

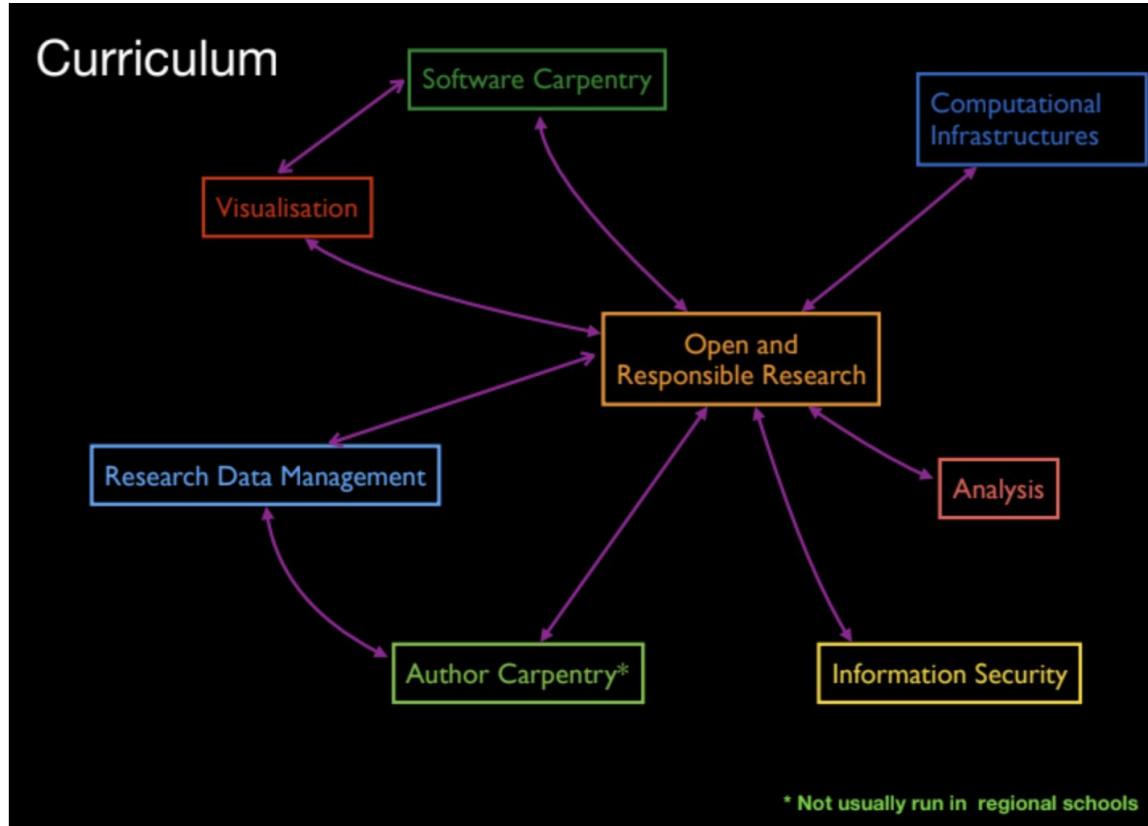


Data
Schools

Open and Responsible (Data) Science Citizenship 1

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Leiden University

Our Curriculum

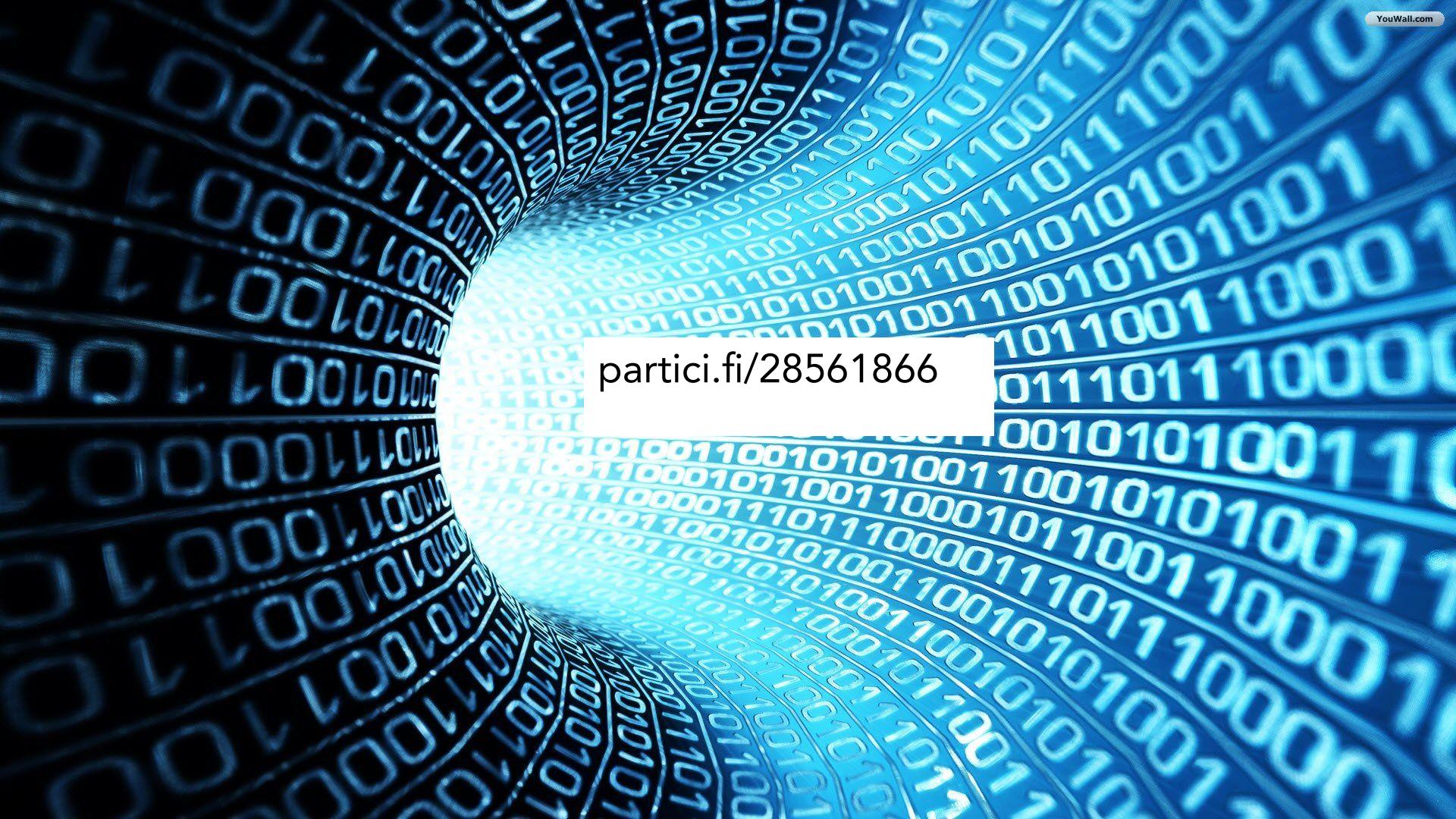


Plan for the Morning

1. Responsible conduct of research
2. Open Science as a new way of being responsible
3. Being a responsible, open science citizen

Not just about learning data science ... learning responsible data practices

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Responsible Conduct of Research

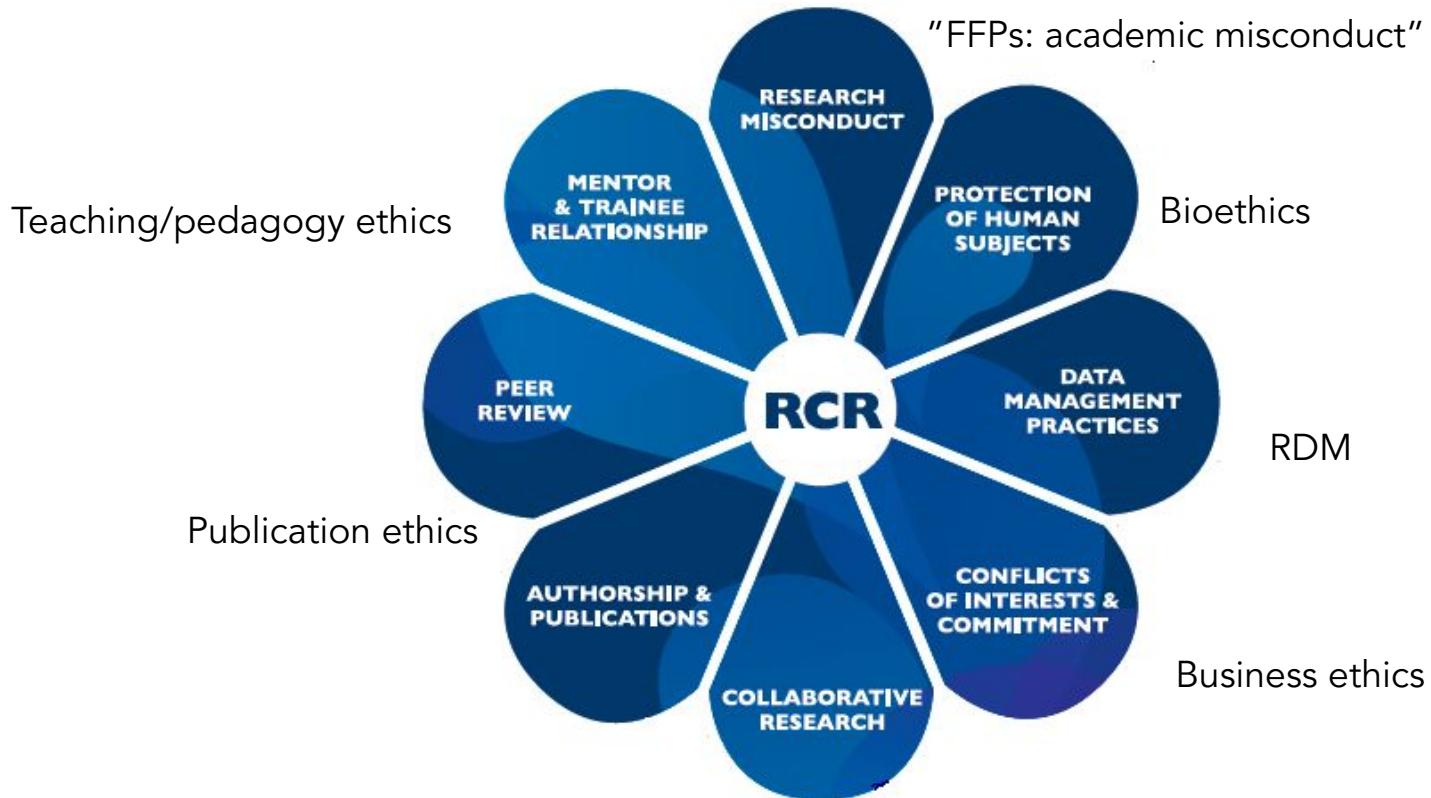
- Not just about being
 - “good at your work”
 - producing data
 - getting on with your colleagues
- As knowledge producers, educators and recipients of public funds we have additional responsibilities as researchers

