

Máster Universitario en Administración y Dirección de Empresas Full Time MBA

Crunching numbers for sustainability

Professor Andrea Saltelli

Crunching numbers for sustainability

In this set of slides:

- 1 Digital twins
- 2 Impact assessment
- 3 Regulatory capture
- 4 Test cases
- 5 Practicum

1.

Digital twins of the planet

Upon request ;-)

A digital twin of Earth for the green transition

For its green transition, the EU plans to fund the development of digital twins of Earth. For these twins to be more than big data atlases, they must create a qualitatively new Earth system simulation and observation capability using a methodological framework responsible for exceptional advances in numerical weather prediction.

Peter Bauer, Bjorn Stevens and Wilco Hazeleger

The European Union (EU) intends to become climate neutral by 2050, and the set of policies designed to bring about this green transition — the European Green Deal — was announced in December 2019 (ref. 1). Accompanied by €1 trillion of planned investment, Green Deal policies aim to help the world's second-largest economy sustainably produce energy, develop carbon-neutral fuels and advance circular products to energy-intensive industrial sectors with zero waste and zero pollution.

A key element of the Green Deal is its dependence on the digital transformation — an openly accessible and interoperable European data space as a central hub for informed decision making. The EU identified two landmark actions to support the necessary information systems: GreenData4EU and Destination Earth. Whereas GreenData4EU will develop the European approach to discover, manage and exploit geospatial information, Destination Earth aims to construct highly accurate models, or 'digital twins', of the Earth to monitor and predict environmental change and human impact to support of sustainable development. Aligned with the new Digital Europe funding programme², Destination Earth is expected to start in 2024, and the first high-priority digital twins serving extreme-weather prediction and climate change adaptation will



Credit: Map of Layerzone / Freepik

Digital Twins of the Earth - in the EU Destination Earth

[nature](#) > [nature reviews earth & environment](#) > [review articles](#) > [article](#)

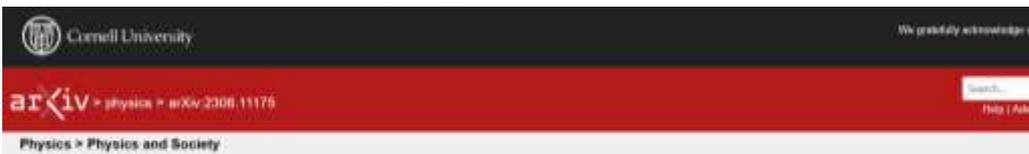
Review Article | [Published: 02 May 2023](#)

Big Data in Earth system science and progress towards a digital twin

Xin Li , Min Feng , Yuxhua Ran, Yang Su, Feng Liu, Chunlin Huang, Huanfeng Shen, Qing Xiao, Jianbin Su, Shiwei Yuan & Huadong Guo

[Nature Reviews Earth & Environment](#) **4**, 319–332 (2023) | [Cite this article](#)

3576 Accesses | 3 Citations | 27 Altmetric | [Metrics](#)



Physics > Physics and Society

Submitted on 19 Jan 2023

Developing Digital Twins for Earth Systems: Purpose, Requisites, and Benefits

Yuhan Rao, Rob Redman, Kristine Dale, Sus E. Haupt, Aaron Hojkinson, Ann Boström, Sid Boukabara, Thomas Geenen, David M. Hall, Benjamin D. Smith, Dev Niyogi, V. Rameswamy, Eric A. Kohn

The accelerated change in our planet due to human activities has led to grand societal challenges including health crises, intensified extreme weather events, food security, environmental justice, etc. Digital twin systems combined with emerging technologies such as artificial intelligence and edge computing provide opportunities to support planning and decision-making to address these challenges. Digital twins for Earth systems (DT4ESs) are defined as the digital representation of the complex integrated Earth system including both natural processes and human activities. They have the potential to enable a diverse range of users to explore what-if scenarios across spatial and temporal scales to improve our understanding, prediction, mitigation, and adaptation to grand societal challenges. The 4th NOAA AI Workshop convened around 100 members who are developing or interested in participating in the development of DT4ES to discuss a shared community vision and path forward on fostering a future ecosystem of interoperable DT4ES. This paper summarizes the workshop discussions around DT4ES. We first defined the foundational features of a viable digital twin for Earth system that can be used to guide the development of various use cases of DT4ES. Finally, we made practical recommendations for the community on different aspects of collaboration in order to enable a future ecosystem of interoperable DT4ES, including equity-centered use case development, community-driven investigation of interoperability for DT4ES, trust-oriented co-development, and developing a community of practice.

Scientists have built a 'digital twin' of Earth to predict the future of climate change



By [Rebekah Frost](#) & [Angela Symons](#)

Published on 11/06/2024 - 16:00 GMT+2 • Updated 16:00



The complex computer model takes into account weather and climate systems as well as our impact on the planet.

Scientists have built a 'digital twin' of Earth to predict the future of climate change

The complex computer model takes into account weather and climate systems as well as our impact on the planet.

DestinE is true game changer in our fight against climate change. ”

- Margrethe Vestager -

Today, the future is literally at our fingertips

By [Rosie Frost](#) & [Angela Symons](#)

Published on 11/06/2024 - 16:00 GMT+2 • Updated 16:00

DestinE is true game changer in our fight against climate change. ”

- Margrethe Vestager -

"The launch of the initial Destination Earth (DestinE) is a true game changer in our fight against climate change," says Margrethe Vestager, Executive Vice-President for a Europe Fit for the Digital Age. "It means that we can observe environmental challenges which can help us **predict** future scenarios - like we have never done before... Today, the future is literally at our fingertips."



Margrethe
Vestager

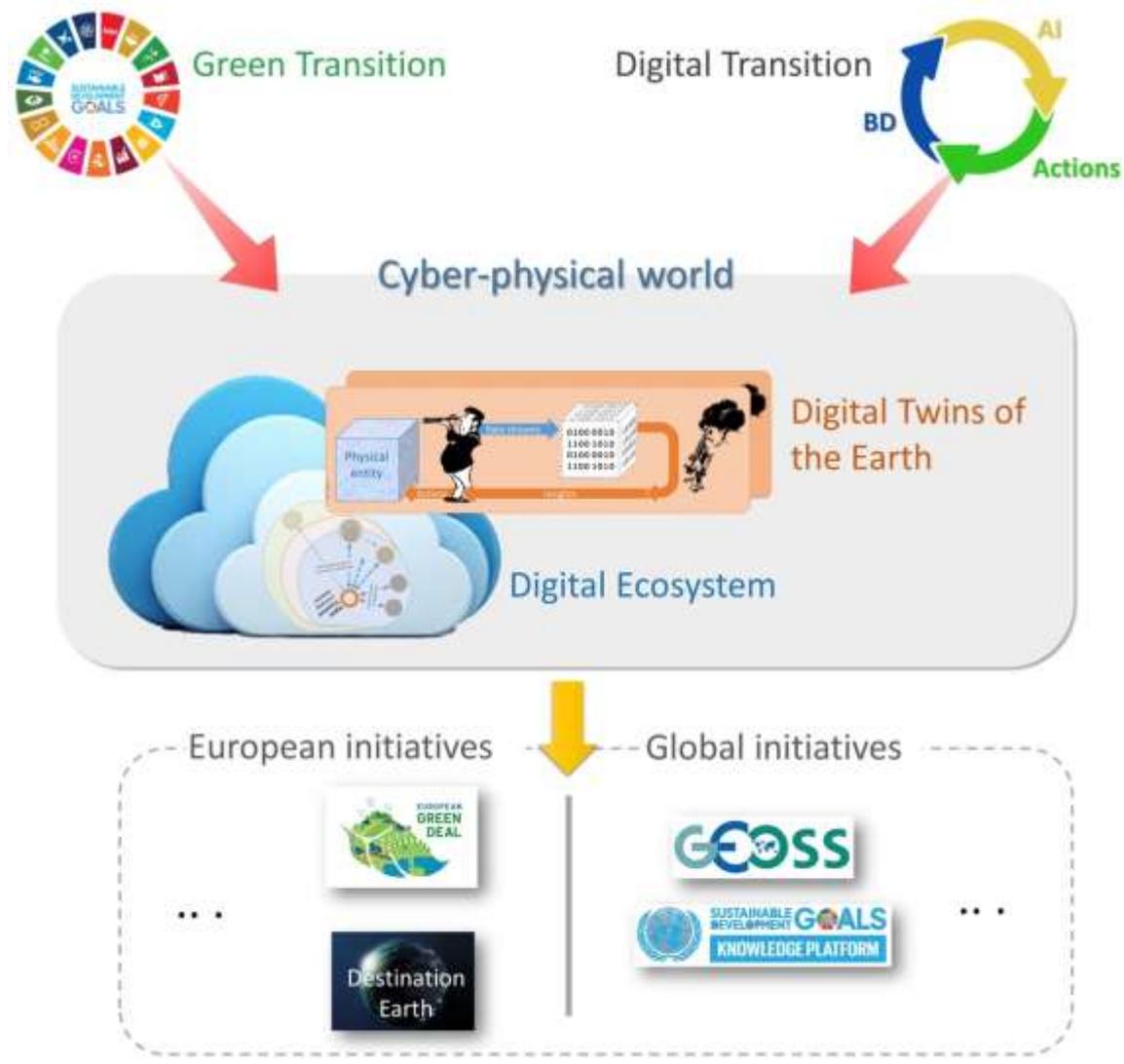
YOU CONTROL CLIMATE CHANGE.



www.climatechange.eu.com

TURN DOWN. SWITCH OFF. RECYCLE. WALK. **CHANGE**

[...] with the advent of the Digital Transformation, the interconnection between the physical and the digital world has become almost complete: economic, industrial, and social relationships have been moved to the “cyber-physical” world ...



Source: S. Nativi, P. Mazzetti, and M. Craglia, 'Digital Ecosystems for Developing Digital Twins of the Earth: The Destination Earth Case', Remote Sensing, vol. 13, no. 11, Art. no. 11, Jan. 2021, doi: 10.3390/rs13112119

Perspective |  **Open Access** |  

Bring digital twins back to Earth

Andrea Saltelli  Gerd Gigerenzer, Mike Hulme, Konstantinos V. Katsikopoulos, Lieke A. Melsen, Glen P. Peters, Roger Pielke Jr, Simon Robertson, Andy Stirling, Massimo Tavoni, Arnald Puy

First published: 26 August 2024 | <https://doi.org/10.1002/wcc.915> | Citations: 2

Edited by Matthias Heymann, Domain Editor and Maria Carmen Lemos, Editor-in-Chief

The Honest Broker

Digital Twins of the Earth: Science or Pseudoscience?

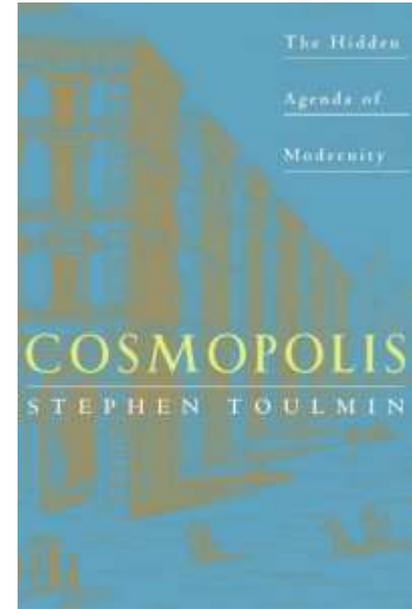
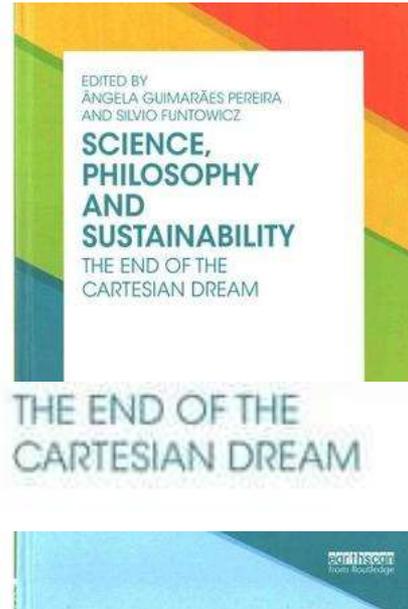
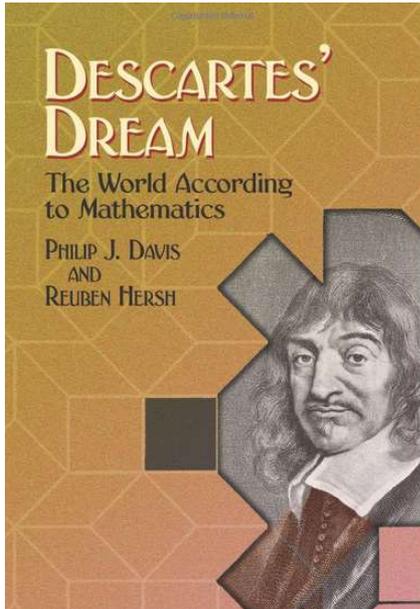
A guest post by Andrea Saltelli



ROGER PIELKE JR.
SEP 09, 2024



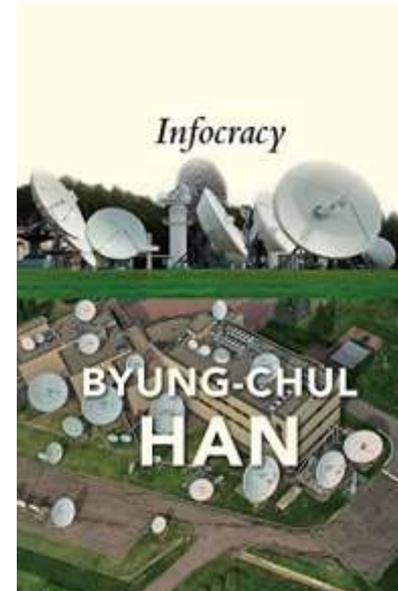
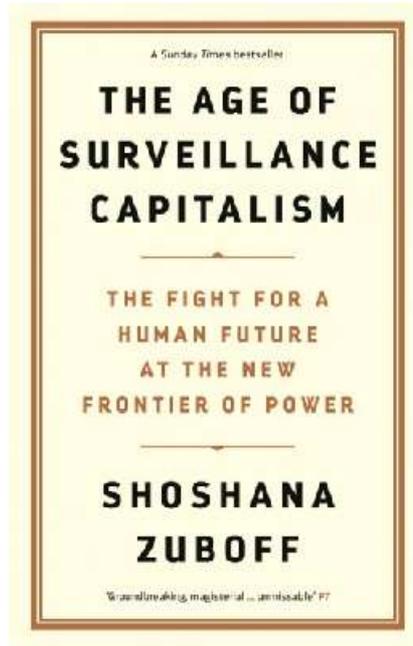
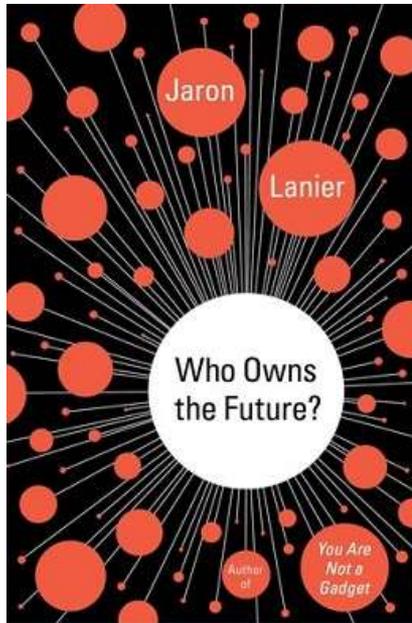
Digital Twins: The planet as a manufact; the ultimate Cartesian Dream



