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Philosophy of Open Science for diverse research environments

OPEN?

Open Science for Policy

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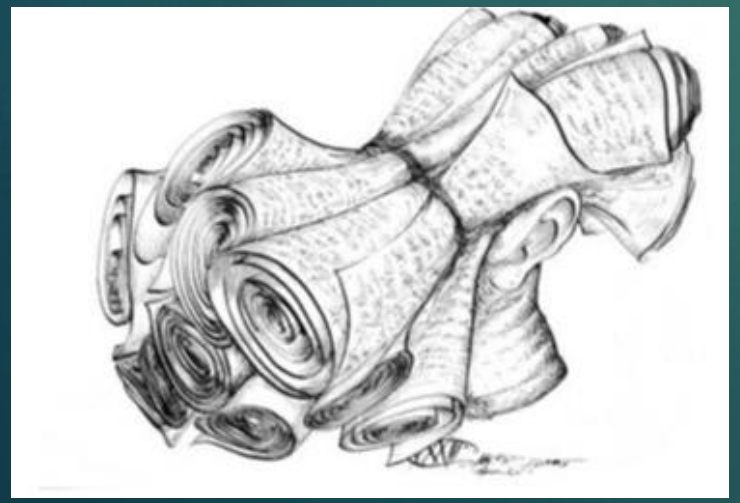
Outline

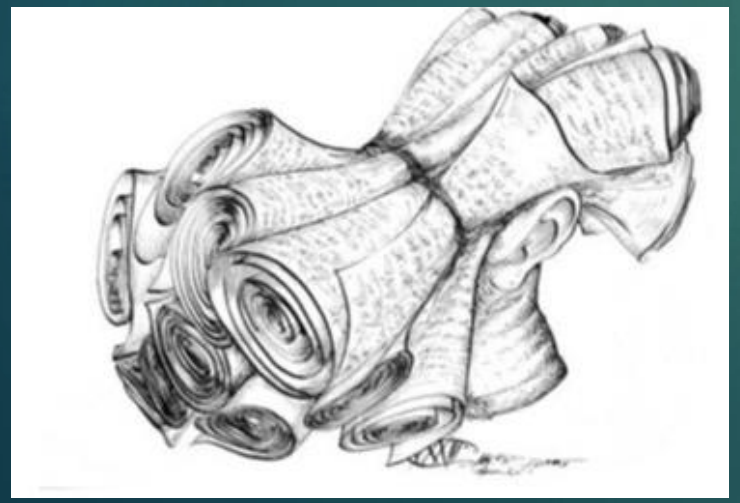
1. Troubled research in a troubled world
2. Openness as sharing
3. Reframing the solution:
    1. The PHIL_OS project
    2. Openness as judicious connection
4. Towards trustworthy narratives of research findings

Troubled research in a troubled world



- Self-referential & hypercompetitive academic publishing…
  - volume and prestige > quality and reproducibility
  - STEM and esp. biomedical research as key model, leaving HASS behind
  - lack of attention for non-academic perspectives and knowledges
- …when there actually *is* some publishing
  - data, models, methods, samples, software as second-tier output
  - threats to sustainability of related infrastructures (digital and physical)
  - hard to track what research is done with industrial and military funding

