
# Introduction

## 12th JRC Annual Training on Composite Indicators & Multicriteria Decision Analysis (COIN 2014)

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From Lorenzetti to Leibnitz to our days a journey through indicators and their use, seen from the lenses of different disciplines …from science and technology studies (STS) to semiotics

Modernity versus post modernity

Occupational psychoses and occupational therapies

Facts, extended facts, hybrid objects

# Indicators?

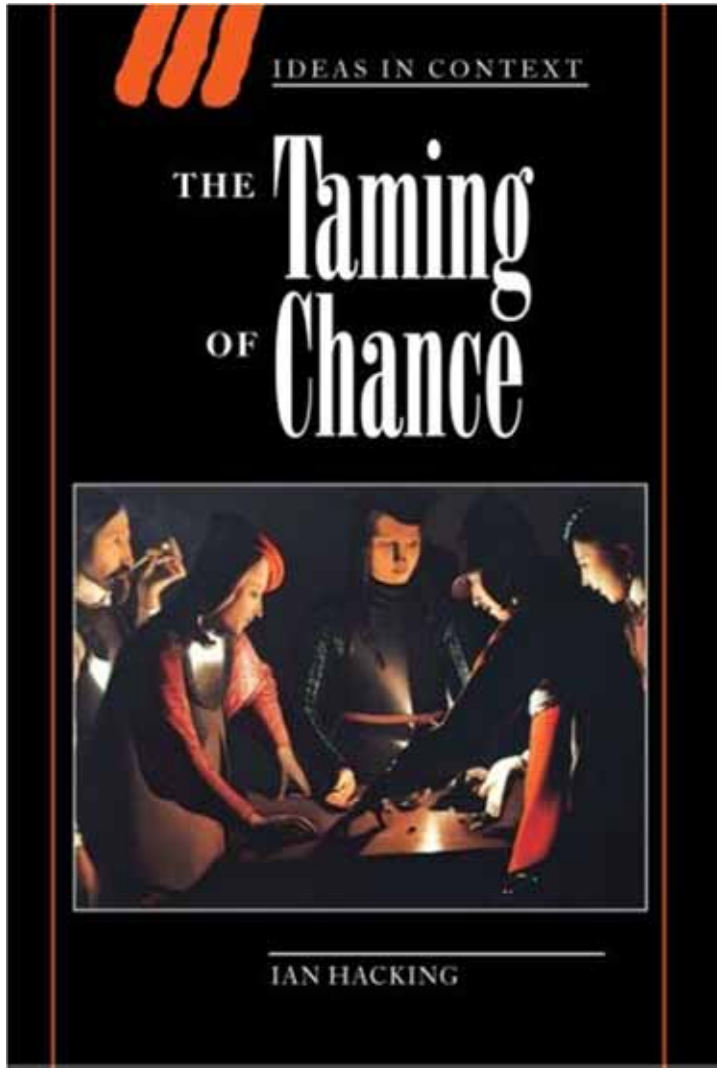

Ambrogio Lorenzetti (c. 1290 – 1348), Allegoria ed Effetti del Buono e del Cattivo Governo, Palazzo Pubblico di Siena, particolare (La Sicurezza)

Ambrogio Lorenzetti (c. 1290 – 1348), Allegoria ed Effetti del Buono e del Cattivo Governo, Palazzo Pubblico di Siena, Effetti del Buon Governo in città

"[…] Lorenzetti is modern because he invites the spectator of his frescoes, […] to assess governments not so much on the political principles and values […] than on the practical consequences of their decisions. The two paintings on the effects of good and bad governance show them were to look, what are the signs, or, in contemporary language, the indicators, to monitor in that respect."

P.-M. Boulanger, www.statistics.gov.hk/wsc/STS023-P3-S.pdf

Studies of history of statistics




Ian Hacking

Leibnitz, 'philosophical godfather of Prussian official statistics' to the Prince Frederik of Prussia 1700; 56 categories to '*measure the power of a state*' (the first scoreboard; e.g. number of marriageable girls, able bodied capable to carry arms, diseases, child mortality… );

Leibnitz's first proposal for a statistical office …

Already in 1745 Jews are being treated as a separate category and counted in Prussian statistics …

According Hacking 'Probability' won an epistemological war between the eighteen and the nineteen century. 'Probability' became king in adjudicating the credibility of evidence. We look at facts mostly through the lenses of statistics

In the previous centuries – up to the enlightenment - chance was equated with superstition.

According to Hacking today's victory of probability is metaphysical (quantum mechanics), epistemological (statistics as a way of knowing things), logical (statistical inference methods) and ethical (no decision taken without statistical evidence), leading to the 'imperialism of probability'…

According Hacking statistics are a defining element of the nascent nation state, and hence of modernity.

Can we say that what official statistics are to modernity composite indicators are to post-modernity?

Official statistics are to the consolidation of the modern nation state (Hacking, 1990), composite indicators are to the emergence of post-modernity, – meaning by this the philosophical critique of the exact science and rational knowledge programme of Descartes and Galileo.

Fast forward some two and a half centuries (after Condorcet) and we discover another jump:

"The role [of statistical indicators] has increased significantly over the last two decades. This reflects improvements in the level of education in the population, increases in the complexity of modern economies and the widespread use of information technology."

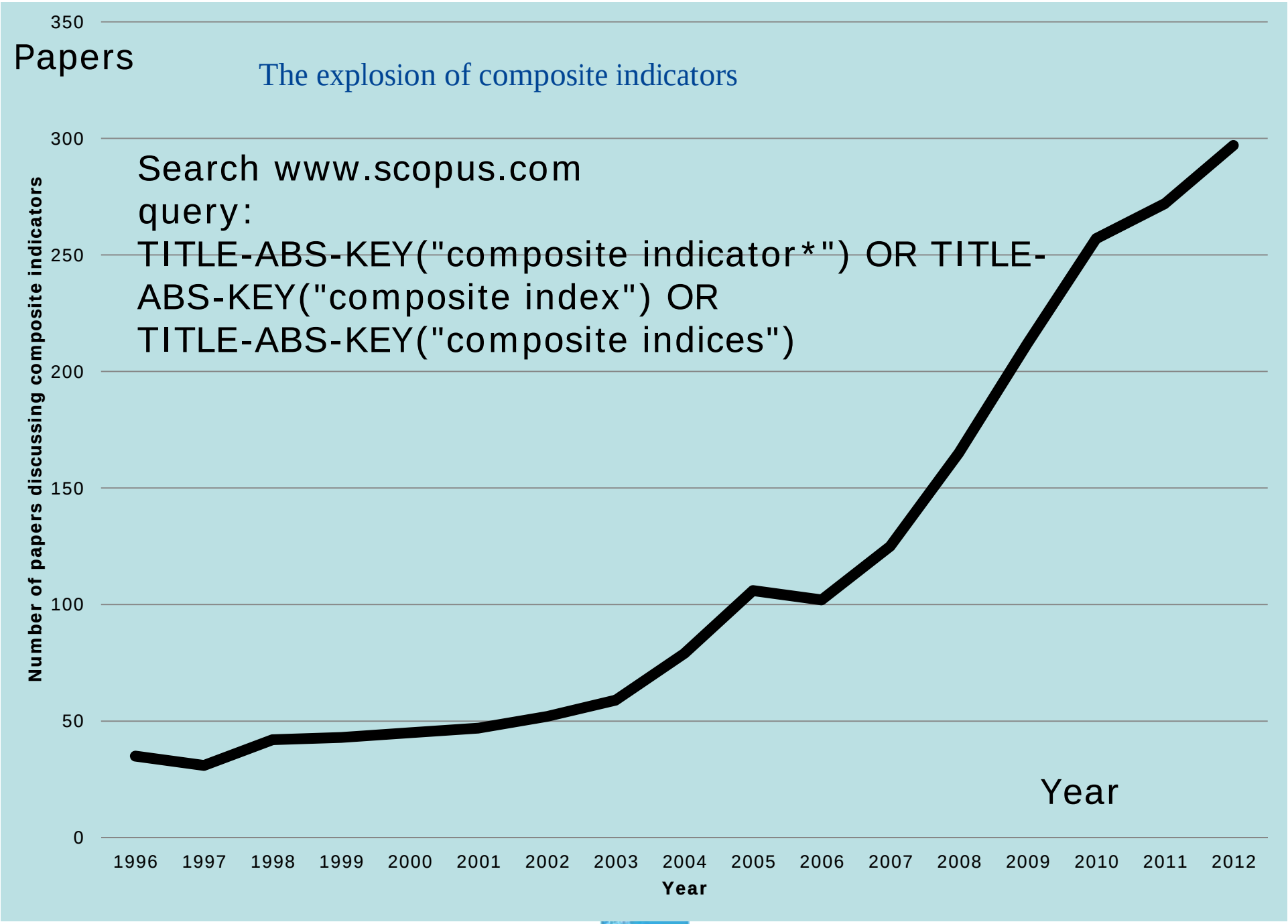
CMEPSP (2009). Commission on the Measurement of Economic Performance and Social Progress, URL: http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf last accessed June 2014.

"In the "information society", access to data, including statistical data, is much easier. More and more people look at statistics to be better informed or to make decisions. To respond to the growing demand for information, the supply of statistics has also increased considerably, covering new domains and phenomena."

CMEPSP Op. cit.

… and composite indicators are part of the picture!

# The explosion of composite indicators



Beside complexity, IT, education, are there other drivers which may have a bearing on the explosion of composite indicators?

- More hybridization of roles, styles
- Changing styles of science's governance
- Issues with trust / quality in the scientific enterprise
- More controversy (wicked issues)

More hybridization of roles, styles

- Different forms of media, of literature, of fora; the emergence of boundary institutions (e.g. at the interface between science and policy), new knowledge producing actors (including a few producing CI's!)

## Hybridization

- "Knowledge production always occurs in political and ideological contexts. However, it must never present itself as such. In order to be legitimate knowledge, it has to be purified of such mundane links. Latour (1993) uses the conceptual pair of hybridisation and purification to describe this process. Purification means a clear separation of nature from society, while hybridization involves mixtures of nature and culture. Latour claims that it is a modern belief that the human and non-human worlds can be separated and exist independent from each other, each in a pure form", Grundmann, 2009.

Latour, B., 1993. We Have Never Been Modern. Cambridge, Harvard UP.

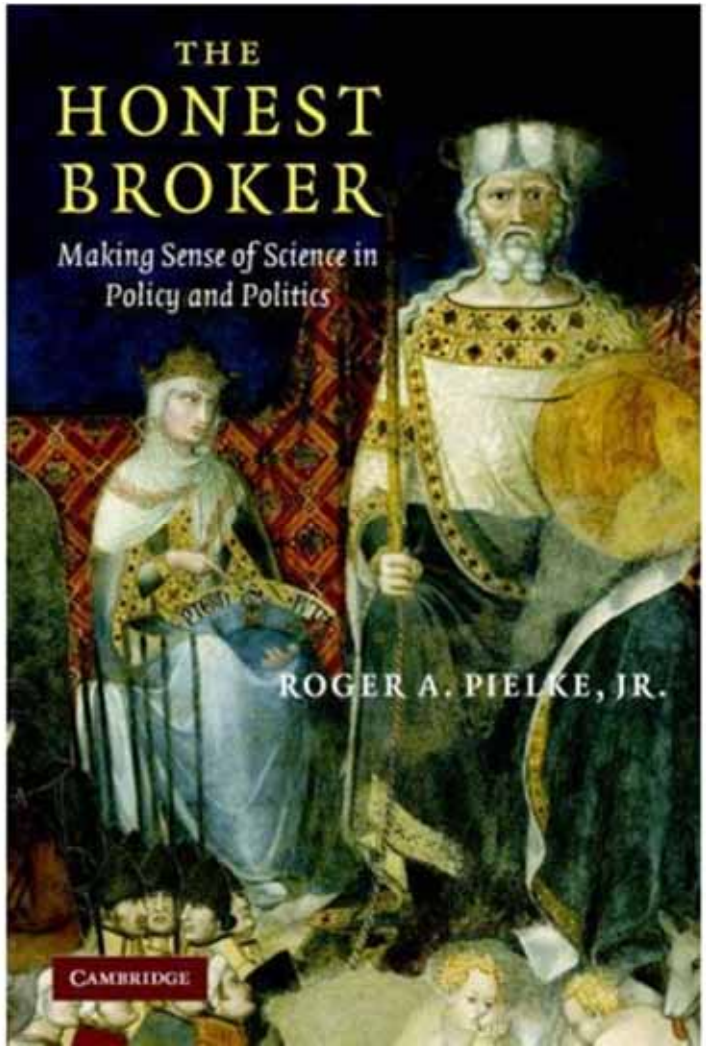
Grundmann, R., 2009, The role of expertise in governance processes, Forest Policy and Economics 11, 398–403

## Hybridization

- "Applied to knowledge production this means that facts (about nature) and values (about we ought to do) are seen as separate in the modern world view but bound up with each other in reality.
- One might suspect that the more knowledge is produced in hybrid arrangements, the more the protagonists will insist on the integrity, even veracity of their findings", Grundmann, 2009.

