomes at Arizona State University, March 2016, on Amazon.

http://www.amazon.com/Rightful-Place-Science-Verge/dp/0692596380/ref=sr_1_1?s=books&ie=UTF8&qid=1456255907&sr=1-1&keywords=saltelli

http://www.andreasaltelli.eu/science-on-the-verge



THE RIGHTFUL PLACE OF SCIENCE:

SCIENCE ON THE VERGE

"Wow. This penetrating, frightening, provocative and irrefutable view of the debasing of science cuts to—and through—the bone. Every producer, consumer and believer of 'science' should read this book, whether interested in pesticides, GMOs, nuclear power, climate change, psychology or fiscal policy."

Professor Philip B. Stark, Associate Dean, Division of Mathematical and Physical Sciences, University of California Berkeley

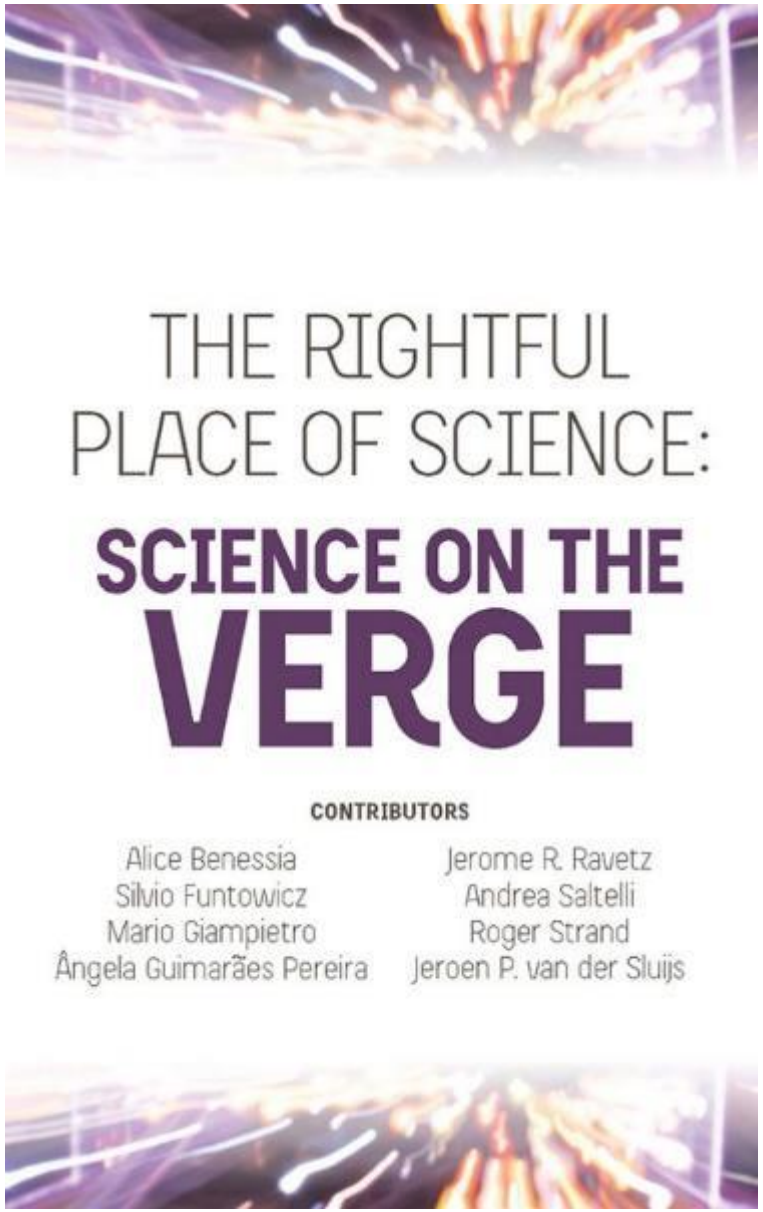
"An uncomfortable but vital diagnosis of the trouble with science. It describes valuable efforts by scientists to heal themselves, including movements for open access and social responsibility, but is clear about the limits of these endeavours. This book is certainly critical, but it is resolutely constructive."

Professor Jack Stilgoe, Senior Lecturer, Department of Science and Technology Studies, University College London

The crisis has ethical, epistemological, methodological and even metaphysical dimensions;

