

# **Can policy documents be used as sources for measuring societal impact? An empirical study based on climate change research**

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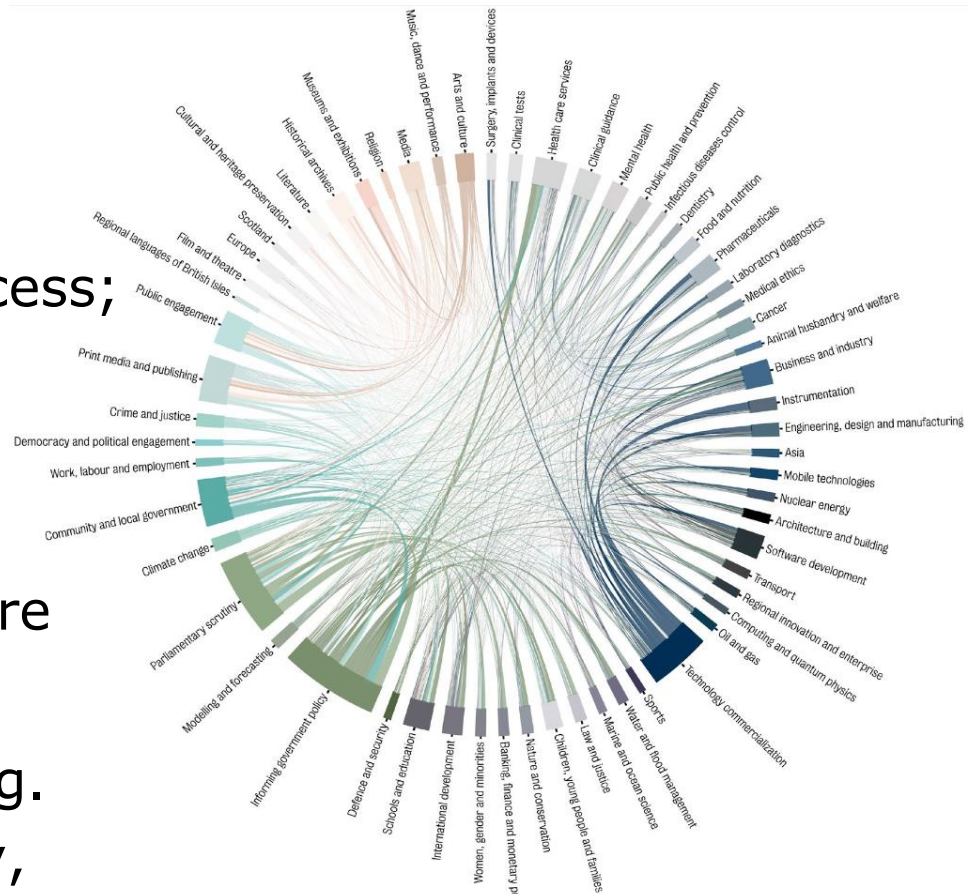
- Since the end of the 1990s: the context of application has increasingly become important in research evaluation
- It is no longer sufficient to show the benefits of research for research itself; the benefits for other sections of society should be demonstrated
- In UK Research Excellence Framework and in Excellence in Research for Australia (ERA) societal impact measurements are considered
- Funding organizations (like the US NSF) expect that applicants predict societal impact and reviewers have to assess the predictions
- Scientometricians started to develop approaches and methods to measure societal impact



- Definition of societal impact in the Metric Tide (literature overview on metrics in scientometrics): “Research has a societal impact when auditable or recorded **influence is achieved upon non-academic organisation(s) or actor(s) in a sector outside the university sector itself** – for instance, by being used by one or more business corporations, government bodies, civil society organisations, media or specialist/professional media organisations or in public debate. As is the case with academic impacts, **societal impacts need to be demonstrated rather than assumed**. Evidence of external impacts can take the form of **references to, citations of or discussion of a person, their work or research results**”



- Case studies are currently preferred to measure societal impact
- Advantage: Presentation of complex facts and situations
- Disadvantage: Focus on success; no generalizability; no comparability
- Analysis of about 6500 case studies, which were submitted to 2014 REF
- Broad spectrum of topics (e.g. Informing government policy, Technology Commercialisation or Climate Change)



Source: King's College London and Digital Science. (2015). The nature, scale and beneficiaries of research impact: An initial analysis of Research Excellence Framework (REF) 2014 impact case studies.



- Disadvantages of the case studies approach led to intense search for reliable and valid metrics
- “The holy grail is to find short term indicators that can be measured before, during or immediately after the research is completed and that are robust predictors of the longer term impact ... from the research” (Cohen et al. 2015)
- Two interesting approaches:
  - Using cited references lists in patents, the contribution of publicly funded research on innovation in industry can be measured
  - Citations of publications in clinical guidelines show the relevance of research for clinical praxis



- Alternative metrics (altmetrics) are seen as promising possibility to measure societal impact
- They focus on mentions of publications in social media and networks
- Altmetrics are views, downloads, clicks, notes, saves, tweets, shares, likes, recommends, tags, posts, trackbacks, discussions, bookmarks, and comments
- The most frequently used sources of altmetrics are Twitter and Mendeley
- Altmetrics can be similarly statistically analyzed as citations
- Analyses are possible on different levels: scientists, institutions, countries