Grundmann, Op. cit.

The issue of stealth advocacy: The Honest Broker: Making Sense of Science in Policy and Politics, by Roger A. Pielke Jr.




Pielke, R. JR, 2007. The Honest Broker, Cambridge: Cambridge Univ. Press

## Changing styles of science's governance

- The questioning of classic positivistic narratives of prediction and control
- The digital culture; what were once promises, such as quality assurance of policy-relevant science by extended peer review (Funtowicz and Ravetz, 1985; 1990) and co-production of knowledge (Jasanoff, 1996), have today 'materialised'.

Funtowicz S. and Ravetz J. 1990. "Uncertainty and Quality in Science for Policy" Dordrecht, Kluwer Academic Publishers.

Funtowicz, S.O. and Ravetz, J.R. 1985. Three Types of Risk Assessment: A Methodological Analysis. Environmental Impact Assessment, Technology Assessment, and Risk Analysis. NATO ASI Series Volume 4, pp 831-848.

Jasanoff, S. 1996, Beyond Epistemology: Relativism and Engagement in the Politics of Science. Social Studies of Science. 26(2) 393-418.

## Issues with trust / quality in the scientific enterprise

## Issues with trust / quality in the scientific enterprise

- "Science still commands enormous—if sometimes bemused—respect. But its privileged status is founded on the capacity to be right most of the time and to correct its mistakes when it gets things wrong. […] The false trails laid down by shoddy research are an unforgivable barrier to understanding"

The Economist

The Economist, October 19, 2013, How Science goes wrong, p. 11.

## Issues with trust / quality in the scientific enterprise

- Non-reproducibility tsunami …
- Laboratory experiments cannot be trusted without independent verification (Sanderson 2013), rules are proposed to spot "suspected work […in] the majority of preclinical cancer papers in top tier journals" (Begley 2013).

Begley CG 2013 Reproducibility: Six red flags for suspect work Nature 497 433–434.

Ioannidis J P A 2005 Why Most Published Research Findings Are False PLoS Medicine 2(8) 696-701.

Sanderson K 2013 Bloggers put chemical reactions through the replication mill Nature 21 January 2013.

## Issues with trust / quality in the scientific enterprise

- A Meta-Research Innovation Centre launched at Stanford (METRICS) to combat 'bad science'.


The Economist, 2013, March 15, Combating bad science Metaphysicians. Sloppy researchers beware. A new institute has you in its sights

## Issues with trust / quality in the scientific enterprise

- The centrality of ethics for the health of the scientific enterprise is well described by Ravetz (1971).

"Two separate factors are necessary for the achievement of worthwhile scientific results: a community of scholars with shared knowledge of the standards of quality appropriate for their work and a shared commitment to enforce those standards by the informal sanctions the community possesses; and individuals whose personal integrity sets standards at least high as those required by their community.

Jerome R. Ravetz

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

## Issues with trust / quality in the scientific enterprise

- Science degenerates when it becomes a commodity for Lyotard (1979) and Mirowski (2011).

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.

Jean-François Lyotard

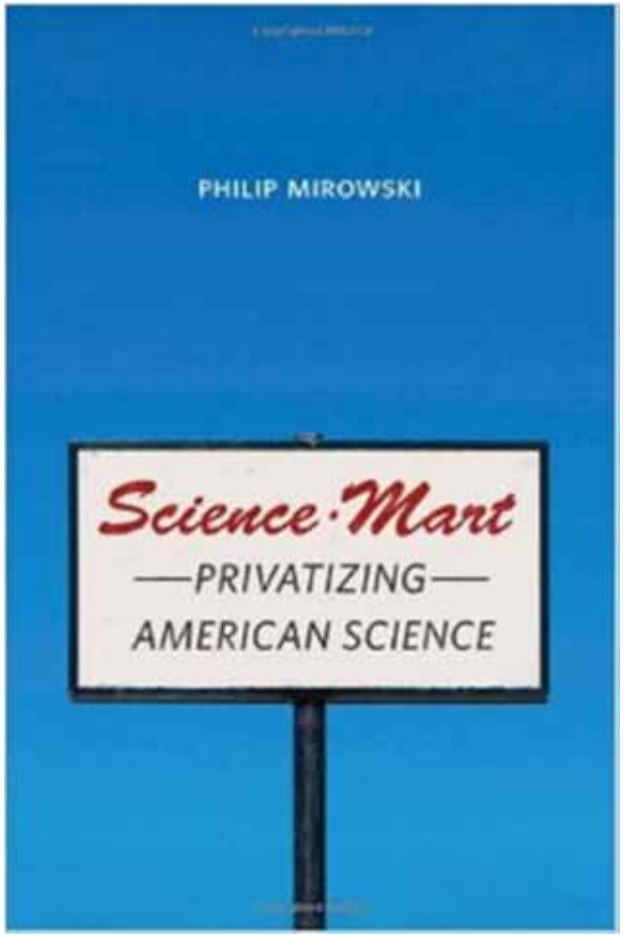
Philip Mirowski

## Issues with trust / quality in the scientific enterprise

- Mirowski's take on science's lost innocence:

After the eighties neoliberal ideologies succeeded in decreasing state intervention in the funding of science, which became increasingly privatized...

…Knowledge as a monetized commodity replaces knowledge as public good...



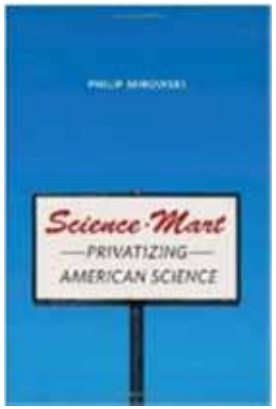
## Issues with trust / quality in the scientific enterprise

- Mirowski's take on science's lost innocence:

…In house science labs of major corporation were closed and research outsourced to universities which …

… became more and more looking as corporations…

… then research ended up outsourced again to contract-based private organizations……➔




## More controversy - wicked issues

- Policy files are all controversial … and controversy is pervasive, from GMO to climate, from bees and pesticides to shale gas fracking, from the cooling liquid of Mercedes-Benz to endocrine disruptors and badger culling …

## More controversy - wicked issues

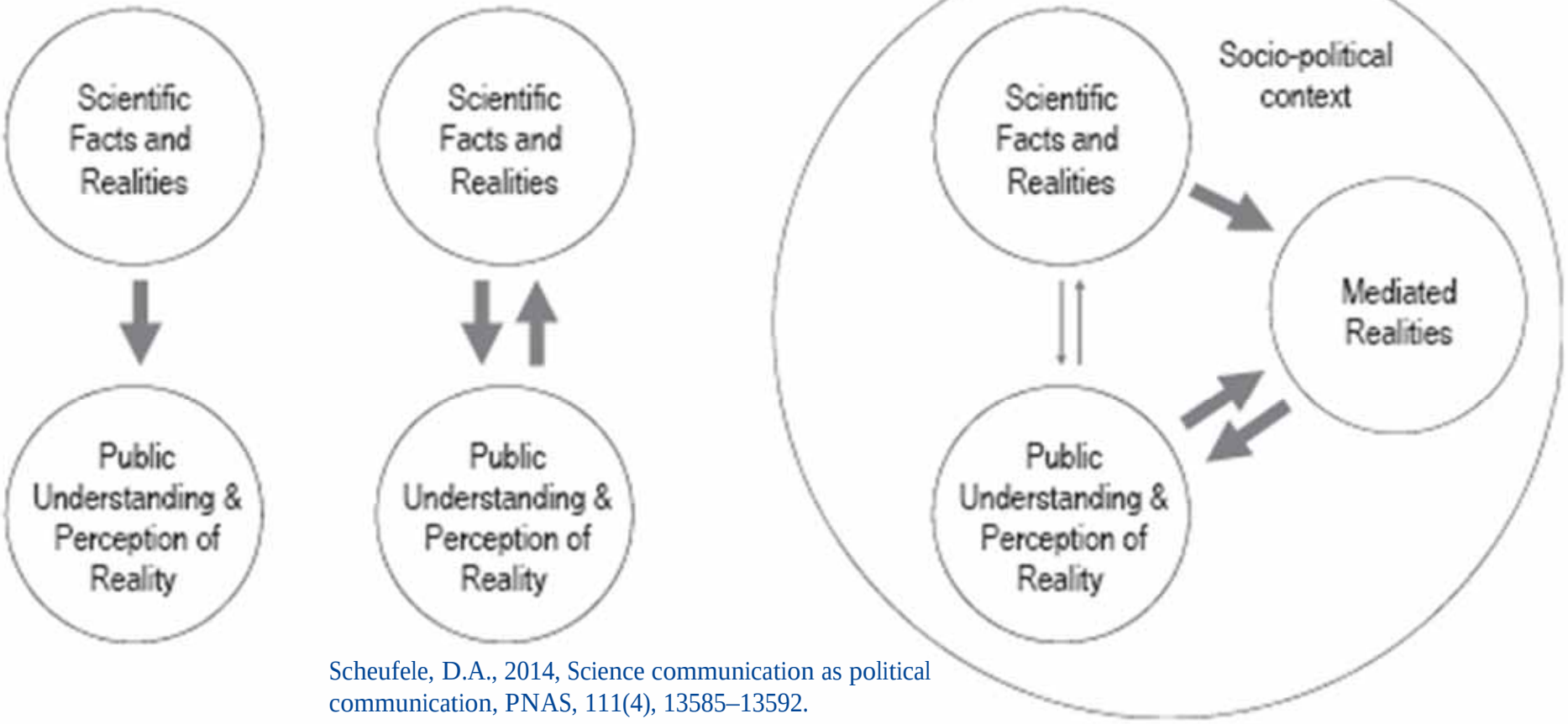
- More and more issues become ‘wicked’ , meaning by this deeply entangled in a web of hardly separable facts, interests and values…
- ‘Medialization’, agenda setting strategies (Scheufele, 2014)


Scheufele, D.A., 2014, Science communication as political communication, PNAS, 111(4), 13585–13592.

MODEL 1:
Knowledge Deficit

MODEL 2:
Public Engagement
with Science

MODEL 3:
Science Communication
as Political Communication




Scheufele, D.A., 2014, Science communication as political communication, PNAS, 111(4), 13585–13592.

Wrapping up on drivers which may have a bearing on the explosion of composite indicators:

- More hybridization of roles, styles ➔ CI as boundary objects, between analysis and advocacy
- Changing styles of science's governance ➔ More actors with a voice

Wrapping up on drivers which may have a bearing on the explosion of composite indicators:

- Issues with trust / quality in the scientific enterprise ➔ Do it yourself movements
- More controversy (wicked issues) ➔ More 'weapons' developed

A commercial:

Some more reading for JRC colleagues.

