



Data
Schools

Open and Responsible (Data) Science Citizenship 2

Louise Bezuidenhout

Plan

- Personal concerns and implementing OS practices at home
 - What have we learned this week?
 - What challenges do we have about implementing these in our research environments?
 - What kinds of assistance can we get?
- RCR and the “bigger picture”
 - Designing just systems
 - Avoiding biases and marginalizations

Recap From Monday

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
 - 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

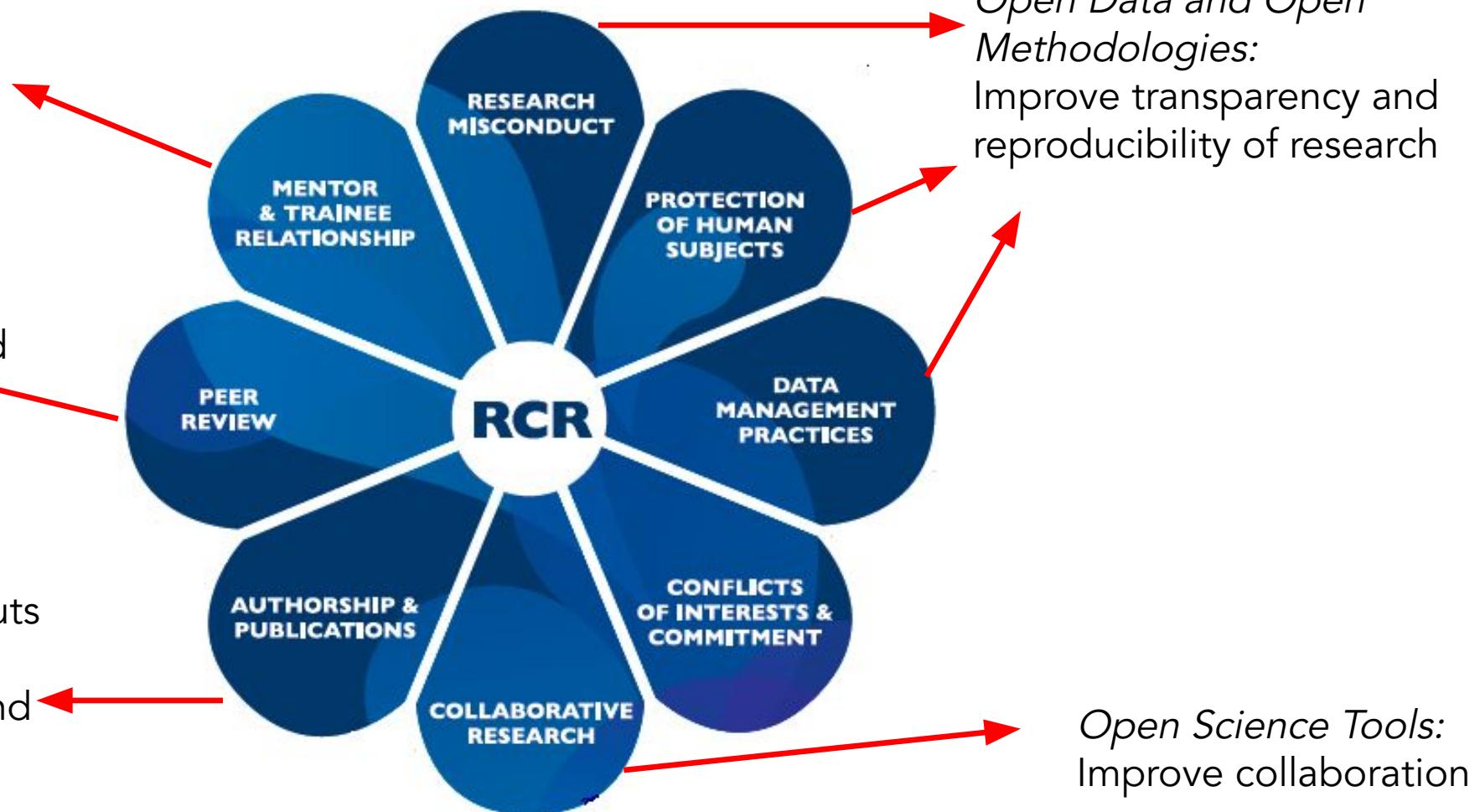
Openness and Responsible Conduct of Research

