Data Schools

Open and Responsible Research 2
Open Science

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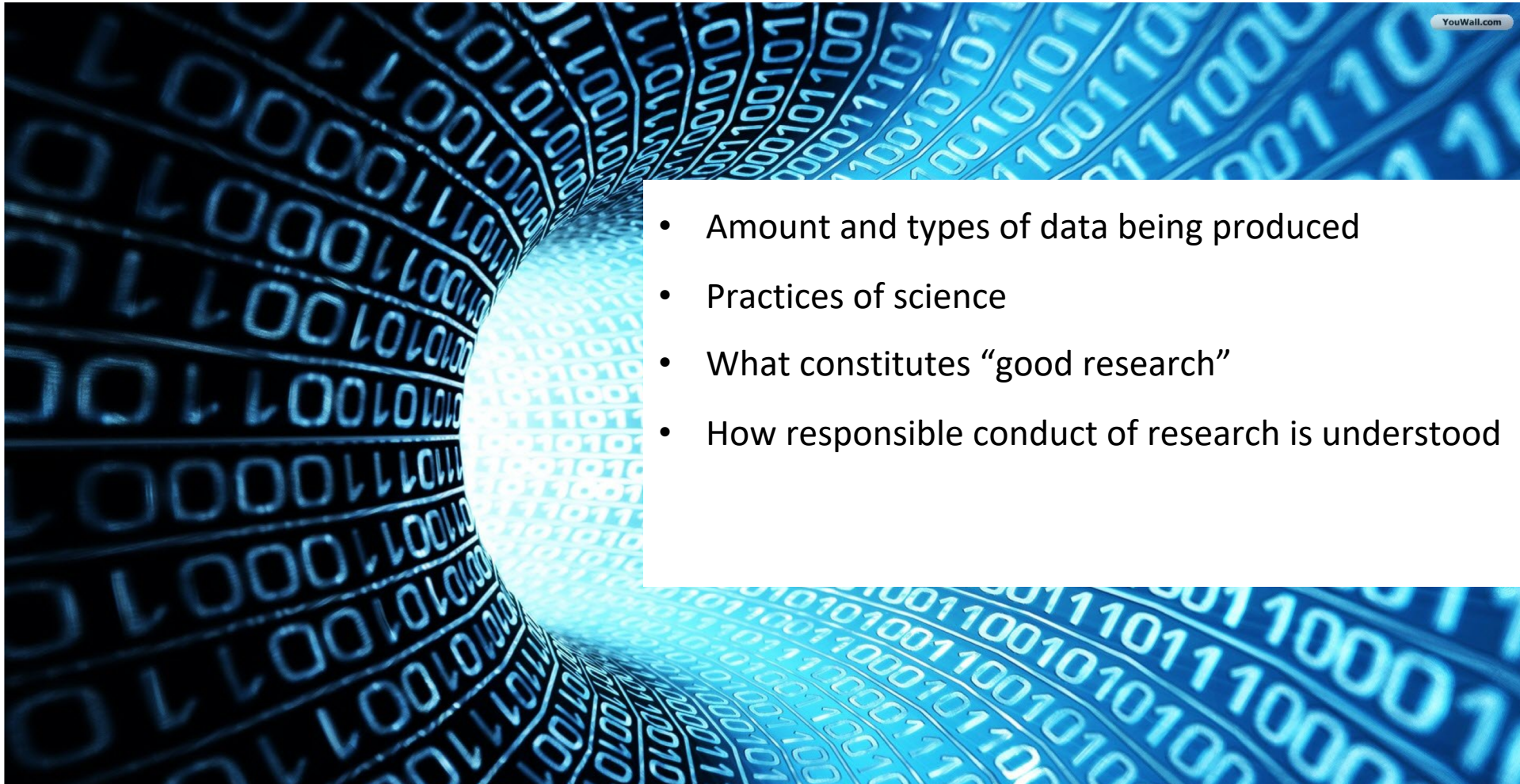


- Amount and types of data being produced
- Practices of science
- What constitutes “good research”
- How responsible conduct of research is understood

Translating RCR into a Digital Age

- Understandings of RCR in a digital age continue to evolve
- Extension of existing discussion, but also new areas for concern
    - Opportunity to share vs loss of control
    - Increase benefits of research for public vs possible harms
    - (Un)Intended marginalizations
    - Data recombination, re-use