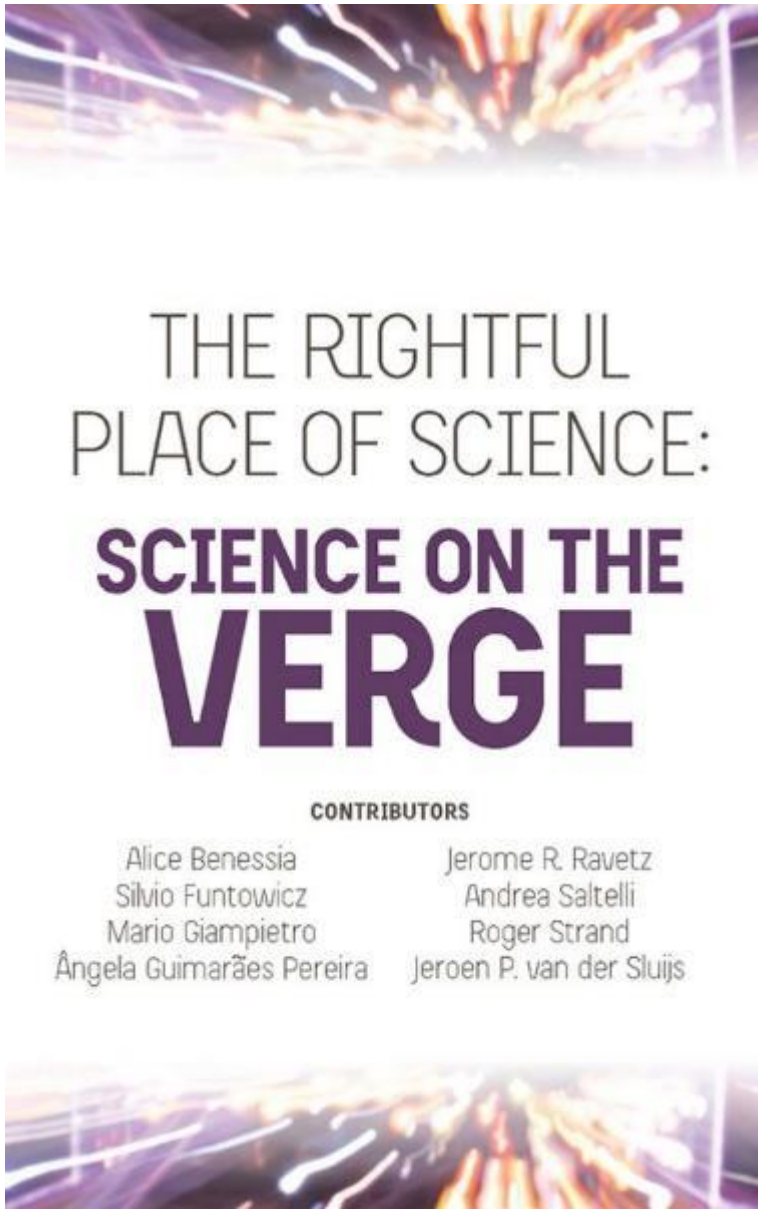
Root causes of the crisis, from history and philosophy of science scholarship to present-day historical critique of commodified science;

The crisis of science *qua science* impacts science as used for policy.



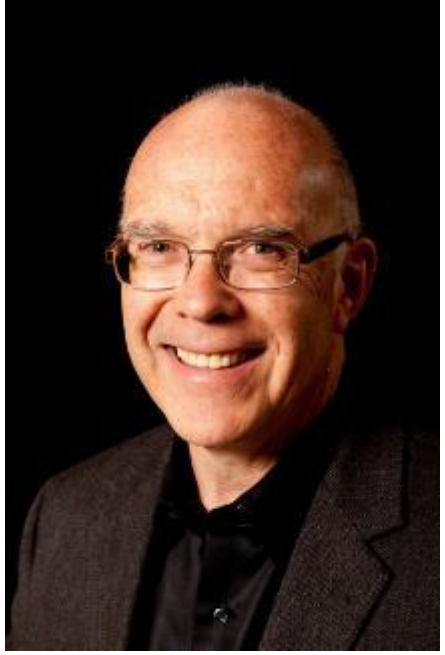
Identified points of friction:

- paradigm of evidence-based policy
- use of science to produce implausibly precise numbers and reassuring techno-scientific imaginaries
- use of science to ‘compel’ decision by the sheer strength of ‘facts’



Is there a crisis?

- Generation of new data/ publications at an unprecedented rate.
- Compelling evidence that the majority of these discoveries will not stand the test of time.
- Causes: failure to adhere to good scientific practice & the desperation to publish or perish.
- This is a multifaceted, multistakeholder problem.
- No single party is solely responsible, and no single solution will suffice.



C. Glenn Begley

John P. A. Ioannides

Begley, C. G., and Ioannidis, J. P., 2015, Reproducibility in Science. Improving the Standard for Basic and Preclinical Research, Circulation Research, 116, 116-126, doi: 10.1161/CIRCRESAHA.114.303819

Unreliable research

Trouble at the lab

Scientists like to think of science as self-correcting. To an alarming degree, it is not

Oct 19th 2013 | From the print edition

Science/knowledge degenerates when it becomes a commodity for Ravetz (1971), Lyotard (1979) and Mirowski (2011).

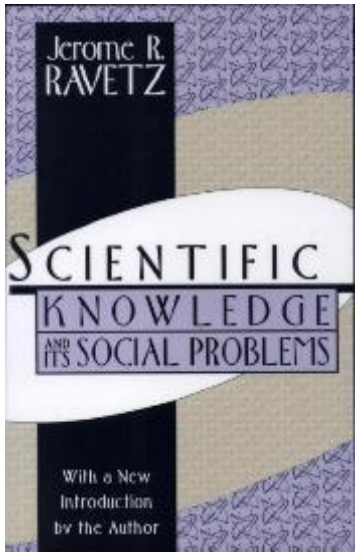
Ravetz, J., 1971, Scientific Knowledge and its Social Problems, Oxford University Press, p. 22.

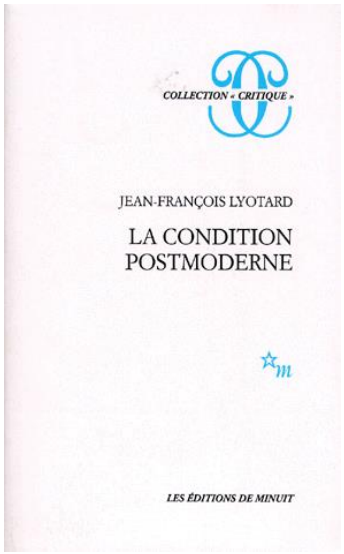
Lyotard, J.-F. 1979. La Condition postmoderne. Rapport sur le savoir, Paris : Minuit, Chapter 10.