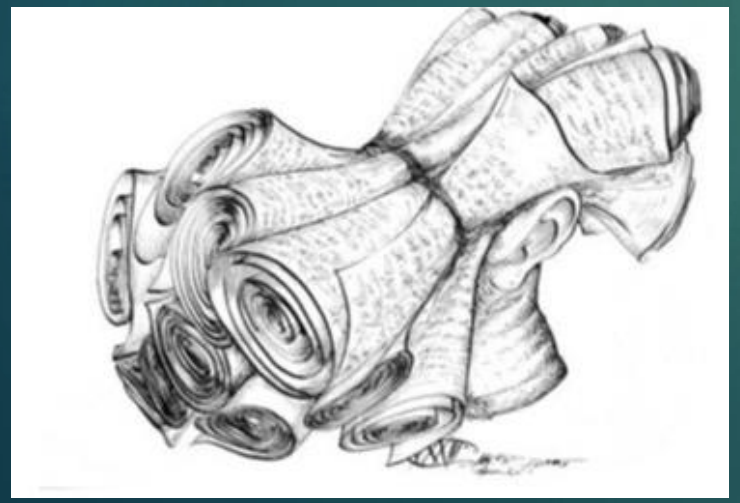
Troubled research in a troubled world



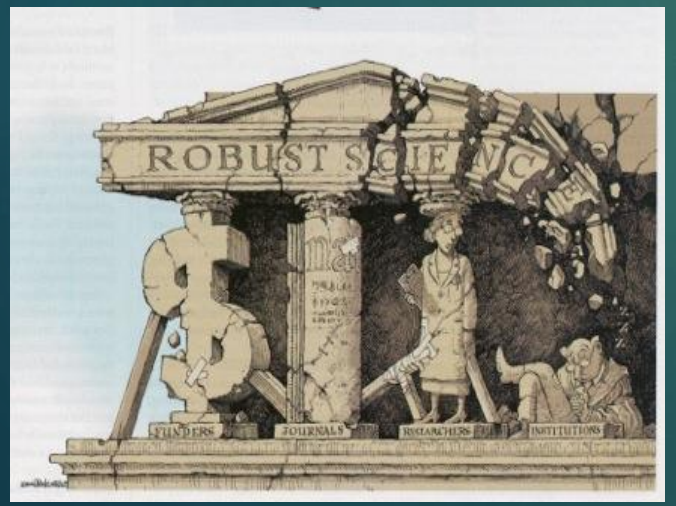
- Long shadow of discrimination, racism and colonialism over what counts as best science
  - Alienation from publics and uneasy relationship to "public interest"
  - Acknowledgment does not easily translate into understanding implications and continuing effects (or what should be done about those)
- Difficult relation to policy-making:
  - Weaponisation of uncertainty: tempered claims and open interpretations are easily instrumentalized
  - Push towards science as guarantor of truth, in tension with non-dogmatic, self-correcting, dynamic nature of research
  - Scientific advice as political scapegoat: contributes to loss of trust

Troubled research in a troubled world

- (Lack of) incentives and rewards for
  - responsible dissemination *and* scrutiny of research components
    - Encouraging open communication beyond strictures imposed by commercial publishers and service providers
    - While acknowledging role of know-how and trust
  - transdisciplinary collaboration and community participation
    - Emphasis on community building and role of institutions therein (beyond individuals)
  - two-way ongoing dialogue with policy
    - to ensure reciprocal understanding of processes of research and decision-making
  - sustainable development / responsible use of (digital) tech
    - Beyond 'lure of novelty', thinking through systemic implications of adopting new tech
  - addressing injustice and resisting discrimination, prejudice, racism