New Questions for RCR

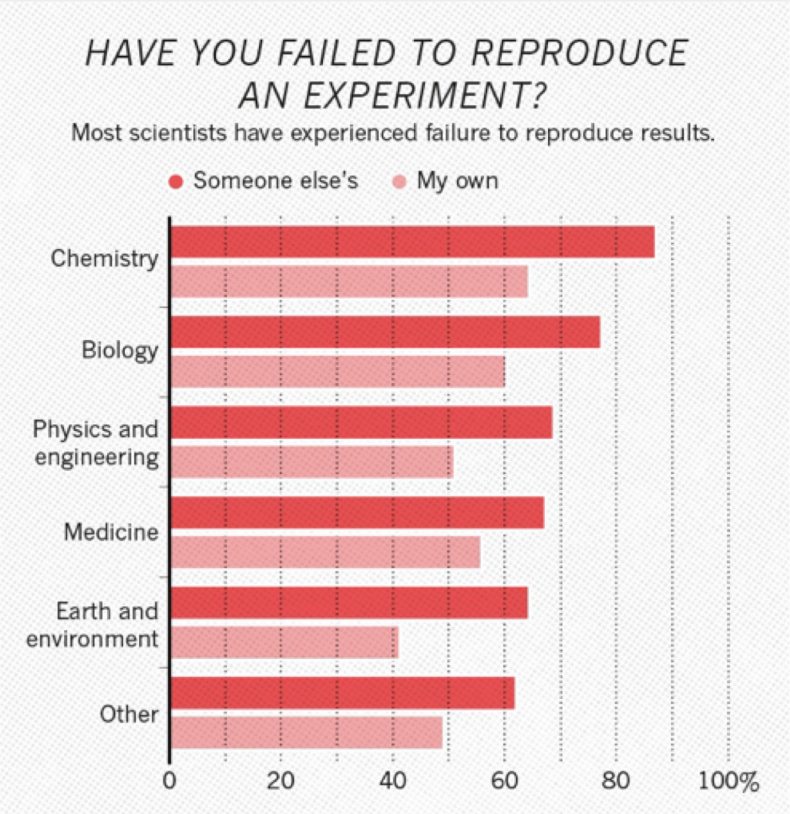
- How can the evolving power of digital technologies be harnessed to uphold the principles of responsible research?
- How can practices and structures of scientific research be adapted to ensure that research benefits the most number of people?
- How can the culture of science be adapted to support this evolution?
- What is the role of the individual scientist/institution/nation/infrastructure in this revolution?

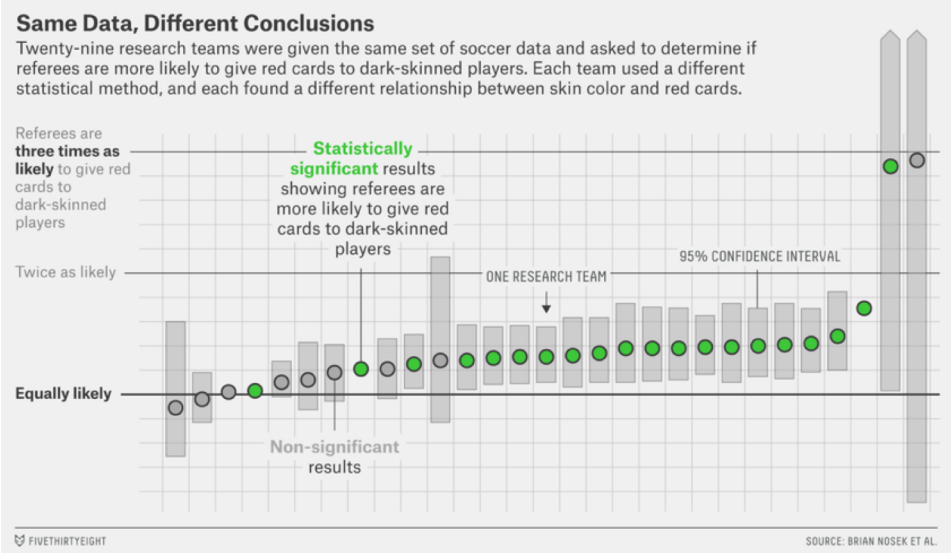
How do we ensure that we create presents and futures that uphold ethical principles and allow research with integrity?

What Is Needed Is More Openness

- There is an historical precedence for this argument:
  - Openness is a core value of science/research
  - Merton 1942
    - Communalism
    - Universalism
    - Disinterestedness
    - Organized skepticism
- Long tradition of sharing resources and scrutinizing research
- Transparency of data and sharing of resources key to addressing issues of reproducibility, networking and public trust

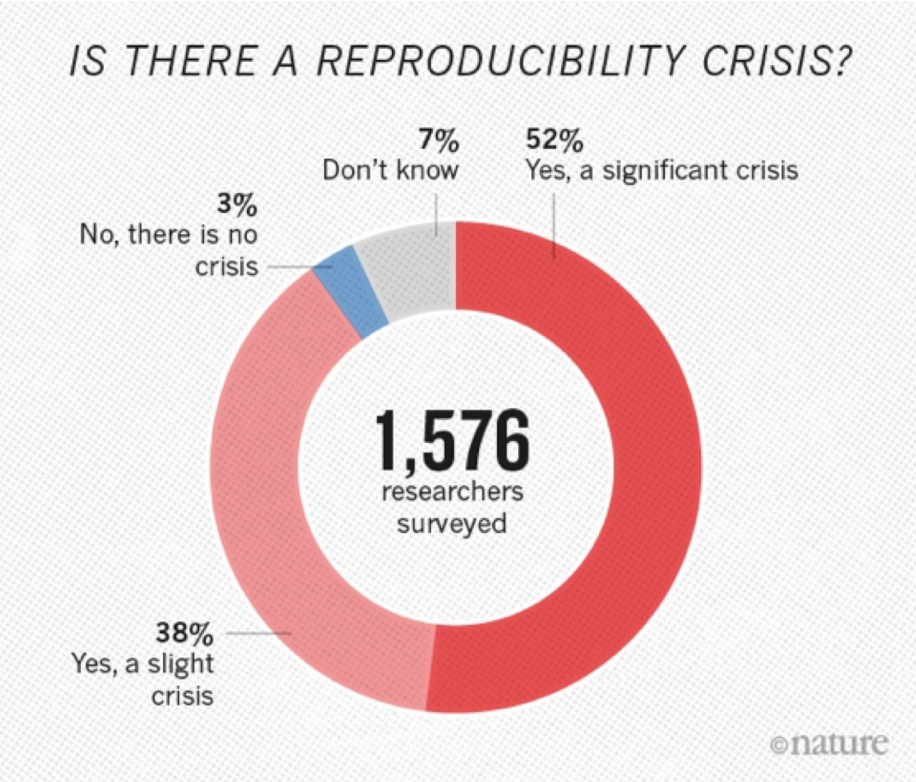
A Reproducibility Crisis?