- The meaning of altmetrics is not clear: What does a tweet claim about research? Do mentions of publications on Facebook say something about the quality of research?
- Relationship between impact and quality is not clear
- Sources of altmetrics can be manipulated (without any greater problems)
- Data quality is unclear: How many publications are mentioned in tweets, blogs etc. but without clear links?
- Broad range of different altmetric sources; it is not clear what belongs to altmetrics and what not?
- Tendency to use composite indicators (e.g. the Altmetric attention score) which are black boxes

# Measuring of target-oriented impact using altmetrics



- Future of altmetrics is in measuring impact target-oriented
- Two possibilities:
  - (1) Twitter- and Mendeley-data can be used to analyze the data for different status groups (e.g. professors, students, journalists)
  - Basically the measurement of impact on certain groups in society is possible (using certain altmetrics sources)
  - (2) The impact on certain sections of society can be measured by statistically analyzing certain documents (good examples are citations in patents or clinical guidelines)
- In this presentation, the analysis of mentions of scholarly publications in policy-related documents is presented





- Since recently, the company Altmetric analyses documents from politically relevant sources to measure the impact of scholarly publications on politics
- Examples for sources, which are analyzed by Altmetric:
  - European Food Safety Authority (EFSA)
  - GOV.UK - Policy papers, Research & Analysis
  - Intergovernmental Panel on Climate Change (IPCC)
  - International Committee of the Red Cross (ICRC)
  - World Health Organization (WHO)
  - UNESCO
  - World Bank

# Dataset which is used to measure the influence on policy-related documents



- Dataset with 191,276 scholarly papers on climate change research, which were published between 1980 and 2014
- Expectation: Since climate change is a frequently discussed topic in politics, we expected many citations in policy-related documents
- Search for mentions of publications in policy-relevant documents using the Altmetric-API
- Only 2341 papers (around 1%) have been mentioned in documents at least once
- Around 80% of the papers have been mentioned once; 20% of the papers between 2 and 18 times

# Policy-relevant sources, in which we found mentions of climate change papers



Policy-relevant source	Number of paper mentions
Food and Agriculture Organization of the United Nations	966
Intergovernmental Panel on Climate Change	866
World Bank	533
Australian Policy Online	299
UK Government (GOV.UK)	284
World Health Organization	124
European Food Safety Authority	117
Oxfam GB Policy & Practice	66
UNESCO	11
International Monetary Fund	9
The International Fund for Agricultural Development	8
The Association of the Scientific Medical Societies in Germany	5
National Institute for Health and Care Excellence	3
The Royal Society for the Prevention of Accidents	2
European Centre for Disease Prevention and Control	1
National Health and Medical Research Council (NHMRC) (Aus)	1

# Which publication years have been mentioned in policy-related documents very frequently?



Publication year	Number of papers on climate change		Number of papers on climate change with at least one policy mention		Difference in percentages
	Absolut	In percent	Absolut	In percent	
<b>2000</b>	4,533	2.4	43	1.9	-0.5
<b>2001</b>	4,889	2.6	39	1.7	-0.9
<b>2002</b>	5,262	2.8	108	4.7	1.9
<b>2003</b>	5,983	3.2	142	6.1	3.0
<b>2004</b>	6,594	3.5	174	7.5	4.0
<b>2005</b>	7,409	3.9	236	10.2	6.3
<b>2006</b>	8,519	4.5	210	9.0	4.6
<b>2007</b>	10,259	5.4	167	7.2	1.8
<b>2008</b>	12,373	6.5	203	8.7	2.2
<b>2009</b>	14,060	7.4	191	8.2	0.8
<b>2010</b>	16,671	8.8	197	8.5	-0.3
<b>2011</b>	19,059	10.0	230	9.9	-0.1
<b>2012</b>	21,849	11.5	184	7.9	-3.6
<b>2013</b>	25,320	13.3	161	6.9	-6.4
<b>2014</b>	27,016	14.2	36	1.6	-12.7
<b>Total</b>	189,796	100.0	2,321	100.0	

# Which document-type has been mentioned in policy-related documents very frequently?



Document-type	Number of papers on climate change		Number of papers on climate change with at least one policy mention		Difference in percentages
	Absolut	In percent	Absolut	In percent	
<b>Article</b>	209,837	94.5	2,057	87.9	-6.6
<b>Review</b>	12,223	5.5	284	12.1	6.6
<b>Total</b>	222,060	100.0	2,341	100.0	

# Limitations of using mentions in policy-related documents as source for altmetrics



- The sources with policy-related documents reflect only a small part of relevant sources which should be analyzed worldwide. However, this part is steadily increased
- Policy documents may not mention every important paper on which a policy document is based on
- The 'transmission' of scientific knowledge to policy is complex, mediated by a range of cognitive and political behaviors and often unconscious. In other words, mentions in policy-related documents only capture a small part of the transmission process.



- Fundamental change in scientometrics: Impact is broader measured – beyond science in other societal sections
- Definition of impact is changing; quality of research loses its focus in research evaluation
- Impact is no longer seen as proxy of scientific quality; one is interested in measuring impact, attention, and influence
- Today, reliable and valid indicators are rare for societal impact measurement; scientometricians try to find solutions
- Possible ideal way: Indicators, which measure impact of publications target-oriented on certain groups in society (e.g. students) or documents (e.g. policy-related documents)