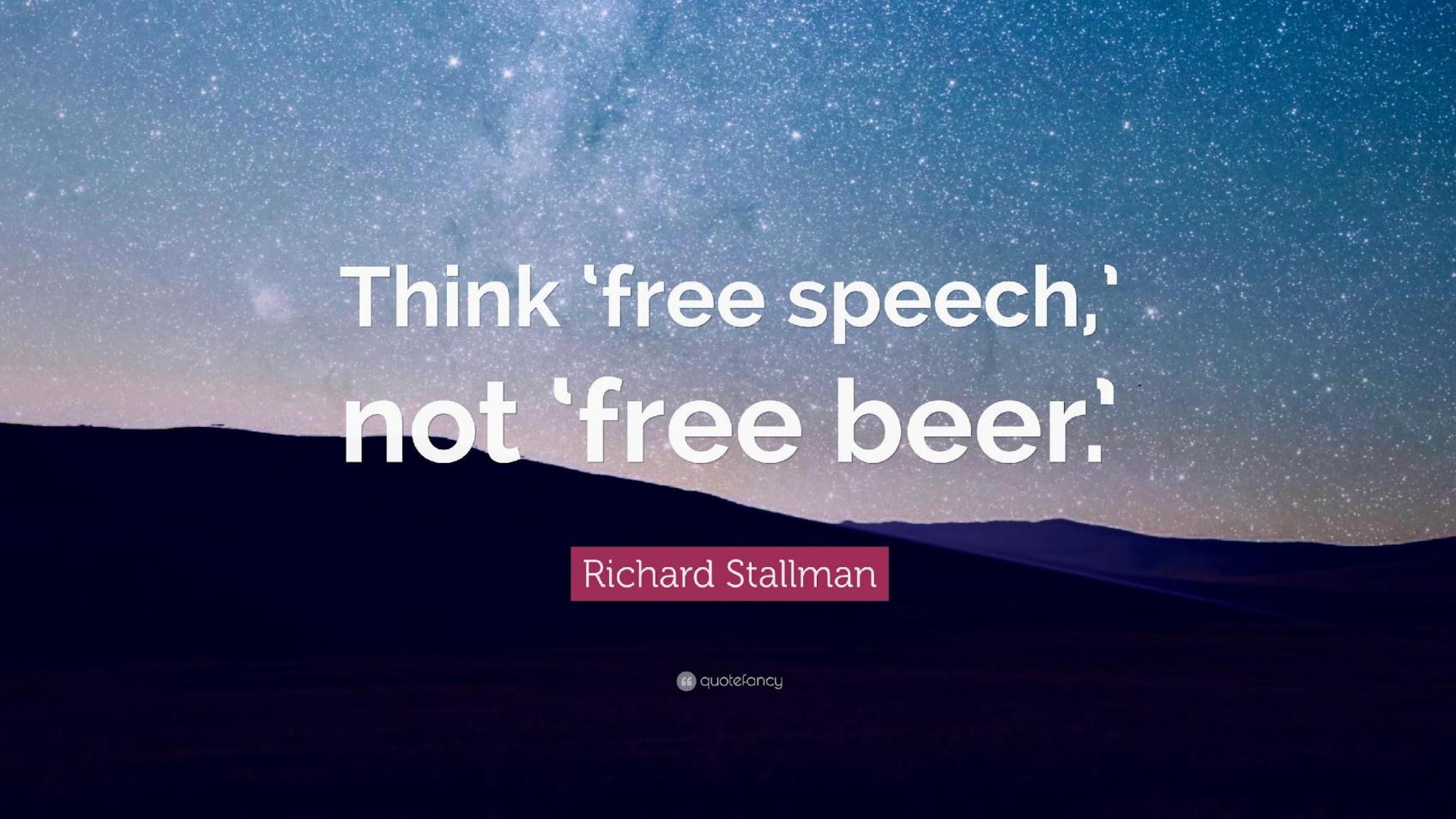
Open Lab Books: Transparency
in research practices