Balancing Multiple Roles as a Researcher

- Data producer
- Data user and/or collaborator
- Author
- Employee
- Teacher/mentor
- Recipient of public funds
- Recipient of public trust
- Citizen/legally-obligated individual
 - *How do all these roles fit together?*



Responsible Conduct of Research



Responsibility as a Product of Integrity

- Practice of scientific investigation with integrity

integrity

/ɪn'teɡriti/ 

noun

1. the quality of being honest and having strong moral principles.

"a gentleman of complete integrity"

synonyms: honesty, uprightness, probity, rectitude, honour, honourableness, upstandingness, good character, principle(s), ethics, morals, righteousness, morality, nobility, high-mindedness, right-mindedness, noble-mindedness, virtue, decency, fairness, scrupulousness, sincerity, truthfulness, trustworthiness
"I never doubted his integrity"

2. the state of being whole and undivided.

"upholding territorial integrity and national sovereignty"

synonyms: unity, unification, wholeness, coherence, cohesion, undividedness, togetherness, solidarity, coalition
"internal racial unrest threatened the integrity of the federation"

Key Ethical Norms

- Responsible research involves the awareness and application of professional norms and ethical principles in all areas relating to research
- Norms/values are the “glue” linking all research practices
 - Beneficence (do good)
 - Non-maleficence (cause no harm)
 - Equity and fairness
 - Diversity and inclusiveness
 - Quality and transparency



Codes of Conduct

- Ethics are often outlined in disciplinary codes of conduct
- Can be helpful ways of summarizing areas of activity to think about in relation to RCR

ACM Code of Ethics and Professional Conduct

1. GENERAL ETHICAL PRINCIPLES.

1.1 Contribute to society and to human well-being, acknowledging that all people are stakeholders in computing.

1.2 Avoid harm.

1.3 Be honest and trustworthy.

1.4 Be fair and take action not to discriminate.

1.5 Respect the work required to produce new ideas, inventions, creative works, and computing artifacts.

1.6 Respect privacy.

1.7 Honor confidentiality.

2. PROFESSIONAL RESPONSIBILITIES.

2.1 Strive to achieve high quality in both the processes and products of professional work.

2.2 Maintain high standards of professional competence, conduct, and ethical practice.

2.3 Know and respect existing rules pertaining to professional work.

2.4 Accept and provide appropriate professional review.

2.5 Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks.

2.6 Perform work only in areas of competence.

2.7 Foster public awareness and understanding of computing, related technologies, and their consequences.

2.8 Access computing and communication resources only when authorized or when compelled by the public good.

2.9 Design and implement systems that are robustly and usably secure.

3. PROFESSIONAL LEADERSHIP PRINCIPLES.

3.1 Ensure that the public good is the central concern during all professional computing work.

3.2 Articulate, encourage acceptance of, and evaluate fulfillment of social responsibilities by members of the organization or group.

3.3 Manage personnel and resources to enhance the quality of working life.

3.4 Articulate, apply, and support policies and processes that reflect the principles of the Code.

3.5 Create opportunities for members of the organization or group to grow as professionals.

3.6 Use care when modifying or retiring systems.

3.7 Recognize and take special care of systems that become integrated into the infrastructure of society.

4. COMPLIANCE WITH THE CODE.

4.1 Uphold, promote, and respect the principles of the Code.

4.2 Treat violations of the Code as

RCR as a Collaborative Endeavour

- Moving beyond the idea of “evil scientist” and “ivory tower”
- Focus on research ecosystems
 - Researchers
 - Research support staff
 - Institutions
 - National/international context
 - Society

Institutional Responsibilities

- Education
 - Infrastructures that support responsible research
 - Capacity for dealing with concerns/whistleblowing/misconduct
 - Engagement and compliance with inter/national regulation
-
- *The roll-out of RCR can be patchy. We will discuss this more in the next ethics lecture.*

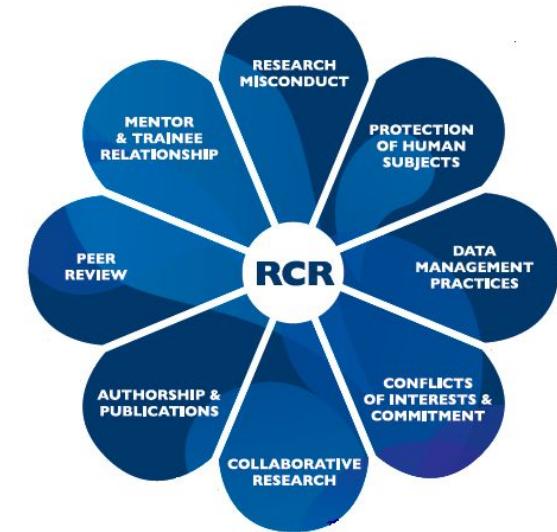
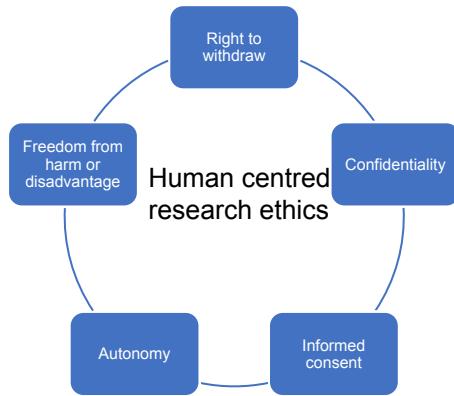
Responsible Research as a Collaboration

RCR is not left up to the individual

- Expectations of conduct
- Research integrity training
- Ethical review of research proposals
- Legal oversight to ensure compliance with national and international laws
- Data management and curation

- Ideally all aligned to support common ethical norms and values

RCR as an Extended Form of Research Ethics



Fostering ethical excellence
instead of avoidance of
misconduct

Extending the Reach of Ethics in Research

- Produce verifiable and re-usable data
- Protect scientists and societies from harm
- Enable collaboration
- Ensure investments (financial, trust, time etc) are recompensed
- Embeds science within cultural/social priorities



Moving Beyond the Individual

- RCR focused on research integrity and research systems that support research integrity
- Responsibility of individuals and individual institutions to produce *beneficial* research in service of society
- How does this work as research and data becomes more digital?

The Digital Revolution

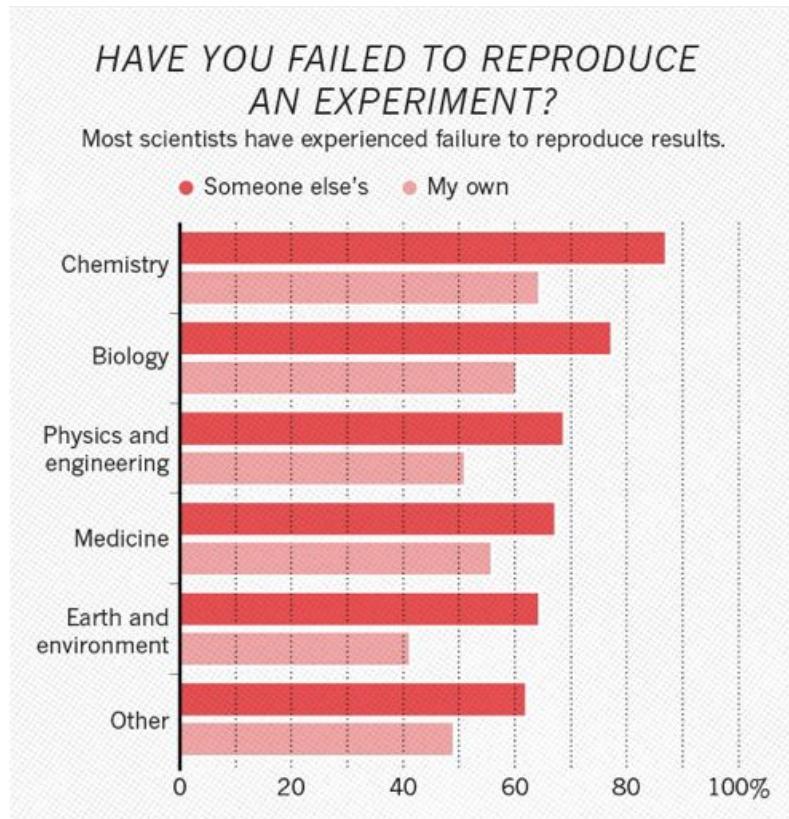
- Data “deluge”
- Big Data
- AI
- Increasing opportunities and prioritization of interdisciplinary research



