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S&T Indicators in the Wild Acting with indicators in an uncertain world

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The argument

- Policy demand for indicators of 'societal impact' in research assessments.
- However providing 'indicators of societal impact' off-the-shelf would be highly problematic, possibly harmful, serving narrow views and interests.
- For quant methods to contribute to research impact assessment (RIA), we need to **go beyond scientometrics as it is**, secluded research.
- Instead, we have to **develop indicators in the wild** ('en plein air') in hybrid forum for engaging with contextual and diverse expertise
- This implies three moves in 'translation':
 - 1. broadening out the scope of data and expertise used
 - 2. use quantitative outputs for **opening up** in processes that include deliberation,
 - **3. engaging** with disparate communities in the **framing of problems and questions**

The parable of Prussian scientific forestry (Seeing like a state, J. Scott)

Forests in Old Prussia

- Wild
- Uncontrolled
- Unpredictable
- Inefficient





Enlightenment and Scientific forestry:

- Cut the wild forest
- Plant Norway spruce –reduce diversity
- Increase yield and predictability
- Loss of forest activities for peasants: (fruits, hunting, medicinal herbs, etc.)

The parable of Prussian scientific forestry (Seeing like a state, J. Scott)

Monocultures and Forest death

- Nutrient depletion leading to 20-30% production loss in 2nd generation
- Storm felling
- Pests due to loss of 'services' of insects, birds and animals.





Restoration forestry or forest hygiene:

- Artificial ant colonies & spiders
- Wooden boxes to provide bird nests
- The dangers of dismembering a complex set of relations and processes to isolate a single element of instrumental value

The parable of Prussian scientific forestry (Seeing like a state, J. Scott)

Task reduction

"Exaggerating only slightly, one might say that the crown's interest in forests was resolved through its fiscal lens into **a single number: the revenue yield of the timber** that might be extracted annually.. "





Performativity

"Backed by state power through records, courts, and ultimately coercion, **these state fictions transformed the reality they presumed to observe**, although never so thoroughly as to precisely fit the grid."

INTRODUCTION: POLICY DEMANDS FOR INDICATORS OF SOCIETAL IMPACT

Misalignment between research and societal needs



Perceived mismatch between discourses (or expectations) of research and actual outcomes.

Energy, environment, health, the digital economy

More research does not mean better societal outcomes

Monitoring tools and incentives (bibliometric indicators!) are part of the problem.

Source: Daniel Sarewitz – Saving Science – New Atlantis August, 2016

Policy demand of indicators of societal impact

Asking research to show its 'societal impact' (e.g. REF)

Framing of demand is often in the form accountability (control). Can indicators show if there is 'societal impact'?

- Indicators counting outputs or citations:
 - Number of co-publications university-industry
 - Number of patents
 - Number of citations by patents
 - Number or twitter mentions —
 - Number of mentions in policy documents

See Robinson-Garcia, Hicks on Friday morning

• Number of blog mentions

These measures can be interesting and provide valuable insights...

...but they are **not reliable tools for research assessment**.

Why current indicators of societal impact don't work

Social contributions of research are based on: (according to SIAMPI, ASIRPA or PIPA):

- **Reciprocal interactions** between researchers and stakeholders
 - Not linear but mostly interactive and iterative processes.
 - Not about 'impact' but mutual **co-production**, learning
- **The "qualitieS" of interactions**, not about the quantity
- Contexts are key and diverse

Therefore **qualitative methods are preferred over quantitative ones** (they can account for context, co-production, learning, values)

Just 'counting' can be analytically wrong, harmful in policy, and unfair (supporting particular interests).

How (if at all) can Quantitative Studies contribute to Research Impact Assessment?

- 1. 'Societal impact': Uncertainty and value-laden
- 2. Scientometrics as a secluded science



3. Towards indicators in the wild



This is mainly an argument about indicators for assessment under conditions of high uncertainty and lack of consensus on values not only for 'societal impact' – not regarding indicators for other purposes.

ASSESSING SOCIETAL IMPACT: DECISION-MAKING UNDER UNCERTAINTY AND LACK OF CONSENSUS

Unspoken assumptions in policy use of S&T indicators

S&T indicator work in policy (enlightenment):

- Knowledge from S&T leads to well-being
- State (e.g. univ. admin) is benevolent
- Expertise (e.g. scientometrics) serves the public good

However – instances of assumptions breaking down

- no agreement on benefits of research (highly contested)
 - Focus of health research in pharma therapeutics
- the state/admin can favour particular interests
 - Nuclear energy?
- experts' views can be aligned with state/particular interests
 - Impact indicators (e.g. pats) favour therapeutics over prevention

Sci Tech & Innovation can have unexpected undesirable effects while indicators of STI can remain "positive"



Criteria for expert advice to policy

'Degree of values consensus on a particular issue.