DT's assumes that climate change needs more evidence to promote political agency, and that said evidence can come in the form of DT's

Problems with DestinE

The epistemic community around DestinE unexposed to the concerns about the digitalization of the real



‘expected utility’, ‘decision theory’, ‘life cycle assessment’, ‘ecosystem services’ ‘sound scientific decisions’ and ‘evidence-based policy’ ... profusion of digits, promises of accuracy



Research Policy

Available online 21 December 2022, 104709

In Press, Corrected Proof



Discussion

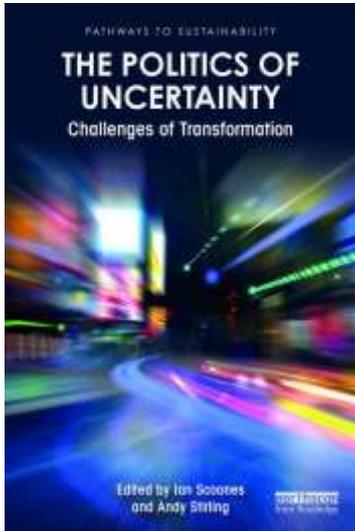
Against misleading technocratic precision in research evaluation and wider policy – A response to Franzoni and Stephan (2023), ‘uncertainty and risk-taking in science’

Andy Stirling



Andrew Stirling

DT's are well received in places where technology is taken to solve policy problems → European institutions are vulnerable to projects oriented to technological solutions (solutionism) and technological optimism

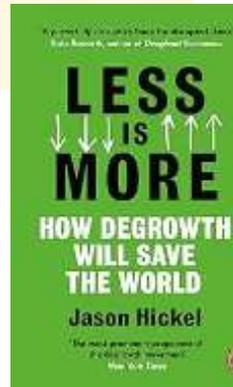
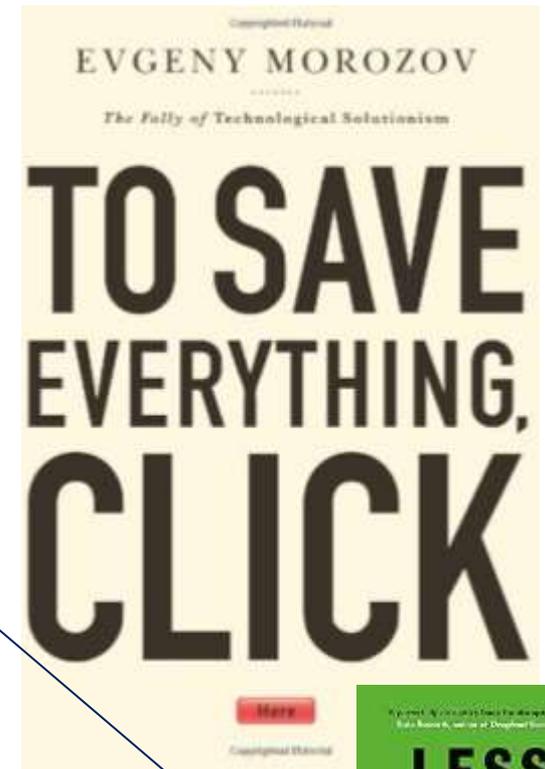


4

THE UNRAVELLING OF TECHNOCRATIC ORTHODOXY?

Contemporary knowledge politics
in technology regulation

Patrick van Zwanenberg



Problems with DestinE: A-la-Zuckerberg approach to introducing new technologies: first it is done, then one worries about “How to embed the ethical, legal, and social considerations in the Digital Twin of the Earth and its interface, such as privacy, equity, accessibility …”



Don't forget 2013 EC's Human Brain Project

“the European Commission awarded ... a staggering 1 billion euro grant ... the people I contacted struggled to name a major contribution that the HBP has made in the past decade” (Yong, 2019)

nature

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Published: 03 September 2014

Neuroscience: Where is the brain in the Human Brain Project?

[Yves Frégnac](#)  & [Gilles Laurent](#) 

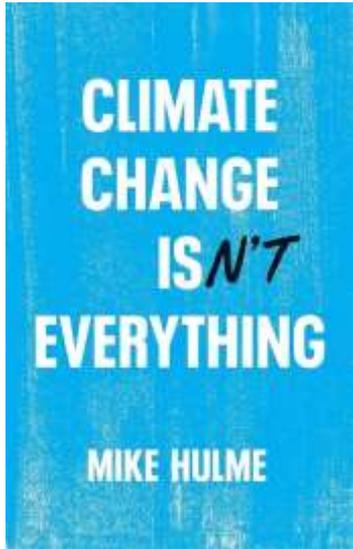
[Nature](#) 513, 27–29 (2014) | [Cite this article](#)

SCIENCE

The Human Brain Project Hasn't Lived Up to Its Promise

Ten years ago, a neuroscientist said that within a decade he could simulate a human brain. Spoiler: It didn't happen.

By Ed Yong JULY 22, 2019

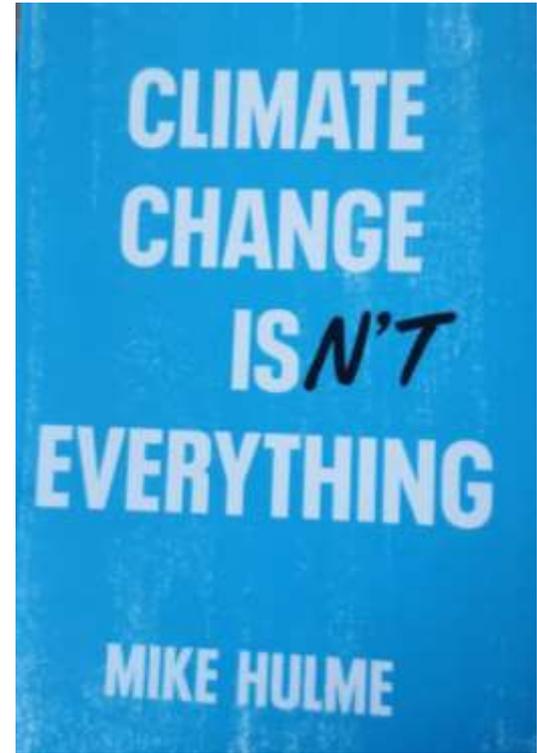


Climate change cannot be the lens through which to look at the world's problems. The war in Syria is not a result of climate change

Rejecting climatic determinism is not a refutation of climate change but of its instrumental use

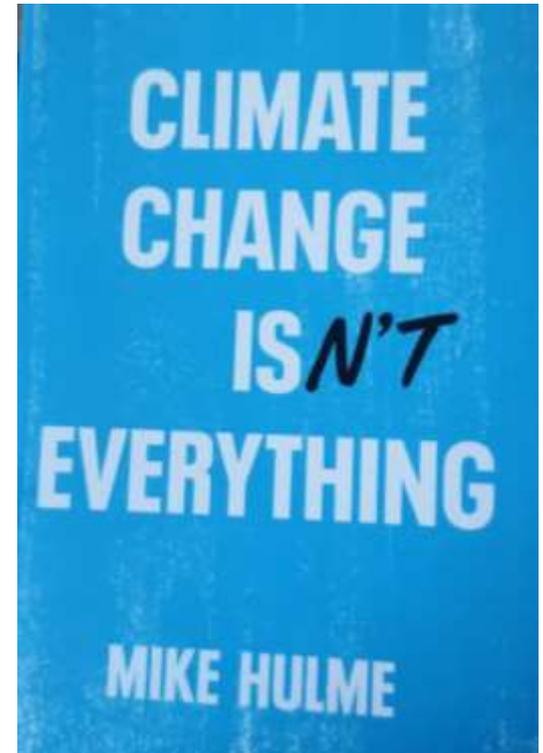
“Climate became globalized in new ways, seen as a single universal system that could be simulated with increasing degree of realism and made predictable … knowledge detached from specific cultural meanings” p. 50

The EU Horizon Europe research programme promises to deliver by 2030 “a full replica… a highly accurate digital model of the Earth to monitor and predict the interactions between natural phenomena and human activities” p. 130



Hulme, Mike. 2023. *Climate Change Isn't Everything: Liberating Climate Politics from Alarmism*. 1st edition. Medford: Polity.

Ambitious visions to manage the Earth's physical and social complexity – whether using the promise of the EU's Destination Earth, machine learning or artificial intelligence – are chimeras



DT's are marketed as a source of 'climate intelligence' but if it is true that "Financial markets and private companies, are in an "arms race" for climate intelligence" [*], should this race be met with public funds?

[*] L. Harris, "Rise of the Climate Rating Agencies," *The American Prospect*, Apr. 12, 2023. Accessed: Jun. 07, 2023. [Online]. Available: <https://prospect.org/api/content/6015e258-d87d-11ed-bd1d-12163087a831/>

Could climate intelligence backfire? Consider the effects of mortgage securitization on the the last housing bubble recession started in 2007

Performing Climate Risks to Financial Stability

Are climate change models the source of our next financial crisis?

MAY 17, 2024

PRINT

SHARE



As the dust of the global financial crisis of 2007–08 settled, many of those looking for someone to blame for the economic disaster zeroed in on something called the Gaussian copula model, a family of mathematical functions used to estimate the probability distribution of investment losses. In a [lament](#) on Wired, for example, the journalist Felix Salmon wrote that the model had become “so deeply entrenched—and was making people so much money—that warnings about



Jessica Weinkle

Problems with DestinE

The engagement of social science and humanities that gets accepted in journals seems to be of a confirmatory nature – to help the actors of DestinE to receive societal consensus

For example:

Purportedly a critique but ...



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[nature](#) > [communications earth & environment](#) > [perspectives](#) > [article](#)

Perspective | [Open access](#) | Published: 27 August 2024

Digital twins of the Earth with and for humans

[W. Hazeleger](#) , [J. P. M. Aerts](#), [P. Bauer](#), [M. F. P. Bierkens](#), [G. Camps-Valls](#), [M. M. Dekker](#), [E. J. Doblas-Beyes](#), [V. Eyring](#), [C. Finkesauer](#), [A. Grundner](#), [S. Hachinger](#), [D. M. Hall](#), [T. Hartmann](#), [F. Iglesias-Suarez](#), [M. Janssens](#), [E. R. Jones](#), [T. Kölling](#), [M. Lees](#), [S. Lhermitte](#), [B. V. van Nieuwpoort](#), [A.-K. Pahker](#), [Q. J. Pellicer-Valero](#), [E. P. Pijpers](#), [A. Silbak](#), ... [F. C. Vossepoel](#) [+ Show authors](#)

[Communications Earth & Environment](#) **5**, Article number: 463 (2024) | [Cite this article](#)

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2



Impact assessment

Definitions; Impact assessment at the European Commission. Cochrane; Rachel Carson; Lyotard, Shapin, Latour; from evidence based policy to policy based evidence; Collingridge, Majone, Beck. A case in class on tobacco and another on exoskeletons; Disputes on genetically modified organisms.

Impact assessment

Evidence based policy

… where does this come from?

Types: Social Impact Assessment, Environmental Impact Assessment, Health Impact Assessment, Economic Impact Assessment ...

Stages:

- Ex ante impact assessment (before a policy/intervention is selected and/or implemented)
- Monitoring (during implementation)
- Ex-post analysis (valuation, after the implementation)

All belong to **evidence-based policy**



Better Regulation: why and how

The Better Regulation agenda ensures evidence-based, transparent EU law-making based on the views of those impacted. The Commission evaluates and improves EU laws, focusing on delivering where it matters the most.

PAGE CONTENTS:

Objectives of the Better
Regulation agenda

What the Commission is
doing

Objectives of the Better Regulation agenda

- Ensure EU policymaking is based on evidence
 - Making EU laws simpler and better, and avoiding unnecessary burdens
 - Involving citizens, businesses and stakeholders in the decision-making process
-
- Ensure EU policymaking is based on evidence
 - Making EU laws simpler and better, and avoiding unnecessary burdens
 - Involving citizens, businesses and stakeholders in the decision-making process

https://commission.europa.eu/law/law-making-process/planning-and-proposing-law/better-regulation_en

Better regulation: guidelines and toolbox

General principles

The better regulation guidelines set out the principles that the European Commission follows when preparing new initiatives and proposals and when managing and evaluating existing legislation.

The guidelines apply to each phase of the law-making cycle.