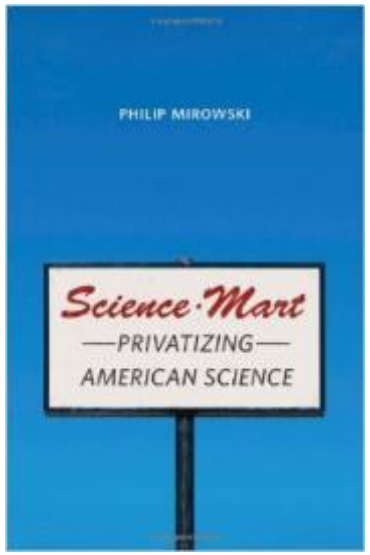
Mirowski, P. 2011. Science-Mart: Privatizing American Science, Harvard University Press.

Jerome R. Ravetz

Jean-François Lyotard







Philip Mirowski

Different readings of the crisis :

- Poor training, statistical design, hubris of data mining, perverse incentives, counterproductive metrics (e.g. Ioannidis; San Francisco Declaration,…)
- Science victim of its own success, exponential growth, senility by exponential growth & hyper-specialization (De Solla Price;)
- Science as another victim of the neoliberal ideology (e.g. Mirowski)
- Science as a social enterprise whose quality control apparatus suffers under the mutated conditions of technoscience (Ravetz, Lyotard)

Does the crisis impact science for policy & science's advice?

Has reproducibility something to do with science for policy or science advice?

Ignoring the connection between science's crisis and science advice?

The OECD report on Science Advice 2015; not a single mention of science's crisis. Only 'crisis situations' ignoring that science itself is into one.

http://www.oecd-ilibrary.org/docserver/download/5js33l1jcpwb.pdf?expires=1442656356&id=id&accname=guest&checksum=AF1467AD25FF8BE6516083077CCEE31A

Likewise at: http://www.ingsa.org/events/2016-conference/

OECDpublishing

Please cite this paper as:

OECD (2015), "Scientific Advice for Policy Making: The Role and Responsibility of Expert Bodies and Individual Scientists", *OECD Science, Technology and Industry Policy Papers*, No. 21, OECD Publishing, Paris.
http://dx.doi.org/10.1787/5js33l1jcpwb-en

OECD Science, Technology and Industry Policy Papers No. 21

Scientific Advice for Policy Making

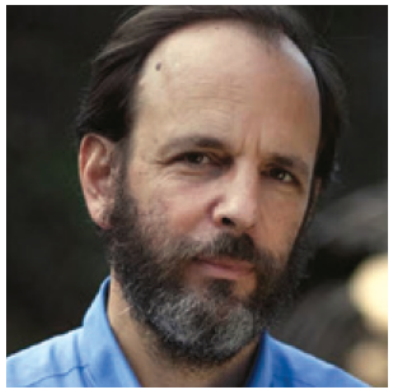
THE ROLE AND RESPONSIBILITY OF EXPERT BODIES AND INDIVIDUAL SCIENTISTS

OECD

Those aspect of science most used in policy (mathematical and statistical modelling) are also those more problematic.

WORLD VIEW *A personal take on events*

MICHAEL LEMCHINE



Reproducibility will not cure what ails science

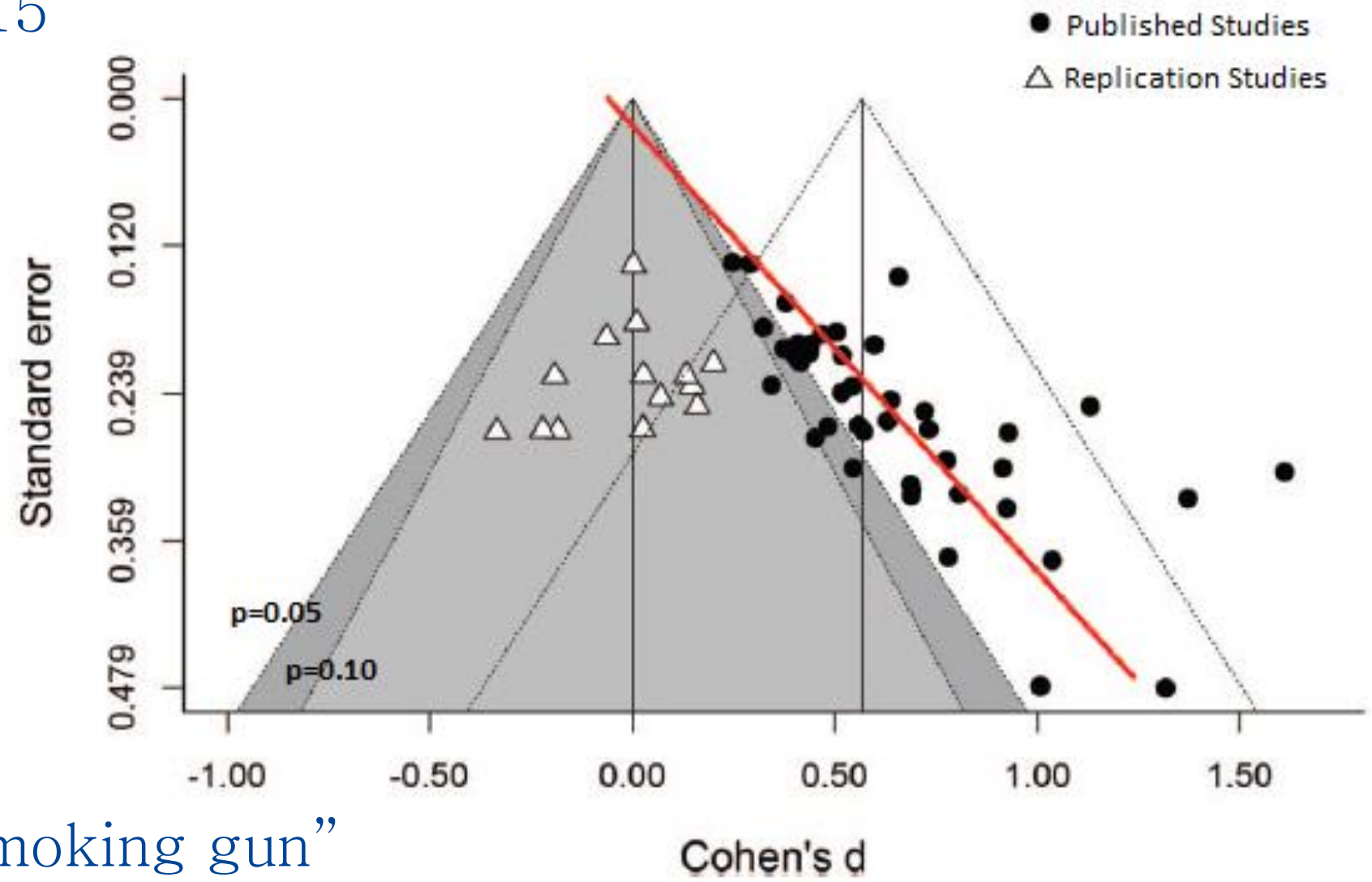
A bill to make data for environmental regulation more transparent reveals the fuzzy boundary between science and ideology, argues **Daniel Sarewitz**.