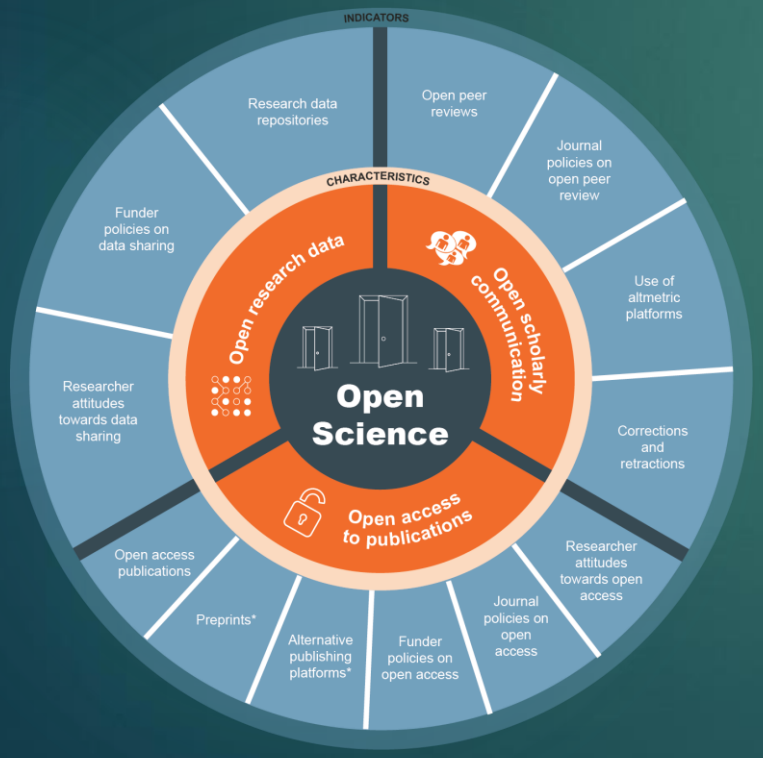
What to do?



Existential challenge with multiple dimensions:

- **Technological:** role of data-intensive methods and AI in fostering wellbeing and planetary health
- **Social**: governance and exchange across research landscape growing in size, diversity and technological scaffolding; how to address diverse publics effectively?
- **Political**: critical thinking and cosmopolitan aspirations vis-a-vis authoritarian, nationalist regimes
- **Economic**: sustainability within an aggressive market economy & increasingly expensive infrastructures
- **Moral**: proliferation of principles and role models; weaponization of scientific authority; little engagement with social implications of technical decisions
- **Methodological**: how to assess good research practice?
- **Managerial**: how to manage ever-expanding scientific skillset with ever-diluted accountabilities?
- **Conceptual: how do we reimagine research practices and the process of discovery to tackle these problems?**

Openness as a solution?



"a **new** approach to the scientific process based on **cooperative work** and new ways of diffusing knowledge by using **digital technologies** and new collaborative tools.. [..] .. **sharing** and using all available knowledge at an **earlier stage** in the research process"

Carlos Moedas, *Open Innovation, Open Science, Open to the World (2015)*

Fast, efficient, free sharing of research outputs helps

- To manage Big Data and the digital transformation of research processes
- To build on existing collections as public goods and data sharing norms/technology (esp. in life sciences)
- To involve diverse publics and forms of scrutiny in science, thereby improving quality and addressing inequity and injustice
- To ensure the production of robust, reliable and socially responsive science and technology

