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# Reflections on open science metrics

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# Current approaches

## Altmetrics/ Social Media Metrics

- Greater diversity compared to traditional indicators → more context?
  - Types of engagement
  - Types of research products
  - Types of stakeholders
- Capable of acknowledging hidden work?
- Capable of capturing societal impact?



# Current approaches

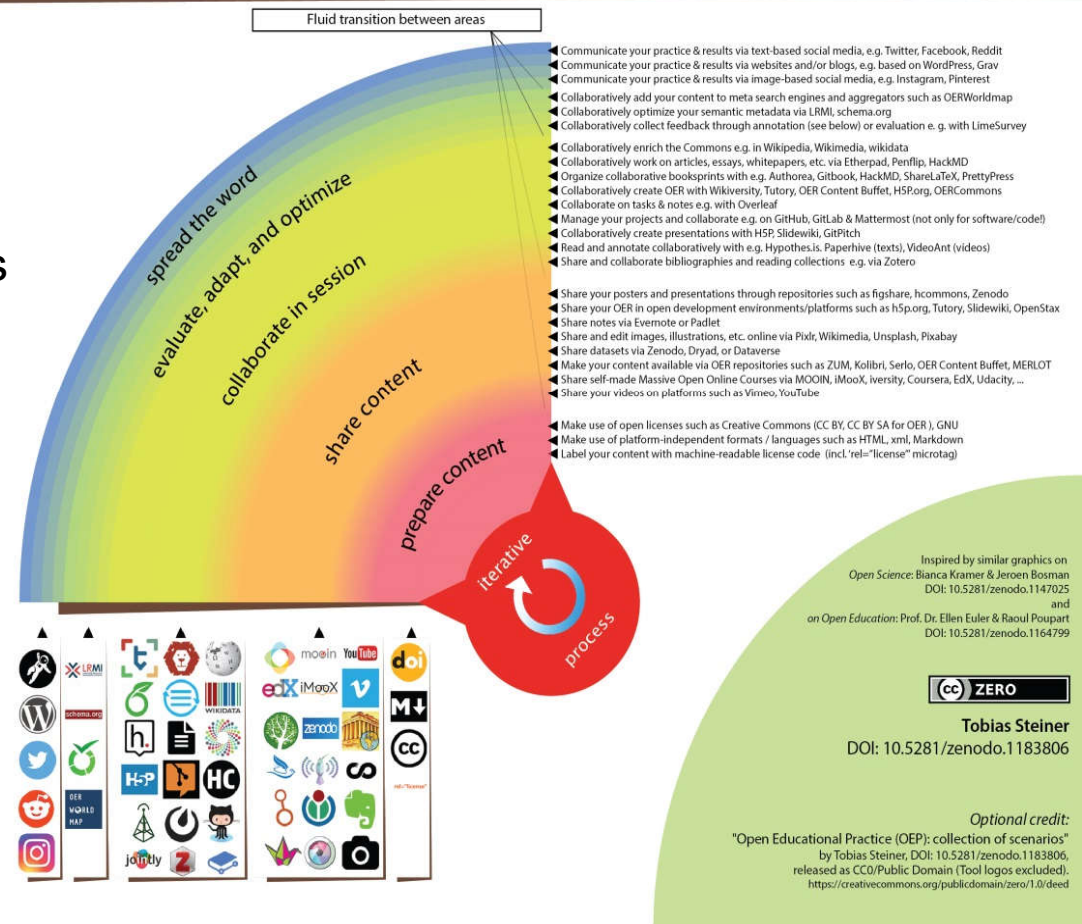
## Doing open science

- Focus on open science practices
- Practice before output:  
Could this be a basis for indicators?