- Nature survey of 1,576 researchers (Baker et al 2016)
- https://psyarxiv.com/qkwst/

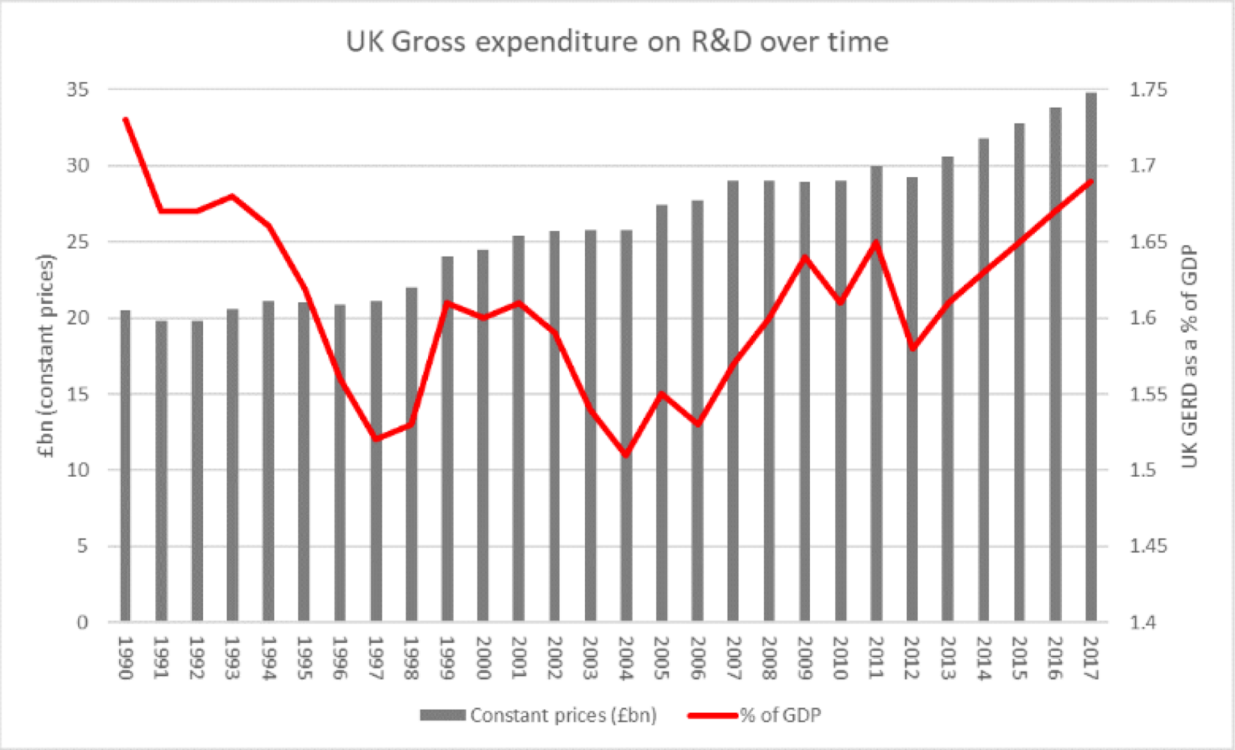
A General Consensus?



- Variability in analysis and methodology
- Incentives aligned towards publication not reproducibility
- Lack of transparency and access to data

Nature survey of 1,576 researchers (Baker et al 2016)

Returns on Public Investment



http://www.sciencecampaign.org.uk/news-media/case-comment/uk-r-d-investment-rises-in-2017.html

New Forms/Places of Knowledge Production

- Big Data
- AI
- Social data
- Citizen science
- Blurred boundaries between academia, commerce and government

https://www.britannica.com/topic/The-Fourth-Industrial-Revolution-2119734

SUSTAINABLE DEVELOPMENT GOALS
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SUSTAINABLE DEVELOPMENT GOALS

Time For A New Approach?

Increase trust in science, don't waste public resources

Get constructive feedback

Be international and inclusive

Increase the speed of discovery

Pictures from freepik.com by @brgfx, @makyzz; flaticon.com by Icon Pond, Dimitry Miroliubov

Slide taken from the LMU OSC toolbox

Open Science

- **The products of scientific research should be freely available to everyone to use and republish as they wish, without restrictions from copyright, patents or other mechanisms of control**
- Open Science includes activities that:
  - facilitate resource sharing
  - improve awareness of sharing
  - create linkages between resources
  - advocate for removal of financial barriers

Open Science

- The movement to make scientific research, data and dissemination accessible to all levels of an inquiring society