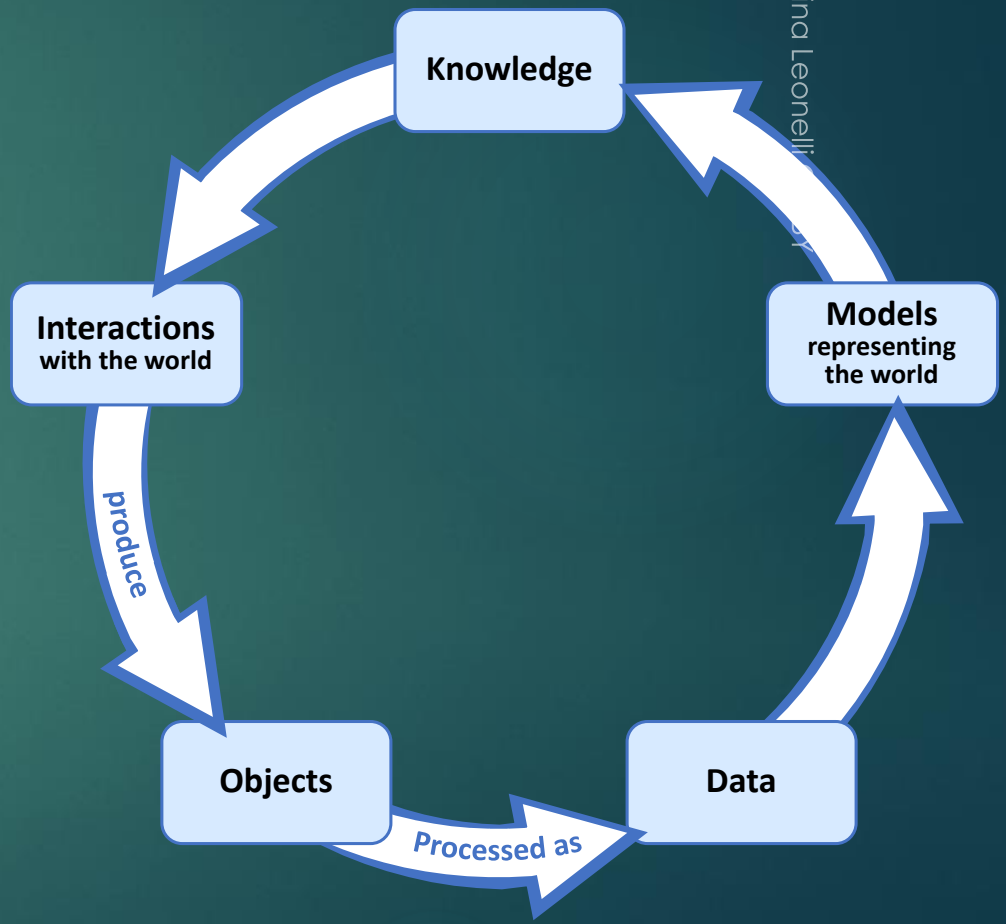
Vision of Open Science as

- about **unlimited access**: making any research element available at any time for everyone
- about the **digital transformation**: it is a novel phenomenon and completely dependent on ICTs
- always **good**: it automatically improves the content of science as well as researchers' working conditions
- **global**: it can reach everybody with an interest in research, no matter where they are based
- facilitating **equity** in research production and consumption: it makes previously inaccessible resources available to those who may wish to use them

How does this vision relate to science and its role in society?

Is Open Science living up to its promise? How to check and help frame the meaning and implementation of openness in research?

- What impact on established methods?
- How to foster equitable collaboration among research sites with diverse backgrounds and goals?
- What repercussions for institutional and assessment cultures and practices?
- What impact on science for policy?



PHIL_OS (21-26): A Philosophy of Open Science for Diverse Research Environments

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Situating research processes

To understand how research practices and related collaborative strategies relate to characteristics of research environments

- **Approach:** *co-produced* philosophy, history and social studies of science (with scientists and OS policy-makers)
- **Focus:** interpretations of openness as a window on the epistemic implications of
  1. **Diversity** in research environments
     - Backgrounds and skills
     - Resourcing: material, human, conceptual, institutional, infrastructural
     - Grounds for reasoning around "best practice"
  2. **Inequity** between research environments
     - Constraints on methods, resourcing and networks
     - Reputational cycles and epistemic injustice

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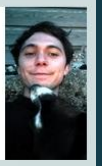