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



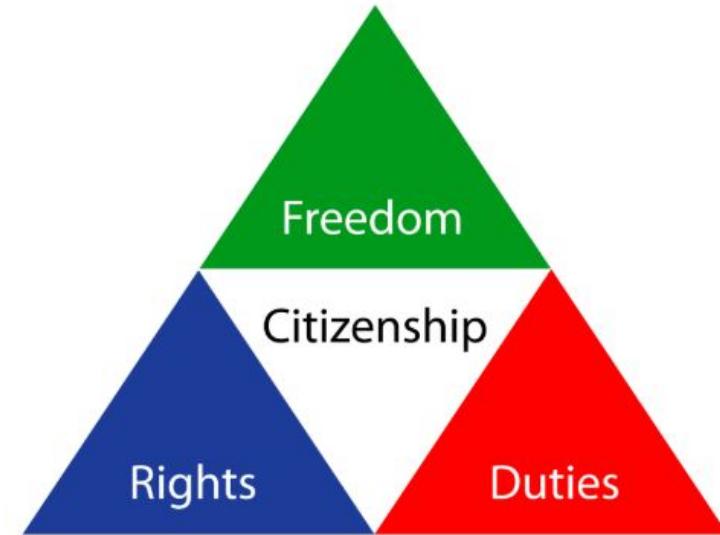
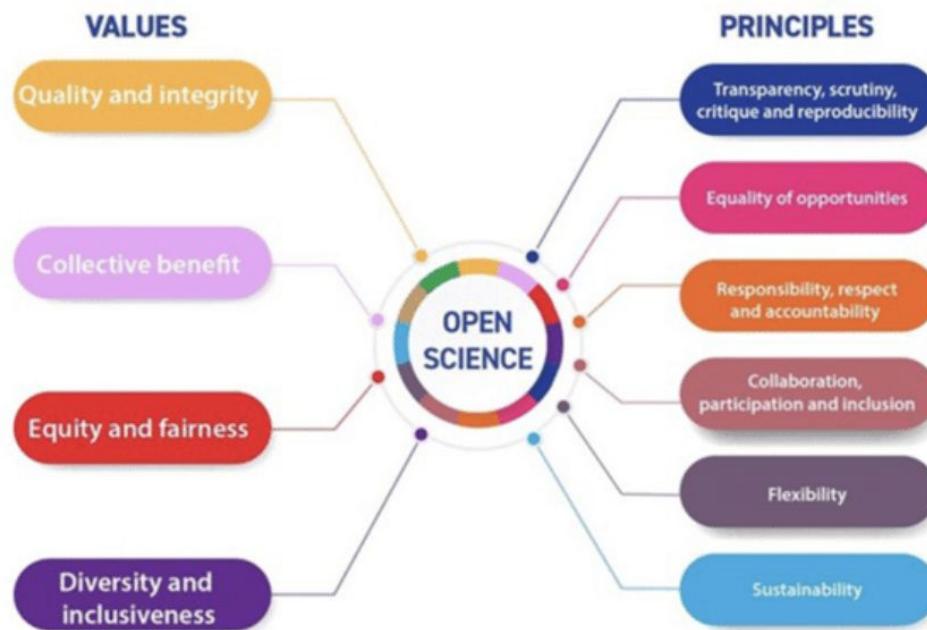