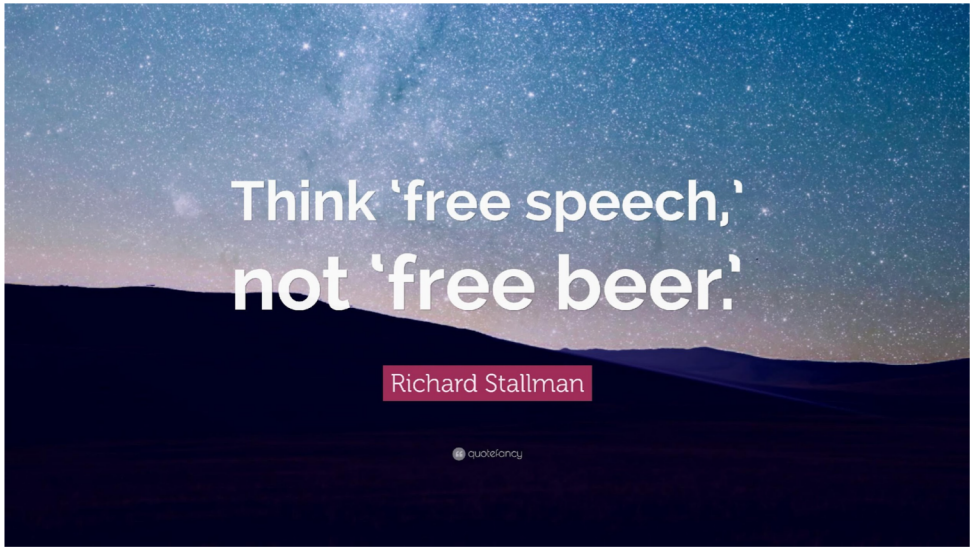
  https://www.fosteropenscience.eu/taxonomy/term/7]

- Scope:
  - Transparency in experimental methodology, observation, and collection of data
  - Public availability and reusability of scientific data
  - Public accessibility and transparency of scientific communication
  - Using web-based tools to facilitate scientific collaboration

  http://www.openscience.org/blog/?p=269]

Free Speech ... Not Free Beer

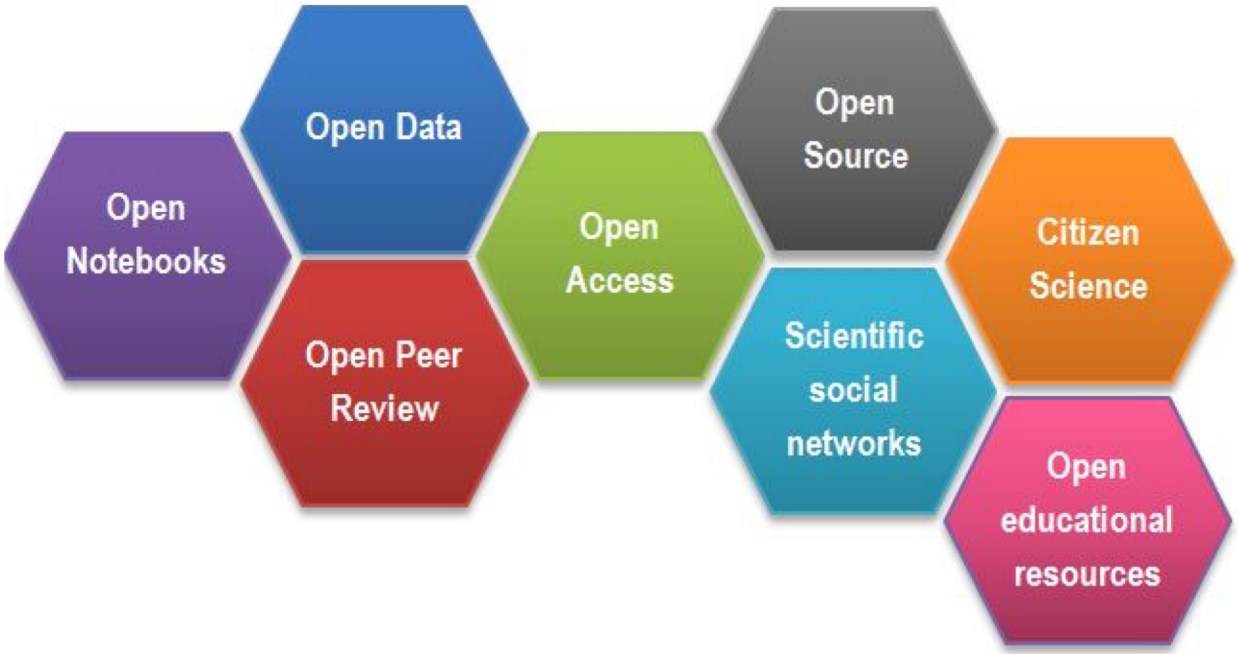
- *Gratis* versus *Libre*
  - "**Free**" means there is no cost, where **libre** means "at liberty", referring to the freedom to modify source code. **Libre** doesn't mean **gratis**. **Libre** can mean available. **Libre** can mean without restriction