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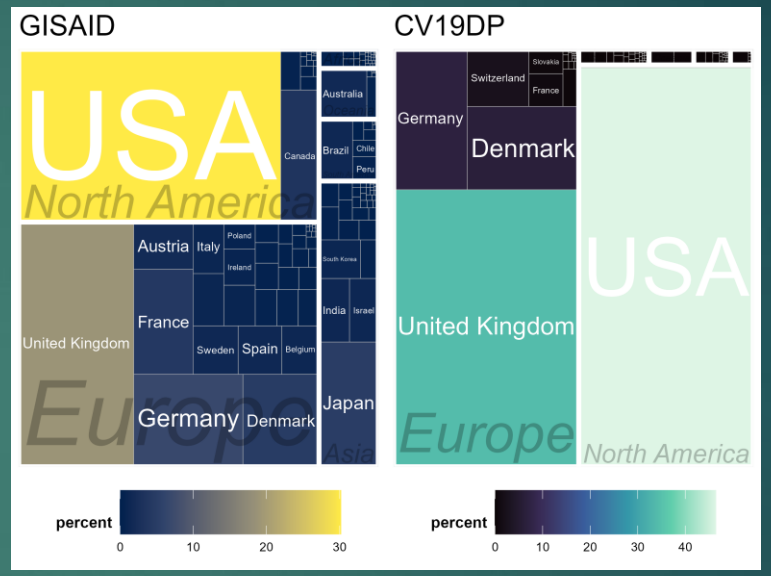
Subproject 1 [with Nathanael Sheehan]: Openness, speed and transdisciplinarity in COVID-19 research

- Leonelli, S. (forthcoming) Is Data Science Transforming Biomedical Research? Evidence, Expertise and Experiments in COVID-19 Science. *Philosophy of Science*.
- Leonelli, S. (2021) Data Science in Times of Pan(dem)ic. *Harvard Data Science Review* 3(1) *[featured article with seven discussion pieces]*

Also:

- Dupré, J and Leonelli, S (2022) Process Epistemology in the COVID Era: Rethinking the Research Process to Avoid Dangerous Forms of Reification. *European Journal for the Philosophy of Science* 12:20 https://doi.org/10.1007/s13194-022-00450-4
- Krige, J and Leonelli, S (2021) Mobilizing the Translational History of Knowledge Flows: COVID-19 and the Politics of Knowledge at the Borders. *History and Technology* 37:1, 125-146. https://doi.org/10.1080/07341512.2021.1890524
- Canali, S and Leonelli, S. (2022) Reframing the Environment in Data-Intensive Health Sciences. *Studies in the History and Philosophy of Science* 93: 203-214. https://doi.org/10.1016/j.shpsa.2022.04.006



From Collection to Analysis: A Comparison of GISAID and the Covid-19 Data Portals

Nathanael Sheehan, Sabina Leonelli, Federico Botta bioRxiv 2023.05.13.540634; doi: https://doi.org/10.1101/2023.05.13.540634

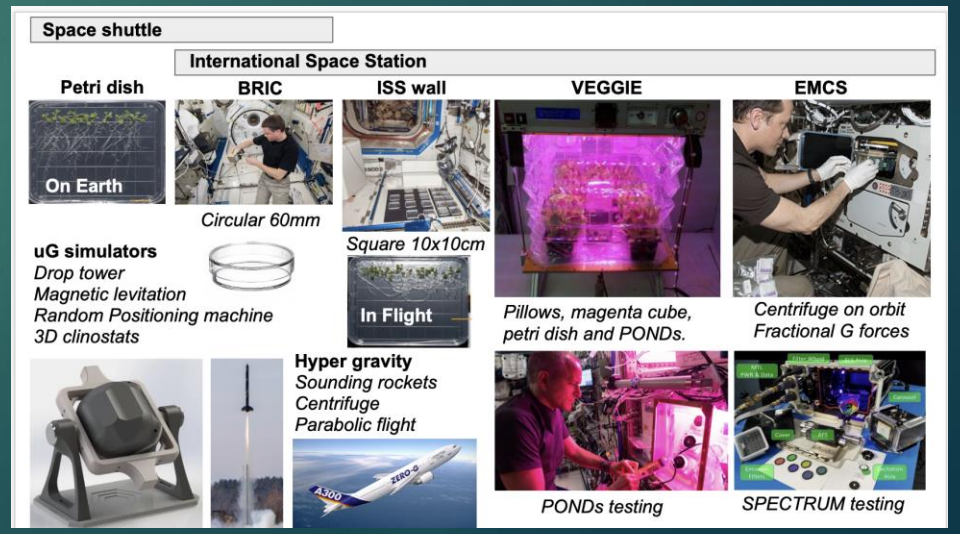
Subproject 2 [with Rose Trappes]: Expertise in and out of citizen science - eBird India