Sarewitz, D., 2015, Reproducibility will not cure what ails science, Nature, 525, p. 159.

Saltelli, A., Funtowicz, S., 2014, When all models are wrong: More stringent quality criteria are needed for models used at the science-policy interface, Issues in Science and Technology, Winter 2014, 79-85. http://issues.org/30-2/andrea/

Shanks et al., 2015

Romance, Risk, and Replication



"P-hacking's smoking gun"

Shanks et al. (2015) JEP:General

Shanks DR, Vadillo MA, Riedel B, Clymo A, Govind S, Hickin N, Tamman AJ, Puhlmann LM., 2015, Romance, Risk, and Replication: Can Consumer Choices and Risk-Taking Be Primed by Mating Motives?, Journal of Experimental Psychology: General, 144(6), e142-e158.,

The myth of scientific quantification via risk or cost benefit analyses, including of the impact of new technologies, has been at the hearth of the critique of the ecological moment (e.g. Schumacher, 1973; Winner, 1986; Funtowicz and Ravetz, 1994)

E. F. Schumacher, 1973, Small Is Beautiful. Economics as if People Mattered, Penguin Perennial,

Winner, L., 1986. The Whale and the Reactor: a Search for Limits in an Age of High Technology. The University of Chicago Press, 1989 edition.

Funtowicz, S.O. and Ravetz, J.R. (1994). The worth of a songbird: Ecological economics as a post-normal science. Ecological Economics 10(3), 197-207.

[…] quality is much more difficult to 'handle' than quantity, just as the exercise of judgment is a higher function than the ability to count and calculate. Quantitative differences can be more easily grasped and certainly more essay defined than qualitative differences: their concreteness is beguiling and gives them the appearance of scientific precision, even when this precision has been purchased by the suppression of vital differences of quality.

Ernst Friedrich "Fritz" Schumacher

E. F. Schumacher, 1973, Small Is Beautiful. Economics as if People Mattered, Penguin Perennial,

Techniques (such as cost benefit analysis, CBA) are never neutral; according to Winner (1986) ecologists should not fall into the trap of CBA and risk analyses

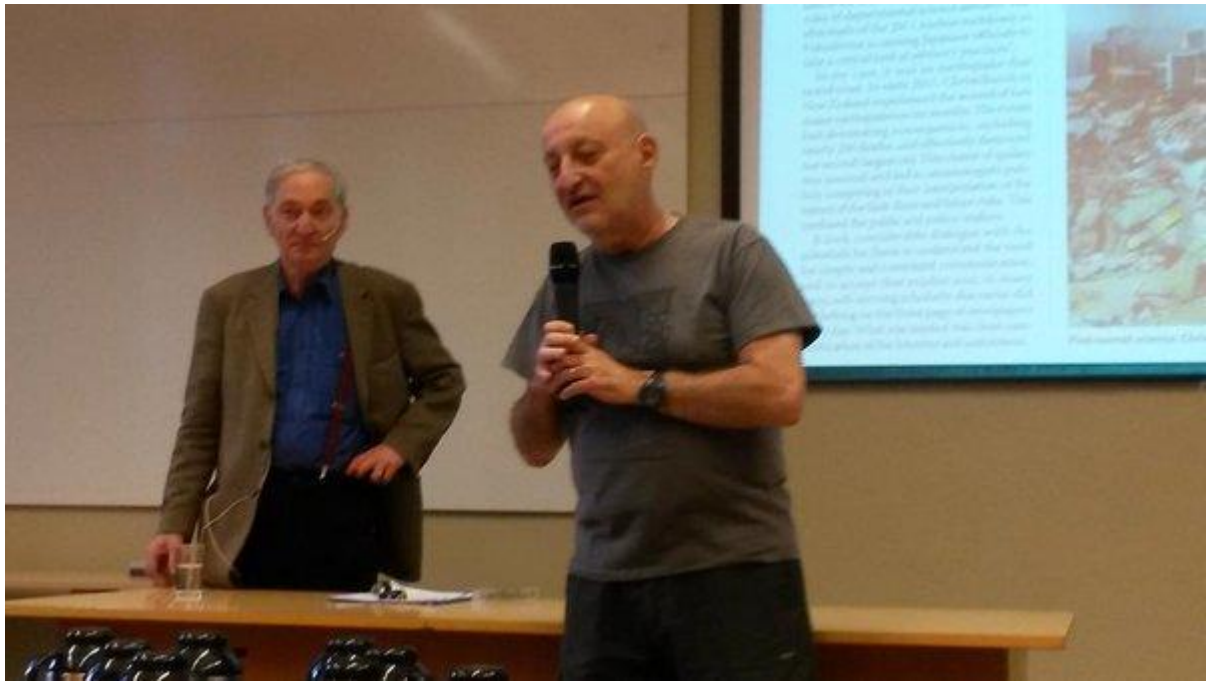
(Chapter ON NOT HITTING THE TAR-BABY)