As Open As Possible, As Closed As Necessary

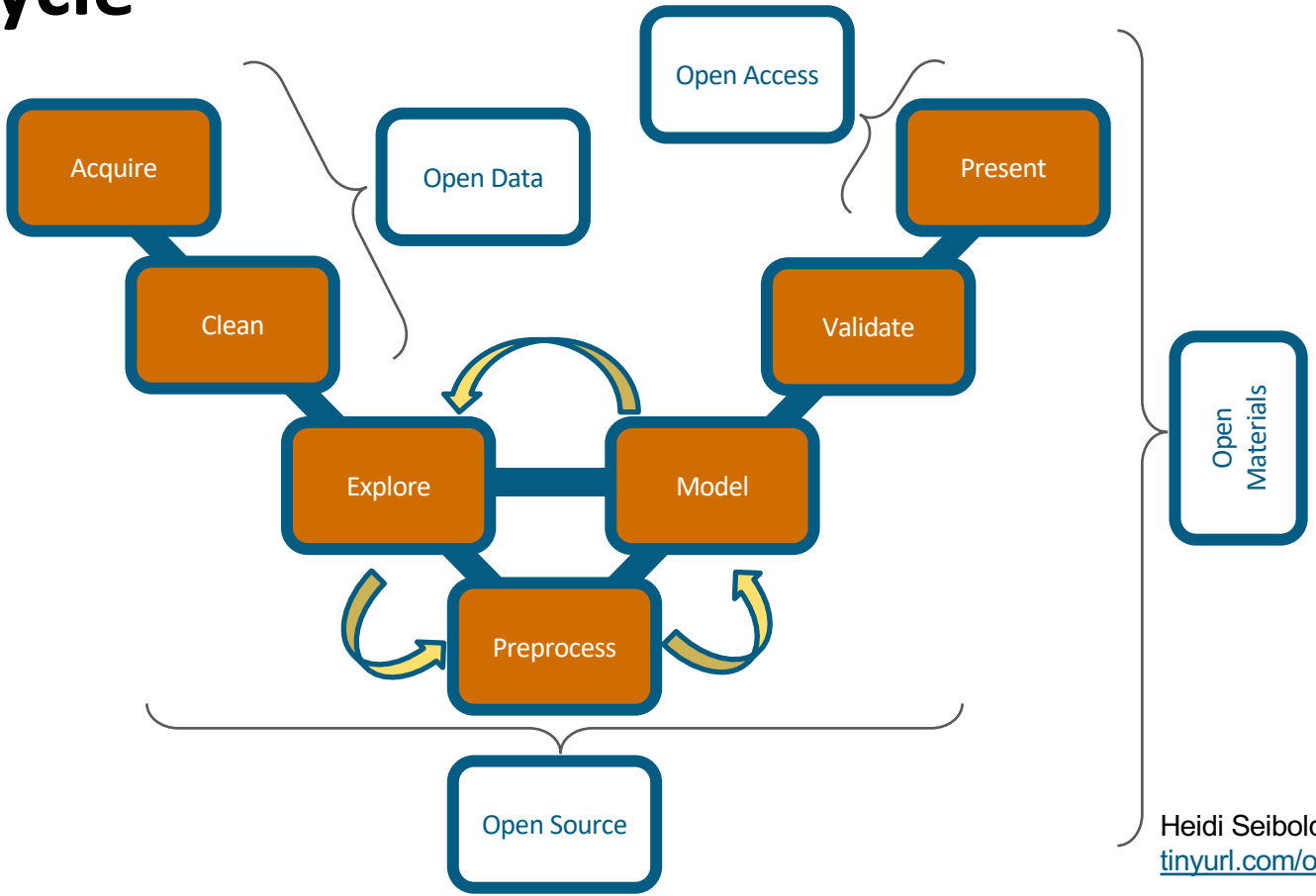
https://www.timeshighereducation.com/blog/data-should-be-open-possible-and-closed-necessary

Open Science: an Umbrella of Many Activities



https://www.fosteropenscience.eu/content/what-open-science-introduction

Open Science Throughout The Research Lifecycle



Heidi Seibold
tinyurl.com/opendatascience

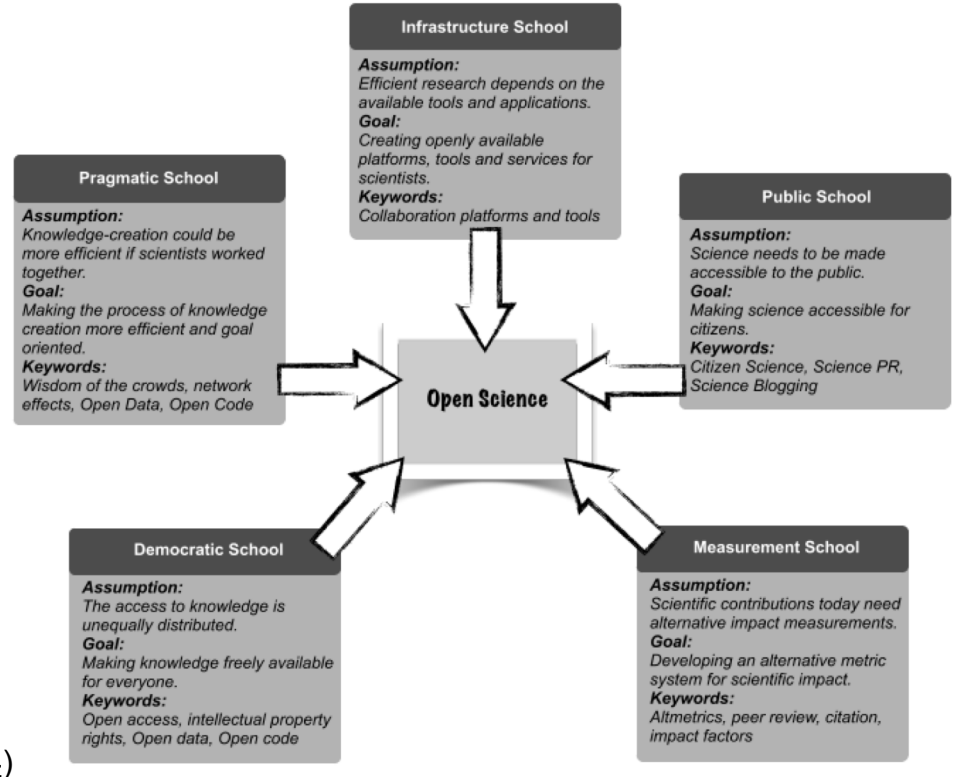
A Way of Thinking And Doing

- An ideology as well as a set of practical actions
- Changing the way we think about responsible research
- Requires buy-in and commitment

Open Science as … a Set of Practices

- The practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods
- Practice-based ethics