Changing Research Environments

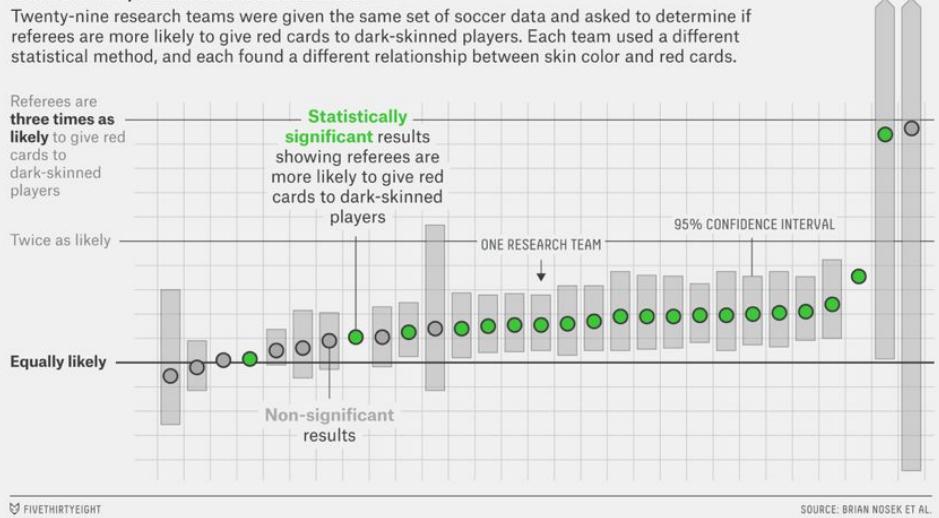
- Advances in computing have not only changed research, but come at a time of significant change in research
- A number of issues are changing the way we think/talk/govern research
 1. Reproducibility crisis
 2. Siloing of research resources
 3. Increased scrutiny of public investment in research
 4. Sustainable Development Goals (SDGs)
 5. Blurred boundaries between academia, commerce and government
 6. Increased pressure for public access to research resources
 7. Citizen science movement
- Driving forward new models of research practice

1. The Reproducibility Crisis in Research



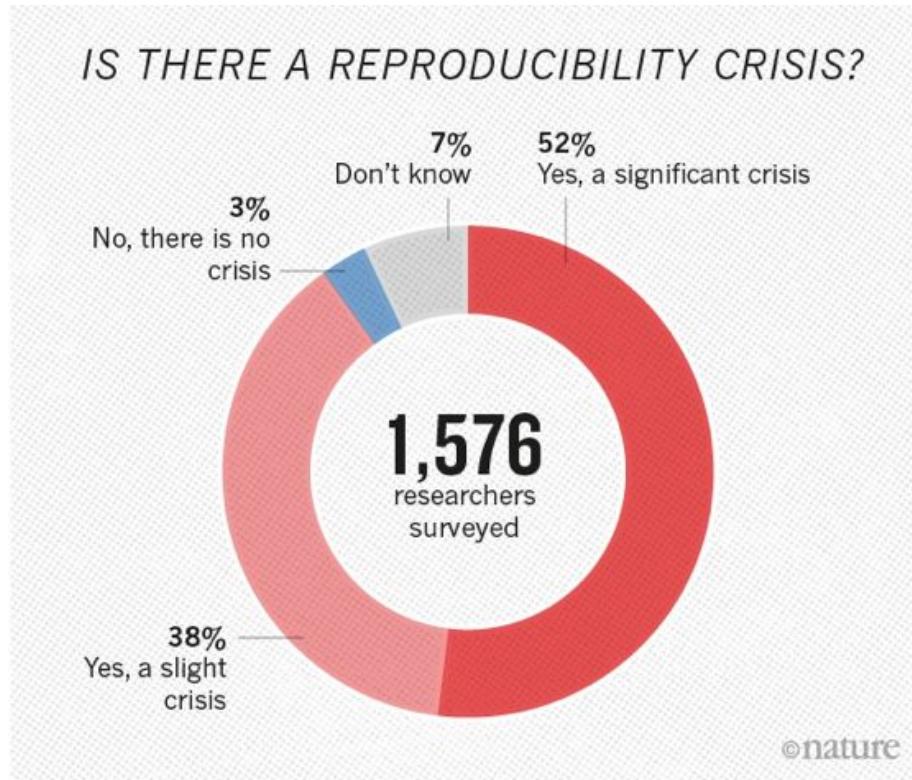
Same Data, Different Conclusions

Twenty-nine research teams were given the same set of soccer data and asked to determine if referees are more likely to give red cards to dark-skinned players. Each team used a different statistical method, and each found a different relationship between skin color and red cards.



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

A General Consensus on the Crisis



- 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)

2. Siloing of Knowledge



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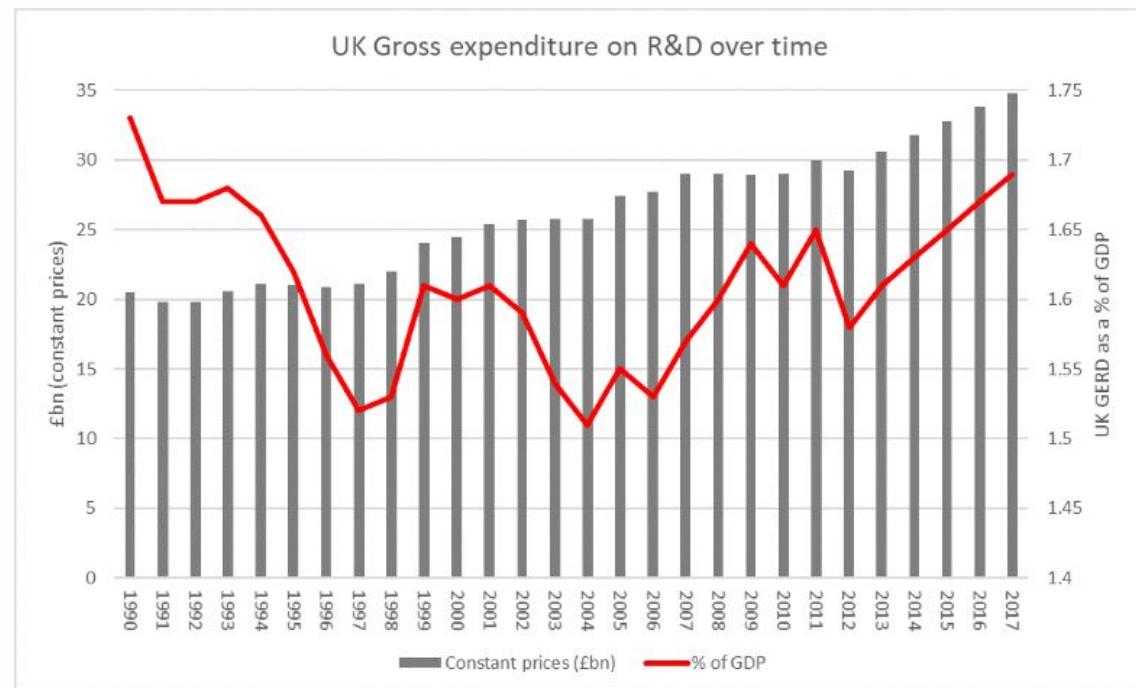
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2 – Gold Open Access – same publishing process as above. The difference is that when an article is accepted for publication, the author/s or funder/s pay an Article Processing Charge (APC). The final version of the published article is then free to read for everyone. The APC to publish Gold Open Access in *Nature* is €9,750 / \$11,690 / £8,490.