Of styles and methods
A quest for JRC's identity
at times of change

*Ângela Guimarães Pereira and Andrea Saltelli*

EUR report, September 2014

## Statistics for policy: three models

A rational-positivist model for the use of indicators and policy (good quality statistics underpin good policies)

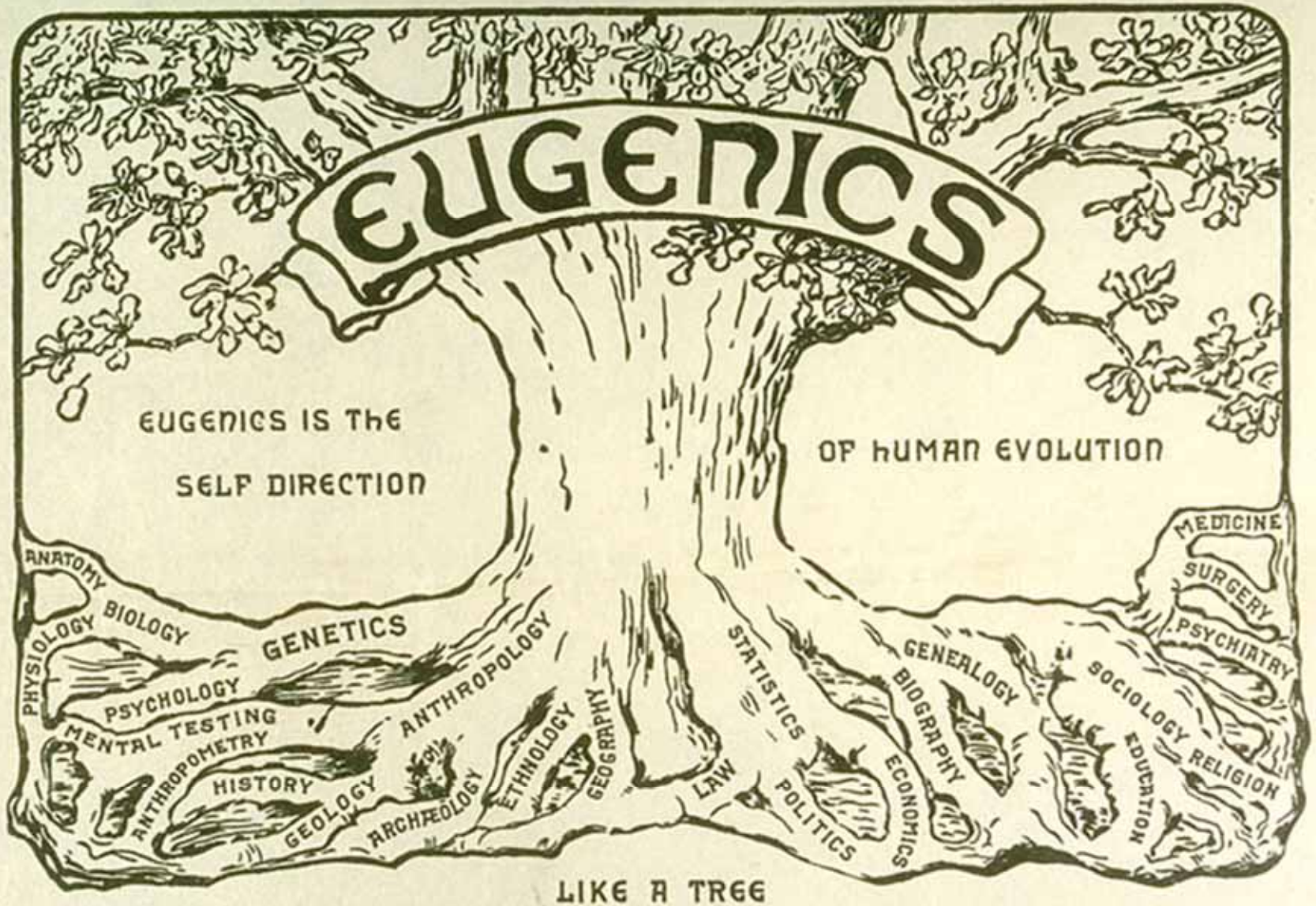
A Discursive-interpretive model (statistics contribute to a process of framing of and focusing on an issue among the many competing for public's attention)

A Strategic model (statistics is used by parties competing for a given constituency).

Boulanger, P-M., Political uses of social indicators: overview and application to sustainable development indicators. International Journal of Sustainable Development, 10 (1,2):14-32, 2007.

… Which leads to a question relevant to JRC:

- It is possible to disentangle evidence based policy from policy based evidence?

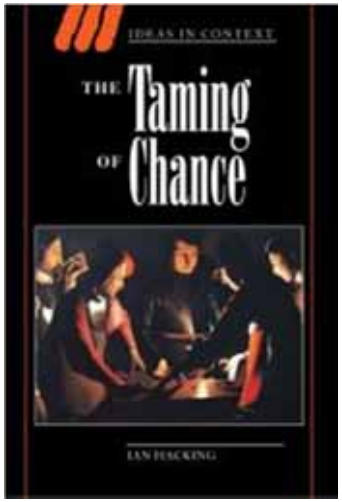


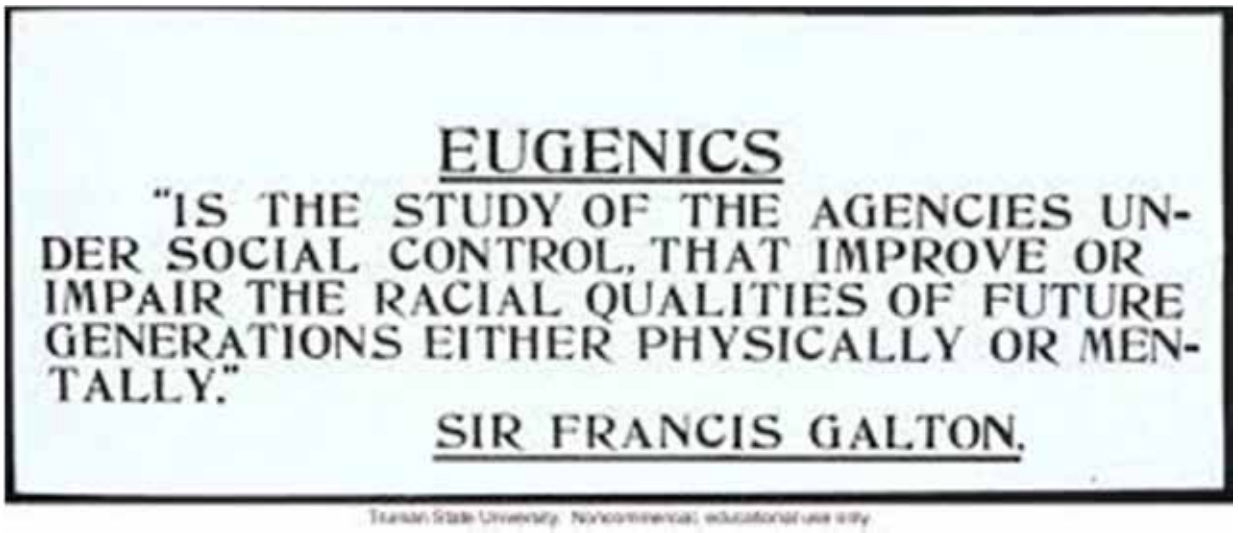

LIKE A TREE

EUGENICS DRAWS ITS MATERIALS FROM MANY SOURCES AND ORGANIZES THEM INTO AN HARMONIOUS ENTITY.

Some sins of statistics …

Francis Galton and Karl Pearson (the one of chi-squared) and their laboratory of biometrics … distinguishing army officers from private soldiers from criminals convicted of murder from non-violent felons from Jews …

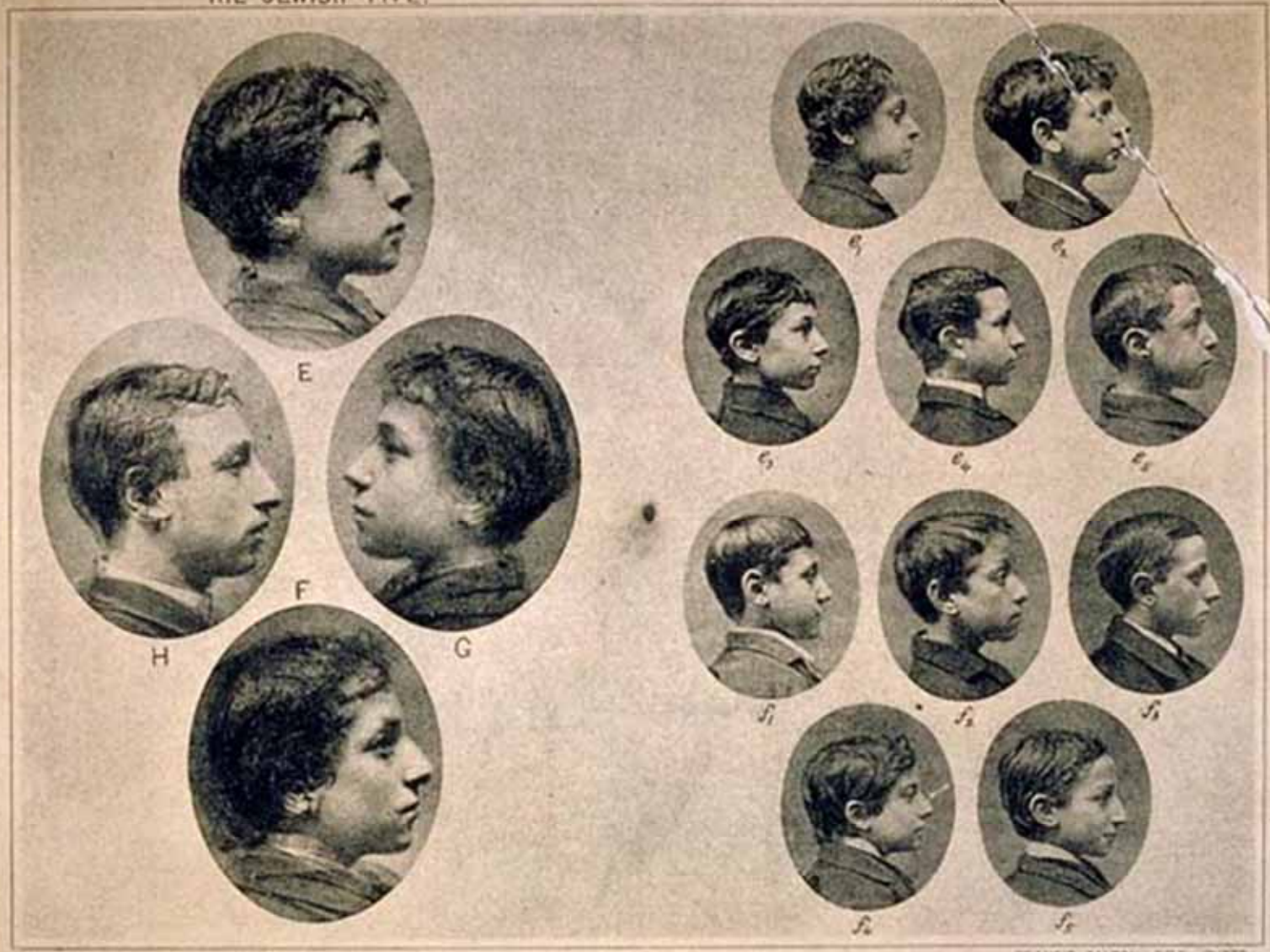


SUPPLEMENT TO "THE PHOTOGRAPHIC NEWS" 17TH APRIL 1885.

THE JEWISH TYPE.

Profile.




FRANCIS GALTON, F.R.S. PHOTO.

COMPOSITES.

Components.

ILLUSTRATIONS OF COMPOSITE PORTRAITURE.

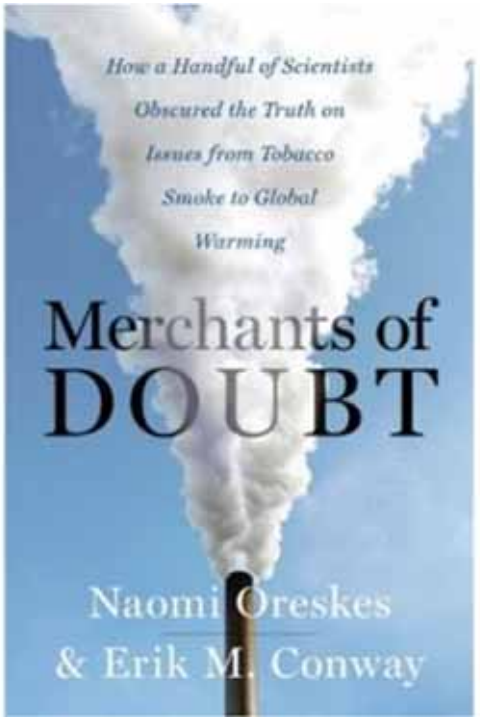
Coming closer to our times, the story of the first R&D Statistics ever. Benoît Godin (2010) tells us what these researchers thought: Measuring the numbers of sons and daughters of scientists will tell us whether a society degenerates toward stupidity.


Godin, B., From Science to Innovation, INRS, Montreal, Canada, Communication presented to the Government-University-Industry Research Roundtable (GUIRR) US National Academy of Sciences, Washington, May 21, 2010.

… but many other data based stories as well: Tobacco & health, capital punishment & crime rate …

Oreskes, N., Conway E. M., 2010, Merchants of Doubt, Bloomsbury Press

Leamer, E. E., Tantalus on the Road to Asymptopia, 2010, Journal of Economic Perspectives, 24, (2), 31–46.