3 NOVEMBER 2021

Better regulation guidelines
English (563.75 KB - PDF)

Download 



20 JULY 2023

Better regulation toolbox
English (6.45 MB - PDF)

Download 

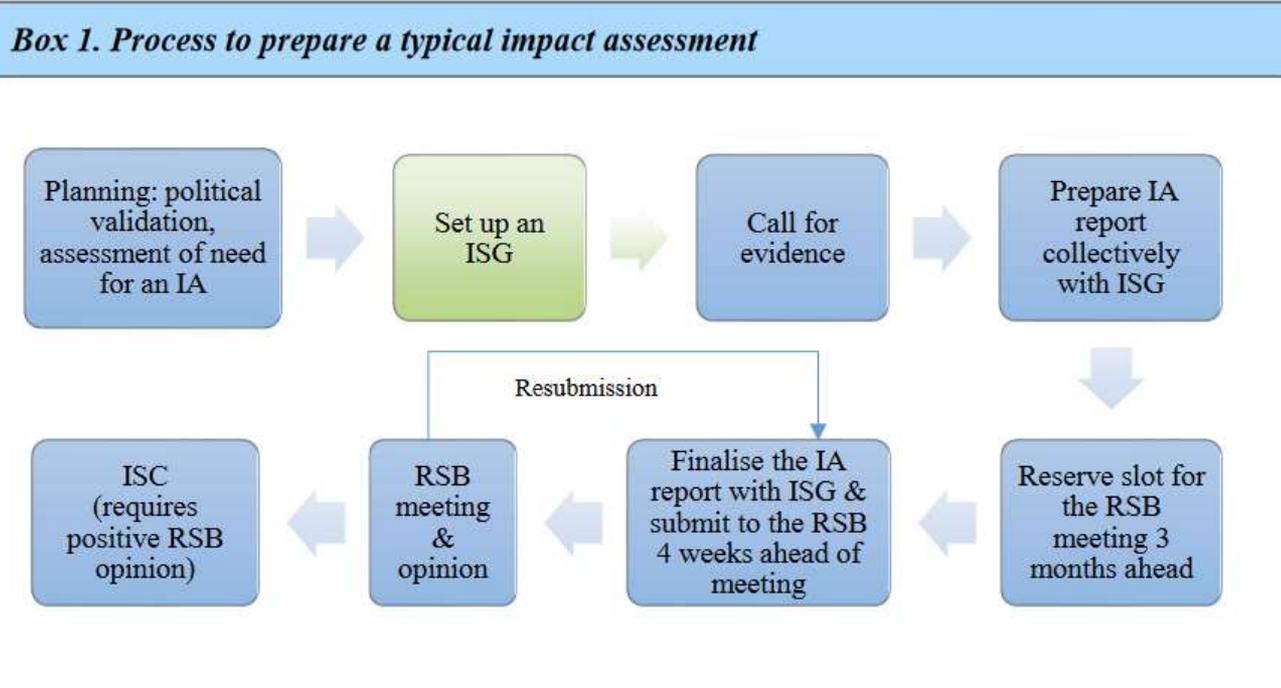


614 pages of tools

https://commission.europa.eu/law/law-making-process/planning-and-proposing-law/better-regulation/better-regulation-guidelines-and-toolbox_en

Impact assessment in the European Commission

LEGEND ☺



IA=Impact assessment
ISG = interservice groups (directorates of the European Commission such as Competition, Internal Market...)

RSB= Regulatory Scrutiny Board

ISC=inter-service consultation

Source: 'Better regulation' toolbox 2023, p. 50

Impact assessment seen as a process (EC model)

1. Problem Definition
2. Objective Setting
3. Identification of Policy Options: (including status quo)
4. Analysis of Impacts: (costs and benefits, potential effects on different stakeholder groups)

Note these points for the group exercise

Impact assessment seen as a process (EC model)

5. Comparison of Options: identify the most effective and efficient approach.

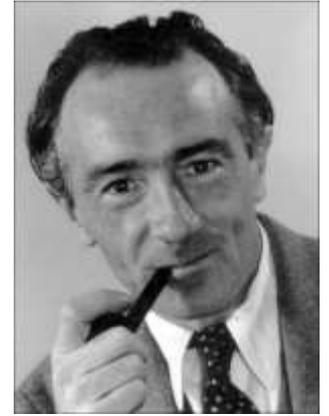
6. Consultation: stakeholders, including the public, industry representatives, and experts.

7. Decision-Making: Presenting the results

Note these points for the group exercise

Evidence based medicine came first!

Evidence Based Medicine was born when clinical decision making was set to integrate clinical expertise with external evidence (e.g. randomized trials) and patient values and preferences

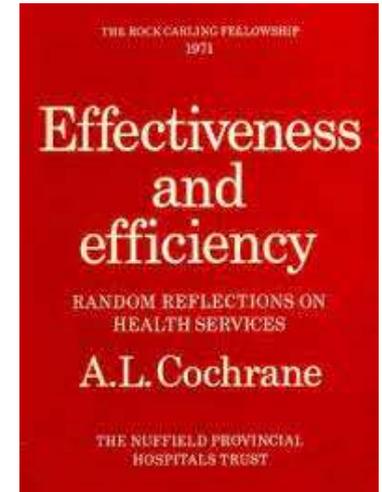


Archie Cochrane,
1909 –1988



This led to the Cochrane collaboration (now simply Cochrane), involving health professionals, patients and policy makers

Runs major systematic reviews. Maintains a library



“A NEW paradigm for medical practice is emerging. Evidence-based medicine de-emphasizes intuition, unsystematic clinical experience, and pathophysiologic rationale as sufficient grounds for clinical decision making and stresses the examination of evidence from clinical research”



This Issue

Article

November 4, 1992

Evidence-Based Medicine

A New Approach to Teaching the Practice of Medicine

Gordon Guyatt, MD, MSc; John Cairns, MD; David Churchill, MD, MSc; Deborah Cook, MD, MSc; Brian Haynes, MD, MSc, PhD; Jack Hirsh, MD; Jan Irvine, MD, MSc; Mark Levine, MD, MSc; Mitchell Levine, MD, MSc; Jim Nishikawa, MD; David Sackett, MD, MSc; Patrick Brill-Edwards, MD; Hertzell Gerstein, MD, MSc; Jim Gibson, MD; Roman Jaeschke, MD, MSc; Anthony Kerigan, MD, MSc; Alan Neville, MD; Akbar Parjo, MD; Allan Detsky, MD, PhD; Murray Enkin, MD; Pamela Frid, MD; Martha Gerrity, MD; Andreas Laupacis, MD, MSc; Valerie Lawrence, MD; Joel Menard, MD; Virginia Moyer, MD; Cynthia Mulrow, MD; Paul Links, MD, MSc; Andrew Ozman, MD, MSc; Jack Sinclair, MD; Peter Tugwell, MD, MSc

Author Affiliations

JAMA. 1992;268(17):2420-2425. doi:10.1001/jama.1992.03490170092032



JAMA. 1992;

SERIES: DAVID SACKETT – A YEAR LATER | VOLUME 73, P82-86, MAY 2016

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Evidence-based medicine has been hijacked: a report to David Sackett

John P.A. Ioannidis  

Published: February 28, 2016 • DOI: <https://doi.org/10.1016/j.jclinepi.2016.02.012> •

 Check for updates



“Under market pressure, clinical medicine has been transformed to finance-based medicine” (2016)

Early milestones in the development of impact assessment was the National Environmental Policy Act (NEPA) in the United States, enacted in 1969



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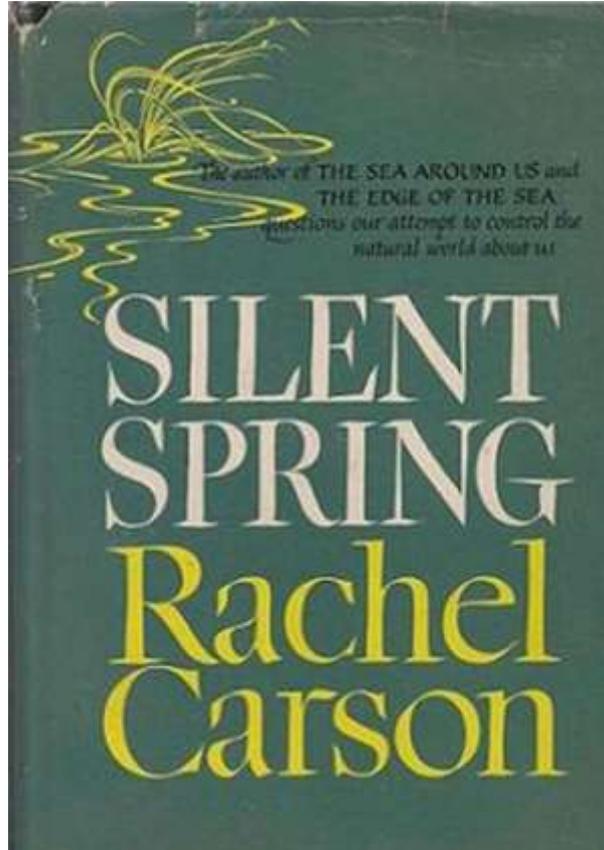
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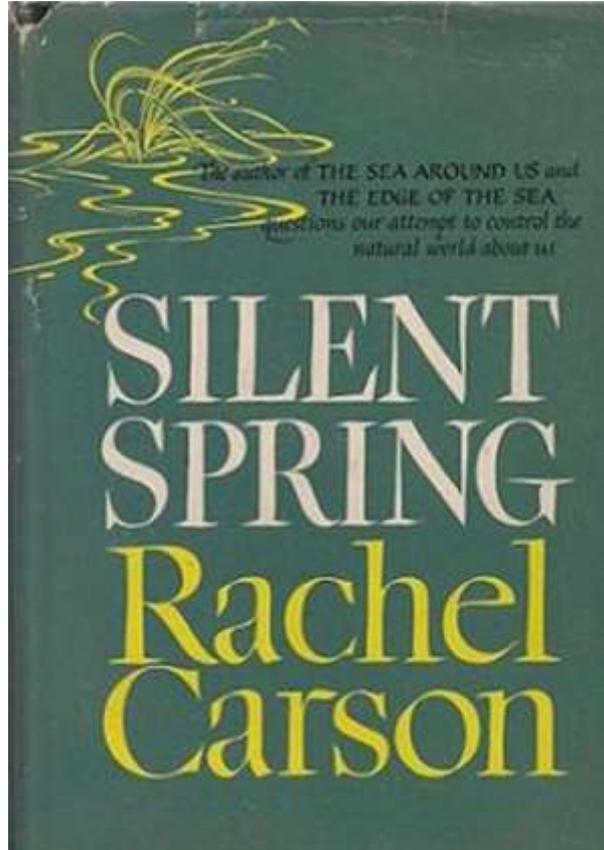
S. 1075 (91st): An Act to establish a national policy for the environment; to authorize studies, surveys, and research relating to ecological systems, natural resources, and the quality of the human environment; and to establish a Board of Environmental Quality Advisers

... NEPA came into being as a result ... of a book (1962)!

The book kickstarted the environmental movement worldwide. Led to the creation of the US Environmental Protection Agency (EPA) ...



... it also led in the US to a ban of DDT, to the Endangered Species Act (1973), to the Clean Air (1970) and Clean Water (1972) acts



Digging deeper on this question of where evidence-based policy comes from...

‘C’est depuis Platon que la question de la **légitimation de la science** se trouve indissociablement connexe de celle de la **légitimation du législateur**.

Dans cette perspective, le droit de décider de ce qui est vrai n’est pas indépendant du droit de décider de ce qui est juste [...] **savoir et pouvoir sont les deux faces d’une même question**: qui décide ce qu’est savoir, et qui sait ce qu’il convient de décider?

La question du savoir à l’âge de l’informatique est plus que jamais la question du gouvernement.’

Chapter 2, Le probleme: La legitimation, Lyotard, J.-F. 1979. La Condition postmoderne. Rapport sur le savoir, Paris : Minuit.



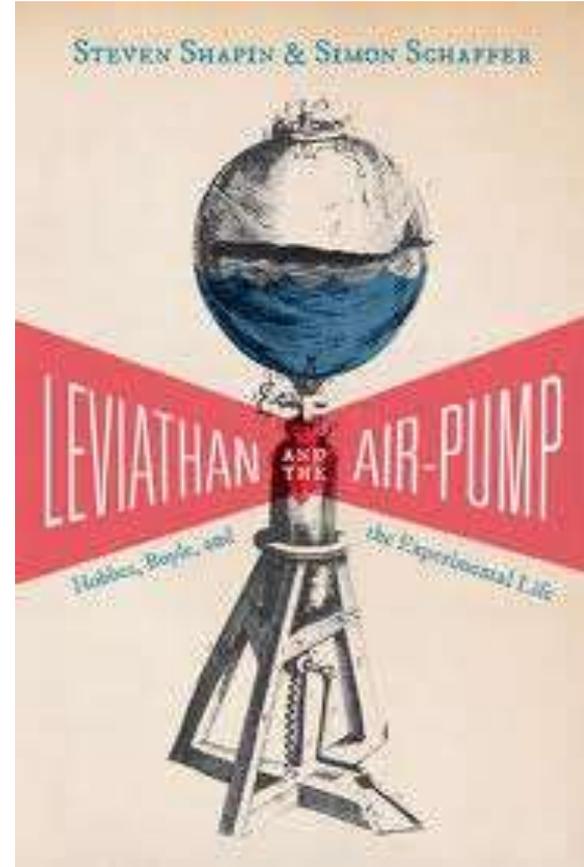
Jean-François Lyotard



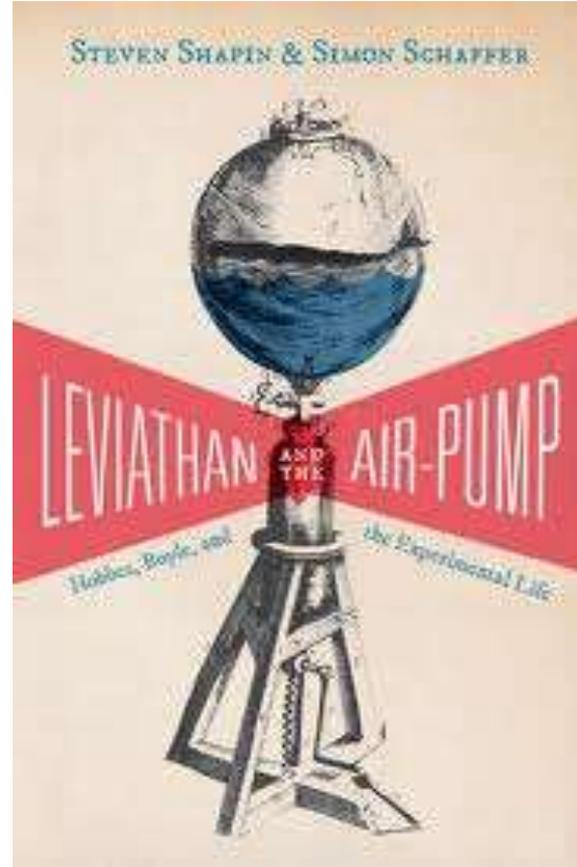
“Solutions to the problem of knowledge are solutions to the problem of social order.