3. Public Benefit: Returns on Public Investment

- Increasing scrutiny of public investment in research projects and infrastructures
- Changing models of university financing



[http://www.sciencecampaign.org.uk/news-media/case-comment/uk-r-d-i
nvestment-rises-in-2017.html](http://www.sciencecampaign.org.uk/news-media/case-comment/uk-r-d-investment-rises-in-2017.html)

4. SDGs and Global Good

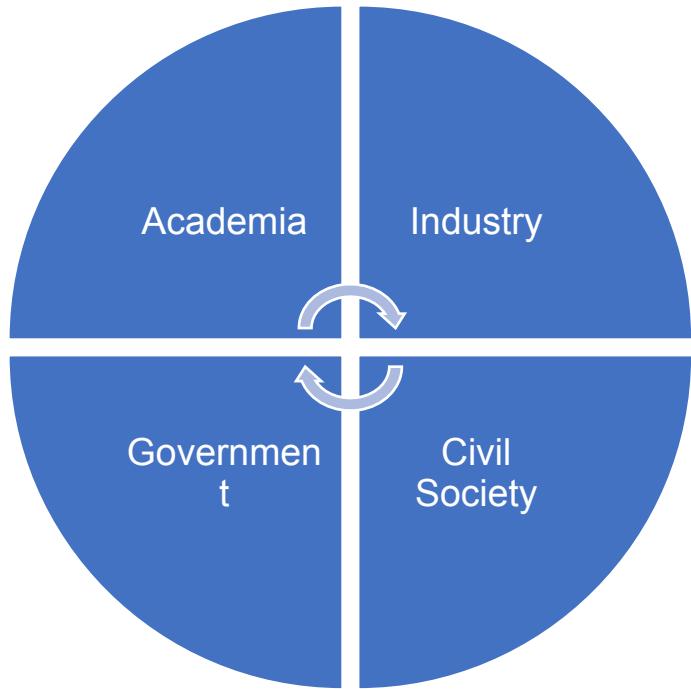


Increased support and funding for research that addresses SDGS and contributes to global development

SUSTAINABLE DEVELOPMENT GOALS



5. Blurred Lines

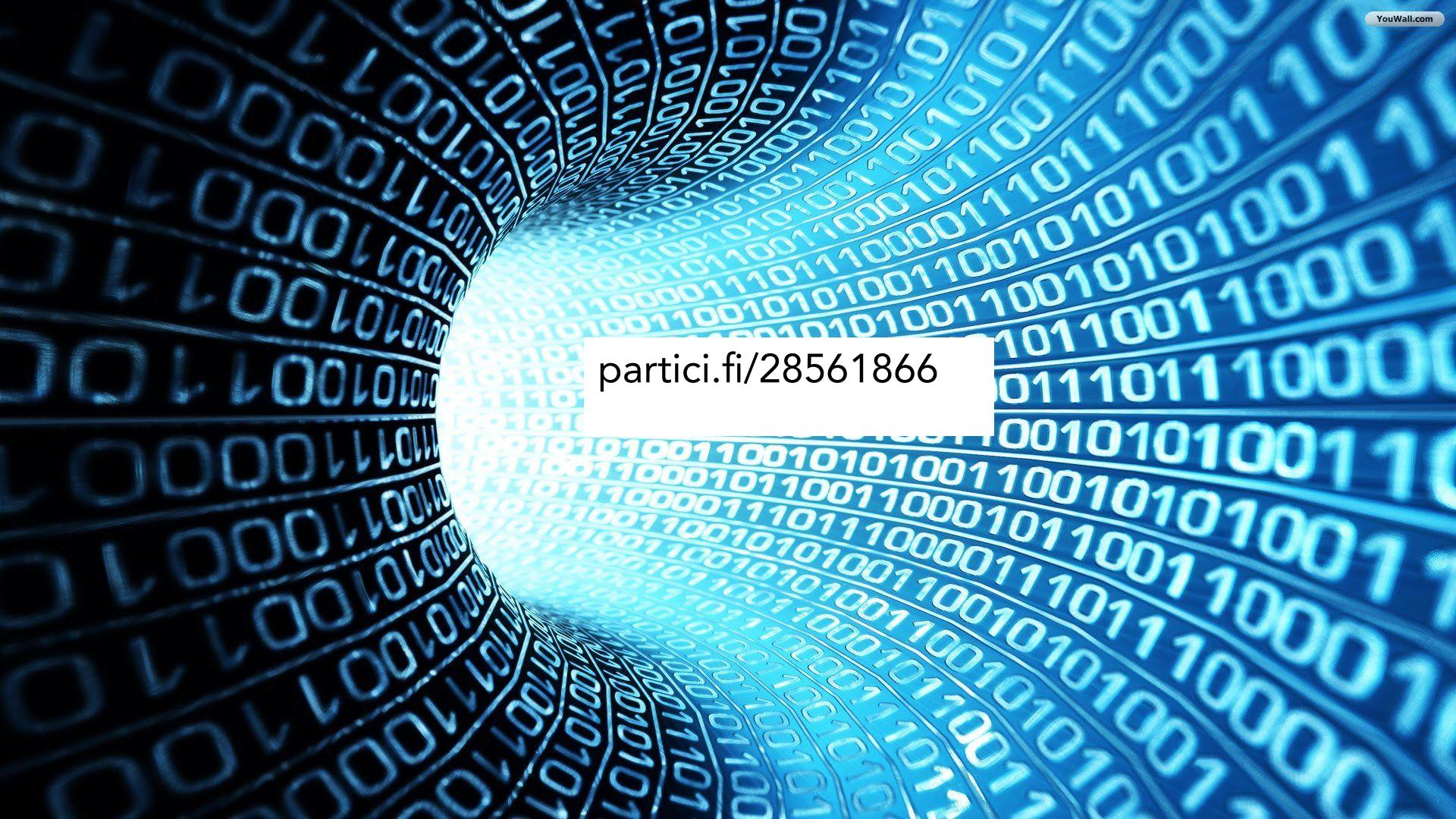


6/7. Societal Involvement



New Challenges for Responsible Research Models

- Broader scope for research impact, but
 - How do we distribute responsibility in/for digital systems and distributed research
 - How do we facilitate the inclusion of non-researchers in research
 - How do we manage sharing and re-use of data
 - Control
 - Ownership
 - Inclusion
 - Reuse

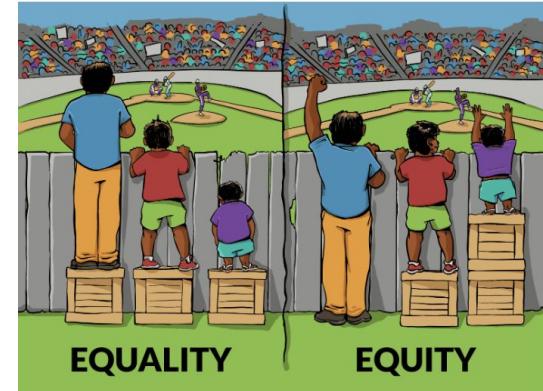


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Questions for Responsible Research

- How to balance the power of digital technologies vs responsible research?
- How to enable changes to culture of science?
- How can research benefit the most number of people around the world?

How do we support equitable research?



Time For A New Approach?