**Think 'free speech,'
not 'free beer.'**

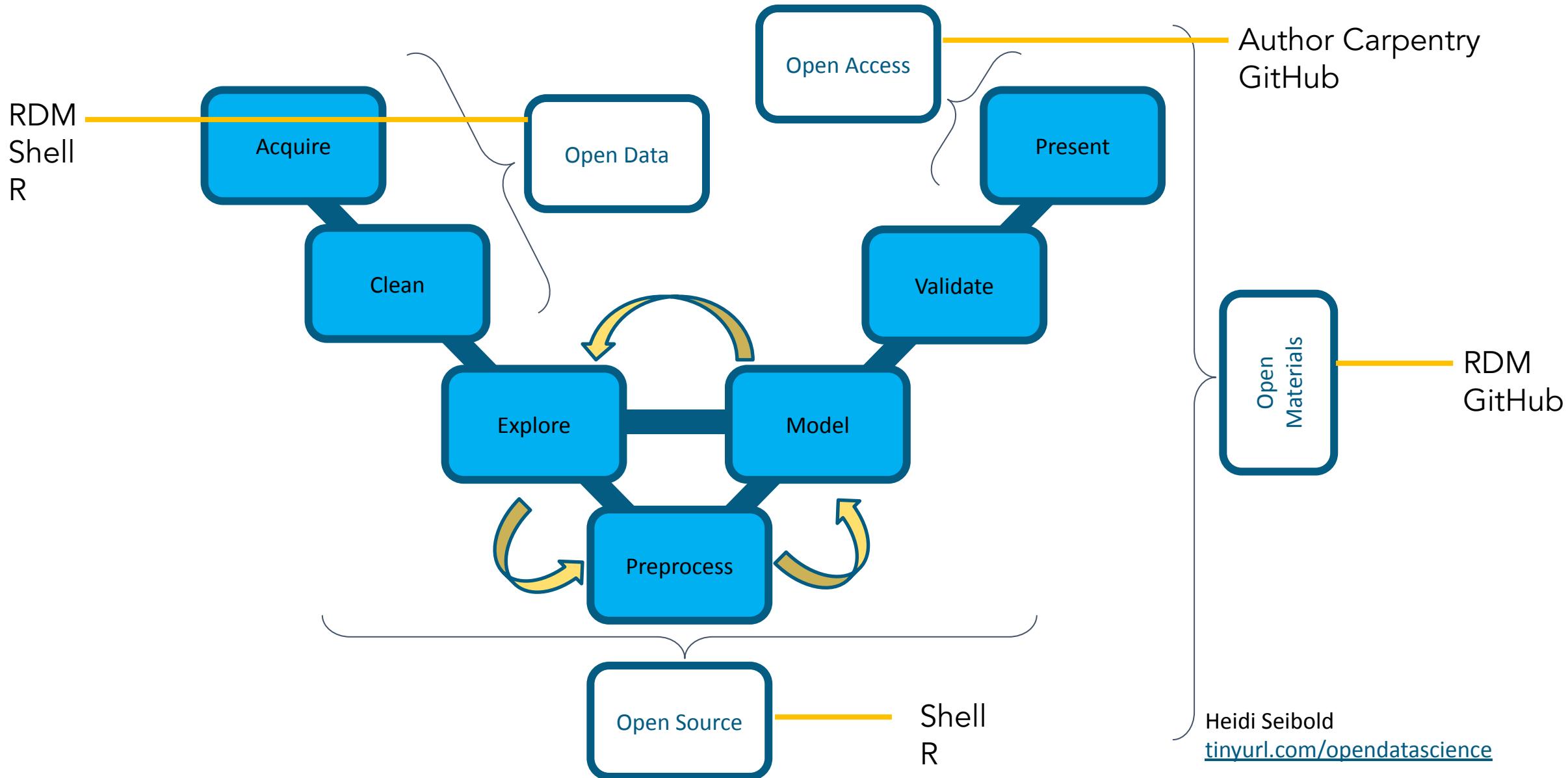
Richard Stallman

Open and Responsible Science Citizenship

- 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 Science Throughout The Research Lifecycle



Everything Has Ethical Considerations

- Be aware of ethical dimensions of research methodology and tools
 - Legal requirements – ie. GitHub, repository requirements
 - Marginalization of learners/users – using CLI instead of GUI
 - Re-use of data – sharing data, not respecting restrictions
 - Responsible publishing vs predatory journals
 - Using resources without contributing
- Even the smallest decisions can have ethical consequences