[...] Trust in Science and trust in the prevailing social order are linked”

Shapin, S., Schaffer, S., 1985, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*, Princeton, 2011 Edition



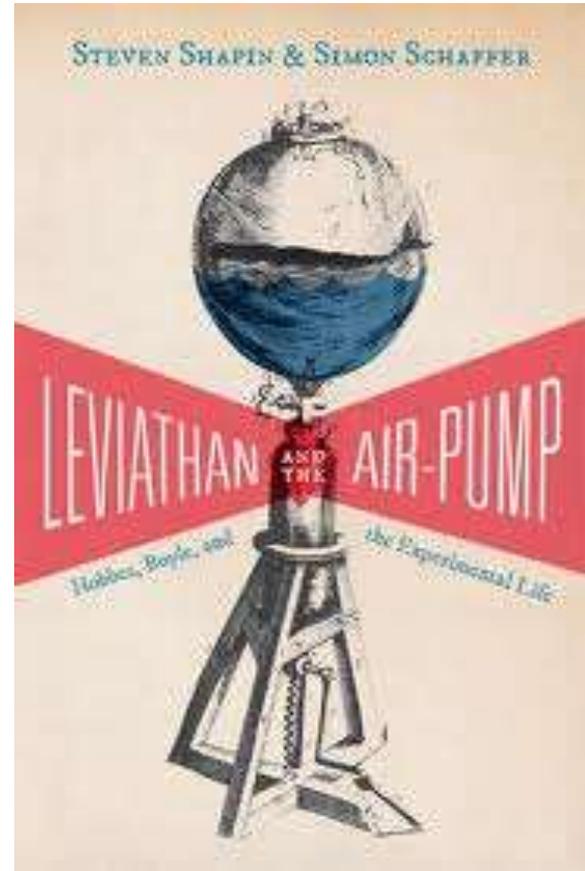
Shapin and Schaffer discusses how establishing 'matter of facts' under controlled 'laboratory' experiments before witnesses, was a way to subtract the discourse about knowledge from religious squabbles ...



Shapin and Schaffer's book inspired Bruno Latour's 'Nous n'avons jamais été modernes', 1991, and was 'hot' during the 'science wars'.



Bruno Latour

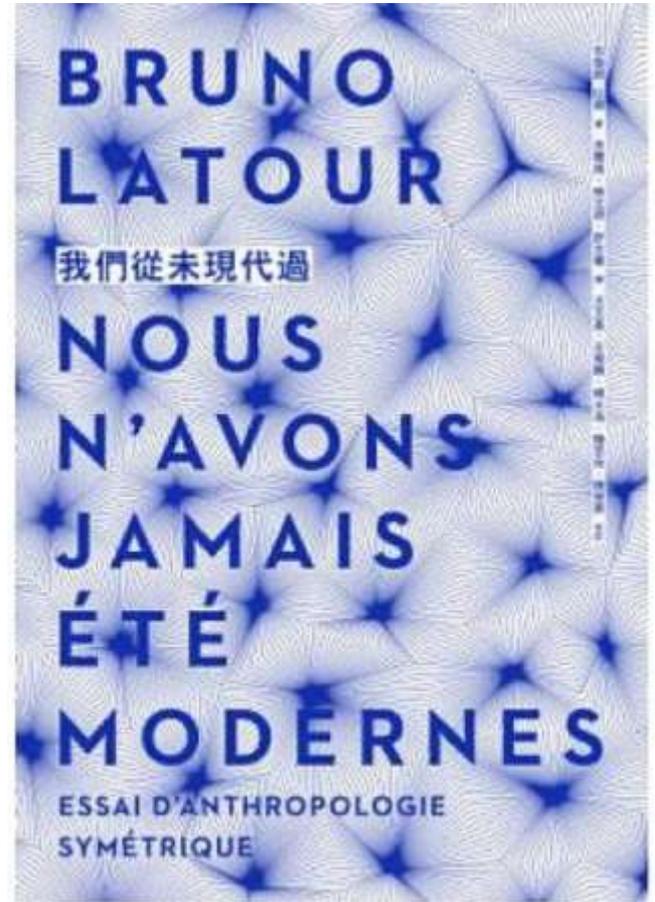
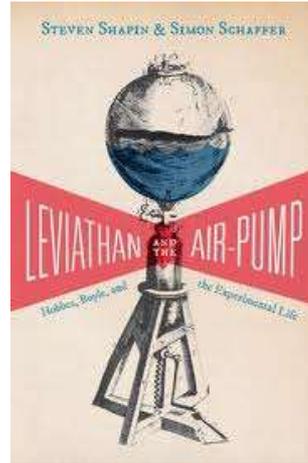


But what does it mean that we “have never been modern?”

The theory in a nutshell: we have never been good at separating facts from values

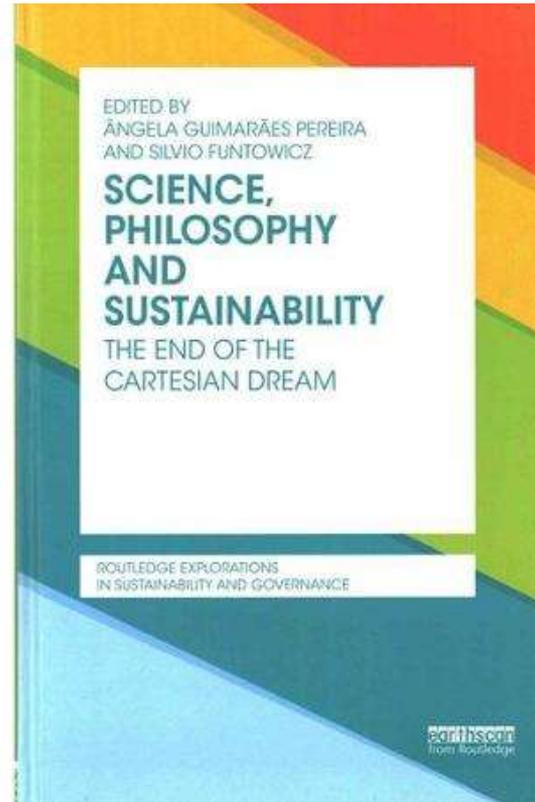
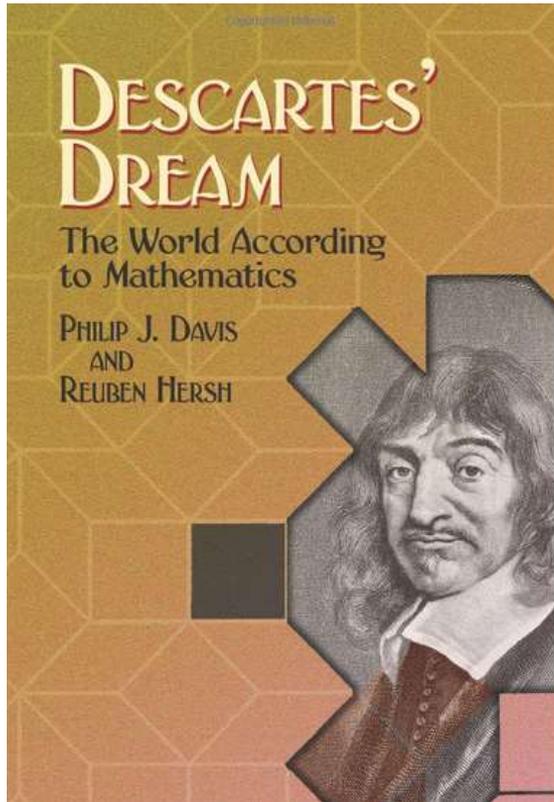


Bruno Latour



If we dig even deeper in this culture
of evidence at the root of the
governance of human affairs: the
Cartesian Dream

Quantification as a key element of the Cartesian Dream





Francis Bacon
(1561–1626)

We call Cartesian dream the idea of man as master and possessor of nature, of prediction and control, of Bacon's wonders of science and of Condorcet's mathématique sociale...



René Descartes
(1596–1650)



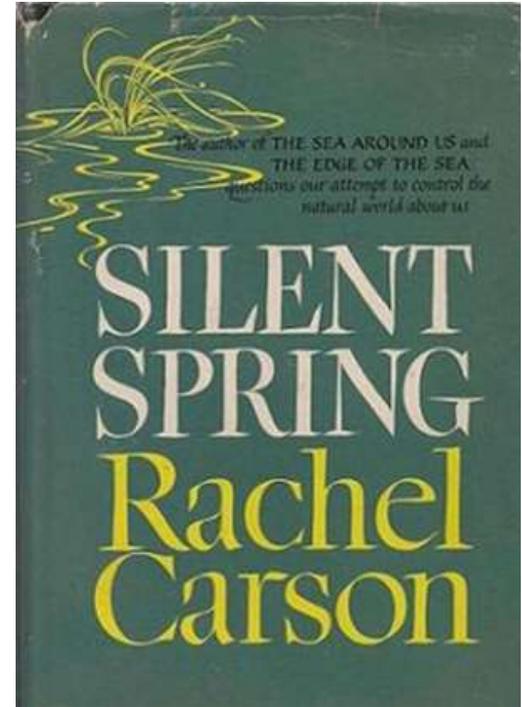
Nicolas de Caritat, marquis de
Condorcet
(1743– 1794)

The end of the Cartesian dream?

The ‘control of nature’ is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man.

The concepts and practices of applied entomology for the most part date from that Stone Age of science.

It is our alarming misfortune that so primitive a science has armed itself with the most modern and terrible weapons, and that in turning them against the insects it has also turned them against the earth.”



← How the book ends

Why is this story of evidence based policy (EBP) so important?

- Because it is a key component of the policy cycle and is enshrined in standards and guidelines
- It is a conflicted topic (like evidence-based medicine)
- Many say it has become its opposite (policy-based evidence), also as part of New Public Management theories and movement
- Power differentials (industry-regulators-citizens) – EBP as a vehicle for regulatory capture
- Purported neutrality

A perplex economist



John Kay [+ Add to myFT](#)

ECONOMICS & BUSINESS COMMENTATOR

John Kay has been writing a column on economics and business since 1995. He is currently a visiting professor at the London School of Economics. He also had a career in the policy world which established the Institute for Fiscal Studies as one of the most respected think tanks, and a business career.

[ES](#) Email John Kay



“And so we have a large consultancy business of transport modellers, environmental experts, risk managers and impact assessment modellers, the front line of an army that has turned evidence-based policy into policy-based evidence. These procedures cloak often casual instinctive assessments in an appearance of objective justification”, Kay, 2014.

Kay, J., 2014, The wisest choices depend on instinct and careful analyses, Financial Times, September 2, available at <https://www.johnkay.com/2014/09/03/the-wisest-choices-depend-on-instinct-and-careful-analysis/>

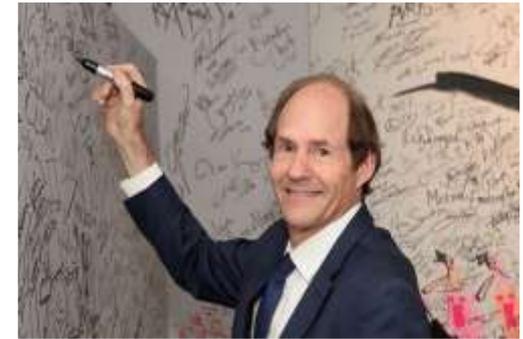
What is New Public Management (NPM)?

- Gained traction in the 1980s and 1990s
- Market-oriented reforms, privatization, deregulation
- Origin in public choice theory (James M. Buchanan)
- Neoliberal revolution (UK, both Tories and New Labour)
- US: reinventing Government Movement (1990s); NPM principles applied to federal agencies (Al Gore)
- World Bank and the International Monetary Fund (IMF)

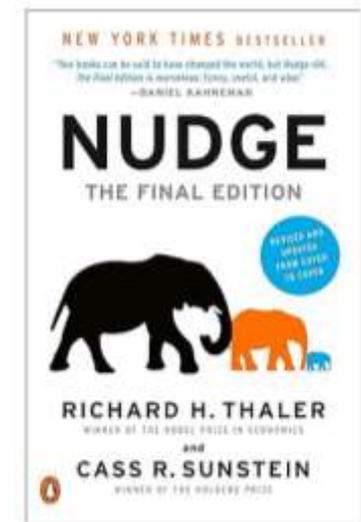
What is public choice theory?

Economists in the room to answer

- Rational choice
- Actors maximizing their utility
- Fighting bureaucracy thanks to market incentives (see later Thaler and Sunstein's 'nudging')
- Tackles rent seeking and voting behaviour



Cass Sunstein



See Timms, A. (2019, June). The Sameness of Cass Sunstein | The New Republic. New Republic. <https://newrepublic.com/article/154236/sameness-cass-sunstein>

The most widely used technique: Cost Benefit Analysis

Pros: Efficiency, simplicity, ease of communication, *prima facie* impersonality

Cons: Dependence of the outcome upon what is included or excluded (what are the externalities?); monetization

Exercise in class (20m + 10 reporting)

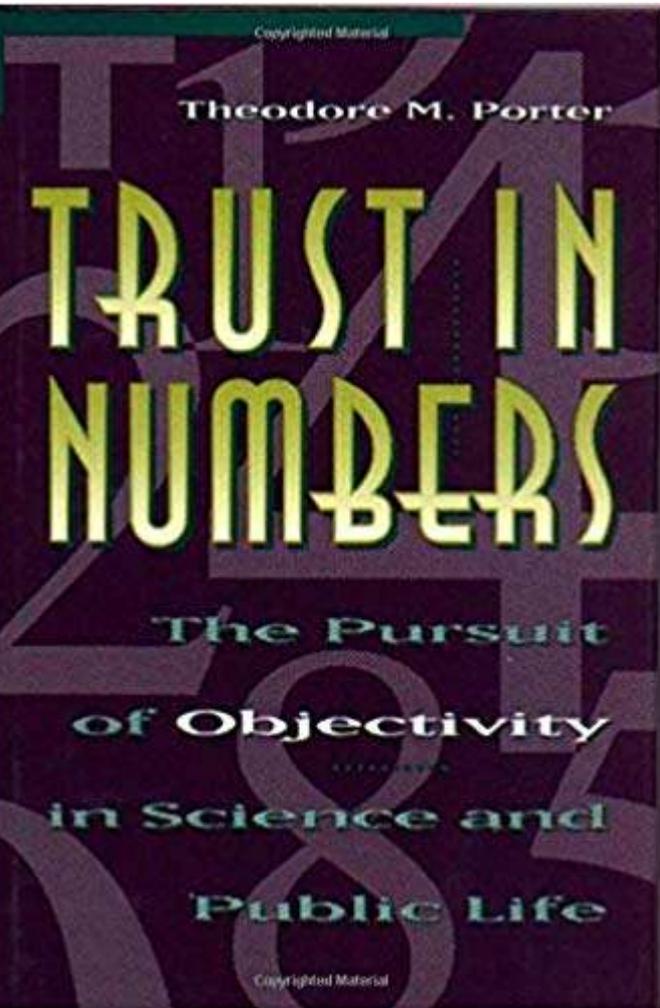
Imagine you work for the health ministry and need to find analytic arguments to judge the desirability and feasibility of policies aimed to reduce smoking habits in the population.