- Global birdwatching data platform, adapted for use in India
- Coordinated by Bird Count India, Nature Conservation Foundation (NCF) in Bangalore
- 18 interviews (and counting) plus informal discussions and observation

P Jeganathan, Wikimedia commons, CC BY-SA 4.0

Subproject 3 [with Paola Castaño]: Reusing unique experimental data for the public good - NASA GeneLab

- Database, specimen repository and collaboration space for omics data from biological investigations in space.
- Enabling "cross-talk amongst valuable experimental biology resources" (GeneLab Strategic Plan 2014, 2).
- Analysis Working Groups (AWG) → secondary data analysis to understand the biological footprints of the stressors, to disentangle the stressors, and to create consensus pipelines.



Subproject 4 [with Emma Cavazzoni]: Pest-plant research for phytosanitary interventions – Northern Italy

- Collaboration with HALY-ID Horizon project and phytosanitary services in Emilia Romagna
- Monitoring *Halyomorpha halys* (*HH*) damage on pears in orchards
  - Remote sensing for plants and insects in the field (drones, camera traps, meteorological sensors)
  - Infrared tech in the lab for damage on pears
  - Coordinating research and interventions with farmers and social services

Pictures by Emma Cavazzoni

Subproject 5 [with Fotis Tsourukis]: Subtropical crop research for food security - Greece

- Collaboration with ELGO-DIMITRA national infrastructure for crop research and phytosanitary services
- Fieldwork starting in October at IOSV Institute in Crete
- Tree crops research under climate change

Subproject 6 [with Joyce Koranteng-Acquah]: Translational Crop Research for Agricultural Policy

- Collaboration with Ghanian CSRI: Crop Research Institute (Kumasi), Food Research Institute, Institute for Innovation in Science & technology, CABI Western Africa (*Accra*)
  - *Response plans* (consultancies over what is known over specific pests and can be helpful to farmers)
  - Collection of *local knowledge* from farming communities (e.g. neem plant as pesticide, phosphorus in soil)
  - *Crop improvement & multiplication* (field trials, lab work)
  - Management of *seeds and germplasm*
  - *Pest-plant-environment* interactions
  - Post harvest crop management

Towards intelligent and responsible openness

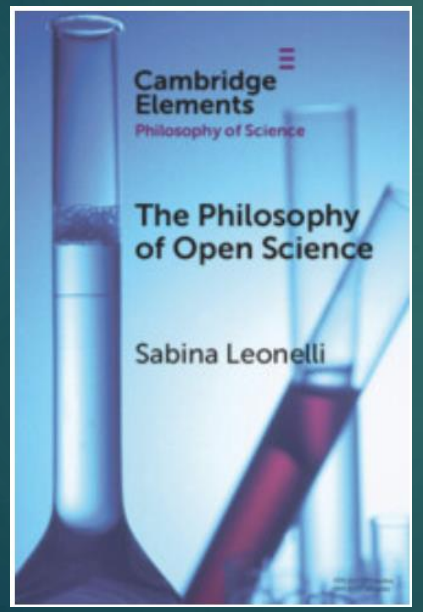
Key findings so far

- divergent interpretations around conceptual underpinnings and practical implications of OS
- OS tools developed by high-resourced and high-powered, English-speaking centres on fashionable topics and (digitally) tractable components
  - unclear how OS supports different (domain/location-specific) understandings of good research practice
  - unclear relation between digital and material resources and practices
  - emphasis on cutting-edge tech: yet some research environments lack infrastructures, equipment, training, institutional support to take advantage..
  - .. and do not always need high tech to develop excellent research!