Erik Conway

Naomi Oreskes

All this to say that in fact you cannot separate evidence based policy from policy based evidence.

Why is this story of evidence based policy so important?

## Chapter 2, Le probleme: La legitimation

'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.'

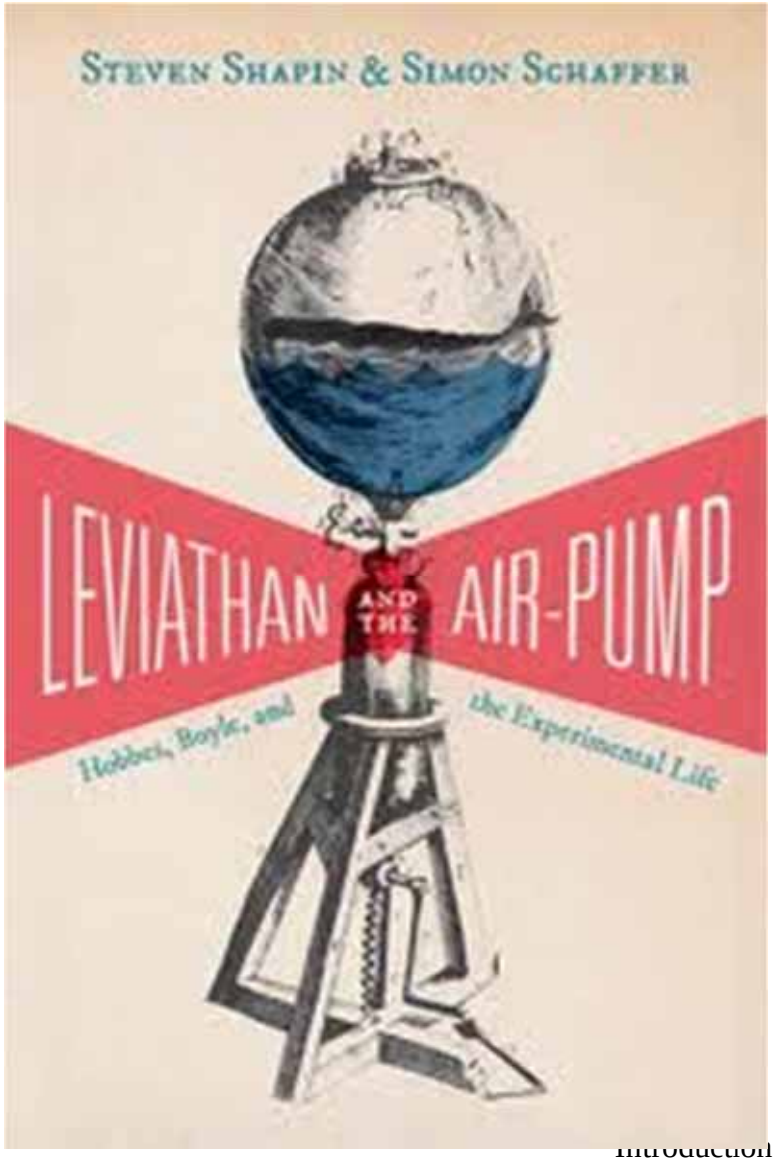
Jean-François Lyotard

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

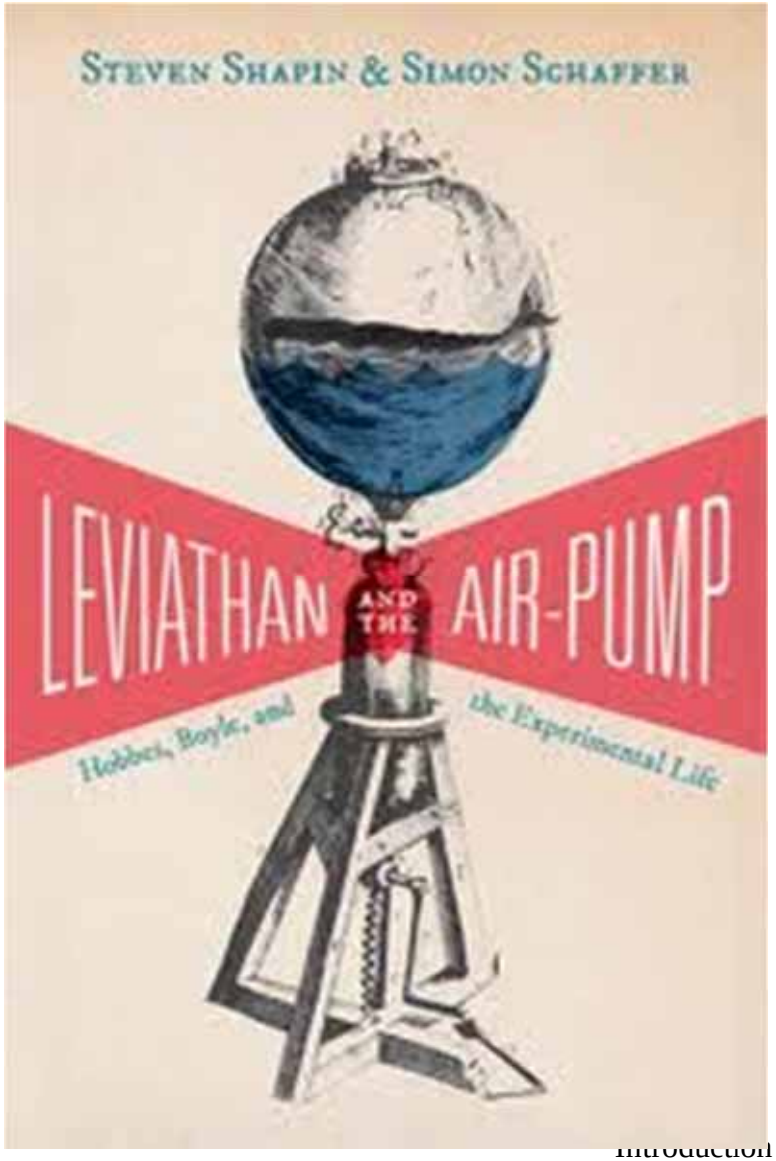
‘Solutions to the problem of knowledge are solutions to the problem of social order.

[…] 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

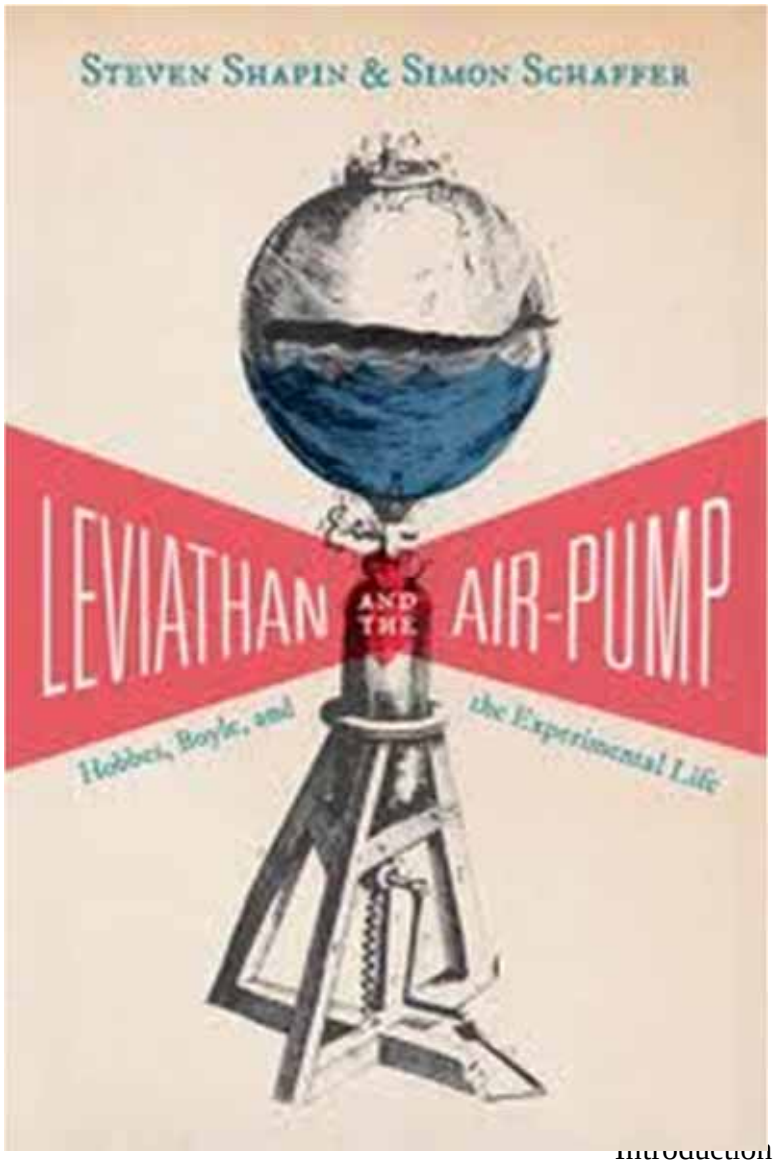


Shapin and Schaffer discusses how establishing 'matter of facts' under controlled 'laboratory' experiments before witnesses, was a way to subtract the discourse about knowledge from religious squabbles …



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



Why is this story of evidence based policy so important?

Because it an oxymoron?
Because everybody says it is in fact the opposite (policy based evidence)
that which takes place?

Why is this story of evidence based policy so important?

"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.

➔ Take home point: use the expression 'evidence based policy ' parsimoniously and with 'qualifiers'

Kay, J., 2014, The wisest choices depend on instinct and careful analyses, Financial Times, September 2.

Relevance of all this to composite indicators? Common critiques of CI include:

- Composite indicators as 'mashup indices', Ravallion (2010)
- If only 'arbitrary weights' could be replaced with 'exact' (shadow) prices …
- There can be as many indices of sustainability as there are normative definitions of what we want to sustain, CMEPSP, (2009)…
- All too easy to manipulate!

Ravallion M. (2010). "Mashup Indices of Development". Policy Research Working Paper 5432, The World Bank.

CMEPSP (2009). Commission on the Measurement of Economic Performance and Social Progress, URL: http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf last accessed June 2014.

To some observers CI are soft just because a set of pure and hard data corresponding to objective 'facts' has been contaminated by subjective weights.

Whatever the shortcomings of CI (and there are many) the neutrality of data as image of facts needs to be questioned.

"Objects of scientific knowledge are intellectually constructed classes rather than 'things themselves' ", Ravetz, 1971, Chapter 4.

"No set of data can be 'perfect' as a report of properties of the objects of investigation, nor can it be independent of the plans and expectations for the later stages of the work", Ravetz, 1971, p. 81.

Jerome R. Ravetz

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

Composite indicators are cherished by the media and the public … an example where demographic and GDP data are given in the same breath with composite indicators … equal dignity?

THE 1.3m people of Mauritius love to prove famous people wrong. On independence from Britain in 1968, pundits such as a Nobel prize-winning economist, James Meade, and a novelist, V.S. Naipaul, did not give much of a chance to this tiny, isolated Indian Ocean island 1,800km (1,100 miles) off the coast of east Africa. Its people depended on a sugar economy and enjoyed a GDP per person of only $200. Yet the island now boasts a GDP per person of $7,000, and very few of its people live in absolute poverty. It once again ranks first in the latest annual Mo Ibrahim index, which measures governance in Africa. And it bagged 24th spot in the World Bank's global ranking for ease of doing business—the only African country in the top 30, ahead of countries such as Germany and France. How does it pull it off?

Economist October 16, 2008

Composite indicators may be instrumental to the creation of a new public.

The though of Charles Sanders Peirce and John Dewey following the work Paul Marie Boulanger (acknowledgments!).

Indicators as 'signs'.

Paul-Marie Boulanger

Paul-Marie Boulanger, P.M., 2014, Elements for a comprehensive assessment of public indicators, JRC Scientific and Policy Report EUR.

Charles Sanders Peirce is the founding father "semiotics".

A triadic conception of the sign as structure connecting three elements: the sign properly said (S), an object (O) and an "interpretant"(I). But an example is needed …

Charles Sanders Peirce

Meet the African vervet monkey
(*Cercopithecus aethiops*)

"This monkey possess a sophisticated repertory of vocal signs for signaling the presence of a predator [distinguishing a] terrestrial stalking one such as a leopard, an aerial raptor such as an eagle or a ground predator such as a snake."

Boulanger Op.cit.