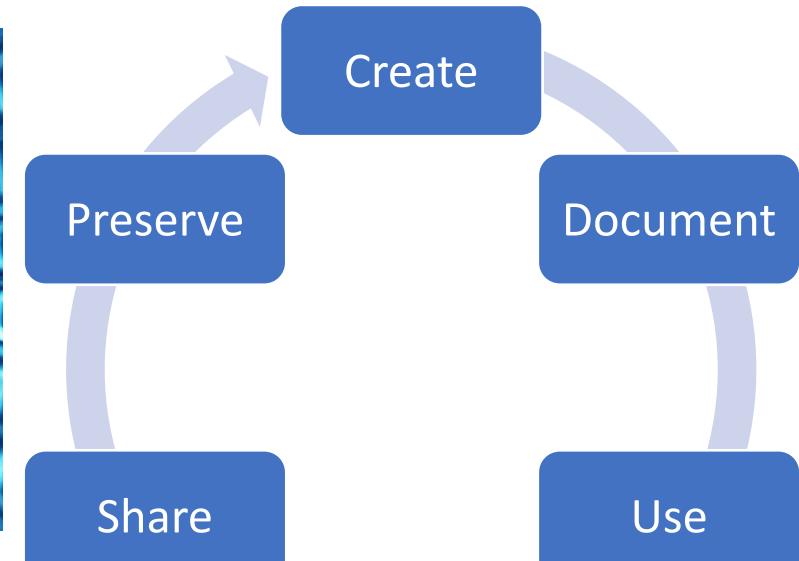
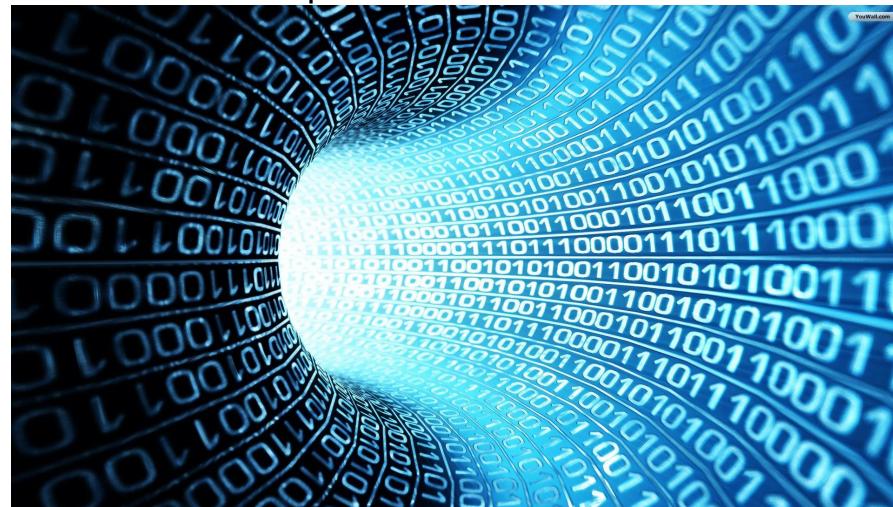


How to be a responsible and open data scientist

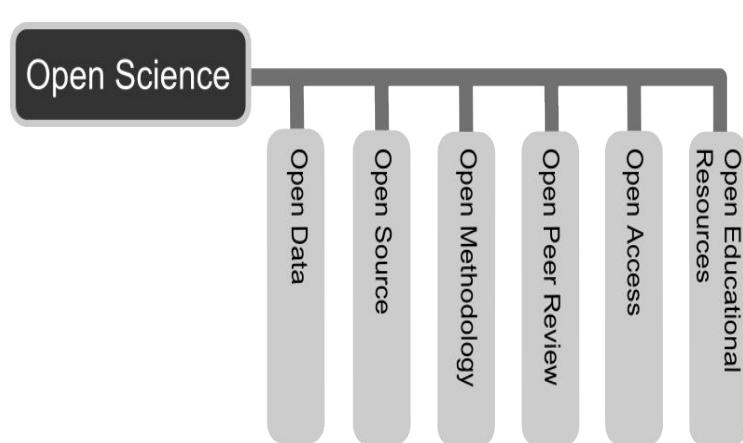


Doing responsible and open data science research

Tools for responsible and open data science



AuthorCarp^εntry



Challenges of Being Open at Home

Implementing Open and Responsible Practices in Your Own Research

- Challenges are common – everyone has them
- Physical, social and regulatory contexts influence perceptions of Open Science and ability to engage in Open Science activities

SA1/3: I think it leads to better science



KY1/1: I won't release data unless I first of all publish



Experiencing Challenges is Normal

What specific challenges do you anticipate encountering when you return home in terms of your data work?

- Think about specific, or general challenges. Take 10 minutes to write some ideas down in the googledoc.