Towards intelligent and responsible openness

- "global" standards can accelerate discrimination
  - researchers may be adversely affected by OS mandates such as data sharing, especially when lacking capacity to participate in development/governance and to negotiate fair credit
  - OS practices may further disadvantage researchers who are not working in the best-established, richest labs in the world
- high level of mistrust from low-resourced researchers and non-academic communities of practice = worse science
  - Less participation: vicious circle of low visibility
  - Partial data collection and biased interpretation efforts

Reframing Open Science and its implementation



Transparency

~~ity~~

Inclusion

Inclusion

Quality

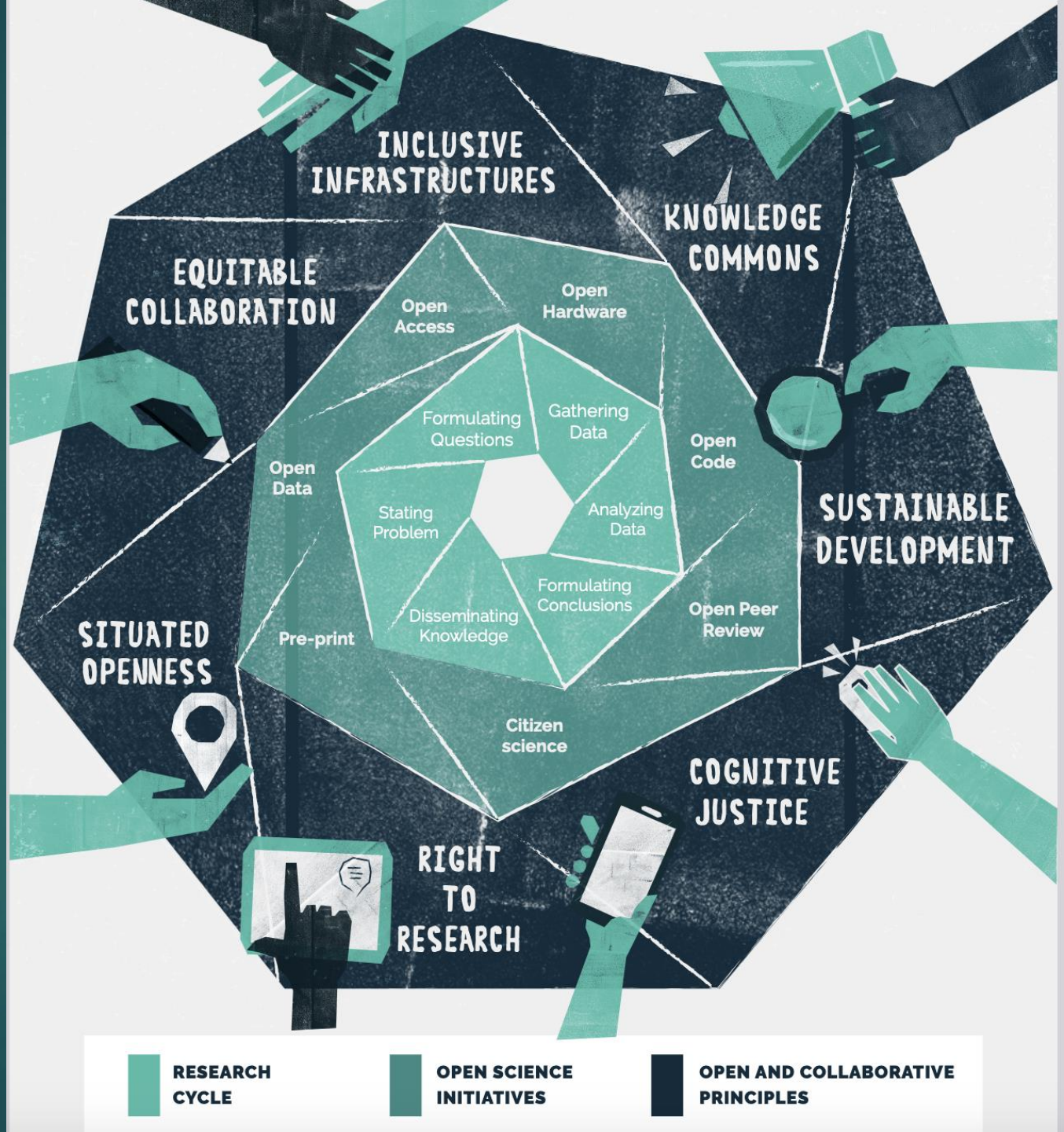
Transparency

Alternative vision of Open Science

- about **responsible use**
- about the critical and constructive scrutiny of how **digital platforms** can support existing and future work
  - Encouraging development of relationship that can sustain and nurture scientific research in the long term
- **good for some and not others**: value-judgements and choices are unavoidable when developing open research and infrastructures
- **accessible to some and not others**: transparent criteria for which users are privileged can be a platform for trustworthiness
- facilitating **equity** in research production and consumption: it makes previously inaccessible resources *more easily* available to those who may wish to use them *for specific purposes* (whose social and scientific value has been explicitly evaluated)

Table 3 Synoptic comparison of the two interpretations of openness I have discussed in this Element.

Openness as sharing	Openness as judicious connection
Unlimited	Relational
Digital	Social
Good	Divisive
Global	Situated
Equal	Equitable
Focused on itemized outputs (objects that can be shared)	Focused on social agency (ways of doing and being with others)



OECD
Inclusive OS
2023

Conclusion:
Towards trustworthy narratives of research findings for policy

"Stories keep us together. Untold stories keep us apart"
(Elif Shafak, 2021)

Transparency requires narrative

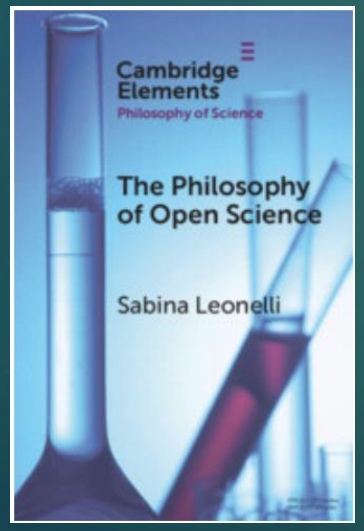