Increase trust in science, don't waste public resources



Get constructive feedback

We need to start to effectively share



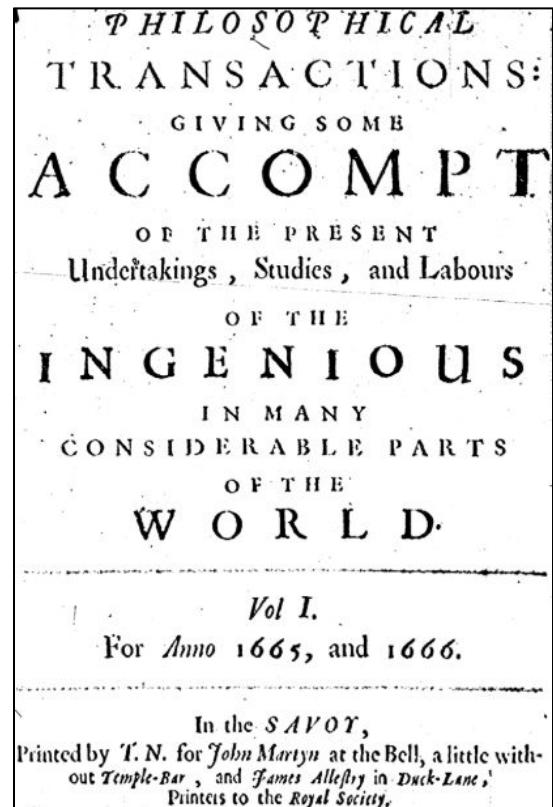
Be international and inclusive

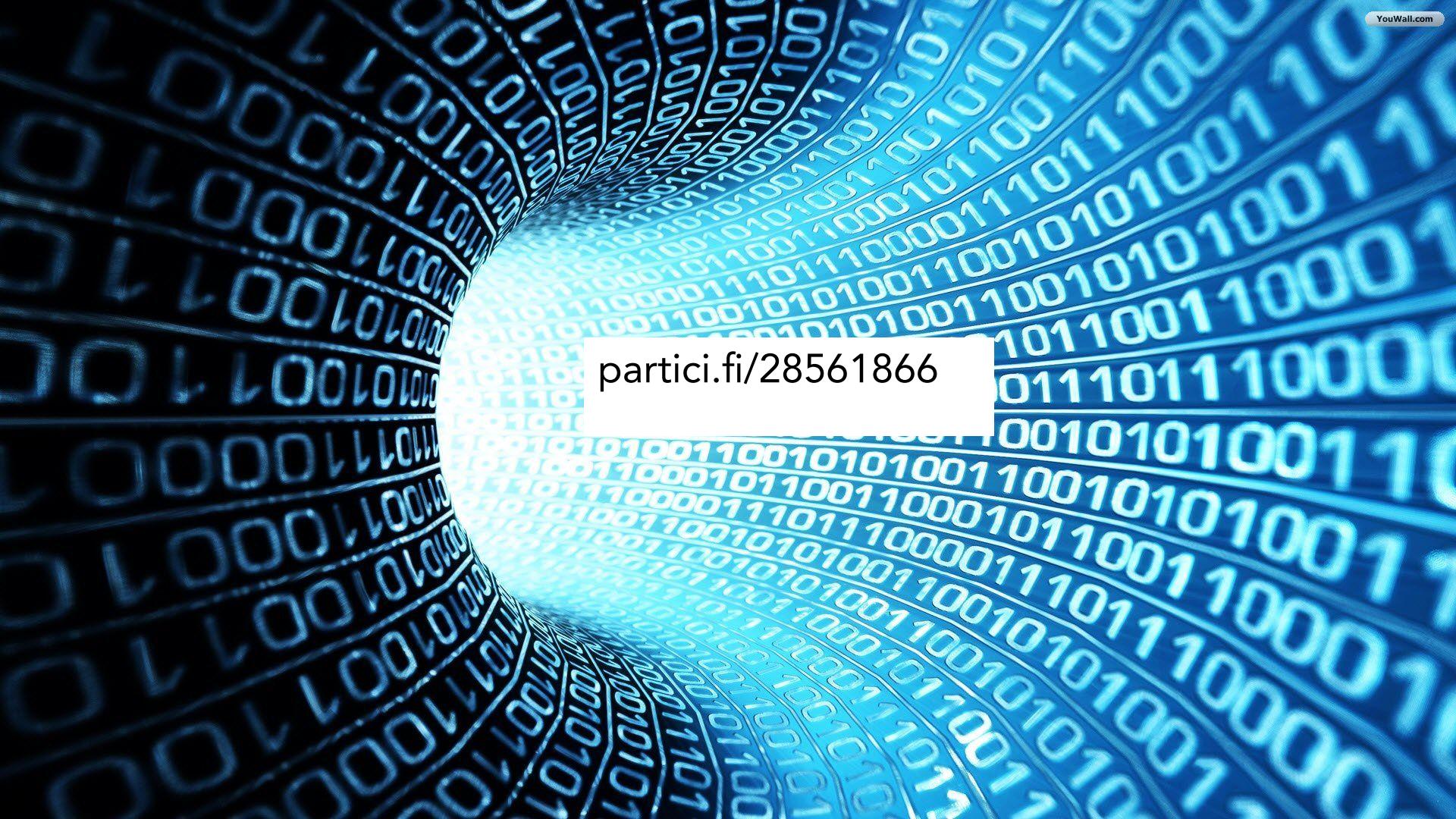


Increase the speed of discovery

Is Openness the Answer?

- Science has always been open(ish)
- Long tradition of sharing resources and scrutinizing research
- Transparency of data and sharing of resources key to advancing research





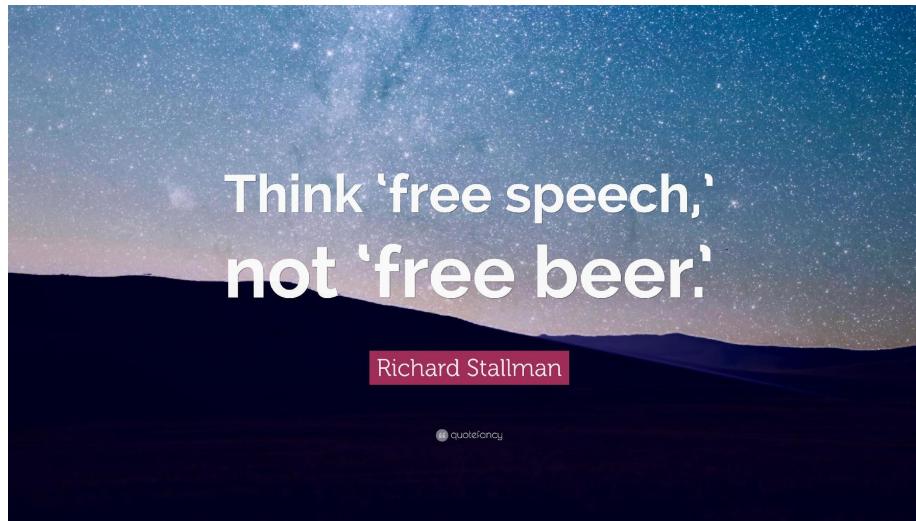
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Any Questions?

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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



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

Scope of Open Science

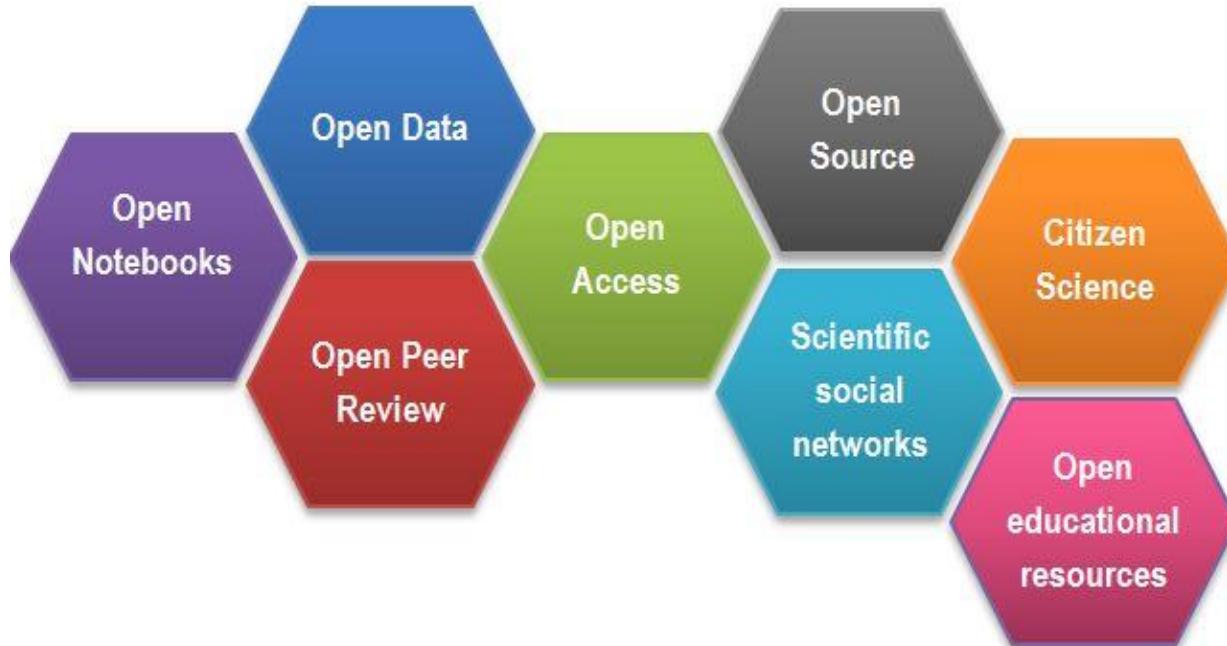
- The movement to make scientific research, data and dissemination accessible to all levels of an inquiring society
- Scope:
 - Transparency in experimental methodology, observation, and collection of data
 - Public availability and reusability of scientific data
 - Public accessibility and transparency of scientific communication
 - Using web-based tools to facilitate scientific collaboration

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 barriers
 - advocate for just distribution of resources



Open Science: an Umbrella for Many Activities



Free and Open Source Software

- Software that is freely licensed to use, copy, study, and change in any way, with source code openly shared to enable the design of the software to be improved



Open Access

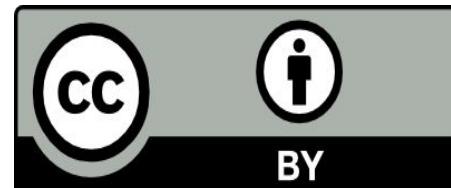
- Set of principles and a range of practices through which research outputs are distributed online, free of access charges or other barriers



Open Data

- Practices to facilitate data being openly accessible, exploitable, editable and shared by anyone for any purpose. Open data is licensed under an open license

Findable Accessible Interoperable Reusable



Other Open Science Movements

- Citizen Science
- Research conducted, in whole or in part, by amateur (non-professional) researchers.
- Also called “public participation”, “participatory monitoring” and “participatory action research”.
- Intended to not only advance research, but also to increase public understanding.
- Open Peer Review
- Any scholarly review mechanism providing disclosure of author and referee identities to one another at any point during the peer review or publication process

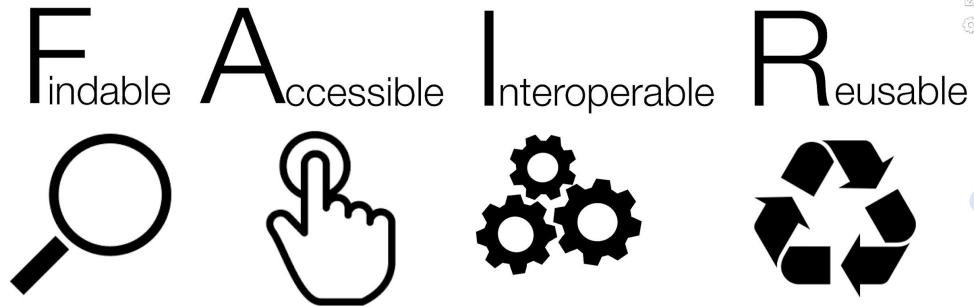
Other Open Science Movements

- Open Educational Resources
- Learning and teaching materials in any format and medium
- Available in the public domain or are under copyright that have been released under an open license, that permit no-cost
- Allows access, re-use, re-purpose, adaptation and redistribution by others
- Scientific social networks
- Networks enabling researchers to share their research under open licenses. Ie. ResearchGate
- Open Hardware
- Physical artifacts of technology designed and offered by the open-design movement.