Different Motivations, Same Response



(Fecher and Friesike, 2014)

https://www.fosteropenscience.eu/content/what-open-science-introduction

Open Science as … a Cultural Change

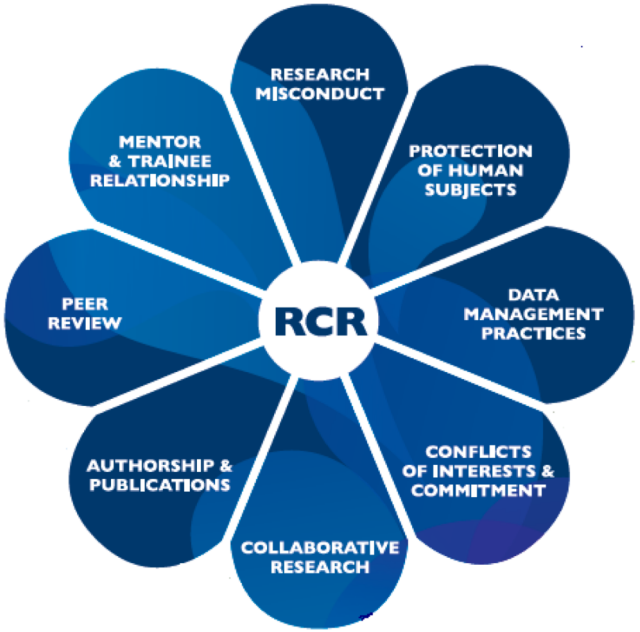
- The products of scientific research should be freely available to everyone to use and republish as they wish, without restrictions from copyright, patents or other mechanisms of control
- Justice, responsibility, egalitarianism

Open Science is Many Things

- Open Science includes activities that:
  - facilitate resource sharing
  - improve awareness of sharing
  - create linkages between resources
  - advocate for removal of financial barrie
  - advocate for just distribution of resourc

Open Science: an Extension of RCR Values

- Openness can be thought of as an extension of RCR
- Allows researchers to uphold *integrity* and core *ethical values* underpinning RCR
- Allows researchers to engage in practical activities relating to RCR



Openness as an Extension of RCR

- A just distribution of resources (public funds and research products)
- A way of maximizing the benefits of research
- A safeguard against possible harms arising from research
- As a means of improving accountability and transparency
- An enactment of collegiality

Openness in RCR

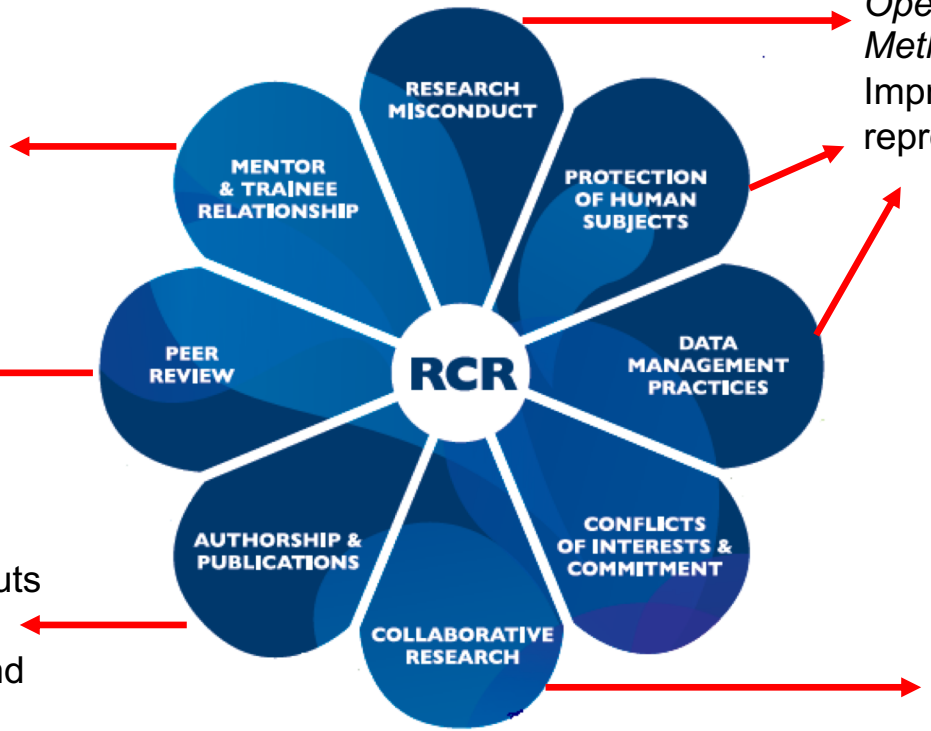
Open Lab Books: Transparency in research practices

Sharing and openness: enhance transmission of values

Open Peer Review: Transparency in peer review leads to better dialogue and collegial behaviour

Open Access: Improves availability of research outputs

Open publishing: leads to improved citations, credit and collaboration

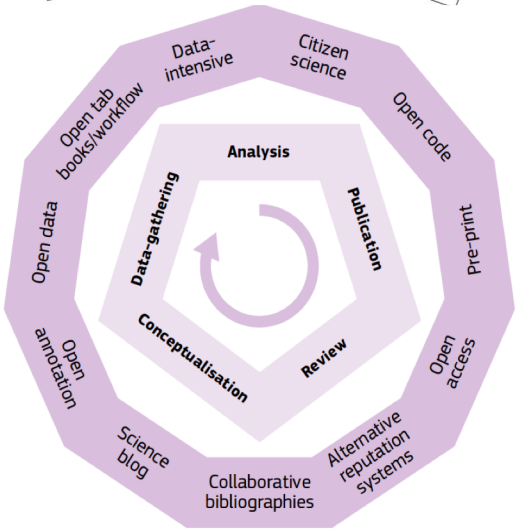


Open Data and Open Methodologies: Improve transparency and reproducibility of research