CHALLENGES OF OPEN+RESPONSIBLE RESEARCH AT HOME		
	CHALLENGE	SOLUTIONS
INSTITUTIONAL / CULTURAL	<ul style="list-style-type: none">• lack of support from supervisor / peers• peers not sharing• ownership / IP concerns• tradition of not being open• lack of interest• being naive about risks• traditions of non-transparency• lack of knowledge• no oversight on ROM	<ul style="list-style-type: none">• highlight that openness is not new• draw attention to funding requirements• openness = citations• use institutional policy<ul style="list-style-type: none">- institutions (ie. cope)- make (i) examples - ie. workflows• engage multiple stakeholders<ul style="list-style-type: none">- incl. uni, admin, gov & undergrads- talk about CAPE + FAIR• ENGAGE WITH CONFER
INFRASTRUCTURE / RESOURCE	<ul style="list-style-type: none">• time• infrastructure• availability of data• repositories - access / lack• lack of training + opportunities• lack of ROM awareness• knowing the laws• processing power	<ul style="list-style-type: none">• use OS tools online - ie. Jupyter notebooks• make use of available databases• check rejections• ask for APC waivers• check out lists of resources• get involved in training - ie. Carpentries• join communities - ie. R, Python• use support networks - ie. AuthorAID• get involved in OS discussions• reflect LINC perspective
PERSONAL CONTEXTS	<ul style="list-style-type: none">• not sure how to share• working with qual research• lack of knowledge of tools• not getting credit• working multidisciplinarily - different approaches to ROM	<ul style="list-style-type: none">• reach out to decision makers to raise concerns• know your rights - Creative Commons / CC BY• know community-expectations behavioural standards<ul style="list-style-type: none">- ie. codes of conduct• "take it slowly" - increase openness incrementally in your own work• find people to model your work practices on• find trusted infrastructures• more communication tools

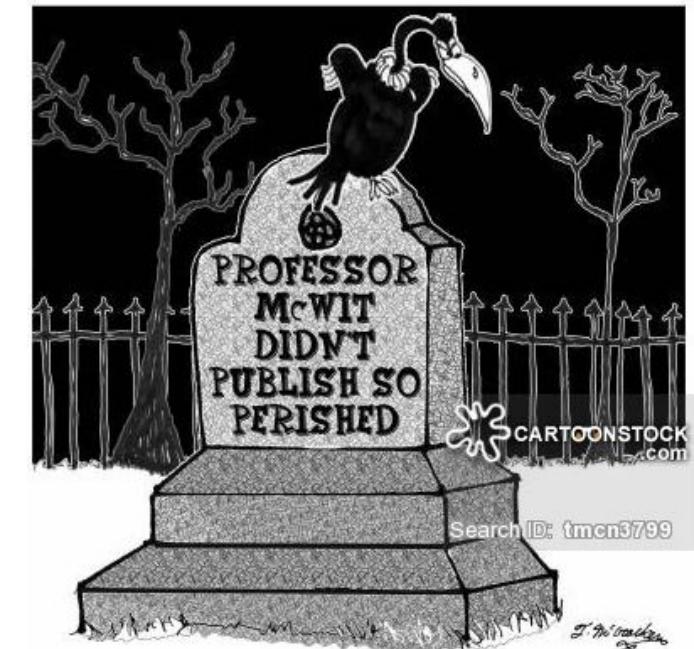
It's OK To Have Challenges

- Challenges can be categorized into a number of different areas:
 1. Cultural resistance and lack of institutional/peer support
 2. Resource limitations
 3. Personal concerns
- Challenges are not insurmountable – many resources can help address them