As Open As Possible, As Closed As Necessary

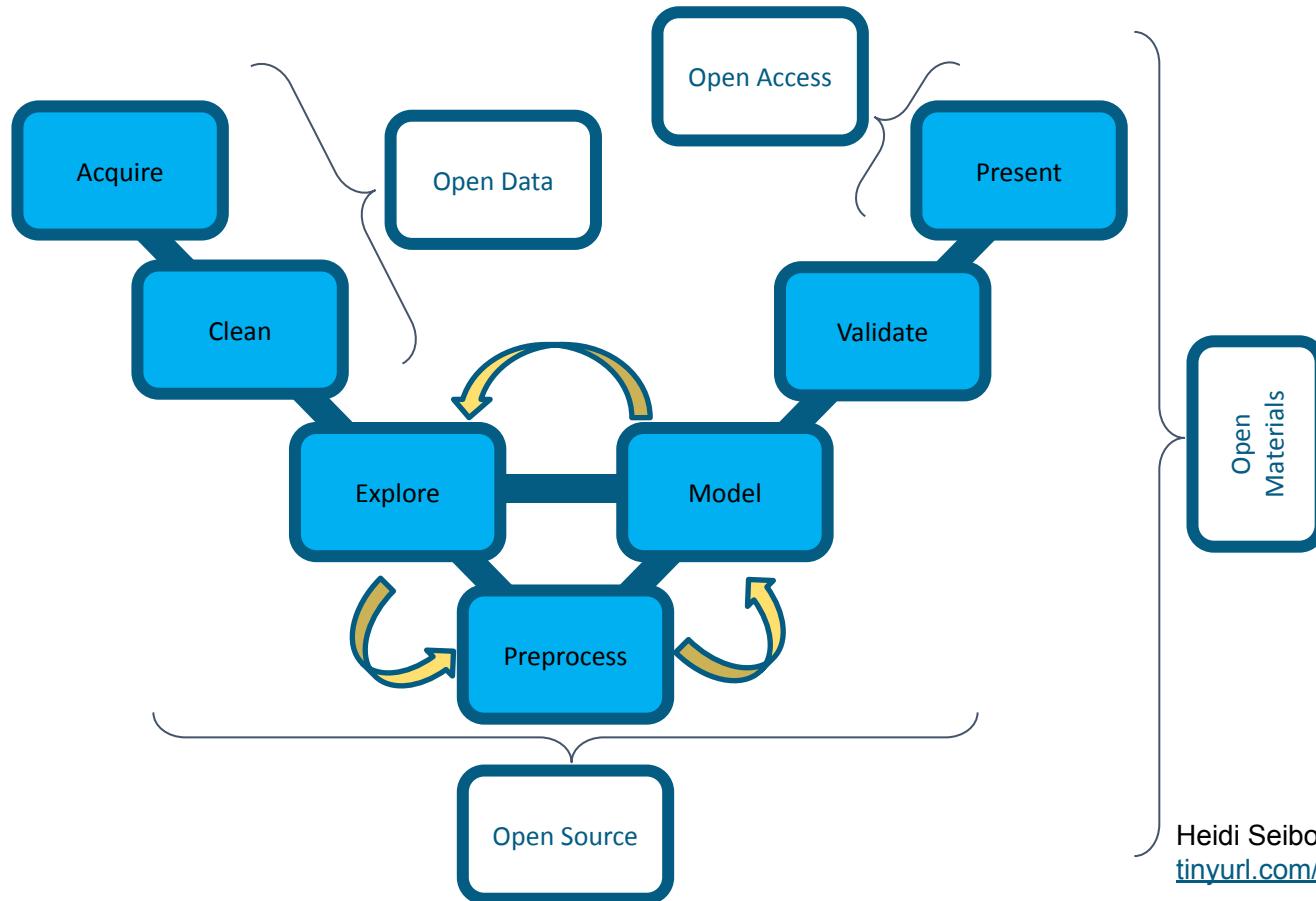


Sensitive data
Commercial
applications
National IP and
traditional
knowledge

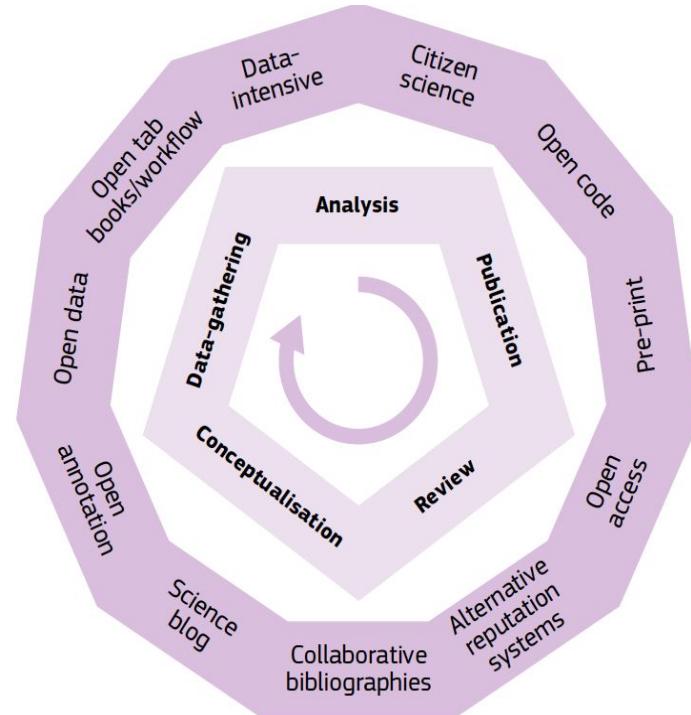
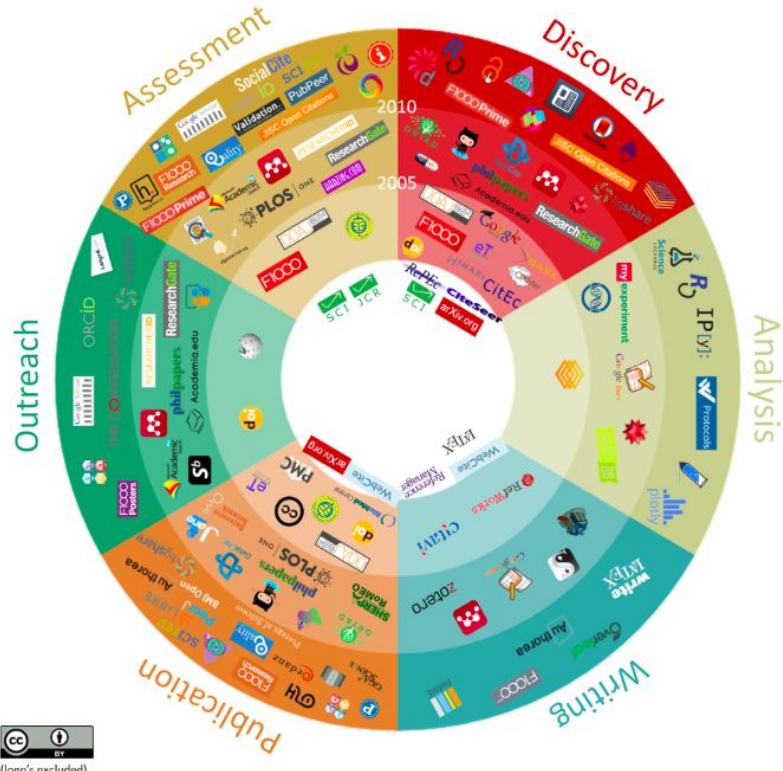


Openness is not an Absolute

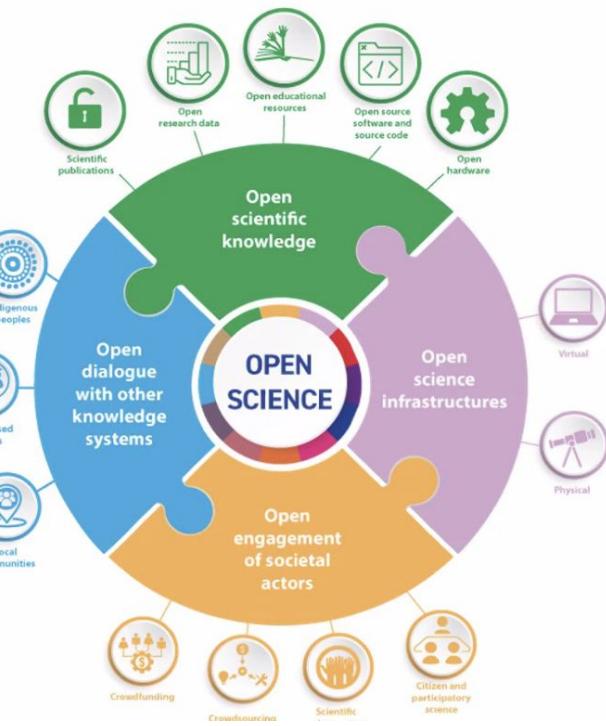
Openness Throughout The Research Lifecycle