Langdon Winner

Winner, L., 1986. The Whale and the Reactor: a Search for Limits in an Age of High Technology. The University of Chicago Press, 1989 edition.

Post-Normal Science as a reaction to the hyper precision of cost benefit and risk analysis as applied to solve ecological problems: "How much is a songbird worth?"

Example: deconstruction of the economics of climate change made by W.D. Nordhaus (1991)



Jerry Ravetz and
Silvio Funtowicz

Funtowicz, S.O. and Ravetz, J.R. (1994). The worth of a songbird: Ecological economics as a post-normal science. Ecological Economics 10(3), 197-207.

See are recent discussion at: Saltelli, A., Stark, P.B., Becker, W., and Stano, P., 2015, Climate Models As Economic Guides Scientific Challenge or Quixotic Quest?, Issues in Science and Technology, Volume XXXI, Issue 3, spring 2015.

Current climate models are grossly misleading

Nicholas Stern calls on scientists, engineers and economists to help policymakers by better modelling the immense risks to future generations, and the potential for action.

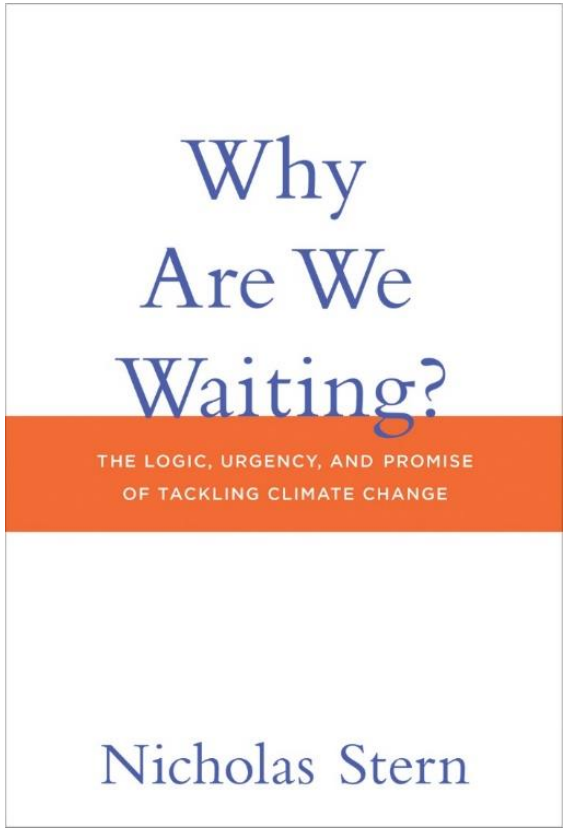
25 FEBRUARY 2016 | VOL 530 | NATURE | 407

"The political will to make the necessary decisions depends partly on improving the analysis and estimates of the economics of climate change"

Things to be incorporated in ‘formal modelling’ [sic]

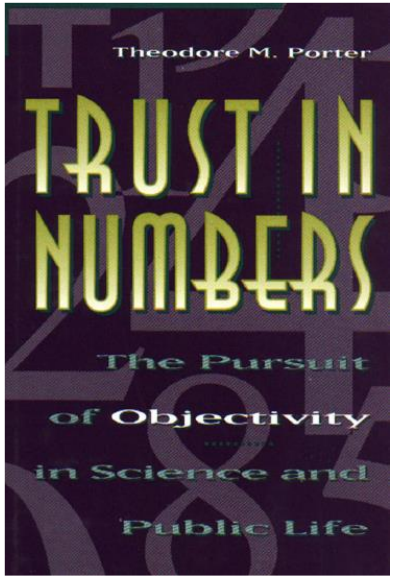
“Damage to social, organizational or environmental capital […]
  Damage to stock of capitals and land […]
  Damage to overall factor productivity […]
  Damage to learning and endogenous growth”, p. 145

‘formal modelling’ as to produce ‘numbers’?