Source: The Simpsons, Smoke on the Daughter

- 1) What policies to consider?
- 2) What other ministries should participate to the discussion?
- 3) What factors should be considered in the analysis?
- 4) What costs should be included? What benefits?
- 5) Indicate whether the selected cost and benefits are amenable to quantification.

Back to our discussion of cost benefit analysis



History of cost benefit analysis. See Chapter 7: “U.S. Army Engineers and the Rise of Cost–Benefit Analysis” or this paper in eCampus

Porter, T. M. Objectivity as Standardization: The Rhetoric of Impersonality in Measurement, Statistics, and Cost–Benefit Analysis. in *Rethinking objectivity* (ed. Megill, A.) 197 –237 (Duke University Press, 1994).

Frames

Most analyses offered as input to policy are framed as cost benefit analysis or risk analyses, but some environmentalists disagree

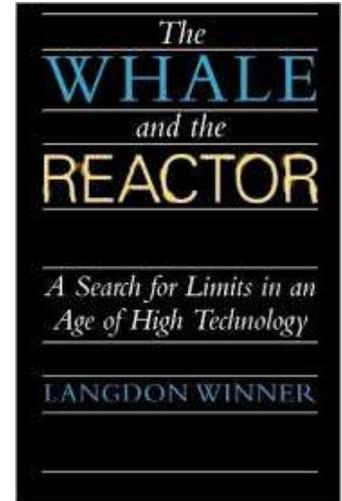


Langdon Winner

8

ON NOT HITTING
THE TAR-BABY

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.



Alternative to Cost Benefit Analysis?

Multi-criteria analysis

Social multi-criteria/Ethical matrices

Use of different ‘Lenses’?



The technique is never neutral. How methodological choices condition the generation of narratives for sustainability

Andrea Saltelli^{a,b}, Lorenzo Benini^c, Silvia Funtowicz^a, Mario Giampietro^{d,e}, Matthias Kaiser^a, Erik Reinert^{a,f}, Jeroen P. van der Sluis^{a,g,h}



Impact assessment culture in the European Union. Time for something new?

Andrea Saltelli^{a,b}, Marta Kur-Czarnecka^c, Samuele Lo Piano^d, Máté János Lőrincz^e, Magdalena Oliczyk^f, Arnald Puy^g, Erik Reinert^h, Steffen Thor Smithⁱ, Jeroen P. van der Sluis^{a,b}

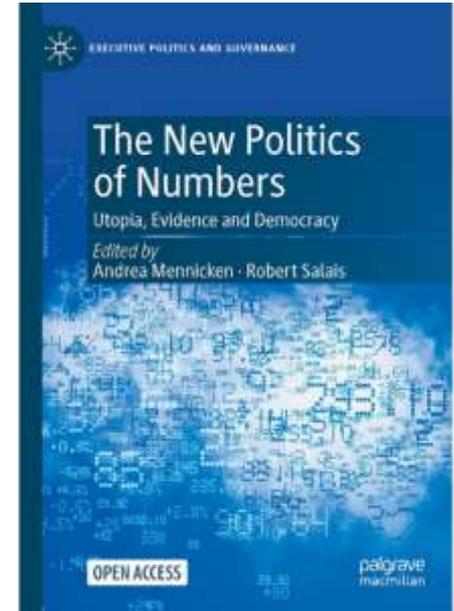
Taking issue with non-
neutrality – what social
have scientists to say

A technical proof of quality is illusory without a parallel investigation of normative quality

Technical Quality

Normative quality

How the numbers of neoliberalism (New Public Management) constitute a regime of a-democracy; the example of indicators of employment



Salais, R. (2022). “La donnée n’est pas un donné”: Statistics, Quantification and Democratic Choice. In *The New Politics of Numbers: Utopia, Evidence and Democracy*, Andrea Mennicken and Robert Salais, Palgrave Macmillan, pp. 379–415.

Evidence based
policy versus policy
based evidence

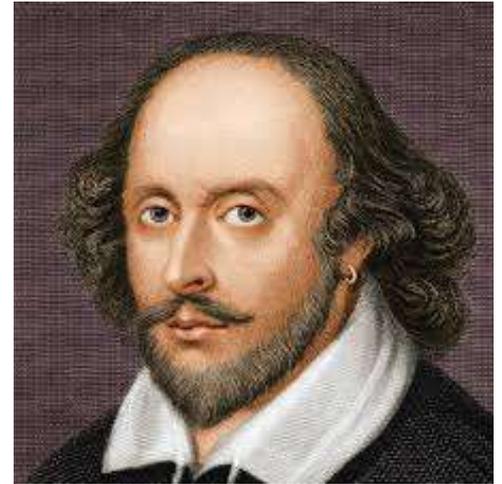
PETRUCHIO: I say it is the moon.

KATHERINE: I know it is the moon.

PETRUCHIO: Nay, then you lie. It is
the blessèd sun.

KATHERINE: Then God be blessed, it is the
blessèd sun.

But sun it is not, when you say it is not,
And the moon changes even as your mind



W. Shakespeare,
the Taming of the
Shrew, Act IV.

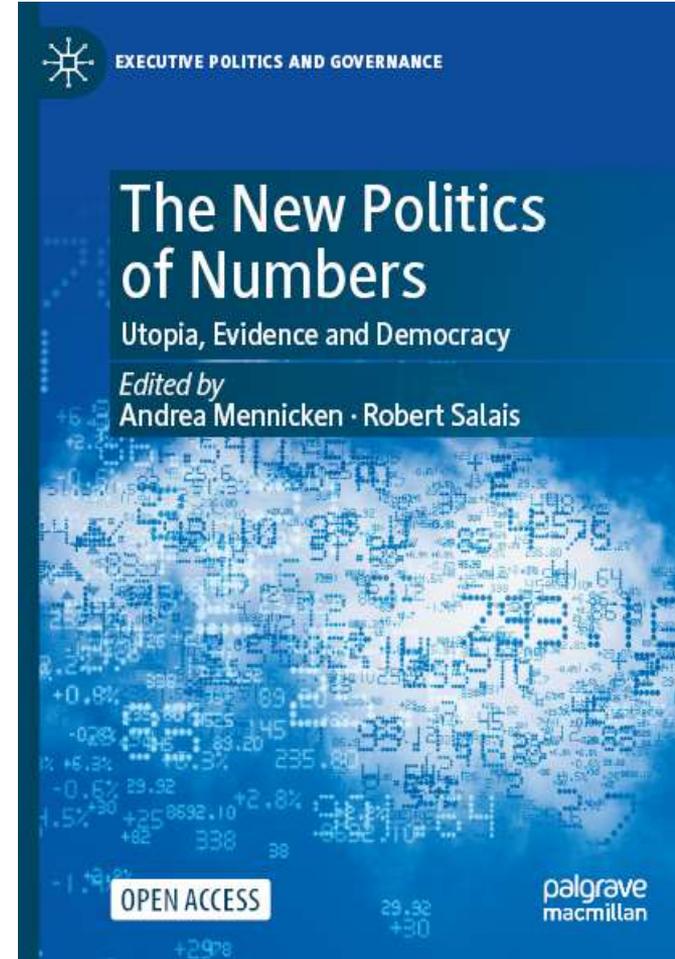
Evidence based policy

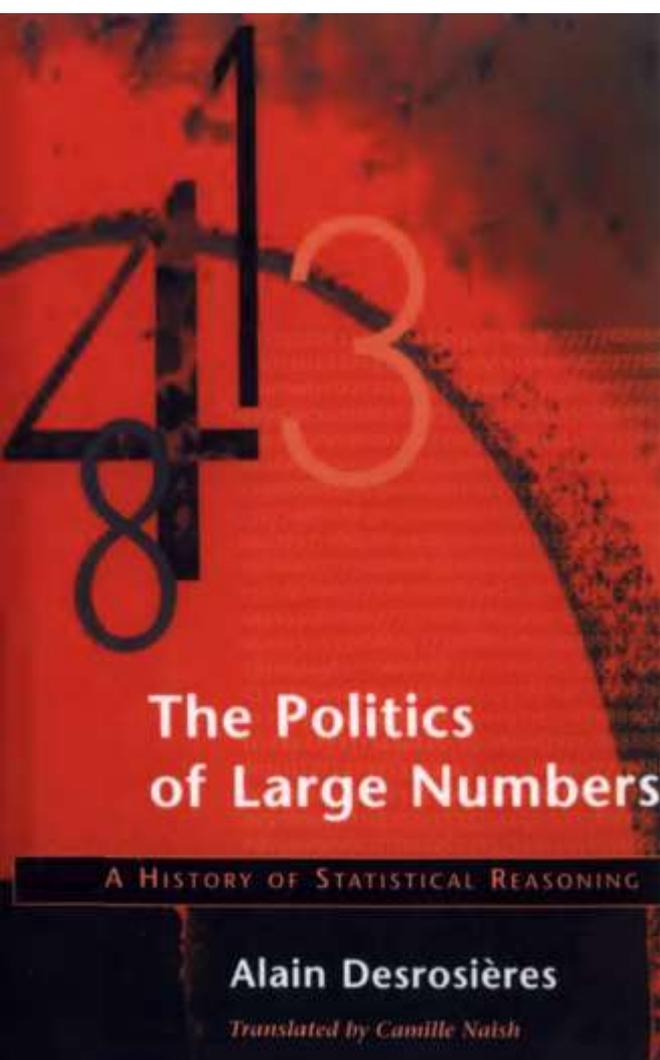
Statistics (creating things that hold together (Desrosières) for the solution of practical problems)

Policy based evidence

Governance driven quantification (a reversal of the statistical pyramid)

CHAPTER 12, “La donnée n’est pas un donné”: Statistics, Quantification and Democratic Choice, *Robert Salais*





Alain Desrosières: “Making things that hold”

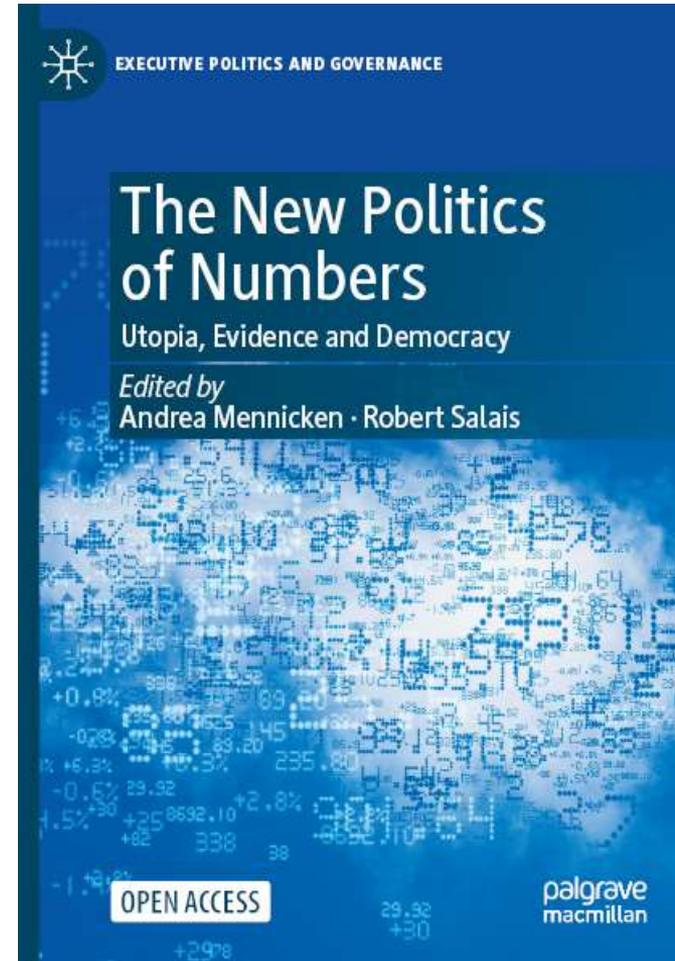
The construction of statistical concepts and categories that can serve for action

BUT

“It is because the moment of objectification can be made autonomous that the moment of action can be based on firmly established objects”

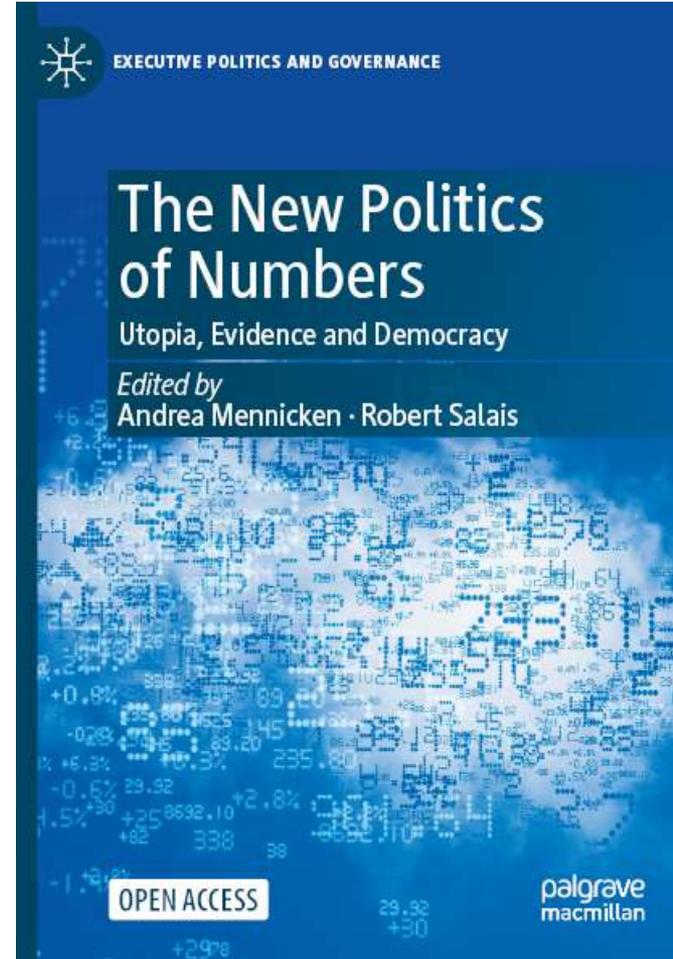
Governance driven quantification is based on pretended objectivity (neutrality), reductionism and justificationism that contribute to a loss of democratic agency (a-democracy)