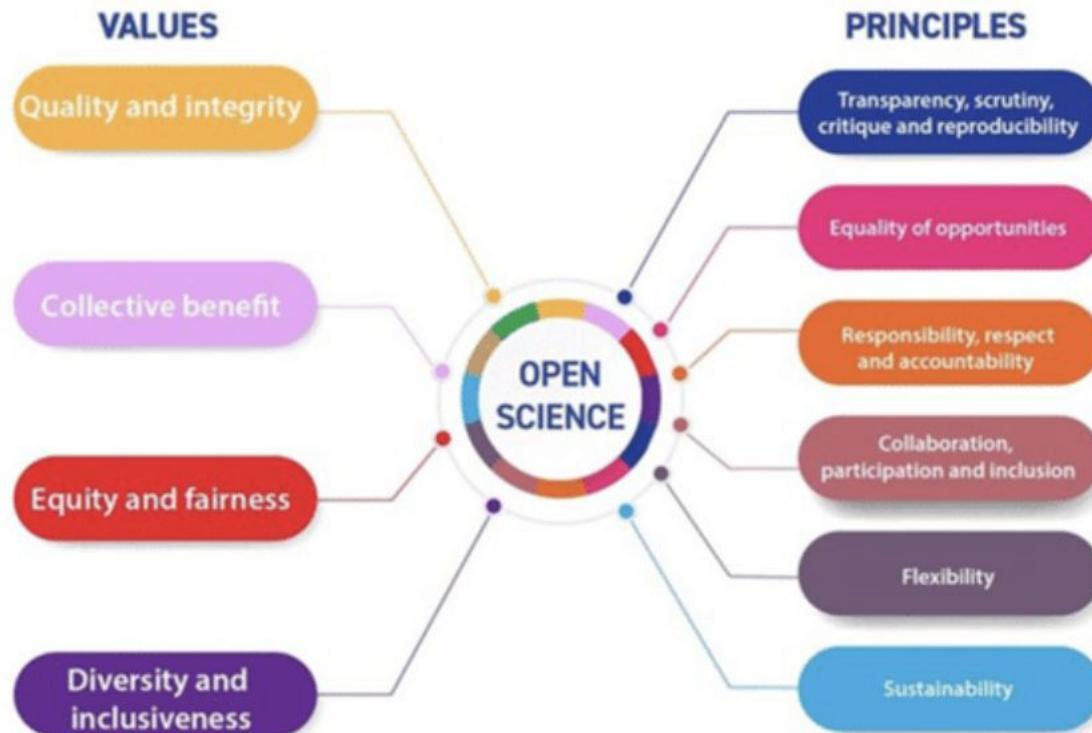
Open Science: Opening Up Research Potential



Open Science: Changing Research



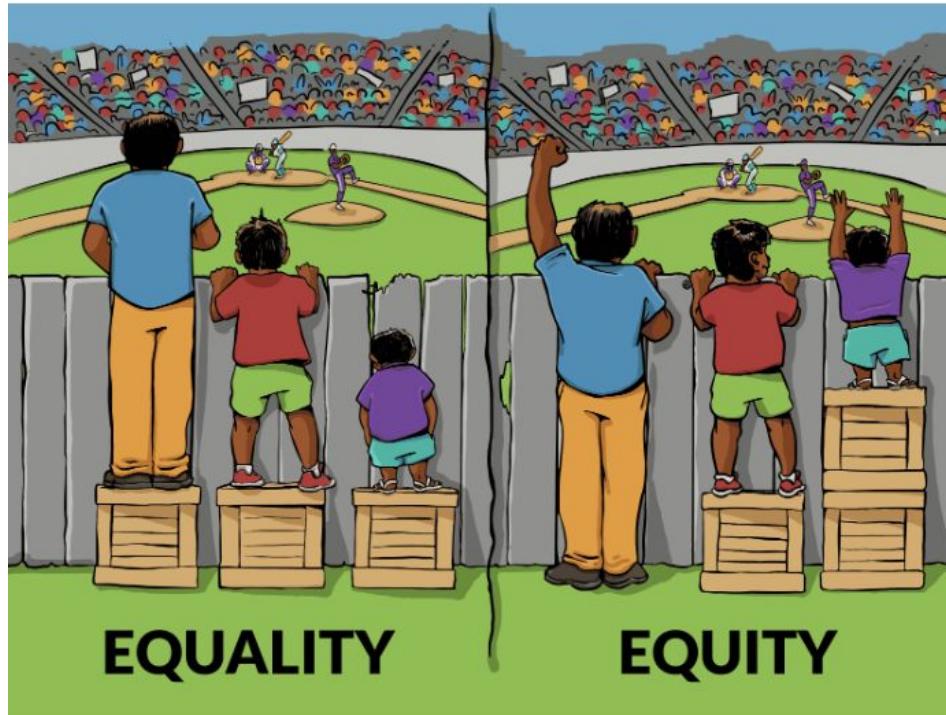
A Way of Thinking And Doing



Open Science as a Path to the Future



How Can Open Science Enable Equity?



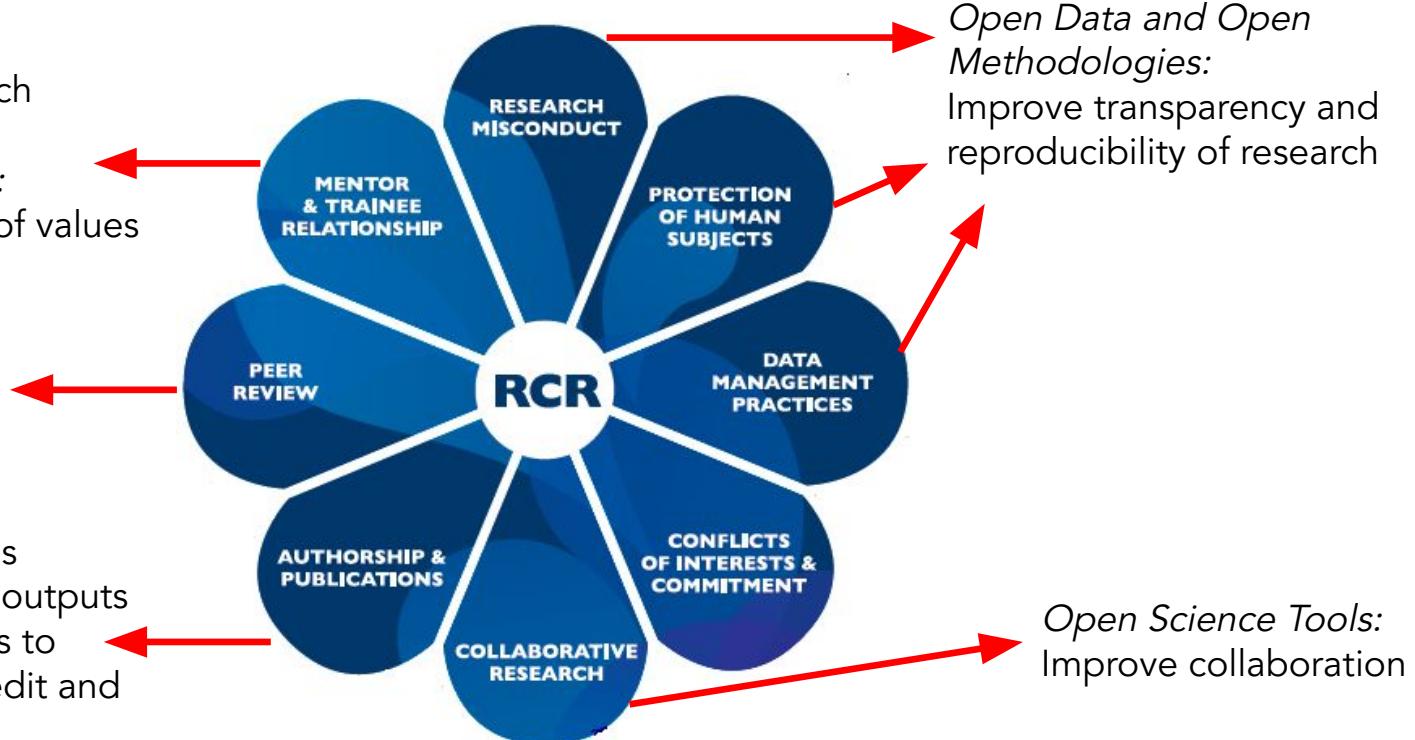
Open Science: an Extension of RCR Values

- Openness can be thought of as an extension of RCR
- Open Science and RCR use the same values
- Transparency and accountability safeguard against harm and misuse
- Openness increases inclusion