Steiner, Tobias. (2018, February 23). Open Educational Practice (OEP): collection of scenarios (Version 1.01EN). Zenodo. <http://doi.org/10.5281/zenodo.1183806>

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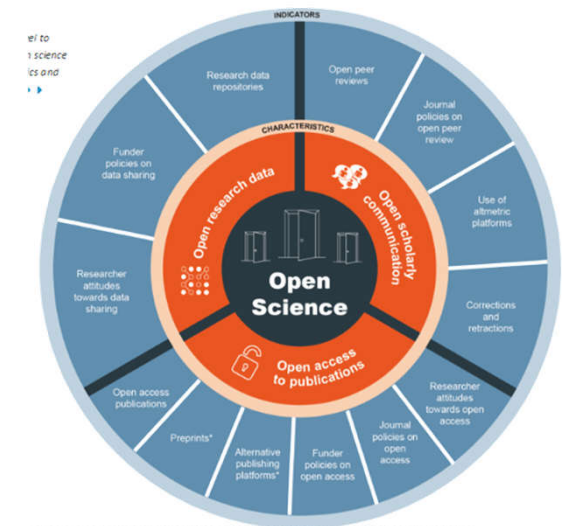
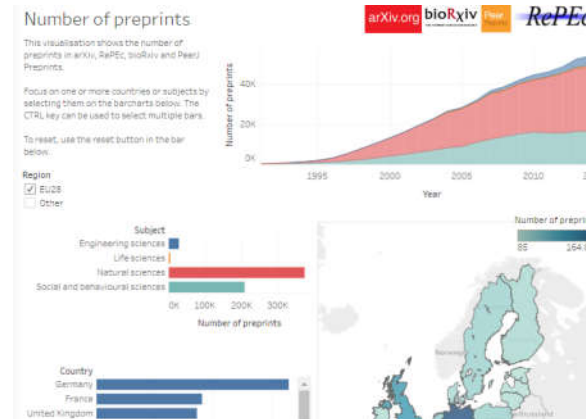
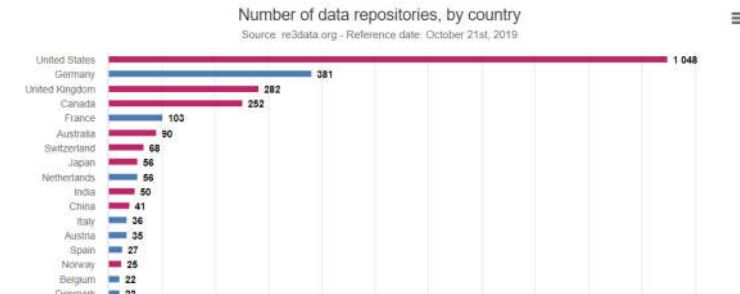
## Open Educational Practice (OEP): collection of scenarios



# Current approaches

## Open Science Monitor

- Open access publications
- Open research data
- Open collaboration
- Monitors progress
- Enables comparisons
- Rather output-focused



# Current approaches

## Areas to be considered

- scientific process + publishing
  - conceptualisation, data gathering/creation
  - analysis
  - diffusion of results
  - review and evaluation
- system level
  - reputation system, recognition of contributions, trust
  - open science skills, awareness
  - science with society

## NEW INDICATORS FOR OPEN SCIENCE

### POSSIBLE WAYS OF MEASURING THE UPTAKE AND IMPACT OF OPEN SCIENCE

DIETMAR LAMPERT, MARTINA LINDORFER, ERICH PREM, JÖRG IRRAN AND FERMÍN SERRANO SANZ

Requirements from research funders	mean rating (0..10 max.)			
% of research funders that mandate the provision of the data / software code produced in the context of the funded activity AND who mandate the conformity to data (exchange) standards	7.9			
		RFO	PM	
Accessibility	mean rating (0..10 max.)			
accessibility of open data / code as % of all data / code produced by publicly (co-)funded projects	9.1			
		R	RO	RFO
Machine-readable	mean rating (0..10 max.)			
% of machine-readable data / metadata	7.9			
		PU	R	RFO
Availability of metadata	mean rating (0..10 max.)			
availability of explanatory metadata as % of all available data (resulting from publicly (co-)funded research)	7.5			
		PU	R	RFO
Quality of metadata	mean rating (0..10 max.)			
quality of metadata (versioning, volume, data format, description of fields, etc.)	8.2			
		PU	R	RFO
Simulation results	mean rating (0..10 max.)			
usability of simulation results (models, data, and code)	7.5			
		R	RFO	PU