Sign ↔ Cry

Object ↔ Predator

Interpretant ↔ Behaviour

Focus now on 'object'. In complex societies 'objects' may need to be discovered.

According to John Dewey societies learn about their problems via a process of 'social discovery'.

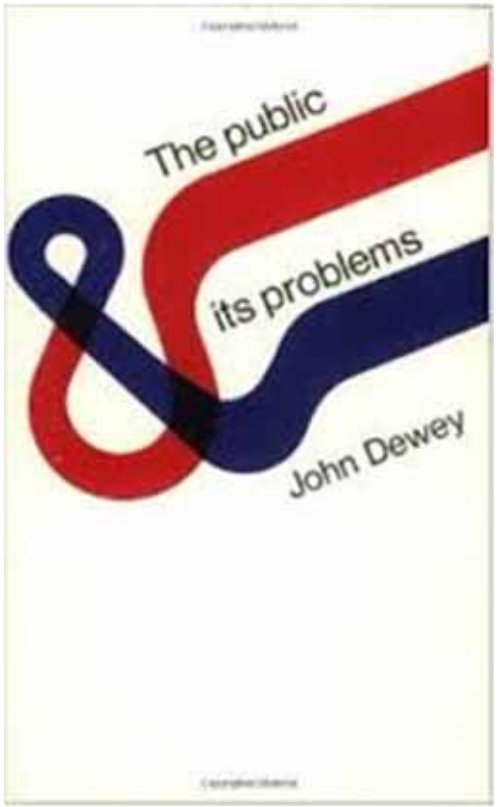
John Dewey

Why are 'social discoveries' needed?

1927: Because there are 'publics' affected by transaction taking place somewhere else.

"[…] machine age has so enormously expanded, multiplied, intensified and complicated the scope of the indirect consequences […] that the resultant public cannot identify and distinguish itself."

Dewey, J., 1938. The Public and its Problems, Read Book Ltd. Edition, 2013.




"When writing "The public and its problem" Dewey was taking stance with Walter Lippmann, [who believed that] the citizens had become only spectators of a political game they were not able to play [because] they could not get informed of the relevant facts."

Boulanger, Op. cit.

'Stereotypes versus frames'.

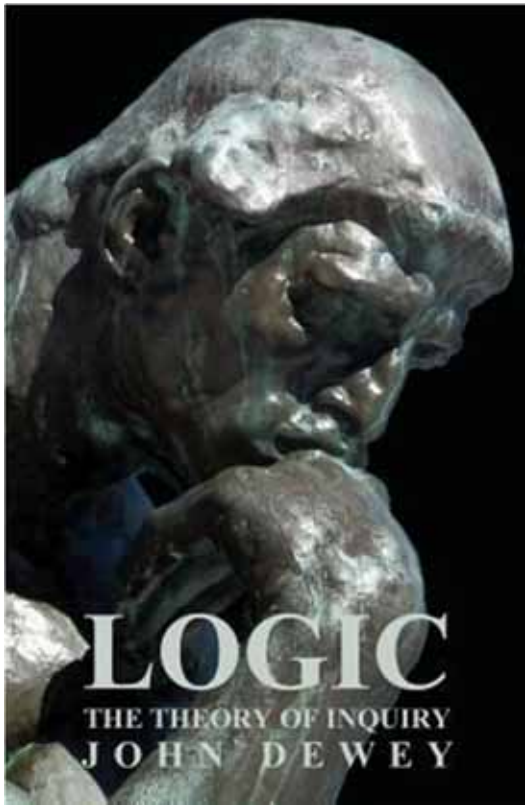
Why are 'social discoveries' needed?

1938: Because there are 'issues' or troubles which are amenable to a scientific solution'.

"In social inquiry, genuine problems are set only by actual situations which are themselves conflicting and confused."

"[A problem is worth of a social inquiry if] it is related to some hypothesis, which is a plan and policy for existential resolution of the conflicting social situation."

Dewey, J., 1938. Logic: The Theory of Inquiry, Swallow Press, 1954.




Rationality descends from experience (pragmatism) ←

Thus we now go beyond 'dealing with externalities'. Social inquiry, one such as a composite indicator may help bringing about, concerns frames and scenarios over a wider horizon.

Dewey was also aware that in addressing these inquiries experts fall victim of 'occupational psychoses'.

- Sociologists will privilege the context where the agent originated the 'trouble' , psychologists the purpose of the agent, the engineer the how the agent made it.
- Although these framings are far from neutral Dewey maintains that 'experts' must remain separated from political decision.

How about the experts? For Dewey:

"Inquiry, indeed, is a work which devolves upon experts. But their expertness is not shown in framing and executing policies, but in discovering and making known the facts upon which the former depend ..."

Today we would call this a 'demarcation model' of science's input to policy.

‘Demarcation model’ of science’s input to policy.

- Protecting science from the political interference…
- Possible abuse of science...
- Scientific information driven by agendas...
- A clear demarcation between the institutions (and individuals) who provide the science, and those where it is used, is needed.

Funtowicz, S. 2006. What is Knowledge Assessment? In Guimarães Pereira, Â., Guedes Vaz, S. and Tognetti, S. (eds) Interfaces between Science and Society. Greenleaf Publishers, Sheffield.

Silvio Funtowicz

On demarcation:

"the incoming commission must find better ways of separating evidence-gathering processes from the 'political imperative' ", A. Glover, former Chief Science Adviser of President Barroso (Wildson, 2014).

Anne Glover

Wilsdon, J. 2014. Evidence-based Union? A new alliance for science advice in Europe. In The Guardian. Available at: http://www.theguardian.com/science/political-science/2014/jun/23/evidence-based-union-a-new-alliance-for-science-advice-in-europe.

The demarcation model is challenged in modern epistemologies, mostly based on the impossibility to achieve separation between facts and values. Alternatives are offered by 'Post Normal Science' (Funtowicz and Ravetz, 1991, 1992, 1993) and by the 'Co-production of knowledge' (Jasanoff, 1996) models.

Funtowicz, S. O., & Ravetz, J. R., 1991. A new scientific methodology for global environmental issues. In R. Costanza (Ed.), Ecological economics: The science and management of sustainability (pp. 137–152). New York, NY: Columbia University Press.

Funtowicz, S. O., & Ravetz, J. R. 1992. Three types of risk assessment and the emergence of postnormal science. In S. Krimsky & D. Golding (Eds.), Social theories of risk (pp. 251–273). Westport, CT: Greenwood.

Funtowicz, S. O. & Ravetz, J. R. 1993. Science for the post-normal age. Futures, 25(7), 739–755.

Jasanoff, S. 1996, Beyond Epistemology: Relativism and Engagement in the Politics of Science. Social Studies of Science. 26(2) 393-418.

An alternative: the Model of Extended Participation from PNS:

- The ideal of rigorous scientific demonstration is replaced by that of open public dialogue…
- "Science" is but one among a plurality of 'relevant knowledges'…
- Citizens become both critics and creators (public engagement, coproduction…)
- Facts become 'extended facts' …

In a composite indicators setting this implies that the 'issue' is co-produced in a context where a plurality of norms are brought to bear …

In this context weights are no longer a nuisance but the raw material for a negotiation process …

Another feature of PNS which makes it particularly suited to the construction of composite indicators is that in PNS quality can become the new organizing principle which "enables us to manage the irreducible uncertainties and ethical complexities" (Funtowicz and Ravetz, 1994).

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.

To understand the full scope of the model of extended participation for science's input to policy this should be contrasted with the prevailing wisdom, which is the positivistic model of prediction and control where '*science speaks truth to power*' (Wildavsky, 1979), where the problem are the citizens with their limited understanding of scientific subject

➔ Deficit model; Public understanding of science (PUS).

Wildavsky, A., 1979, Speaking Truth to Power: The Art and Craft of Policy Analysis, Boston Little, Brown and Company.

"[…] in a democracy local populations not only will, but also should, use the sciences in ways most suitable to them. The objections that citizens do not have the expertise to judge scientific matters overlooks that important problems often lie across the boundaries of various sciences so that scientists within these sciences don't have the needed expertise either."

Feyerabend, P. (1975, 2010) Against Method,

Verso publisher, London.


Paul Feyerabend

"Moreover doubtful cases always produce experts from one side, experts for the other side, and experts in between. But the competence of the general public could be vastly improved by an education that exposes expert fallibility instead of acting as if it did not exist."

Feyerabend, Op. cit.

## Expertise and responsibility

- Experts as stakeholders among many, with their occupational psychoses.
- Example: most analyses offered as input to policy are framed as cost benefit analysis (monetization, the occupational psychosis of economists) or risk analyses.
- Techniques (such as CBA) is never neutral; according to Winner (1986) ecologists should not fall into the trap of CBA.
- Some CBA amount to little more than occupational therapies!

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.

Frames:

- Frames are never neutral. The example of car accident statistics framed with a focus on the driver and not on the car, or the road.

- "the statistics on road accidents [give] details about the driver (age, gender, speed, alcohol or drugs intake, etc.) but none about the vehicle (age, make and model) or about the road where the accident took place. In other words, the institutions put the emphasis on the "agent-act ratio" excluding implicitly the importance of others elements of the drama such as the scene (road and traffic) and the agency (hazardousness of the vehicle)", Boulanger, 2014.

Boulanger, Op. cit., quoting Gusfield, J. (1981). The Culture of Public Problems. Drinking-Driving and the Symbolic Order. Chicago : The University of Chicago Press.

Frames:

- GMO presented as a food scare. The Economist, discussing the introduction of a GMO labelling scheme in Vermont (US): "Montpelier is America's only McDonald's-free state capital. A fitting place, then, for a law designed to satisfy the unfounded fears of foodies […] genetically modified crops, declared safe by the scientific establishment, but reviled as Frankenfoods by the Subarus-and-sandals set", (The Economist, 2014).

The Economist, Vermont v science, The little state that could kneecap the biotech industry, May 10th 2014

Questions about GMO deemed relevant by citizens (Marris, 2001)

- Why do we need GMOs? What are the benefits?
- Who will benefit from their use?
- Who decided that they should be developed and how?
- Why were we not better informed about their use in our food, before their arrival on the market?
- Why are we not given an effective choice about whether or not to buy and consume these products?
- Do regulatory authorities have sufficient powers and resources to effectively counter-balance large companies who wish to develop these products?

Marris, C., Wynne, B., Simmons P., and Weldon, S. 2001. Final Report of the PABE research project funded by the Commission of European Communities, Contract number: FAIR CT98-3844 (DG12 - SSMI), December 2001.

Thus, as exemplified by the case of GMO, a risk analysis is performed to demonstrate the safety of a new technology after the technology has been introduced. According to Langdon Winner (1986, p. 138-163) citizens should instead question the broader power, policy and profit implications of that introduction.

Winner, L. Op. cit.