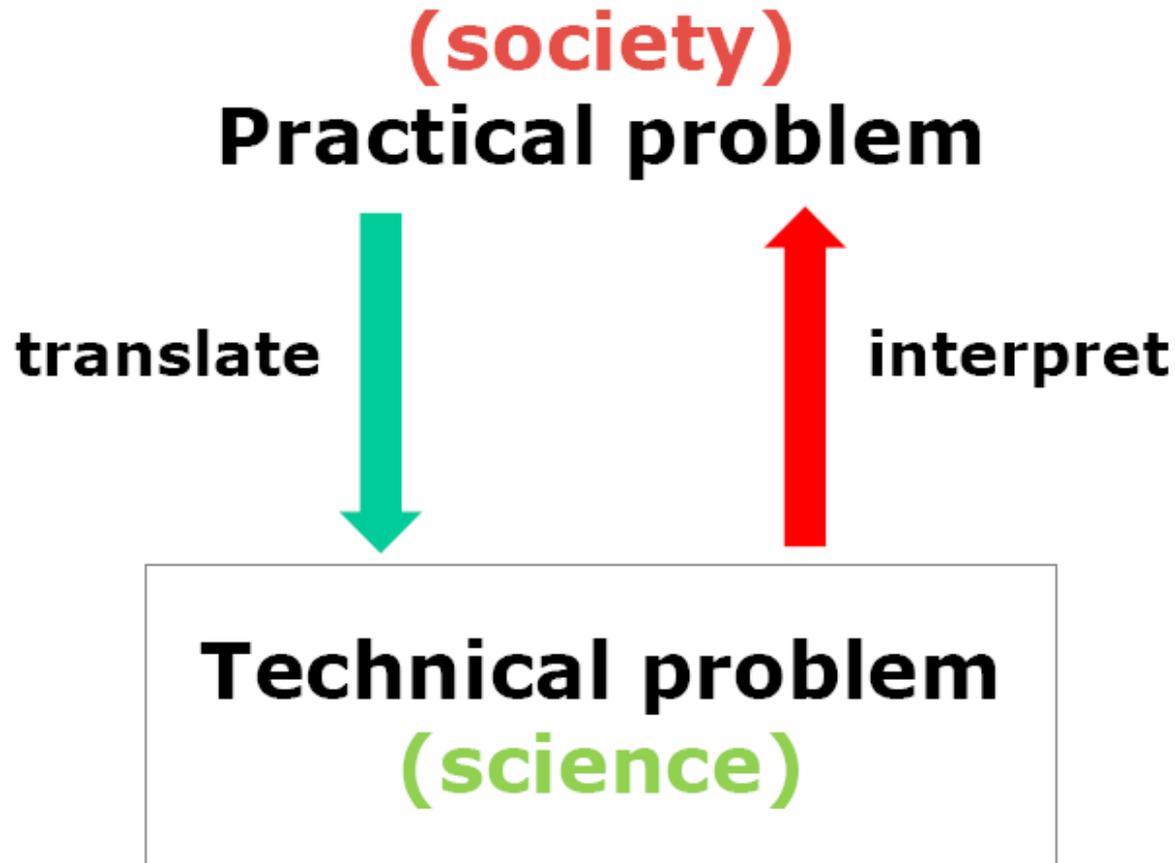
CHAPTER 12, “La donnée n’est pas un donné”: Statistics, Quantification and Democratic Choice, *Robert Salais*



Contesting unjust/unfair governance arrangement is impossible without producing alternative constructions of evidence – that requires muscles not easily available to the lay citizen

CHAPTER 12, “La donnée n’est pas un donné”: Statistics, Quantification and Democratic Choice, *Robert Salais*



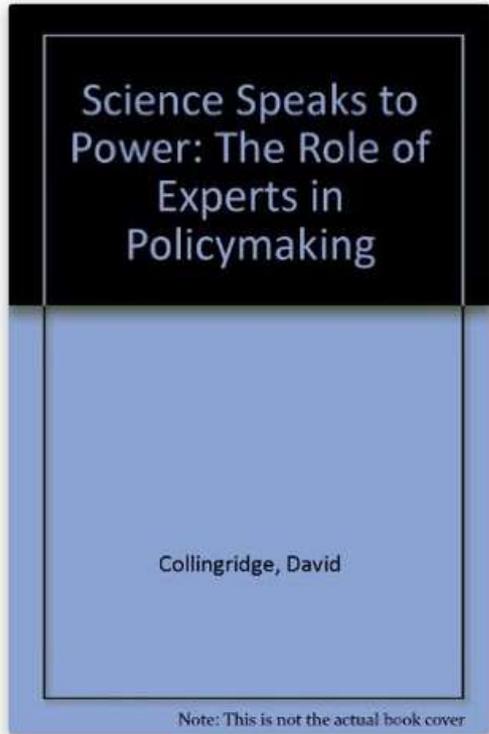


Courtesy of Jeroen van
der Sluijs



Based on: Ravetz, J., 1971,
Scientific Knowledge and its
Social Problems, Oxford
University Press.

Hold on a second: who said that
policies should be based on science?



Science Speaks to Power: The Role of Experts in Policymaking

Hardcover – 31 Dec 1986

by [David Collingridge](#) (Author), [Colin Reeve](#) (Author)

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Hardcover
from £999.11

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... since it is so expensive you can find a study copy ...

Collingridge and Reeve advocate as model for policy decision one of least dependence on science.

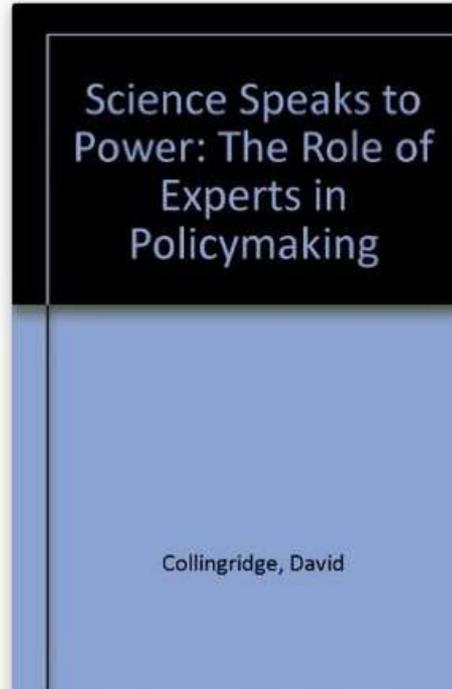
Collingridge, D. and Reeve, C., 1986, *Science Speaks to Power: The Role of Experts in Policy Making*. London: Frances Pinter.

Collingridge and Reeve (1986) twin myths of rationality

1. policy action is predicated on the accumulation of facts and the taming of uncertainty and
2. the power of science (whereby science is there to provide dispassionate facts to adjudicate controversies).

Collingridge, D. and Reeve, C., 1986, *Science Speaks to Power: The Role of Experts in Policy Making*. London: Frances Pinter.

Aim: to deconstructs these myths based on a number of historical test cases (views of 1986)

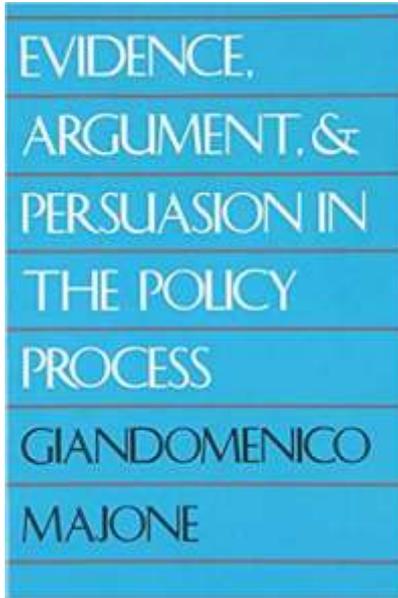


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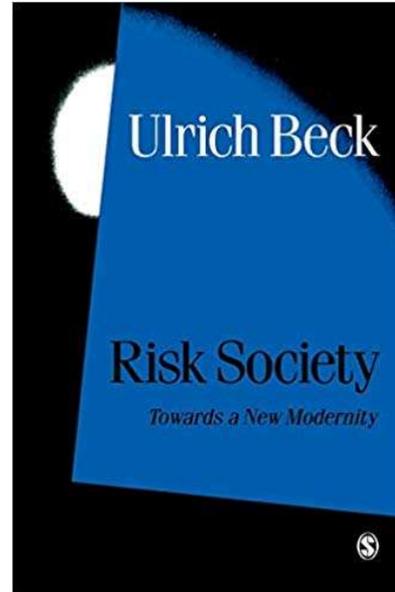
From Ulrich Beck to Giandomenico Majone: the technique is never neutral



Ulrich Beck
(1944 –2015)



1989



1992 (1986)



Environmental Science & Policy

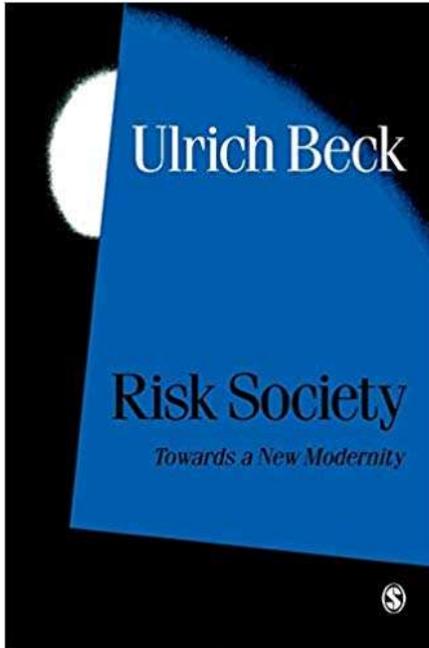
Volume 106, April 2020, Pages 87-98



The technique is never neutral. How
methodological choices condition the
generation of narratives for sustainability

Andrea Saltelli ^{a, b, c, d, e}, Lorenzo Benini ^c, Silvio Funtowicz ^a, Mario Giampietro ^{d, e}, Matthias Kaiser ^a,
Erik Reinert ^{a, f}, Jeroen P. van der Sluijs ^{a, b, h}

Science as a self-service shop for financially well-endowed customers in need of arguments
(Beck 1992)

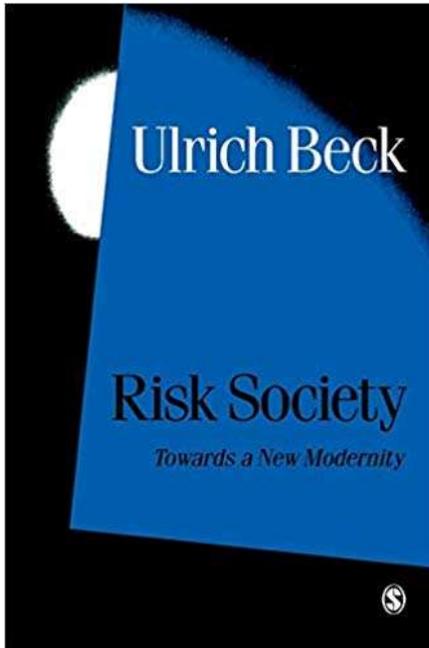


1992 (1986)



Ulrich Beck
(1944 –2015)

“... from the experts and the fundamental controversies they have fought out (or not fought out) one can learn how unwelcome results can be blocked professionally (by methodological criticism, for instance).”(Beck 1992)



1992 (1986)



Ulrich Beck
(1944 –2015)

EVIDENCE,
ARGUMENT, &
PERSUASION IN
THE POLICY
PROCESS
GIANDOMENICO
MAJONE

Since to say anything of importance in public policy requires value judgment, this artificial separation between values and rational capacity is a threat to all notions of public deliberation and defensible policy choices (p. 8)

Multiple policy evaluation should also be possible. It would recognize the legitimacy of the different perspectives ... the objective is not to construct a grand model that would combine all the partial perspectives into...a weighted average ...of equity, effectiveness, legality ... (p.9)

EVIDENCE,
ARGUMENT, &
PERSUASION IN
THE POLICY
PROCESS
GIANDOMENICO
MAJONE

The pretended distinction between facts and value is used instrumentally

In the policy process fact and values cannot be separated in the making of an argument

EVIDENCE,
ARGUMENT, &
PERSUASION IN
THE POLICY
PROCESS
GIANDOMENICO
MAJONE

“When science, technology, and public policy intersect, different attitudes, perspectives, and rules of argument come into sharp conflict. Scientific criteria of truth clash with legal standards of evidence and with political notions of what constitutes sufficient ground for action”

EVIDENCE,
ARGUMENT, &
PERSUASION IN
THE POLICY
PROCESS
GIANDOMENICO
MAJONE

“the technique is never neutral”

<https://arxiv.org/ftp/arxiv/papers/1712/1712.06457.pdf>

Majone: “In any area of public policy the choice of instruments, far from being a technical exercise that can be safely delegated to the experts, reflects as in a microcosm all the political, moral, and cultural dimensions of policy-making”

EVIDENCE,
ARGUMENT, &
PERSUASION IN
THE POLICY
PROCESS

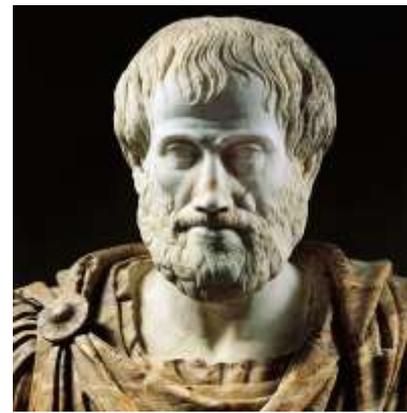
GIANDOMENICO

MAJONE

“[my suggestion is to view a] policy analyst as a producer of arguments, capable of distinguishing between good and bad rhetoric, rather than as a “number cruncher” ...



ARISTOTLE 'RHETORIC', C.4TH BCE



Source: Getty images

'THE ART OF PERSUASION'

ETHOS

AN APPEAL TO PROVE THE AUTHORITY OF THE SPEAKER AND THEIR CREDIBILITY

- PROOF OF EXPERTISE
- YOU'VE GOT THE RECEIPTS!