Sharply contested issues raise the political stakes and introduce dynamics quite different from issues which are less controversial.

Degree of uncertainty present in a decision context.

The greater the uncertainty – both scientific and political – the more important it is for science to focus on policy options rather than simply scientific results.'

Roger Pielke (2007) The Honest Broker.

Under conditions of low consensus and high uncertainty... ...not possible to separate knowledge formation and decision making.

Research impact assessment

High uncertainty

- Ex-ante the impact of research is unknown
- Ex-post time-lag and attribution make it difficult to track influence

Low value consensus

- Technologies and innovations often contested
- Research can influence in innovation in different directions.
- The value of research depends on the valuation of the innovations that it may influence

NOT the amount of impact but **the qualities of the contribution**. **More is not better.** Innovation is not a scalar. It's a vector about values.

Contested indicators – societal contributions depends on field/perspective

• E.g. # patents in univs. may prevent rather than foster innovation.





General Indicators of impact: Patents, Tweets, Co-Pubs.







SCIENTOMETRICS AS SECLUDED RESEARCH: THE WORLD IN A DATABASE AND ITS POLITICAL ECONOMY

Translations in science

(Callon, Lascoumes & Barthe, 2001, Acting in an uncertain world)



Scientometrics as a 'science'



Scientometrics for policy dependence and isolation



"The evaluation gap is the phenomenon (...) that the criteria in assessments do not match the character or goals of the research under evaluation or the role that the researcher aims to play in society." (Wouters, 2014)



Stirling (2010)





TOWARDS INDICATORS IN THE WILD: BROADENING OUT, OPENING UP, & ENGAGEMENT

2. Research in the wild (Callon et al. 2001)

Secluded research:

carried out under controlled conditions, with standardised objects, allowing comparability and reproducibility.



Research in the wild:

conducted out of the lab, under diverse, uncertain conditions and local contexts.



Collaboration between secluded res. and res. in the wild



Collaboration between secluded res. and res. in the wild



1. Broadening out for RIA: Expanding the research collective

This is about pluralising inputs \rightarrow beyond the bibliometric database

In terms of relevant data

- Media \rightarrow Analysis of news, policy discourse
- Social media data \rightarrow Altmetrics
- Health data \rightarrow Global disease burden, Healthcare data
- Economic data \rightarrow Consumption, exports, etc. (Ciarli on rice)

In terms of expertise (not only digital traces).

- Stakeholders (e.g. consultation to experts for 'validation')
- Mixed-methods (Diversity Approach SPRU/Ingenio)
- Case studies (ASIRPA,)
- PIPA (Participatory methods)

Taking inputs from outside the lab – the wild

1. Expanding the research collective The Diversity Approach to Research Evaluation

Interviews of interactions between collaboration members --Bibliometric mapping used in the cognitive maps



Bone, Hopkins et at. (Unpublished)

Collaboration between secluded research and research in the wild:



2. S&T indicator as a tools in policy deliberation

- 'Conventional' use of indicators ('Science Arbiter'--Pielke)
 - Purely analytical character (i.e. free of normative assumptions)
 - Seeking convergence (partial converging indicators, Martin and Irvine, 1983)
 - Aimed at justifying 'best-choices' (e.g. excellence)
 - \rightarrow Unitary and prescriptive advice
- 'Opening up' indicators('Honest broker' -- Pielke)
 - Aimed at locating the actors in their context and dynamics
 → Not predictive, or explanatory, but exploratory
 - Construction of indicators is based on choice of perspectives
 → Make explicit the possible choices on what matters
 - Supporting debate
 - → Making science policy more 'socially robust'
 - \rightarrow Plural and conditional advice

Barré (2001, 2004, 2010), Stirling (2008)

Quantitative evidence for opening up: Allowing for flexibility in interpretation

Closing down: Unique and prescriptive Proposing "best choices"

Rankings -- ranking list of preferences

Academic Ranking of World Universities - 2011				
World Rank	Institution	Country	National Rank	Total Score
1	Harvard University		1	100.0
2	Stanford University		2	72.6
3	Massachusetts Institute of Technology (MIT)		3	72.0
4	University of California, Berkeley		4	71.9
5	University of Cambridge	N	1	70.0
6	California Institute of Technology		5	64.7
7	Princeton University		6	61.2
8	Columbia University		7	60.4
9	University of Chicago		8	57.5
10	University of Oxford		2	56.4

how much? how fast? who's ahead?