Some example of composite indicators as a tool for analysis, which retain the multi-dimensional nature of an issue (unlike monetization), facilitate discovery, offer an interpretant …

Comparative Analysis of Alcohol Control Policies in 30 Countries

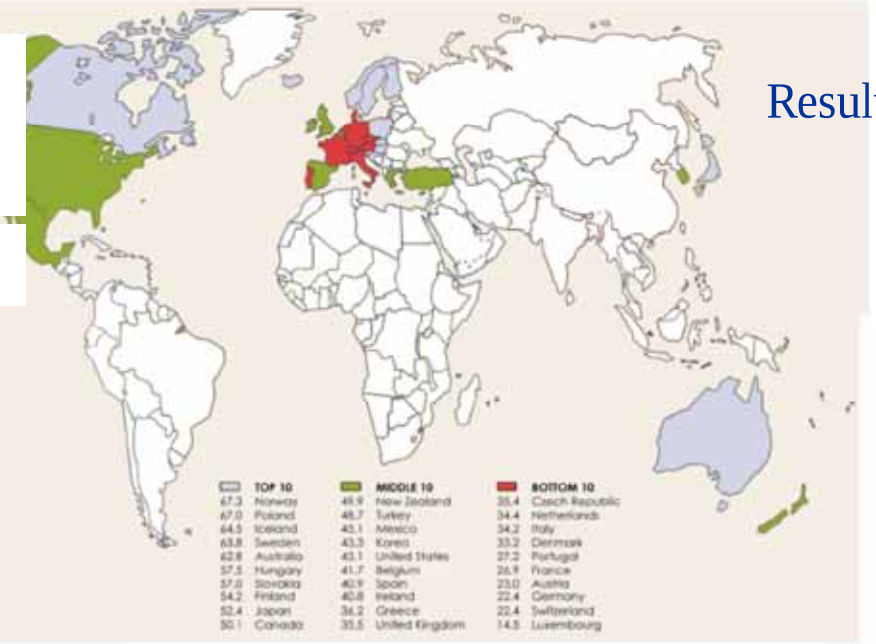
Concept:
(WHO report)

| Domains | Ratings | Topics | Policies |
|---|---|---|---|
| ical availability (32 points) | ☆☆☆ | Legal alcohol purchase age (y) | 16, 17, 18, 19, 20+ |
| | ☆☆☆ | Alcohol server liability for damages caused by actions of patrons | No, Yes |
| | ☆☆ | Restrictions on types of alcoholic beverages sold in retail stores | None; Partial government monopoly; Full government monopoly |
| | ☆☆ | Restrictions on density of stores selling alcoholic beverages in a given locale | None; On wine only; On wine and spirits; On wine, spirits, and beer |
| | ☆☆ | Restrictions on business hours for selling alcohol | None; On hours or days; On both hours and days |
| Drinking context (8 points) | ☆☆ | Community mobilization programs to increase public awareness of, and prevent alcohol problems | No, Yes |
| | ☆ | Mandatory training of alcohol servers to prevent and manage aggression | No, Yes |
| Alcohol prices[a] (24 points) | ☆☆☆ | Beer price index | 0–0.29, 0.30–0.59, 0.60–0.89, 0.90+ |
| | ☆☆☆ | Wine price index | 0–0.9, 1.0–1.9, 2.0–2.9, 3.0+ |
| | ☆☆☆ | Spirit price index | 0–2.9, 3.0–5.9, 6.0–8.9, 9.0+ |
| Alcohol advertising (3 points) | ☆ | Number of different media (print, broadcast, billboards) with advertising restrictions | 0, 1, 2, 3 |
| Motor vehicles (34 points) | ☆☆☆ | Random breath testing | None,[b] Rare, Occasional, Often, Very often |
| | ☆☆☆ | Legal blood alcohol limit—adult (mg/dl) | 0.08+, 0.03–0.07, 0–0.02 |
| | ☆☆☆ | Legal blood alcohol limit—youth (mg/dl) | 0.04+, 0.02–0.03, 0–0.01 |
| | ☆☆ | Mandatory penalty for exceeding legal limit | Fine, License suspension |
| | ☆☆ | Graduated licensing for young drivers | No, Yes |

Published in

PLoSMedicine

Results

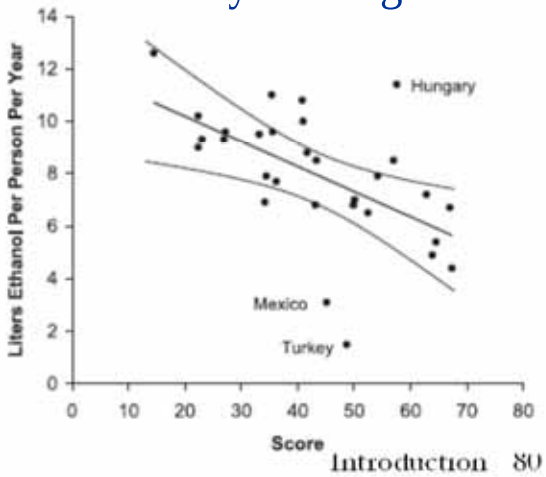


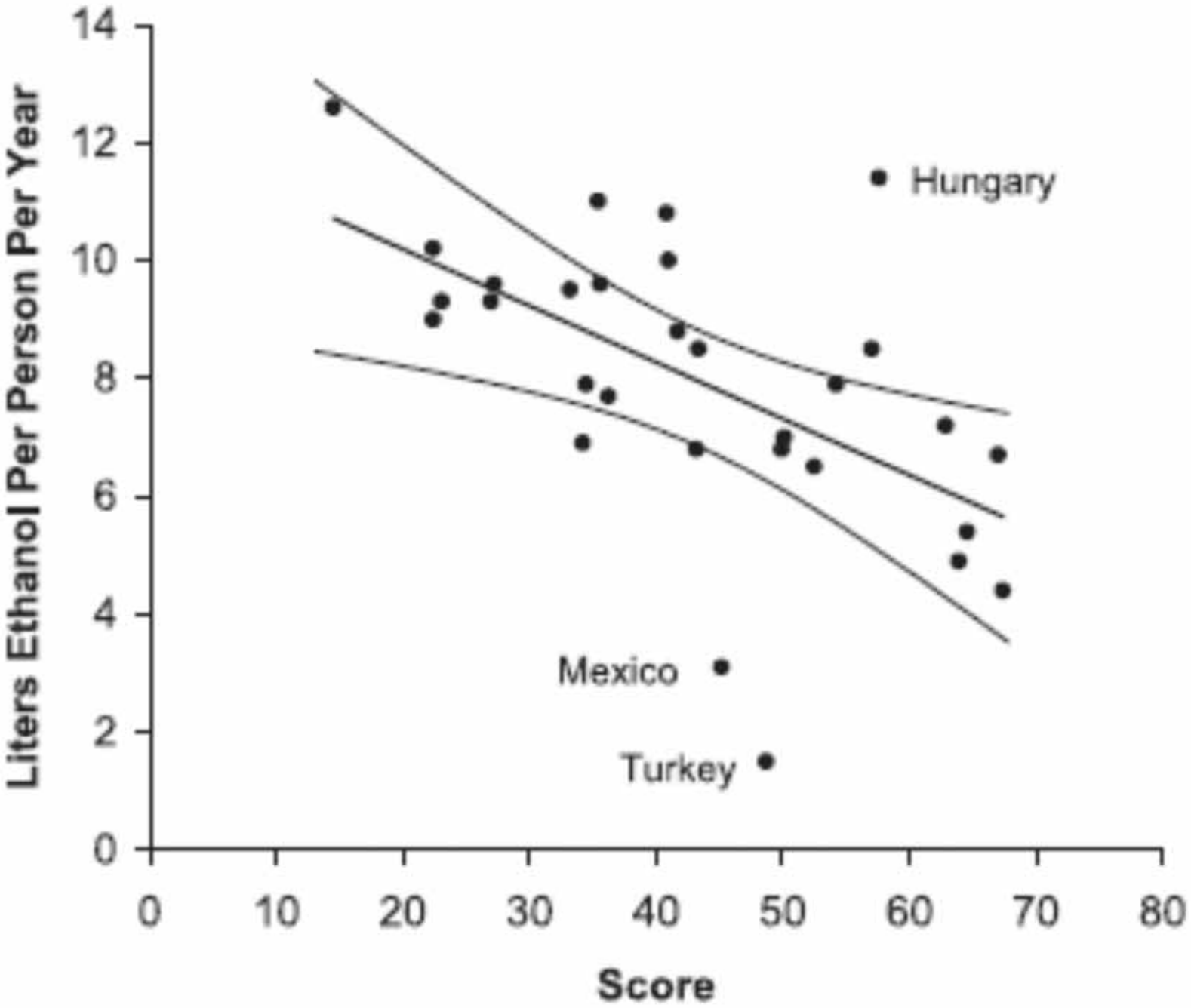

Sensitivity analysis

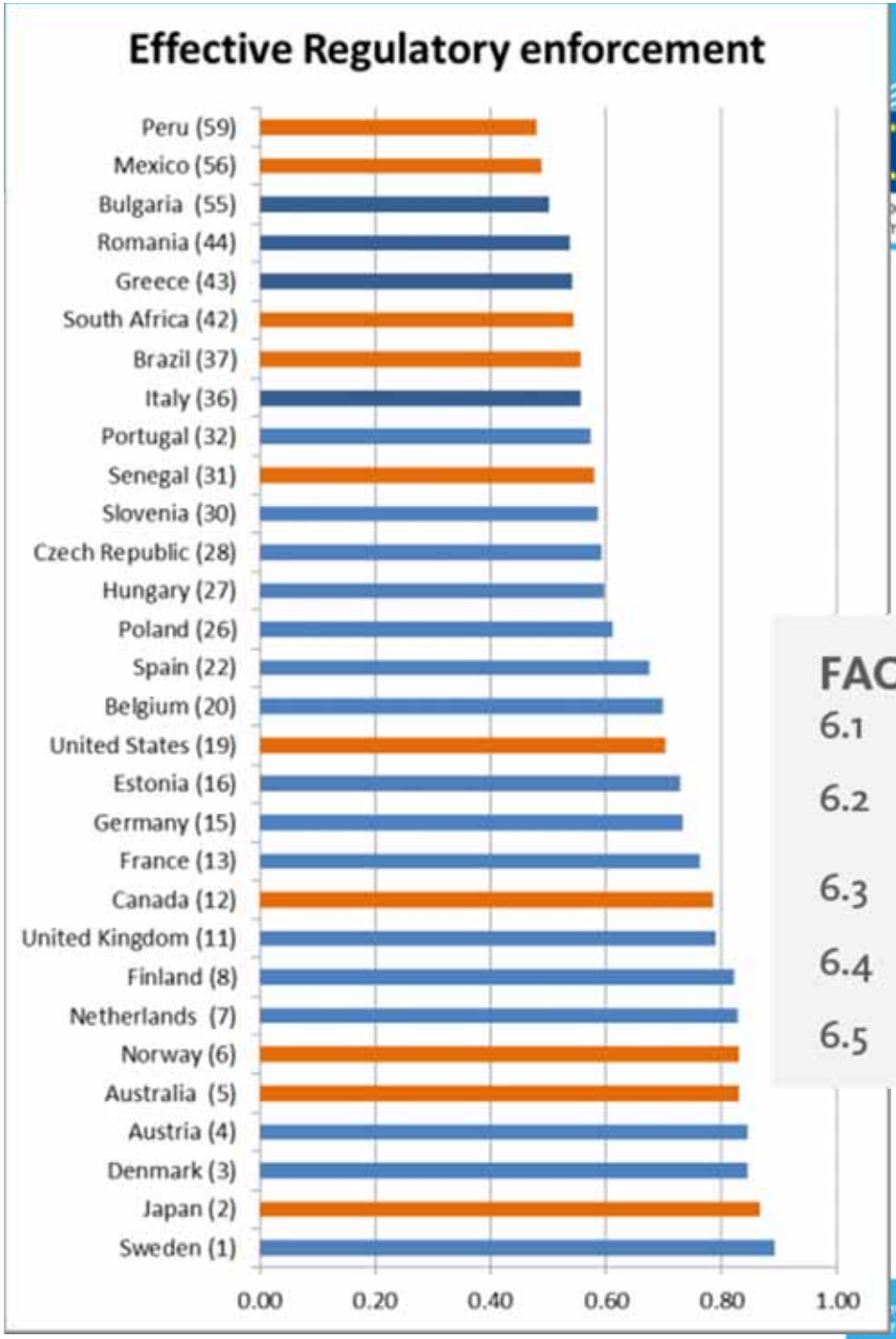
| Country | Ranks | | | Scores | | |
|---|---|---|---|---|---|---|
| | Baseline | Median | Range | Baseline | Median | Range |
| Norway | 1 | 1 | 1–2 | 67.3 | 71.1 | 69–77 |
| Poland | 2 | 2 | 1–4 | 67.0 | 70.6 | 67–76 |
| Iceland | 3 | 4 | 3–6 | 64.5 | 63.4 | 56–74 |
| Sweden | 4 | 4 | 3–5 | 63.8 | 64.3 | 61–73 |
| Australia | 5 | 5 | 3–7 | 62.8 | 62.9 | 56–65 |
| Hungary | 6 | 8.5 | 6–12 | 57.5 | 51.4 | 46–62 |
| Slovakia | 7 | 7.5 | 6–12 | 57.0 | 54.9 | 46–63 |
| Finland | 8 | 7 | 4–10 | 54.2 | 57.3 | 50–65 |
| Japan | 9 | 10.5 | 8–17 | 52.4 | 50.1 | 38–55 |
| Canada | 10 | 10 | 7–14 | 50.1 | 50.1 | 46–52 |
| New Zealand | 11 | 10 | 6–12 | 49.9 | 50.1 | 47–59 |
| Turkey | 12 | 12 | 9–16 | 48.7 | 48.8 | 41–57 |
| Mexico | 13 | 13 | 11–17 | 45.1 | 43.8 | 38–49 |
| Korea | 14 | 13 | 8–18 | 43.3 | 47.0 | 39–53 |
| United States | 15 | 16.5 | 13–27 | 43.1 | 40.2 | 19–47 |
| Belgium | 16 | 16 | 14–20 | 41.7 | 39.8 | 36–43 |
| Spain | 17 | 16 | 14–21 | 40.9 | 38.4 | 32–47 |
| Ireland | 18 | 17.5 | 15–19 | 40.8 | 38.7 | 36–43 |
| Greece | 19 | 18.5 | 15–23 | 36.2 | 37.6 | 32–42 |
| United Kingdom | 20 | 21.5 | 20–23 | 35.5 | 33.9 | 28–36 |
| Czech Republic | 21 | 23 | 19–26 | 35.4 | 31.8 | 25–36 |
| Netherlands | 22 | 21 | 17–24 | 34.4 | 33.0 | 29–40 |
| Italy | 23 | 22 | 16–24 | 34.2 | 33.6 | 30–39 |
| Denmark | 24 | 22 | 18–24 | 33.2 | 32.1 | 28–37 |
| Portugal | 25 | 25.5 | 23–27 | 27.2 | 25.1 | 21–28 |
| France | 26 | 26 | 24–27 | 26.9 | 24.3 | 20–28 |
| Austria | 27 | 27.5 | 27–28 | 23.0 | 19.4 | 15–23 |
| Germany | 28 | 29 | 28–29 | 22.4 | 17.3 | 11–22 |
| Switzerland | 29 | 27 | 24–29 | 22.4 | 21.7 | 14–30 |
| Luxembourg | 30 | 30 | 30–30 | 14.5 | 12.1 | 6–16 |