- Sharing alone does not enhance intelligibility and reciprocal understanding: this is not the transparency that we want
- Transparency requires **understanding through engagement**: the ability and opportunity to engage with another's reasoning and practical experience, and make sense of it in one's own terms
  - This presupposes skills and resources which may include access to data/materials, but not necessarily: *sharing helps but it is not the starting point*
- Assembling one's content as stories is a critical part of this - works better than offloading:
  - Constructing a narrative requires considering audience and type of conversation / use
  - Forces to engage in building a connection and considering what's best to share
  - E.g. assessing researchers through narrative CVs; narrating evidence for climate change

Telling evidence-based stories: demanding but necessary

- This demands engagement with interlocutors, effort to understand their background and skills, and the perspective from which they are likely to consider one's claims – and adapt one's own vision accordingly

- Demanding for both scientists and policy-makers as intended interlocutors
  - Resource-hungry: time, thinking, logistics, emotional energy
  - Technically challenging: Standardization needs to be balanced with situational knowledge
  - Epistemically complex: evidencing truth-value requires careful assessment of what constitutes relevant evidence and how it should be presented
  - Value-laden: requires articulation of and engagement with value systems and socio-economic priorities

Thank you for your attention!



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abstract

The rise of the importance of Science for Policy activities has raised an issue of how to maintain scientific freedom and responsibility in an environment, where certain topics and outcomes of research are preferred by the society and are thus better financed. One possible solution to this problem is consistent integration of Open Science principles into policies of science.

The presentation gives a short overview of Open Science principles and discusses the means of how to align them with Science for Policy requirements.