Open and Responsible Research

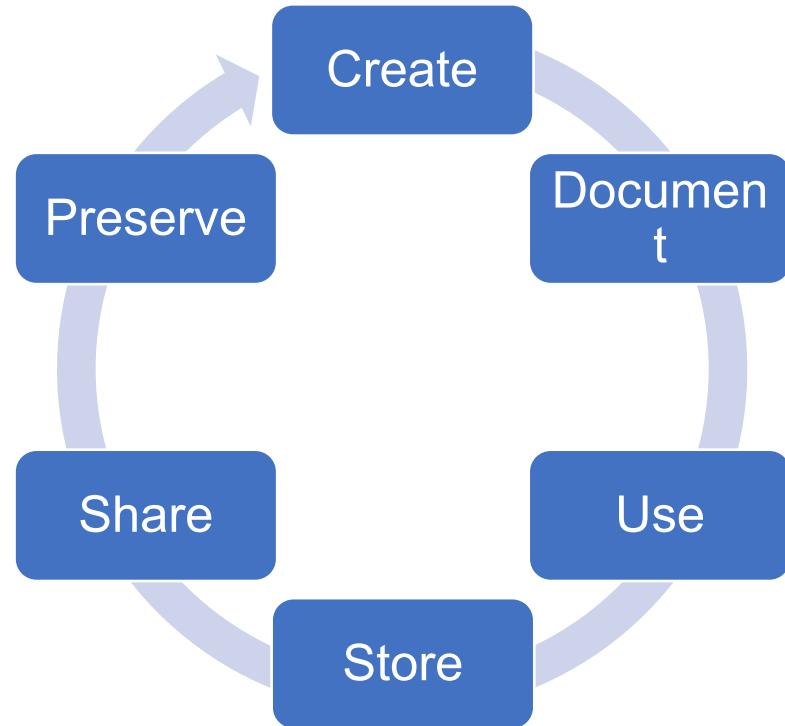
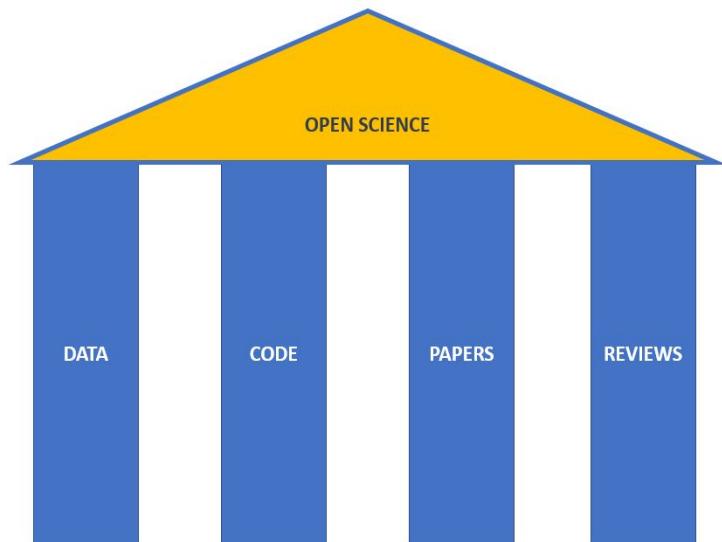
- Open Lab Books:*
Transparency in research practices
Sharing and openness:
enhance transmission of values
- Open Peer Review:*
Transparency in peer review leads to better dialogue and collegial behaviour
- Open Access:* Improves availability of research outputs
Open publishing: leads to improved citations, credit and collaboration



Openness as a Continuum and a Journey

- Open Science is both a cultural movement as well as research decisions/practices
- Commitment to openness is the start – like anything, learning to be open takes time, motivation and mentorship/support
- Changes to daily research practices can open up 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: What Works for You?

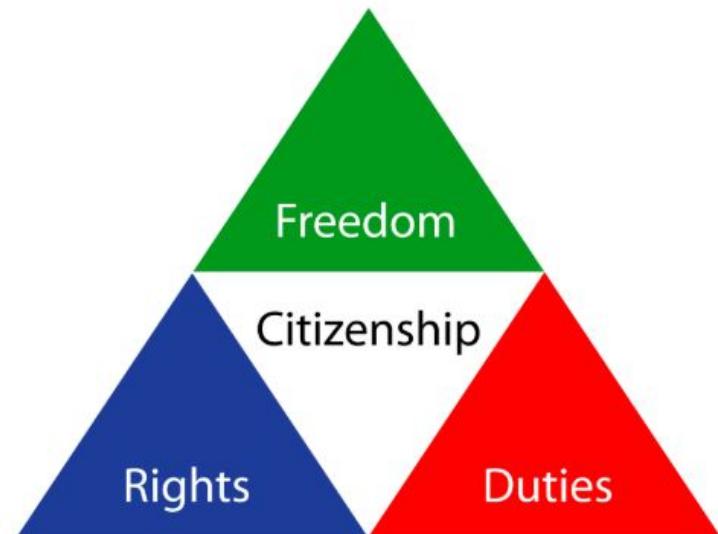


Pragmatic Openness

- 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
 - Shared values
 - 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 Science Citizenship

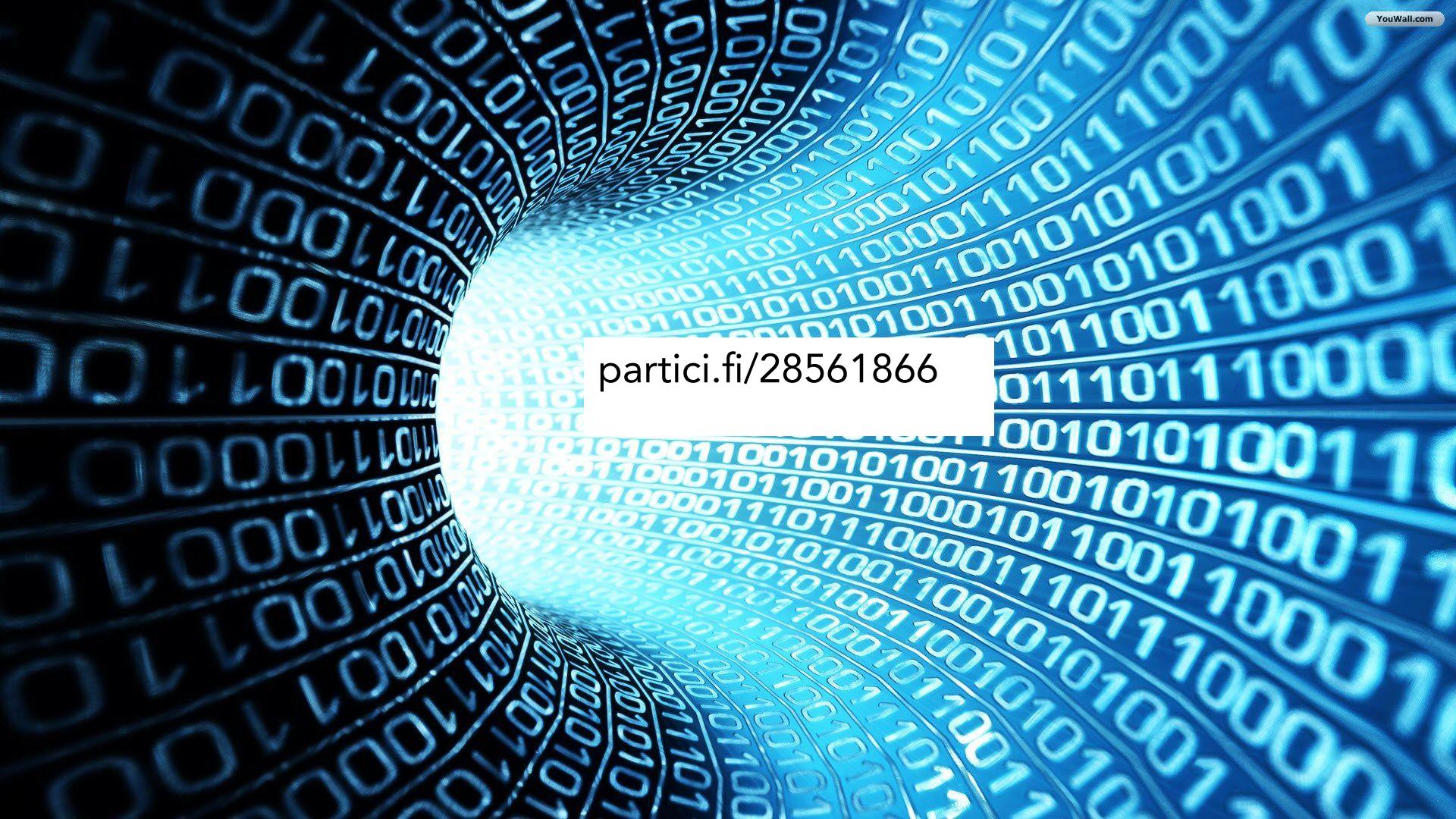
- Research is a community endeavour
 - Individuals with a shared identity
 - Shared resources and traditions
 - Key actions such as resource sharing and communal practice
- “Research citizenship” gives us opportunities and responsibilities
 - Benefits from freedom of research and protection of rights
 - Benefit from communal resources and practices
 - Responsibilities to protect and grow culture and community

Being a Good Science Citizen

- RCR and Open Science form the blueprint for a form of "science citizenship" that benefits the most *equitably*
- As a "citizen" of the research community you therefore have responsibilities for these resources
 - Uphold community values (beneficence, equity, transparency)
 - 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 service (reviewing, curating etc)

Open and Responsible Research Citizenship

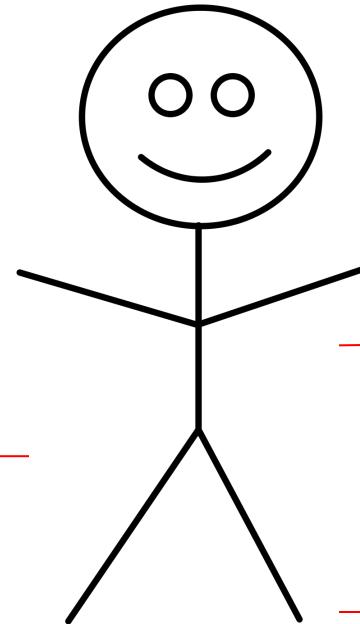
- Be proud of being part of the community
- Remember that everyone has to start somewhere – you learn as you grow
- Ethical conduct is part of daily life and small tasks. It's not just about the big picture
- Ethical conduct benefits everyone. It will make you a better researcher and your research better. This is good for everyone!



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Tools for Responsible, Open (Data) Science

- Data science
- Practical skills
 - Norms and values
 - "Micro ethics"



- Data management
- Norms and values (FAIR)
 - Practical tools - RDM

- Data use
- Finding and using data
 - Data re-use and attribution

- Authorship
- ORCID
 - Journals and licensing

Openness, sharing, justice, beneficence

- Ethics and responsibility
- Areas for activity