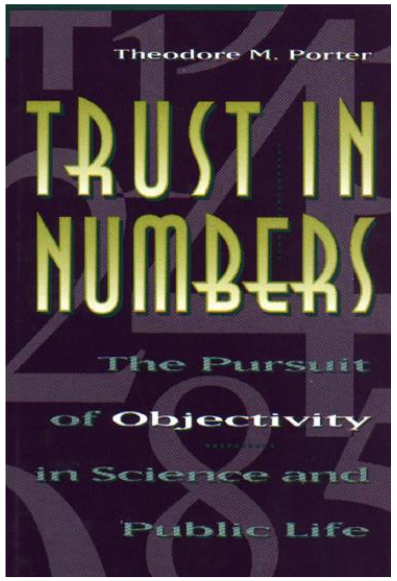


p. 8: “The appeal of numbers is especially compelling to bureaucratic officials who lack the mandate of a popular election, or divine right. Arbitrariness and bias are the most usual grounds upon which such officials are criticized. A decision made by the numbers (or by explicit rules of some other sort) has at least the appearance of being fair and impersonal.”

Theodor M. Porter



Theodore M. Porter, Trust in Numbers, The Pursuit of Objectivity in Science and Public Life, Princeton 1995

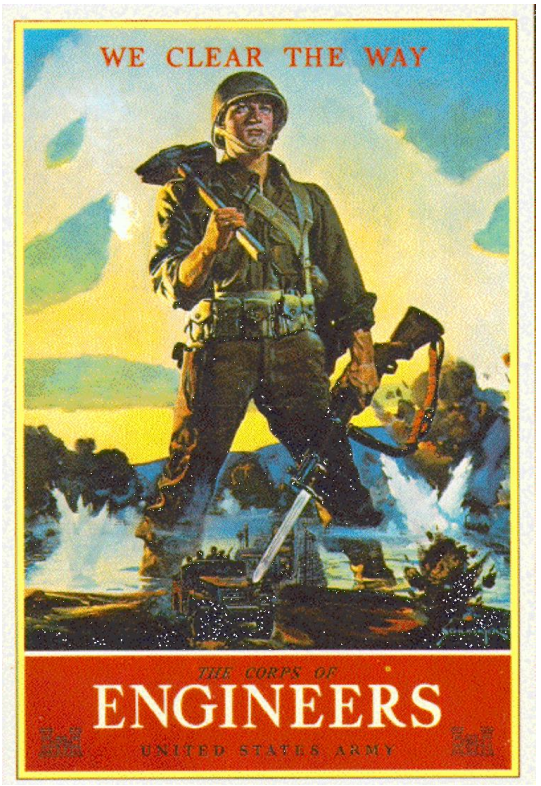


p. 8: “Scientific objectivity thus provides an answer to a moral demand for impartiality and fairness. Quantification is a way of making decisions without seeming to decide. Objectivity lends authority to officials who have very little of their own.”

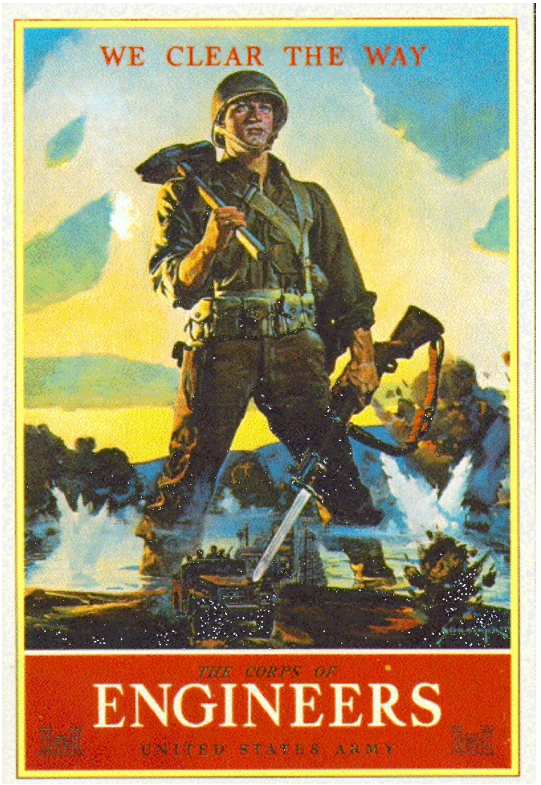
Trust, authority and styles of quantification: two different stories

ECOLE NATIONALE
DES PONTS ET CHAUSSEES

US Army Corps of Engineers®



Porter's story: Quantification needs judgment which in turn needs trust …without trust quantification becomes mechanical, a system, and 'systems can be played'.

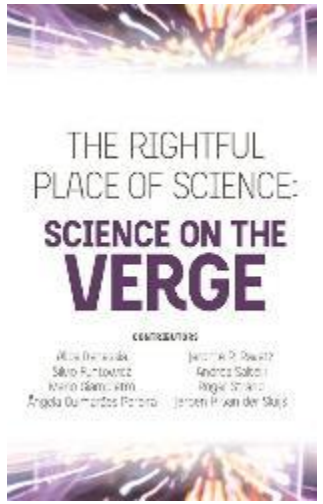


Quantification as an instrument of hypocognition? Simplifications, linearization and compressions of understandings; Socially constructed ignorance?

Ravetz, J. R., 1987. “Usable Knowledge, Usable Ignorance, Incomplete Science with Policy Implications, Knowledge, Creation, Diffusion, Utilization, 9(1): 87-116.

Rayner, S., 2012. “Uncomfortable knowledge: the social construction of ignorance in science and environmental policy discourses”, Economy and Society, 41(1): 107-125.