ARISTOTLE EXPLAINS THERE ARE THREE MODES (PISTEIS) OF PERSUASION IN RHETORIC

PATHOS

AN APPEAL TO EMOTIONS

- PASSIONATE DELIVERY
- PERSONAL ANECDOTES
- METAPHOR AND SIMILE



LOGOS

A LOGICAL APPEAL (WHICH ENHANCES **ETHOS**)

- FACTS AND FIGURES
- DEDUCTIVE REASONING ENDING IN CONCLUSION (SYLLOGISM)
- A BODY OF PROOF... SORT OF... (ENTHYMEME)



Persuasion = logos + pathos + ethos

Aristotle's "Rhetoric"

3



Regulatory capture

Merchants of doubts, guardians of reasons, when science becomes the instrument of capture, the epistemic ladder of regulatory capture

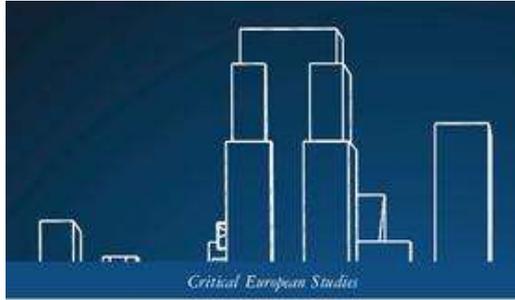
Something impact assessment also needs to consider: regulatory capture



Source: <https://techliberation.com/2011/01/20/toles-cartoon-on-regulatory-capture/>, cartoon of Tom Toles

Power asymmetries in the framing of issues:
those who have the deepest pockets marshal
the best [foremost 'scientific'] evidence

Sylvain Laurens



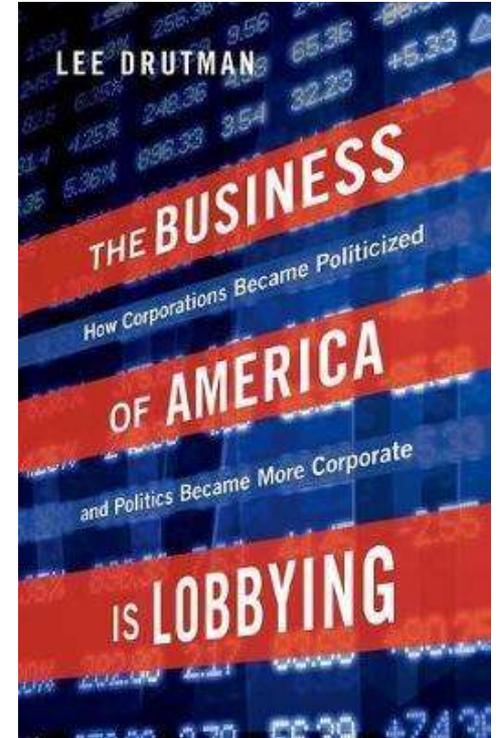
LOBBYISTS AND BUREAUCRATS IN BRUSSELS

CAPITALISM'S BROKERS

Sylvain Laurens

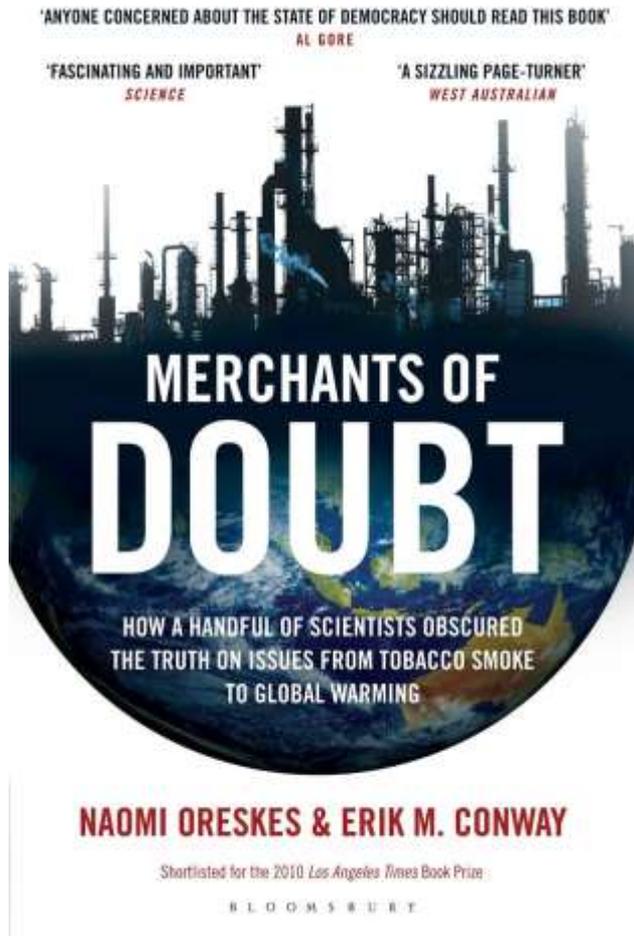


Lee Drutman



For both Laurens and Drutman a salient aspect of this power is lobbyists' access to more and better disseminated knowledge/science

What regulatory
capture has to do
with all that



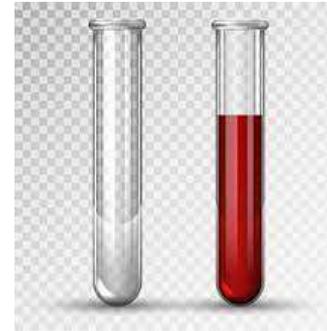
Naomi Oreskes and Erik M. Conway

‘sound science’ and
‘good epidemiology’
against ‘junk science’

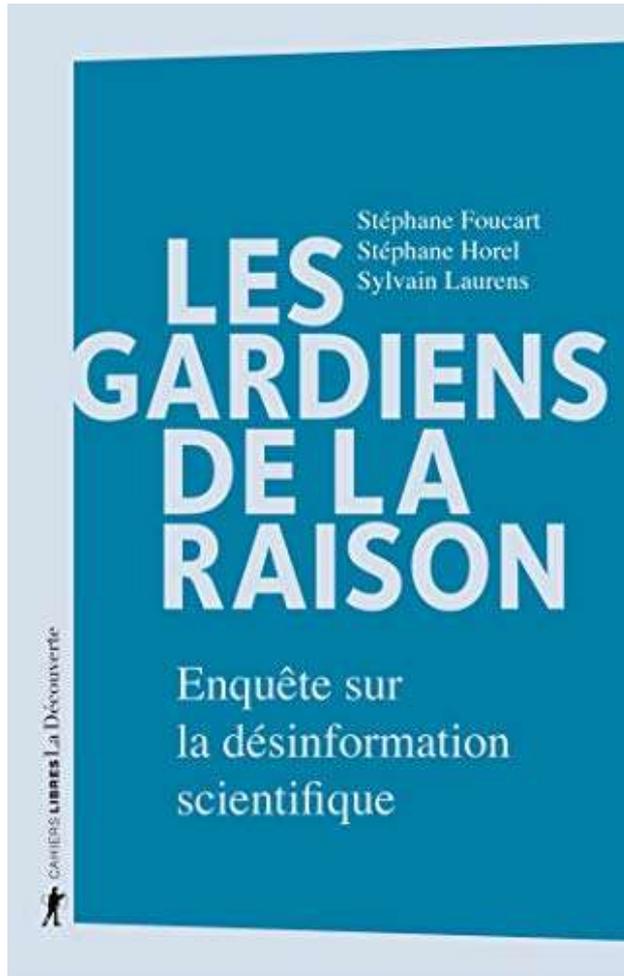
Guardians of reason



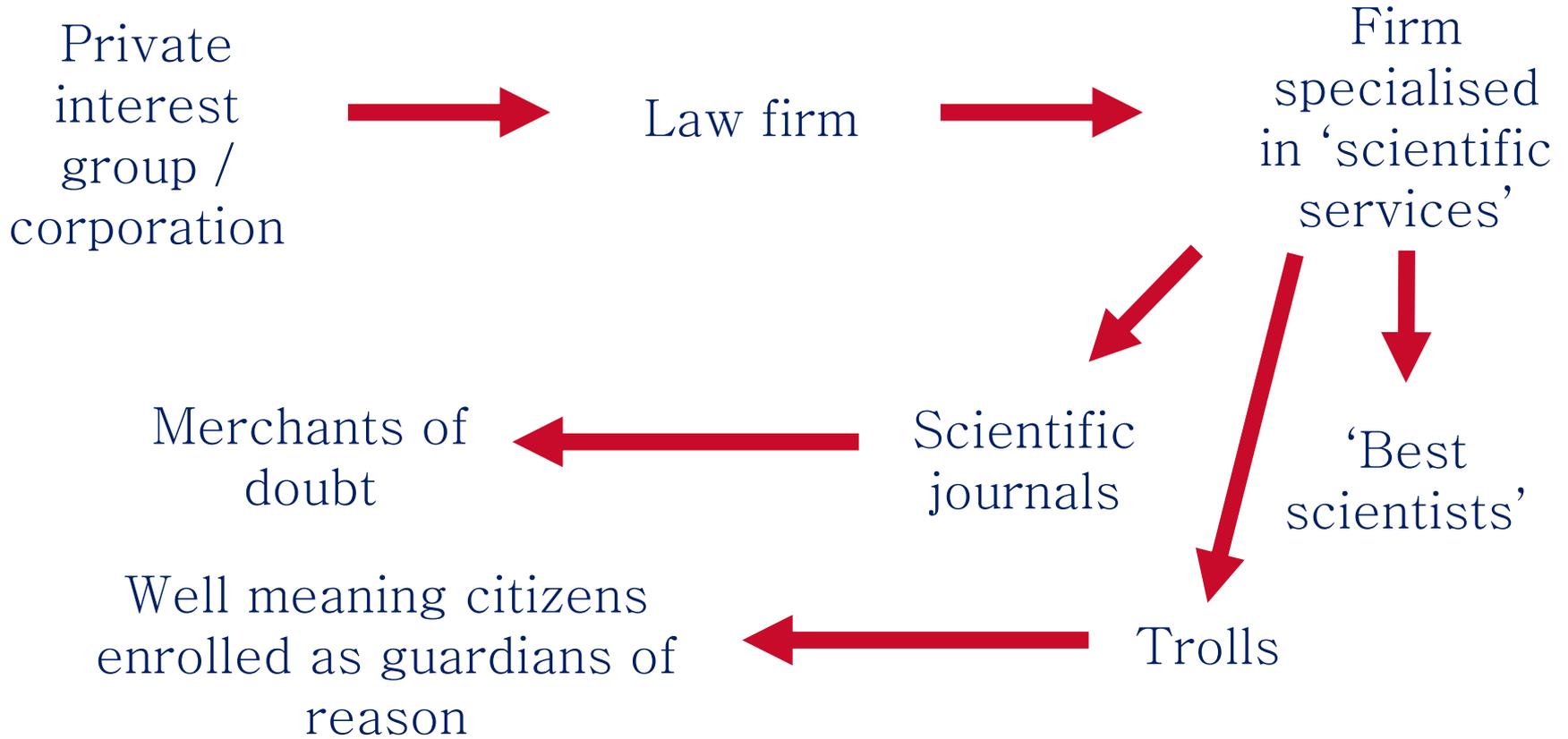
Guardians of sound science



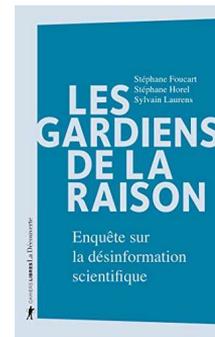
shutterstock.com · 408560539



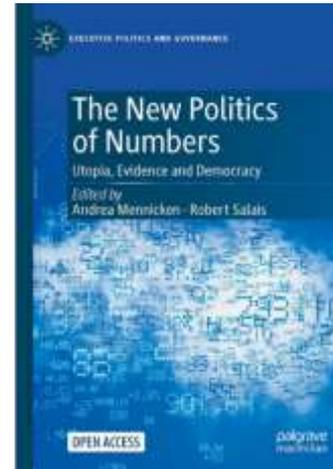
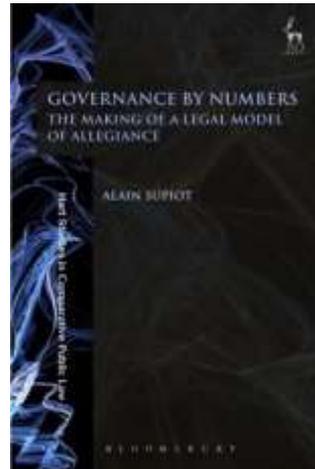
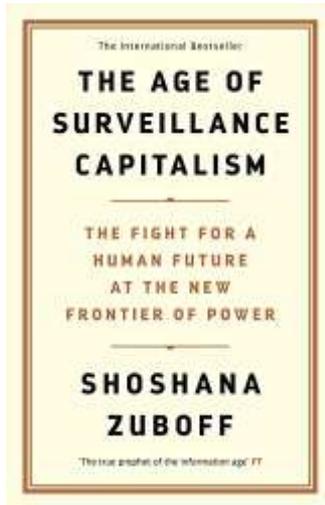
An army of self-proclaimed ‘fact checkers’ becomes mobilized in the defence of a neoliberal and conservative credo, posing as victims of an assault on science perpetrated by the purported enemies of reason



Strategies so *rapides et inédites*



New powerful instruments such as the use of AI and algorithms in combination with cognitive psychology and the new social media to influence the behaviour of consumers / voters

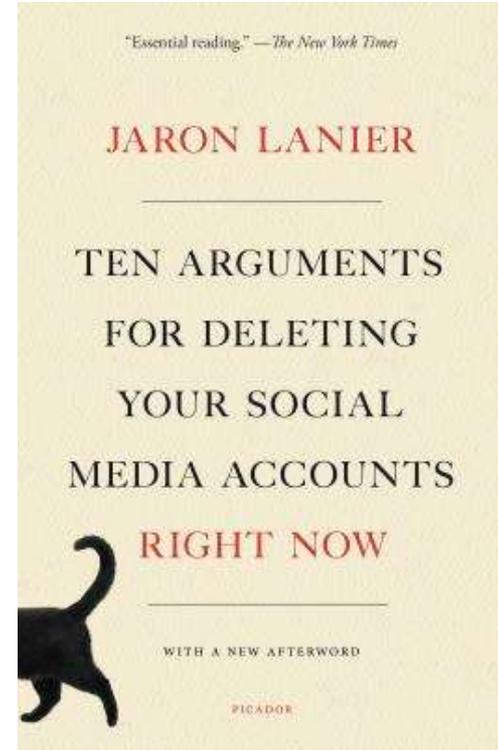
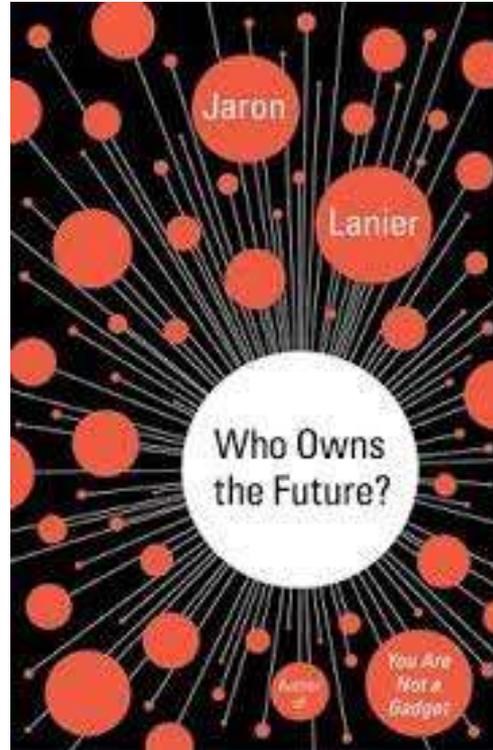