# Current approaches

## Open science and open innovation

- Specifies dimensions of openness for each indicator
  - Accessibility
  - Re-use
  - Recognition
  - Transparency
  - Verifiability
  - Inclusiveness
  - Collaboration
- Includes citizen science



## # of OA publications in Germany

TABELLE 2: ANZAHL VON OPEN-ACCESS-PUBLIKATIONEN IN DEUTSCHLAND

NAME DES INDIKATORS	ANZAHL VON OA PUBLIKATIONEN IN DEUTSCHLAND
Untersuchungseinheit	Publikation
Datenquelle	Web of Science, Scopus (integriert, kuratierte Daten über KB Datenbank verfügbar)
Dimension	Zugänglichkeit
Abdeckung	Die Abdeckung der OA Publikationen in den einzelnen Datenbanken ist noch nicht zufriedenstellend. Die Integration neuer Datenquellen ist notwendig.
Kommentare	Genauer zu spezifizieren nach Art des Zugangswegs Gold, Grün oder Bronze. Timelag bei der Zugänglichmachung ist zu beachten
Art der Erhebung	Deskriptiv, Ratio im Verhältnis zu Non OA, aufliegen nach Forschungsfeld
Feld/Kanal/Plattformspezifik	Aufliegen nach Disziplin/Forschungsfeld (Subject Categories)

Quelle: Eigene Darstellung





# Current approaches

## Open Science Career Evaluation Matrix (OS-CAM)

- Areas to be considered
  - Research output
  - Research process
  - Service and leadership
  - Teaching and supervision
  - Professional experience

Open Science Career Assessment Matrix (OS-CAM)	
Open Science activities	Possible evaluation criteria
<b>RESEARCH OUTPUT</b>	
<b>Research activity</b>	Pushing forward the boundaries of open science as a research topic
<b>Publications</b>	Publishing in open access journals Self-archiving in open access repositories
<b>Datasets and research results</b>	Using the FAIR data principles Adopting quality standards in open data management and open datasets Making use of open data from other researchers
<b>Open source</b>	Using open source software and other open tools Developing new software and tools that are open to other users
<b>Funding</b>	Securing funding for open science activities
<b>RESEARCH PROCESS</b>	
<b>Stakeholder engagement / citizen science</b>	Actively engaging society and research users in the research process Sharing provisional research results with stakeholders through open platforms (e.g. Arxiv, Figshare) Involving stakeholders in peer review processes
<b>Collaboration and Interdisciplinarity</b>	Widening participation in research through open collaborative projects Engaging in team science through diverse cross-disciplinary teams
<b>Research integrity</b>	Being aware of the ethical and legal issues relating to data sharing, confidentiality, attribution and environmental impact of open science activities Fully recognizing the contribution of others in research projects, including collaborators, co-authors, citizens, open data providers
<b>Risk management</b>	Taking account of the risks involved in open science
<b>SERVICE AND LEADERSHIP</b>	
<b>Leadership</b>	Developing a vision and strategy on how to integrate OS practices in the normal practice of doing research Driving policy and practice in open science Being a role model in practicing open science
<b>Academic standing</b>	Developing an international or national profile for open science activities

# Why are open science metrics needed?

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- Describe open science and open research outputs
- Make open science efforts more visible
- Provide guidance towards a ,new normal‘