The Alcohol Policy Index
(New York Medical College)

Policy message




Liters Ethanol Per Person Per Year
Score
Hungary
Mexico
Turkey
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
80

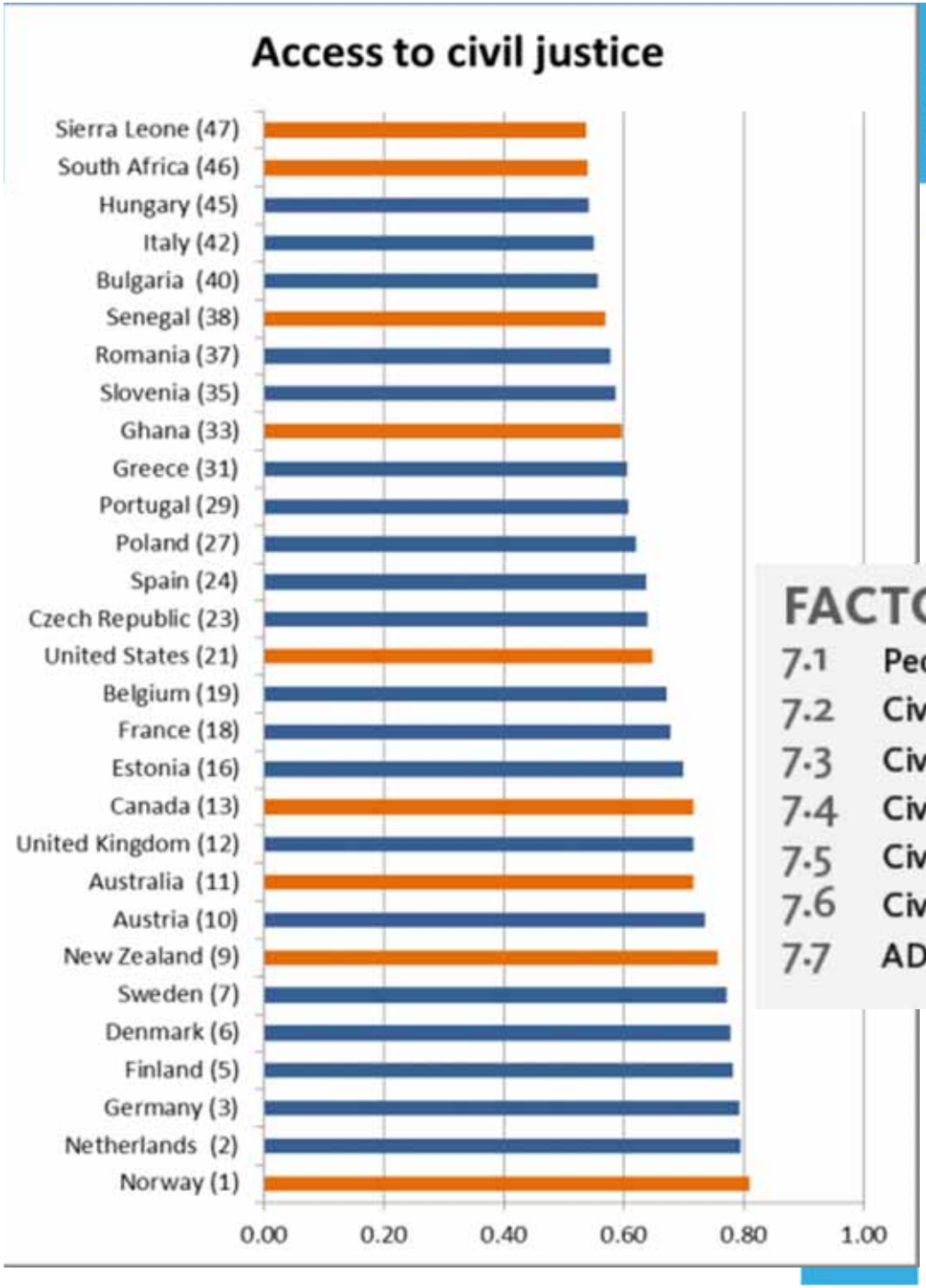



6th dimension of the Rule of Law Index
(World Justice Project)

- 83 survey questions
- 97 countries (20 EU)

**FACTOR 6: Regulatory Enforcement**

| | |
|---|---|
| 6.1 | Government regulations are effectively enforced |
| 6.2 | Government regulations are applied and enforced without improper influence |
| 6.3 | Administrative proceedings are conducted without unreasonable delay |
| 6.4 | Due process is respected in administrative proceedings |
| 6.5 | The Government does not expropriate without adequate compensation |

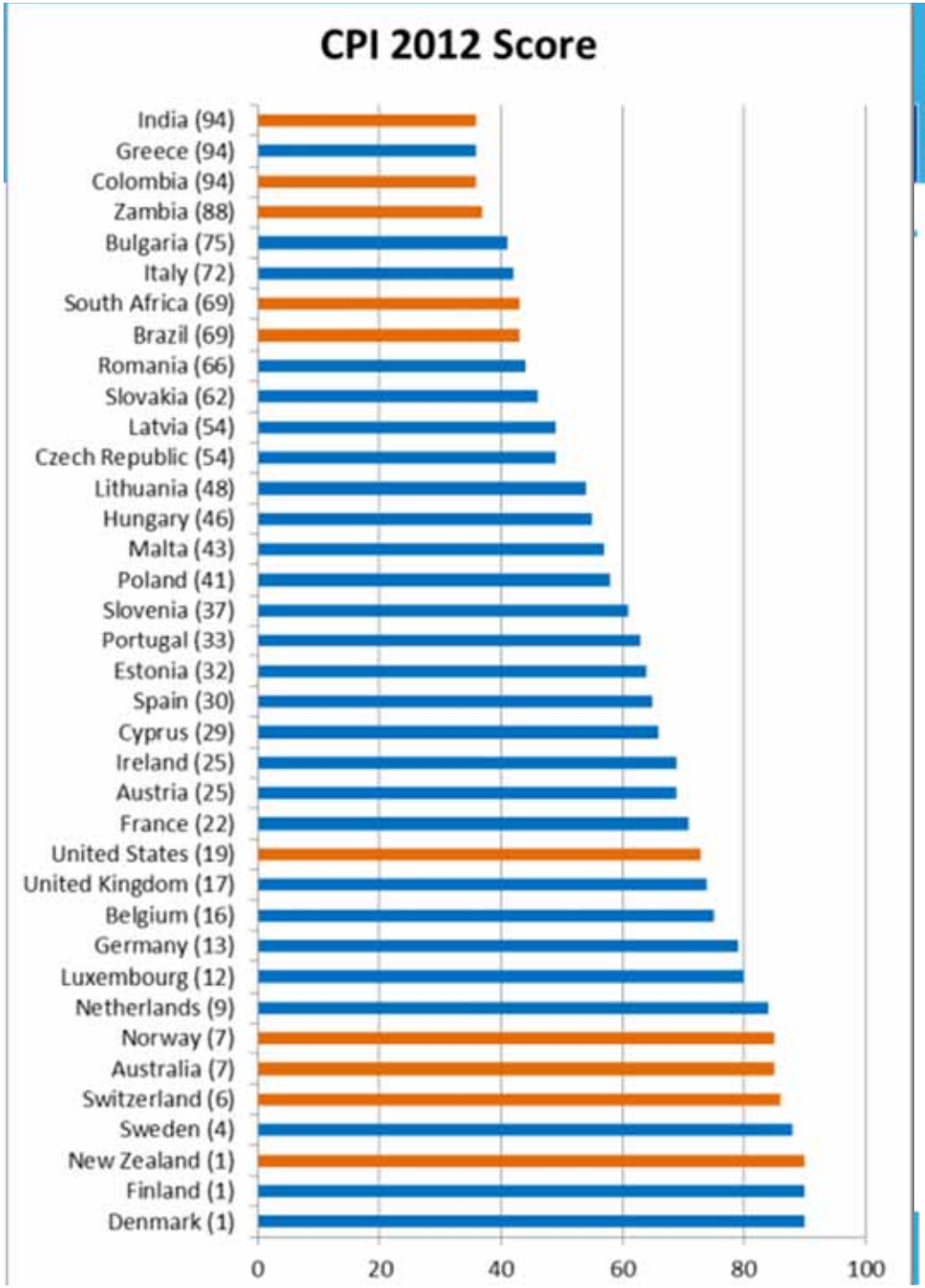



7th dimension of the Rule of Law Index (World Justice Project)

- 56 survey questions
- 97 countries (20 EU)

**FACTOR 7: Civil Justice**

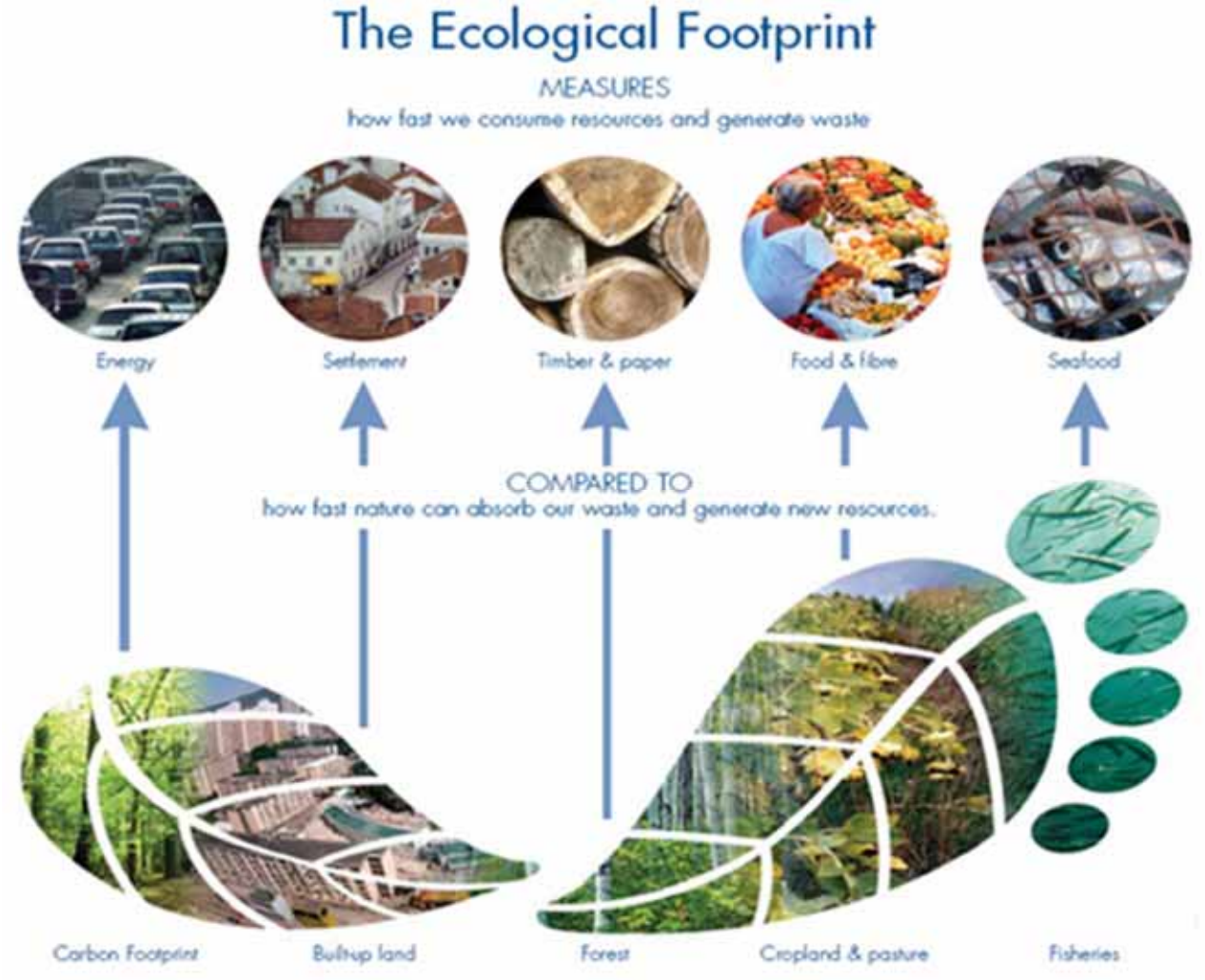
| | |
|---|---|
| 7.1 | People can access and afford civil justice |
| 7.2 | Civil justice is free of discrimination |
| 7.3 | Civil justice is free of corruption |
| 7.4 | Civil justice is free of improper government influence |
| 7.5 | Civil justice is not subject to unreasonable delays |
| 7.6 | Civil justice is effectively enforced |
| 7.7 | ADRs are accessible, impartial, and effective |