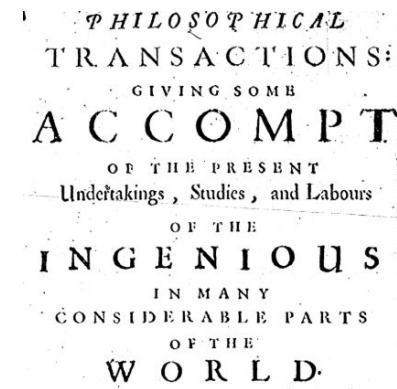
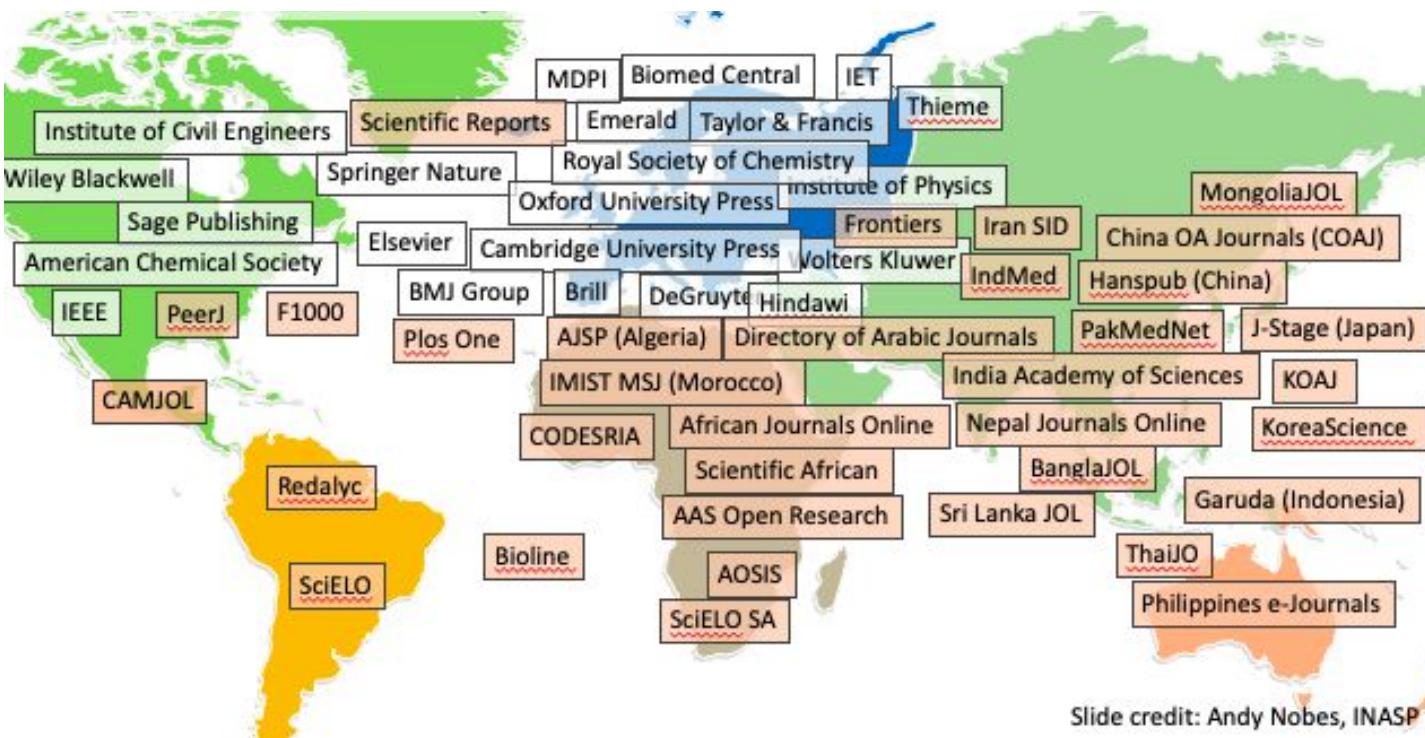


1. Cultural Resistance and Lack of Support

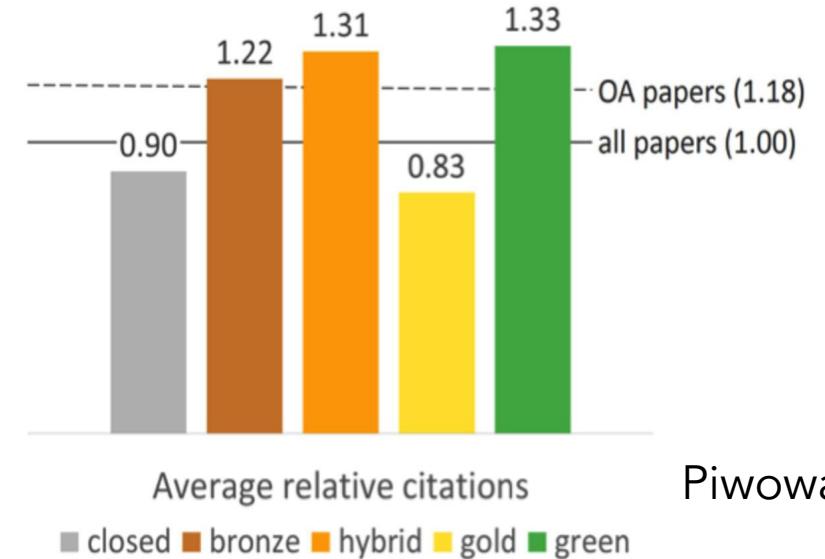
- A quick background:
 - Inherited colonial academic systems
 - Historic lack of funding and resources limiting research scope
 - “Parachute research”
- Problems include
 - Lack of institutional support
 - Lack of regulations/guidance
 - Lack of trust
 - Antiquated career assessment criteria