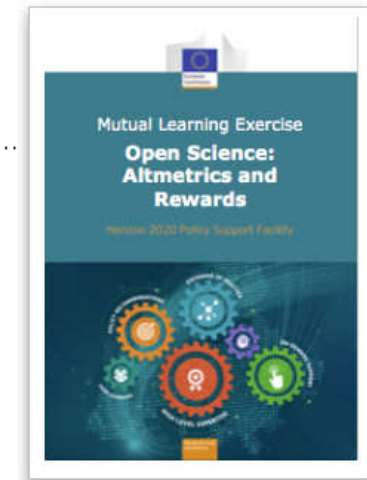




# Why are open science metrics needed?

## Sticks and carrots

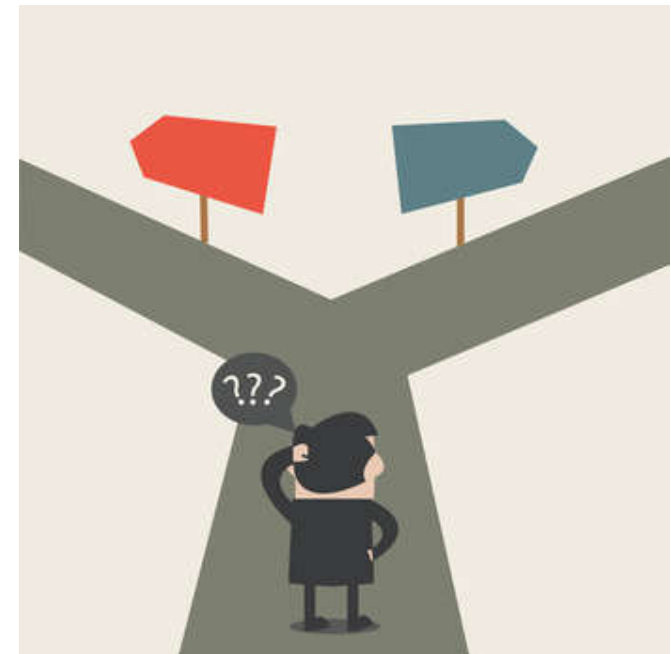
- “incentivize both research quality and open practices” (p. 26)
- “linking open practices with performance evaluation has proven to be a very effective measure, especially when made mandatory” (p. 29)



# Dilemmata of open science indicators

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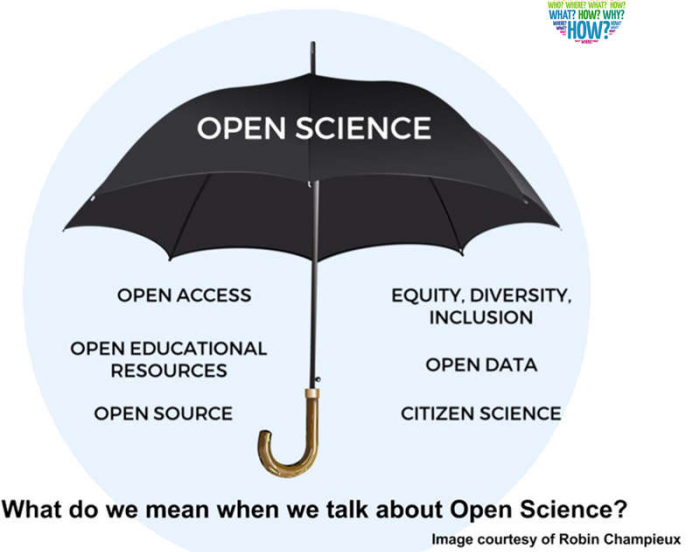
- Lack of clear meaning
- Efficiency of indicators-illusion
- Open science is a moving target
- All or nothing-principle