Quantitative outputs: Allowing for flexibility in interpretation

which way? what alternatives? why?

Model 1: Unique and prescriptive Proposing "best choices" Rankings -- ranking list of preferences

Model 2: Plural and conditional Exploring complementary choices Facilitating options/choices in landscapes



Indicator use for informing decision in a hybrid forums

Hybrid forums are collaboration between secluded research and research in the wild.

"In hybrid forums, in which (...) [indicators] are discussed, uncertainties predominate, and everyone contributes information and knowledge that enrich the discussion." Callon et al. 2001

But how should hybrid forums be organised, so as to incorporate quantitative evidence? (Yes, it is our problem as well)

Challenge: To develop processes with 'responsible', 'inclusive', 'opening up' use of quantitative evidence in S&T. Fochler and De Rijcke (2017): evaluative inquiry

Ex-ante: Multicriteria Decision Analysis Methods?? **Ex-post:** Participatory Impact Pathway Analysis (PIPA)??



3. Participation in framing of problems and questions

According to Callon, the most difficult move is extending research in the identification and framing of problems.

- Most often problem is a given by state institutions
- Problematisation / enrichment by other stakeholders
- Qualitative techniques interviews, focus groups, etc.
- Importance in delineation and ontology building.



Summary: Towards transdisciplinary collaborations

Transdisciplinary teams needed for:

- Participation of relevant stakeholders
- Experts on the sector under study to use and interpret data
- STS interviews, ethnography, participation
- Experts on 'technologies of participation' (Rip, Doug Robinson)

Complementarities between Scientometrics and STS

(gross simplification of traits)

Scientometrics	STS	
Secluded research	Research in the wild	
Positivist	Interpretative	
Value-free	Value-laden	
Technocratic State	Civil Society	
Quantitative	Qualitative	
Top-down	Bottom-up	
Expert-based	Participatory	
Closing down	Opening up	

Back to the origins of scientometrics?

De Solla Price Henry Small rooted on History of Science

Garfield's ISI close to U. Penn Dept. of Sociology and History

CONCLUSIONS: PLURALISING INDICATORS

Summary of the argument

- 1. Indicators of societal impact: Research can have contested effects.
 - Not about more or less, but about the qualities of the contribution
 - Values S&T is deeply involved in some of the worse problems
- 2. Indicators as secluded research are part of an institutional configuration that fosters S&T with little discussion on goals
 - Focusing on 'indicator of impact' avoids questioning what type of contribution we want – blind support for status quo.
 - We are part of the problem.
- 3. Quantitative studies of science can play a different role in policy
 - Democratization of S&T advice needs a pluralisation of indicators
 - This implies leaving the lab and **doing research in the wild**

There can be NO general indicators of societal impact – Only indicators useful for supporting impact assessment in certain contexts – in the wild. (Cf. Molas-Gallart et al., 2003)

An agenda for indicators in the wild

- Broadening out the inputs
 - Expand the research collective
 - Representation of fields, languages, countries, 'traces' that count.
 - Reaching out to other expertise (e.g. including conceptual frameworks)
- Opening up the outputs
 - STI indicators as tools for deliberation (Barré)
 - Develop outputs that allow exploration of choices.
- Embed indicators in social appraisal processes
 - Develop new processes on design, creation and use of indicators
 - Collaborations with experts on qualitative and participatory methods and beyond

Why should WE engage with indicators in the wild?

Rationales for pluralisation and participation (Stirling, 2004)

- 1. Substantive: IndWild produce more socially robust knowledge More thorough scanning of knowledge. Inclusion of plural perspectives.
- 2. Normative: Under a democratic view, pluralisation is good on its own From a tool to project 'the perspectives' of incumbent institutions, towards becoming an 'honest broker', facilitating deliberation.
- **3. Instrumental/Strategic:** IndWild provide credibility and legitimacy. Indicators for research impact assessment as a window of opportunity to reposition quantitative studies of science.

Big companies' services) are taking over consultancy services on indicators. In the face of a simplistic delivery of indicators of RIA... (e.g. Altmetrics) **academia can offer socially responsible research assessment.**