Open Science Tools: Improve collaboration

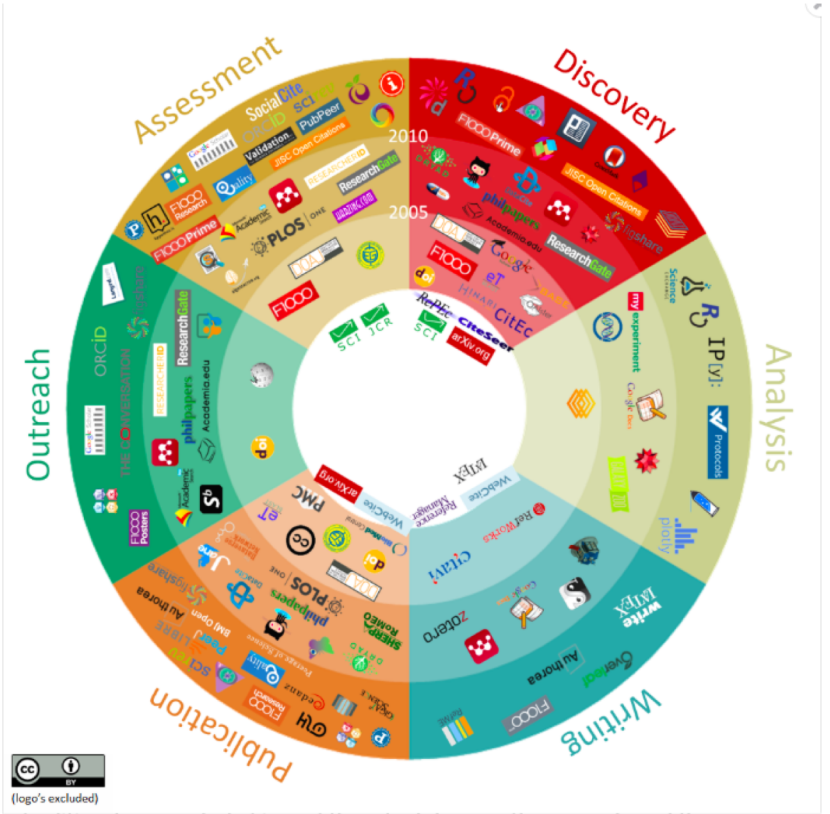
Extending the Reach of RCR

- Creating new visions for the future
- *Policy:* guiding research priorities and practices
- *Open Education, Open Hardware:* getting marginalized communities into research



Extending the Reach of RCR

- Changing the way research is done
- Changing the tools in research
- Linking up areas, disciplines and communities



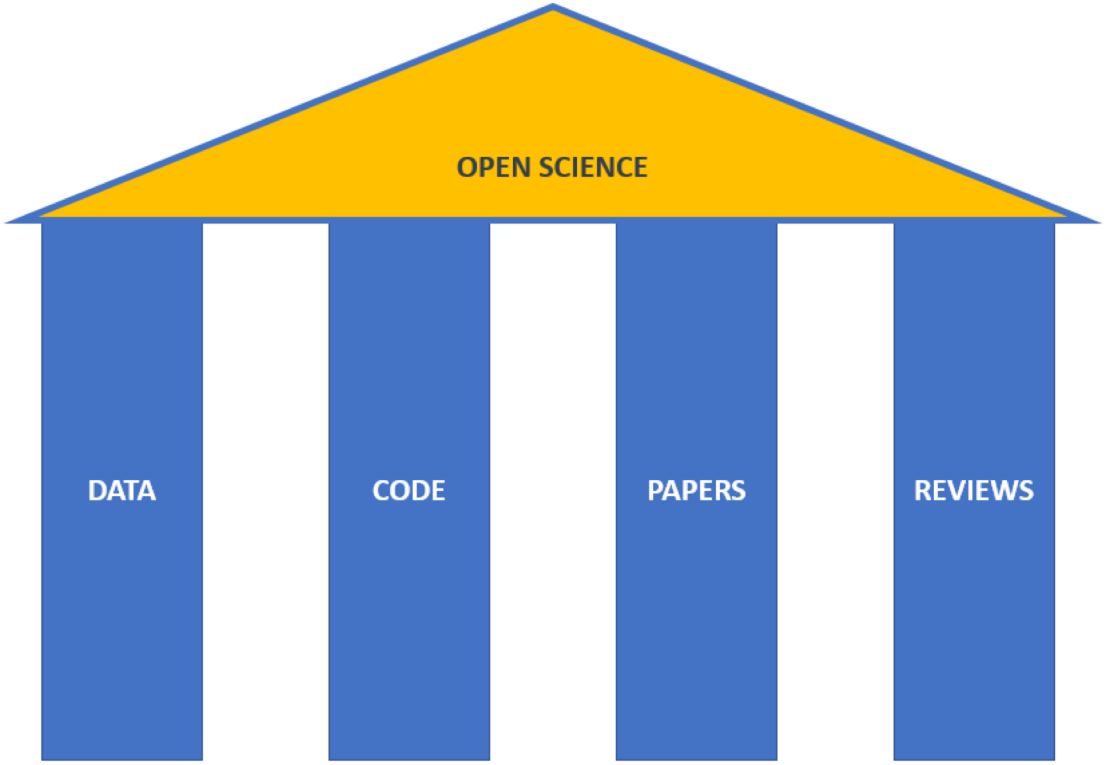
www.openuphub.eu/component/k2/item/610-101-innovations-in-scholarly-communications