# Dilemmata of open science indicators

## Lack of clear meaning

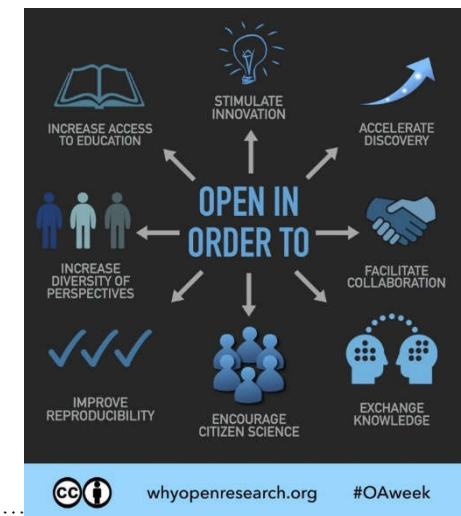
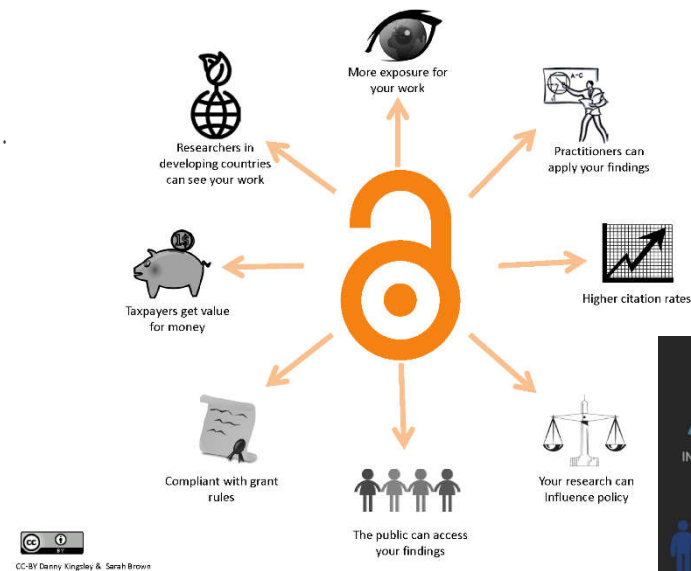
- Open access to outputs?
  - Which: articles, books, lectures, data, slides...?
- Open practices?
- Open software?
- Open peer review?
- Framework conditions, such as policies?
- Open-minded?
- Open to all?



# Dilemmata of open science indicators

## Lack of clear meaning

- Efficiency
- Reproducibility
- Credibility
- Visibility
- Reflexivity
- Impact
- ...
- “Open science is about improving the quality, accountability and social contribution of research...” (p. 96)



# Dilemmata of open science indicators

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## Efficiency of indicators-illusion

- Open science indicators are hard work for everybody concerned
- „The more impact you actually have, the harder it is to account for it“ (Power, 20, p. 65)
- Are indicators the right incentives for what we want to achieve?



# Dilemmata of open science indicators

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## Open science is a moving target

- Dependency on context: disciplines, policies, platforms, use cases....





# Dilemmata of open science indicators

## Open science is a moving target

**Table 2.** Overview of Thematic Analysis.

Biomedical researchers' understandings of openness	Factors affecting the practice of openness in science
1. The timely donation of and access to research components	1. The existence of repositories and databases for data, materials, software, and models
2. Standards for the format and quality of research components	2. The competitiveness of academic fields
3. Metadata and annotation	3. The digital nature of research
4. Collaboration and cooperation with peers and communities	4. Credit systems in academic research
5. Freedom to choose venues and strategies for disseminating research	5. Career structures in academic research
6. Transparent peer review systems	6. Collaborations with industrial partners, as well as attempts at commercialization
7. Access to research components in non-Western and/or nonacademic contexts	7. Models and guidelines for intellectual property
	8. Governmental views on the status and social role played by universities
	9. The existence of various, and at times conflicting, government policies on Open Science

# Dilemmata of open science indicators

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## Open science is a moving target

- Dependency on context: disciplines, policies, platforms, use cases....
- Indicators and metrics contradict open science
- Multidimensional individual indicator space as a solution?



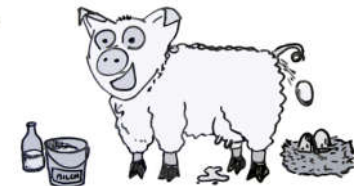
# Dilemmata of open science indicators

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## All or nothing-principle

- Who is an open science champion?
- Are open science indicators supportive in becoming a better researcher?

I'm not necessarily on board with everything. How many people really do open data? And preregister everything. And do open peer review. And preprint. What if I only do a couple of those things? What if I do green open access but not gold? Am I not an open scientist if I don't do a live open lab notebook with a simultaneous bodycam?



# Questions? Thank you!

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## Reflections on open science metrics

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