## Corruption Perceptions Index (Transparency International)

- 13 sources
- 176 countries (27 EU)

An example of indicator based advocacy where multidimensionality is suppressed via the reduction to a single metric (acres of equivalent land), volatile assumptions are taken, spurious precision is generated, and a meaningless 'interpretant' is proposed.


The Ecological Footprint
MEASURES
how fast we consume resources and generate waste
Energy
Settlement
Timber & paper
Food & fibre
Seafood
COMPARED TO
how fast nature can absorb our waste and generate new resources.
Carbon Footprint
Built-up land
Forest
Cropland & pasture
Fisheries


EARTH
OVER
SHOOT
DAY
2012


eco footprint

## How many Chinas does it take to support China?

CHINA 2.5

What about some other countries?

FRANCE 1.6

INDIA 1.8

U.S.A. 1.9

EGYPT 2.4

GREECE 3.1

U.K. 3.5

ITALY 4.0

SWITZER-LAND 4.2

QATAR 5.7

JAPAN 7.1

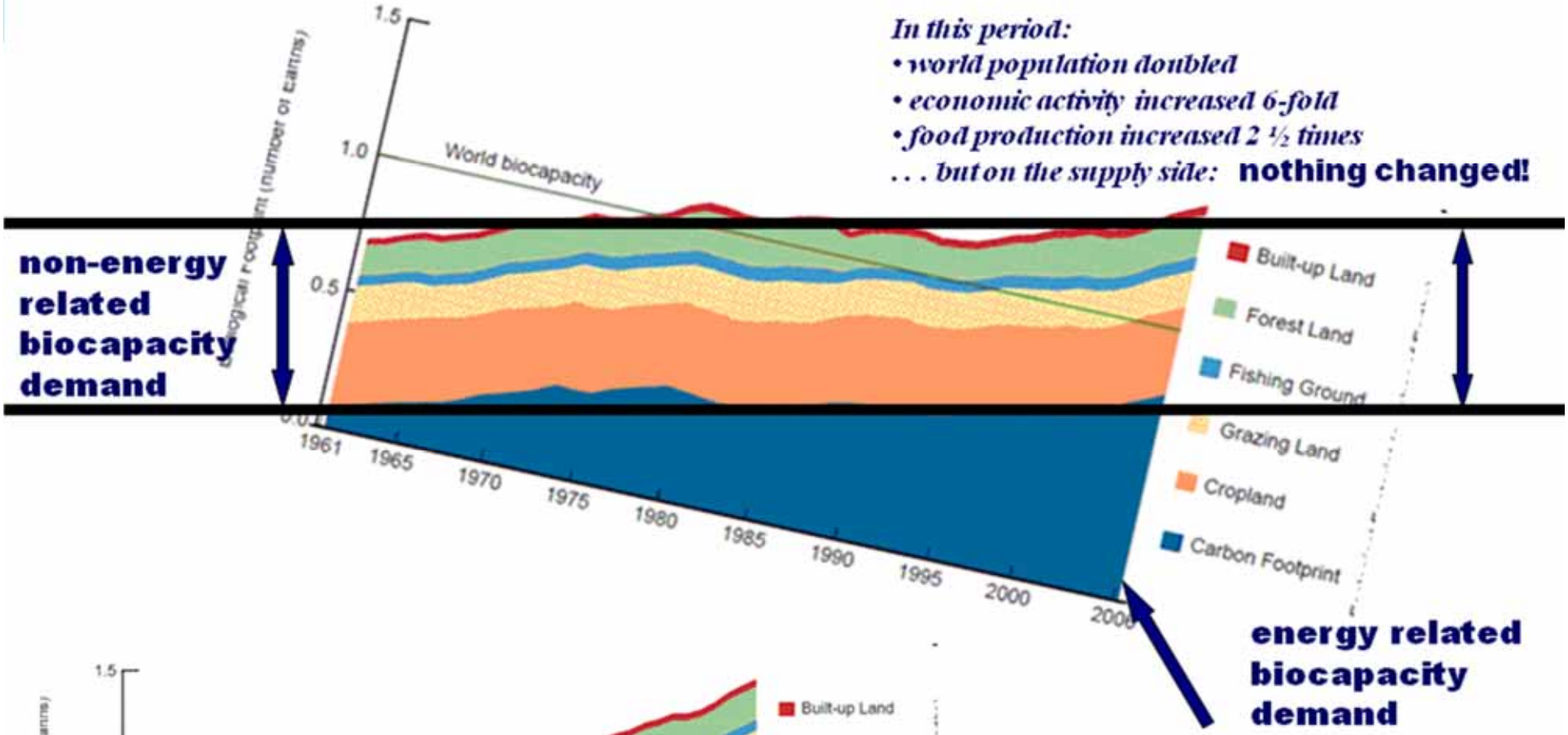
WORLD 1.5

EARTH OVER SHOOT DAY 2013

Based on two “accounts (biocapacity and footprint) representing the supply and demand of renewable biological resources across six mutually exclusive land-use types: cropland, grazing land, forest, fishing ground, built-up land, and the area of forest required to offset human carbon emissions (the carbon footprint)” the EF tells man how many planets he is using.

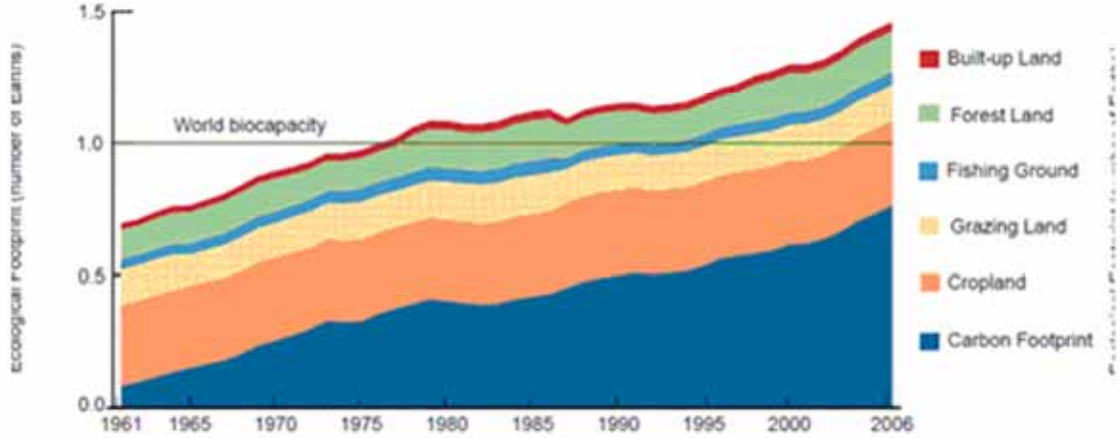
Biocapacity and footprint of consumption are both converted into an abstract land unit (global hectares or gha)

# The change of world footprint in time (1961-2006)




*In this period:*
- *world population doubled*
- *economic activity increased 6-fold*
- *food production increased 2 ½ times*

*. . . but on the supply side:* **nothing changed!**




*the only measured change in EF is generated by a very creative protocol converting energy use into hectares of planet . . .*

The footprint is almost entirely driven by energy consumption, which corresponds to carbon emission which are in turn sequestrated by forests; […] Carbon sequestration rate is hence what drives the results.

But this number could be made negative as well as infinity depending on what number one picks … it is totally volatile (Giampietro and Saltelli, 2014).

Giampietro, M., and Saltelli, A., 2014, Footprints to nowhere, Ecological Indicators, 46, 610–621.
Goldfinger, S., Wackernagel, M., Galli, A., Lazarus, E., Lin, D., 2014, Footprint facts and fallacies: A response to Giampietro and Saltelli (2014) "Footprints to Nowhere", 46, 622–632.
Giampietro, M., and Saltelli, A., 2014, Footworking in Circles, Ecological Indicators, 46 (2014) 260–263.

## Is the EF a rhetorical device?

- The implausible accuracy (Earth overshoot day = August 20!)
- Offsetting a flow with a stock (Kg of CO2 per year versus square meters of land)
- The anti-trade bias (CMEPSP, 2009, p. 71)
- The total dependence upon energy related pressures
- Paradoxical policy implications (e.g. in Agriculture)

Giampietro and Saltelli, Op. cit.

CMEPSP (2009). Commission on the Measurement of Economic Performance and Social Progress, URL: http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf last accessed June 2014.

## Is the EF a rhetorical device?

- The EF is inconsistent with its stated purpose of measuring demand on ecosystems
- The EF depends mostly from a dimensionally flawed energy emissions assessment
- The EF is optimistic at the global scale and policy-misleading at the local one
- One cannot accept EF's flaws on the ground that the EF has normative virtues
- EF's rhetoric trivializes bio-economics and muddles the sustainability debate

Giampietro and Saltelli, Op. cit.

Giampietro and Saltelli are not alone in this severe judgment:

"EF measurements, as currently constructed and presented, are so misleading as to preclude their use in any serious science or policy context.[…], less than half the area of the United States planted with eucalypts could essentially give us an EF equal to one Earth—an approach that no ecologist would recommend."

Blomqvist L, Brook BW, Ellis EC, Kareiva PM, Nordhaus T, et al. (2013a) Does the Shoe Fit? Real versus Imagined Ecological Footprints. PLoS Biol 11(11): e1001700. doi:10.1371/journal.pbio.1001700.

Rees WE, Wackernagel M (2013) The Shoe Fits, but the Footprint is Larger than Earth. PLoS Biol 11(11): e1001701. doi:10.1371/journal.pbio.1001701

Blomqvist L, Brook BW, Ellis EC, Kareiva PM, Nordhaus T, et al. (2013b) The Ecological Footprint Remains a Misleading Metric of Global Sustainability. PLoS Biol 11(11): e1001702. doi:10.1371/journal.pbio.1001702.

Some conclusions.

- Composite indicators are models. They are built for analysis and advocacy, and are defined by their quality.
- Analysis, advocacy and quality are not independent from one another. Example: most developers adopt for transparency and simplicity linear aggregation procedures to build composite indicators which are fraught with considerable difficulties. In this case quality may suffer at the expenses of advocacy (Saltelli and Saisana, 2013).
- Composite indicators sit between analysis and advocacy, but quality discriminates the plausible from the rhetorical.

Saltelli, A., and Saisana, M., Advocacy, analysis and quality. The Bermuda triangle of Statistics, International Statistical Institute Conference, Hong Kong, August 2013, Statistics and Policy.

Some conclusions.

- Building a composite indicator can be seen as a process of social discovery for which a model of extended participation comes natural.
- Frames and indicators are co-produced in the process which must be designed as to have a meaningful 'interpretant', or 'end-in-sight'.

Click to edit Master text styles

- Second level
  - Third level
    - Fourth level
      - Fifth level

Click to edit Master text styles

- Second level
  - Third level
    - Fourth level
      - Fifth level