Big Picture/Little Picture

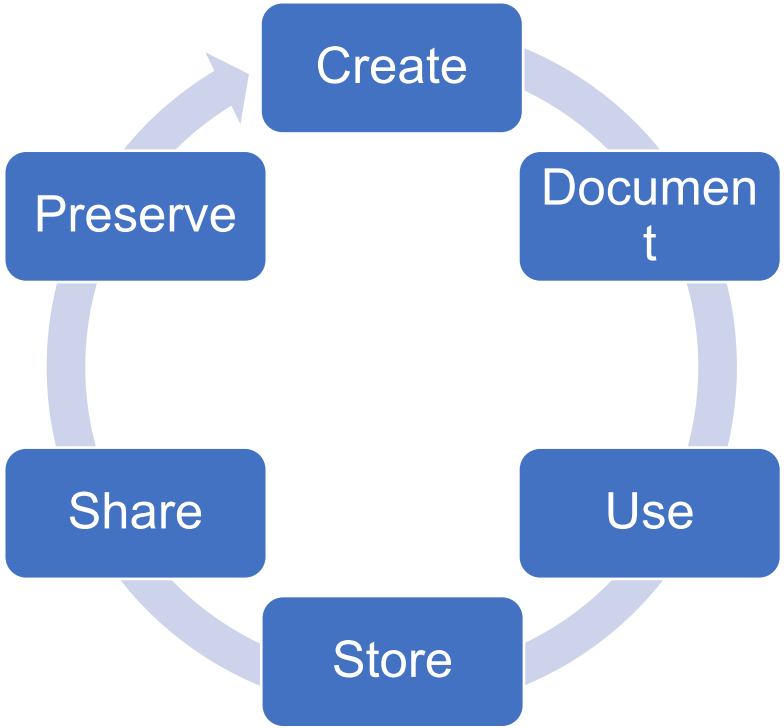
- Open Science is a cultural movement as well as a set of practices
- Individual researchers can show support for Open Science through the way they do their research
- Can make changes to daily research practices to be more open in all aspects of research

- *There is no “hard and fast” rule – openness must work for you within your specific work context and with your daily challenges*

“My” Open Science



Different Actions at Different Stages



Individual Openness: More Than Open Access

Share your data - the research data that underpins publications should also be accessible to support validation and facilitate reuse. In cases where data sensitivities won't allow open access, be sure to provide details on how someone could request authorised access.

Share your code - many researchers now develop bespoke bits of code to help them analyse and/or visualise the data they have collected. Having access to this code is essential for supporting the validation of your findings and to help others to build upon your work.

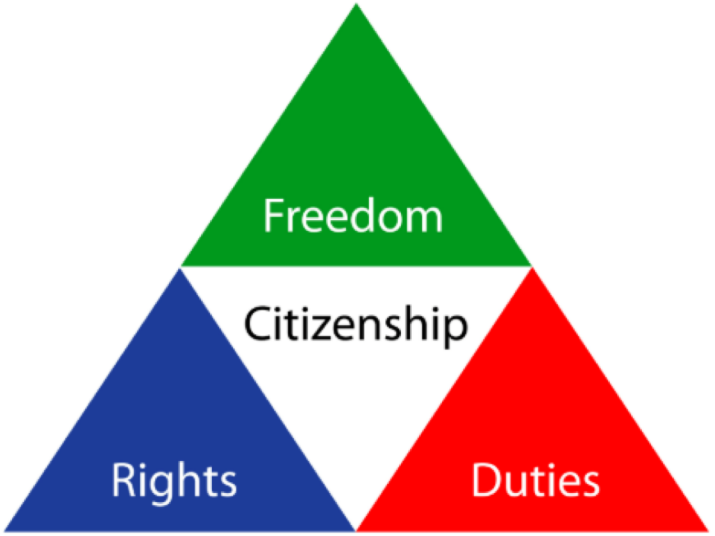
Share your workflows - without knowing what steps were taken to capture, process and analyse the data - and in what order - it can be virtually impossible to validate published findings. This has led to what some are calling the Reproducibility Crisis. Nature's special issue on Challenges in Irreproducible Research gives you a better sense of the scale of this problem.

Pragmatic Openness

- Openness in research is new ... And can be scary
  - It’s ok to have concerns
  - It’s ok to realise that not all the open practices will work for you
  - There can be legal, regulatory, ethical reasons not to share
- However, you benefit from the increasingly open research landscape (papers, data, software)
- So, how can one avoid ”freeloading”?

Responsible and Open Research as Citizenship

- Citizenship:
  - ethical obligations arising out of social living
  - being part of a community requires the acceptance of civic responsibilities and contribution to the overall public good
- As a citizen you have duties and expected ways of acting
  - Follow rules
  - Participate in community activities
  - Protect the community and its resources from misuse



Responsible and Open (Data) Science Citizenship

- Research is a community endeavour
  - involves social actions such as resource sharing and communal practice
  - responsible researchers are “citizens” of the research community
- Citizenship is a give and take
  - Benefits to facilitate freedom of research
  - Structures to safeguard rights as researcher
  - Responsibilities to assume to protect culture
- Support and grow culture instead of just living in it

Responsible and Open (Data) Science Citizenship

- RCR and Open Science form the blueprint for a form of ”science citizenship”
- Research relies on the use of “community resources”
  - data, papers and so forth
- As a “citizen” of the research community you therefore have responsibilities for these resources
  - follow community determined rules (such as citation, licensing and so forth)
  - Contribute to communal resources (data sharing)
  - Maximise good for the community by participating in civic service (reviewing, curating etc)