Saltelli, A., Giampietro, M., 2015, The fallacy of evidence based policy, Verge book ➔



Need for responsible quantification

See also JRC workshop on responsible quantification Brussels, June 2015
https://ec.europa.eu/jrc/en/event/conference/use-quantitative-information

Responsible quantification:

- Quantification under extended peer communities
- NUSAP and sensitivity auditing

Lane, S. N., Odoni, N., Landström, C., Whatmore, S. J., Ward, N. and Bradley, S., 2011. “Doing flood risk science differently: an experiment in radical scientific method.” Transactions of the Institute of British Geographers, 36: 15–36.

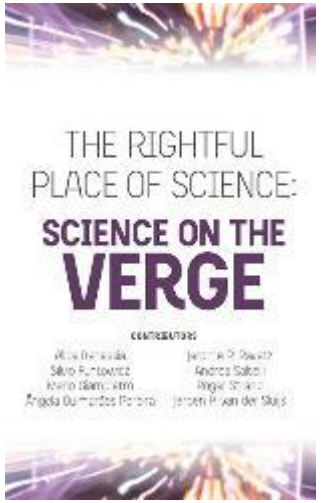
Van der Sluijs, J., Craye, M., Funtowicz, S., Kloprogge, P., Ravetz, J. and Risbey, J., 2005. “Combining Quantitative and Qualitative Measures of Uncertainty in Model based Environmental Assessment: the NUSAP System”, Risk Analysis, 25(2): 481–492.

Saltelli, A., Guimarães Pereira, A., van der Sluijs, J. P. and Funtowicz, S., 2013. “What do I make of your Latinorum? Sensitivity auditing of mathematical modelling”, International Journal of Foresight and Innovation Policy, 9(2–4): 213–234.

Responsible quantification:

- Quantitative story-telling
- … and a license not to quantify

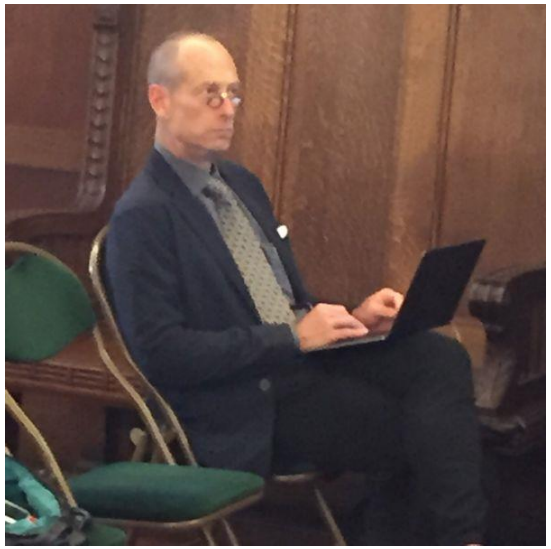
Saltelli, A., Giampietro, M., 2015, The fallacy of evidence based policy, Verge book ➔



Watch the videos from the workshop 'Significant digits. Responsible Use of Quantitative Information', Brussels, 11,9-10 June 2015.

https://ec.europa.eu/jrc/en/event/conference/use-quantitative-information

John Kay, Financial Times



Philip Stark,
University of Berkeley

The book's chapters

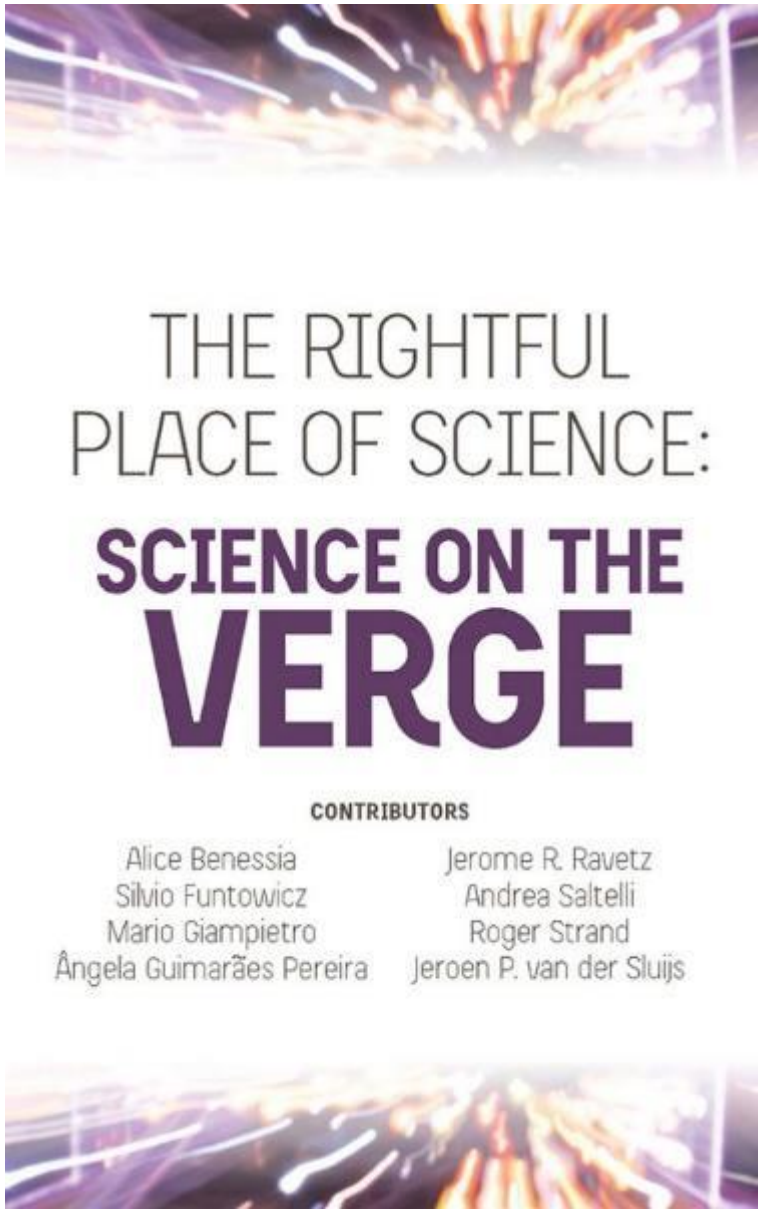
Dan Sarewitz, Preface Pedro Almodóvar, Jonathan Swift, the floating island of Laputa and a portrayal of XVIII science; what lesson for science's present predicaments