Digressing now ... the existential reading of Jaron Lanier



Source: <https://svauthorsfest.org/authors/jaron-lanier/>

Jaron Lanier: “The new media make us ... worse persons”

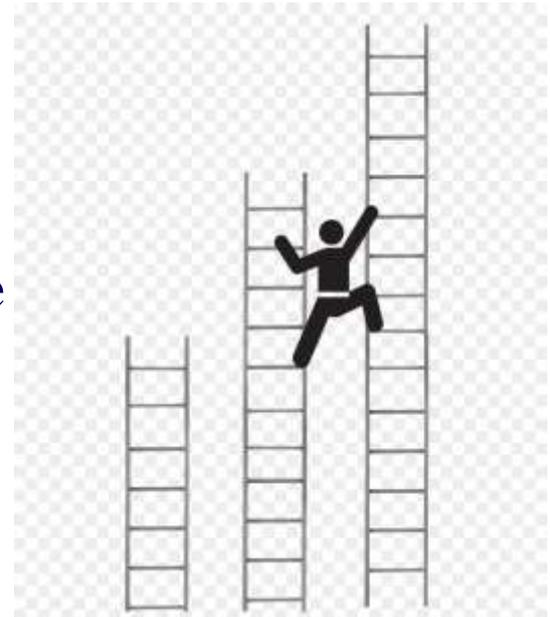


An epistemic ladder for regulatory capture

- Epistemic. Invalidating the inference or the methods
- Institutional. Delegitimising and/or 'colonising' institutions
- Political. Promoting a worldview where the very idea of regulation is undesirable

Science, the endless frontier of regulatory capture

Andrés Schelli ^{a, B}, Dorothy J. Denkel ^{b, *}, Monica Di Fiore ^c, Nina Holland ^d, Martin Pigeon ^e



Credits: <https://www.subpng.com/>

4



Some cases

Pollinators decline, aquaculture and Sámi herders

Some cases

Chemicals pollution, biodiversity and ecosystem services: the case of neonicotinoid insecticides and entomofauna collapse (insectageddon)



Environmental Science & Policy

Volume 142, April 2023, Pages 99-111



Impact assessment culture in the European Union. Time for something new?

Andrea Sattler ^{a, b, *},                   

Late lessons from early warnings:
science, precaution, innovation

Pollinators decline has been a policy
issue for some time now ... see this
2013 report from the European
Environment Agency



ISSN 1725-9177



Decline of pollinators

Insects Opinion

Insectageddon: farming is more catastrophic than climate breakdown

George Monbiot

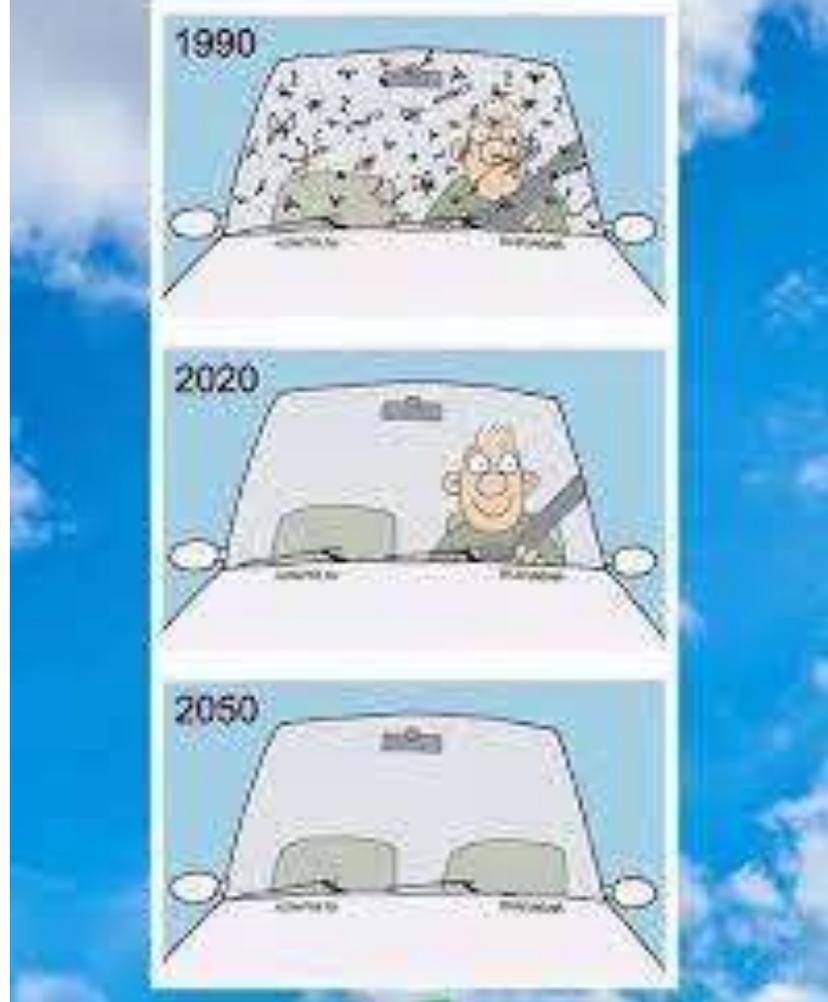
The shocking collapse of insect populations hints at a global ecological meltdown

🐦 @GeorgeMonbiot

Fri 20 Oct 2017 12.11 BST



Windshield effect



Source: <https://jeffreyrubel.substack.com/p/bugs-on-a-windshield>

While the foraging area of bees may extend over up to 9 km away from the honeybees, and the impact of insecticides implies bioaccumulation and hence long term effects, **the prevailing measuring techniques held valid in regulation fail to detect the toxicity of these insecticides**



Colony collapse disorder, source: Wikipedia

Van der Sluijs, Jeroen P., Noa Simon-Delso, Dave Goulson, Laura Maxim, Jean-Marc Bonmatin, and Luc P Belzunces. 2013. "Neonicotinoids, Bee Disorders and the Sustainability of Pollinator Services." *Current Opinion in Environmental Sustainability* 5 (3-4): 293-305.



Robinson, Claire, et al. 2018.
“Ensuring a Higher Level of Protection from Pesticides in Europe: The Problems with Current Pesticide Risk Assessment Procedures in the EU – and Proposed Solutions. A White Paper Prepared for the Coalition Citizens for Science in Pesticide Regulation.”

<https://doi.org/10.5281/ZENODO.2543743>.



The white paper reveals a jungle of conflicts of interests, loopholes, and sloppy regulation in the way pesticides are regulated in the EU

At the level of the narratives, one side insist to a plurality of factors that might explain the decline (including climate change), the other the specific and determinant role of pesticides

The variety of values of seafood production and value chains

Seafood is to a large part traded in long value chains across the globe;

Increased seafood productions → polluting effects or other potential harms (fish diseases, diminishing stocks) → societal value conflicts and intense political debate



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Volume 142, April 2023, Pages 99-111



Impact assessment culture in the European Union. Time for something new?

Andreea Sattelli ^{a, b, c, d, e}, Maria Kac-Czamecka ^{f, g}, Samuele Lo Piano ^{h, i},
Máté János Lőrincz ^{j, k}, Magdalena Olczyk ^{l, m}, Arnald Puy ^{n, o}, Erik Reinert ^{p, q, r},
Stefán Thor Smith ^{s, t, u}, Jeroen P. van der Stuij ^{v, w, x, y, z}

<https://doi.org/10.1016/j.envsci.2023.02.005>

The variety of values of seafood production and value chains

Conflicted scientific evidence produced by different stakeholders as to existing quotas; the issue of illegal or unreported activities

Conflicted evidence in aquaculture and its impact as well – different models/cultures:

- extensive small-scale production units, regulated by strict certification schemes and legal regimes
- intensive large-scale (and GMO based?) production to feed an increasing global population, and to meet expectations of the global markets

The variety of values of seafood production and value chains

An ethical matrix approach

- identify the relevant stakeholders
- identify potentially affected organisms
- Identify ethical principles

Table 1. Ethical matrix for a genetically modified fish species.

Ethical matrix for gm-fish:	Do avoid doing any harm	Do try to do some good	Dignity / autonomy	Justice / fairness
Small producers	Dependencies on nature and corporations	Adequate income and work security	Freedom to adopt or not to adopt	Fair treatment in trade
Consumers	Safe food	Nutritional quality Food security	Respect for consumer choice (labelling)	General affordability of food product
Treated fish	Proper animal welfare	Improved disease resistance	Behavioural freedom	Respect for natural capacities (telos)
Biota	Pollution and strain on natural resources	Increasing sustainability Improved resilience	Maintenance of biodiversity	No additional strain on regional natural resources

Climate, energy, and Sámi herders

Windfarm in indigenous herders' areas?

Loss of habitat, economic predation and legal frameworks “potentially dwarf the putative effects of projected climate change on reindeer pastoralism.” (Tyler, et al. see cit. below)



Source: <https://www.nationalgeographic.com/>



Norwegian wind farms violate rights of Sámi reindeer herders, says court

euro news.

Energy Research & Social Science 122 (2023) 104906

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Original research article

Sámi perspectives on energy justice and wind energy developments in Northern Norway

Aniek Blokzijl^{a,*}, Elisabet Dueholm Rasch^b



Environmental Science & Policy

Volume 142, April 2023, Pages 99–111



Impact assessment culture in the European Union. Time for something new?

Andrea Sathli^{a,*}, J. R. M. Marta Kuc-Czarnicka^a, Samuele Lo Piano^a, Mihai János Lőrincz^a, Magdalena Olczyk^a, Arnold Puy^a, Erik Reinert^a, Stefan Thor Smith^a, Jeroen P. van der Stuij^a

<https://doi.org/10.1016/j.envsci.2023.02.005>

Business Risk and Climate Analytics (next lesson)

Fiedler, Tanya, Andy J. Pitman, Kate Mackenzie, Nick Wood, Christian Jakob, and Sarah E. Perkins-Kirkpatrick. 2021. "Business Risk and the Emergence of Climate Analytics." *Nature Climate Change* 11 (2): 87–94. <https://doi.org/10.1038/s41558-020-00984-6>.

The screenshot shows the top portion of a web page for a journal article. At the top, the journal title "nature climate change" is displayed in a bold, lowercase font. Below this, there are four navigation links: "Explore content", "About the journal", "Publish with us", and "Subscribe", each with a small downward arrow. A blue horizontal line separates this header from the main content area. Below the line, a breadcrumb trail reads "nature > nature climate change > perspectives > article". The article type is identified as "Perspective" with a vertical bar, followed by the publication date "Published: 08 February 2021". The main title of the article, "Business risk and the emergence of climate analytics", is shown in a large, bold, black font. Below the title, the authors are listed as "Tanya Fiedler, Andy J. Pitman", "Kate Mackenzie", "Nick Wood", "Christian Jakob" and "Sarah E. Perkins-Kirkpatrick", with an email icon next to the first two names. At the bottom of the article information, it says "Nature Climate Change 11, 87–94 (2021) | Cite this article". Finally, at the very bottom, there are statistics: "12k Accesses | 83 Citations | 682 Altmetric | Metrics".

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Business risk and the emergence of climate analytics

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5.

Practicum

Exoskeletons

One more case for you:
legislating on
exoskeletons
(20m + 25 discussion)



Source: <https://james-camerons-avatar.fandom.com/>

We are in a near future. An impact assessment should be prepared to support a regulation/directive/communication on a new class of medical devices: exoskeletons. While these exoskeletons can be used for medical purpose to enhance mobility and general functionality for disabled people, recent anecdotal evidence suggest they can be used for mischief by mobsters, burglars, mercenaries.

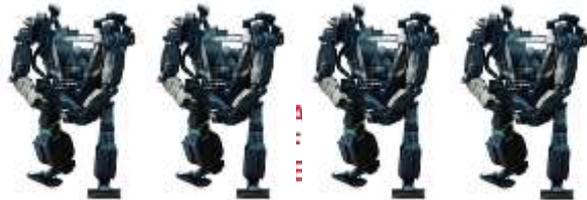
The regulation sets limit on the exoskeletons' power and establishes a system of authorization for users.

The industry claims that the power limitation may endanger the life of their customers (who might need an extra boost of energy in danger situations) and that the system of registration for users will depress demand. Further the machineries' power is an important element of the industry's advertising strategy.

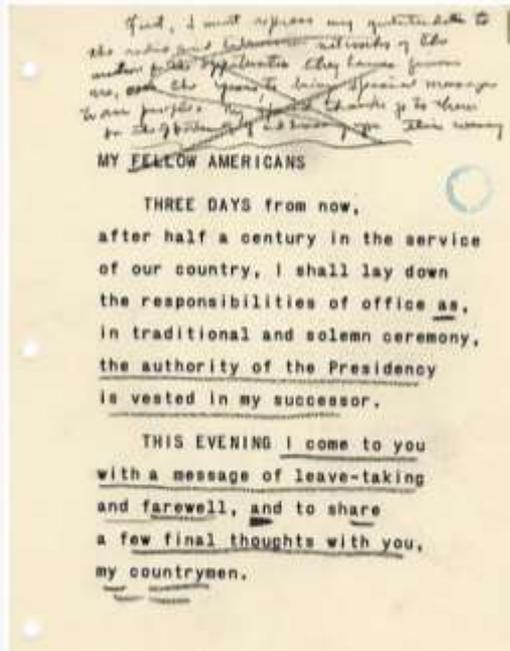
Users (association covering the interests of disabled peoples) want them safe and cheap, and are less sanguine about the regulation system provided is not too burdensome.

Some NGO's complain that these enhancement are as dangerous as weapons, and that as such their use should be discouraged. Other stakeholders observe that they risk becoming fashionable to the point of redefining humanity.

The industry puts forward data showing that indeed this is a very high-innovation field (impressive share of high skill workers in the sector's labour force) and that the market size – puny at present – is quickly growing in importance in several member states. The evidence of improper use is sketchy but very vivid. Some tabloids run scare stories



1. Problem Definition
2. Objective Setting
3. Identification of Policy Options: (including status quo)
4. Analysis of Impacts: (costs and benefits, potential effects on different stakeholder groups)



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You all have read this ... for next lessons: how did Eisenhower's hopes and fears stand the test of times

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Thank you