Chapter 1. Andrea Saltelli, Jerome Ravetz, Silvio Funtowicz, Who will solve the crisis in science? Is there a crisis? What is being done 'from within'? Is this sufficient? What are the diagnoses for the crisis' root causes, and what are the solutions 'from without'?

Chapter 2. Andrea Saltelli, Mario Giampietro, The fallacy of evidence based policy Quantification as hypocognition; socially constructed ignorance & uncomfortable knowledge; ancien régime syndrome; quantitative story telling

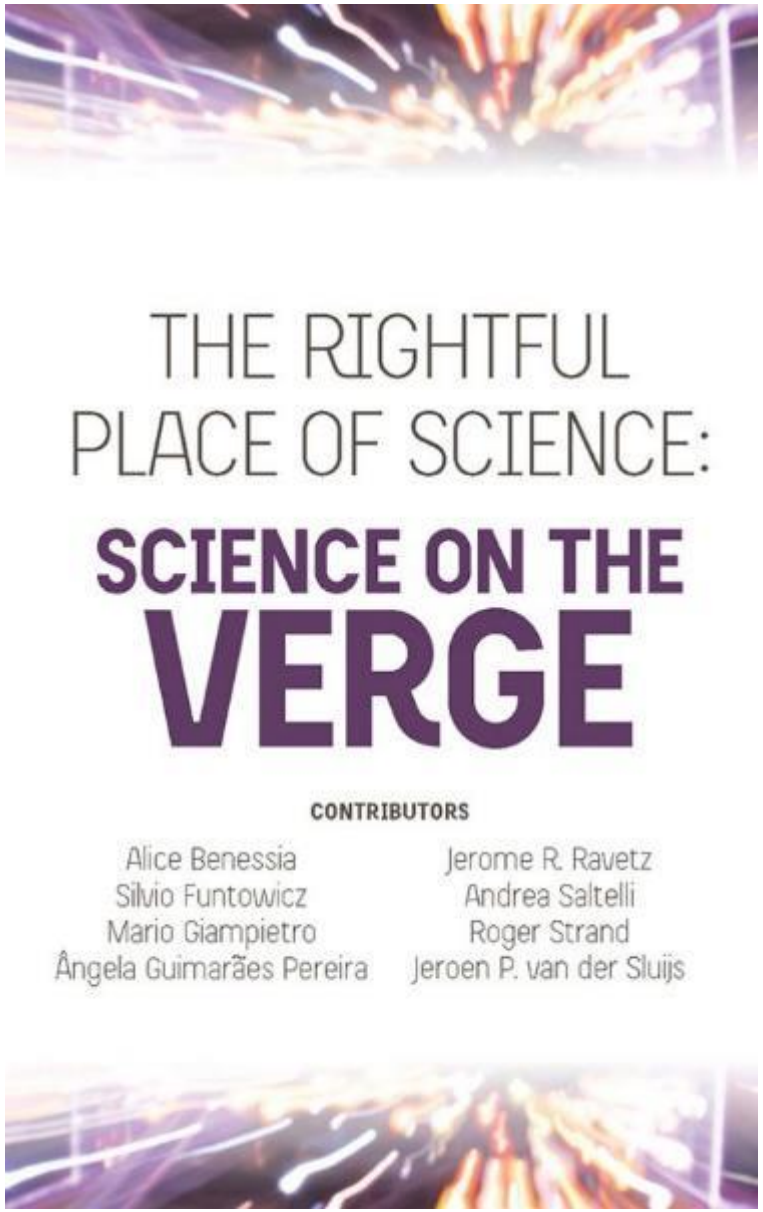
Chapter 3. Alice Benessia, Silvio Funtowicz, **Never late, never lost, never unprepared** Trajectories of innovation and modes of demarcation of science from society: 'separation', 'hybridization' and 'substitution'; what contradictions these trajectories generate

Chapter 4. Ângela Guimarães Pereira, Andrea Saltelli , **Institutions on the verge: working at the science policy interface**
The special case of the European Commission's in house science service; the Joint Research Centre as a boundary institutions; diagnosis, challenges and perspectives



Chapter 5. Jeroen van der Sluijs, Numbers running wild Uses and abuses of quantification a the loss of 'craft skills' with numbers; 7.9% of all species shall become extinct

Chapter 6. Roger Strand, Doubt has been eliminated Gro Harlem Brundtland's famous 2007 speech, after the Fourth IPCC report and the Stern review; when science becomes a 'life philosophy'; science as the metaphysics of modernity; the Norwegian Research Ethics Committee for Science and Technology inquiry



While trust in science as such appears to be still substantially unscathed, the use of science to adjudicate policy disputes is increasingly conflicted;

This entails a crisis in the dual legitimacy system at the heart of modernity: that of science providing the facts and policy taking care of the values;