1a. Getting Your Institution On Board

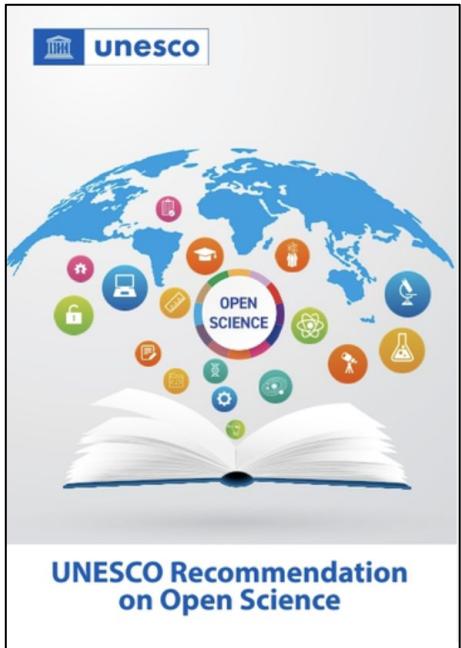


In the SAVOY,
Printed by T.N. for John Martyn at the Bell, a little without Temple-Bar, and James Allestry in Duck-Lane,
Printer to the Royal Society.

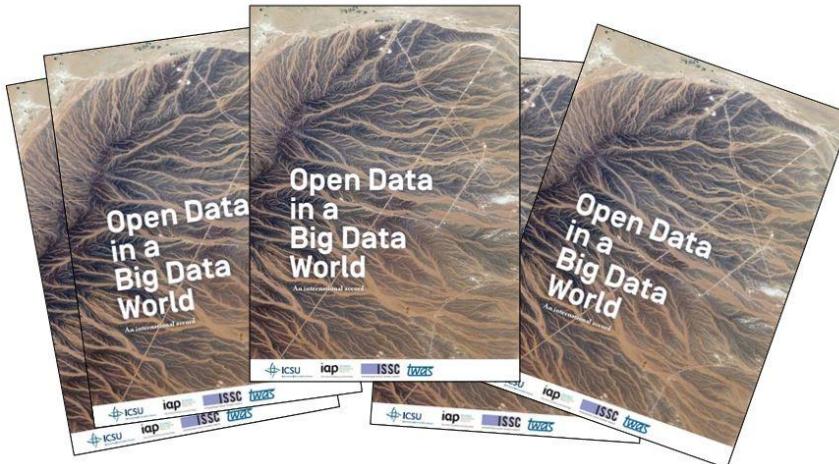


Piwowar 2018

1b. Getting Better Protection and Guidance



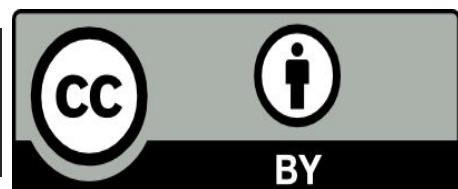
UNESCO Recommendation
on Open Science



RESEARCH DATA ALLIANCE

Data-sharing Agreements

! THINK ✓ CHECK > SUBMIT



1c. Getting Over Issues of Trust



Data-sharing Agreements

C | O | P | E

PROMOTING INTEGRITY IN
RESEARCH AND ITS PUBLICATION

1d. Changing the Way We Assess Research Excellence



**Coalition for Advancing
Research Assessment**

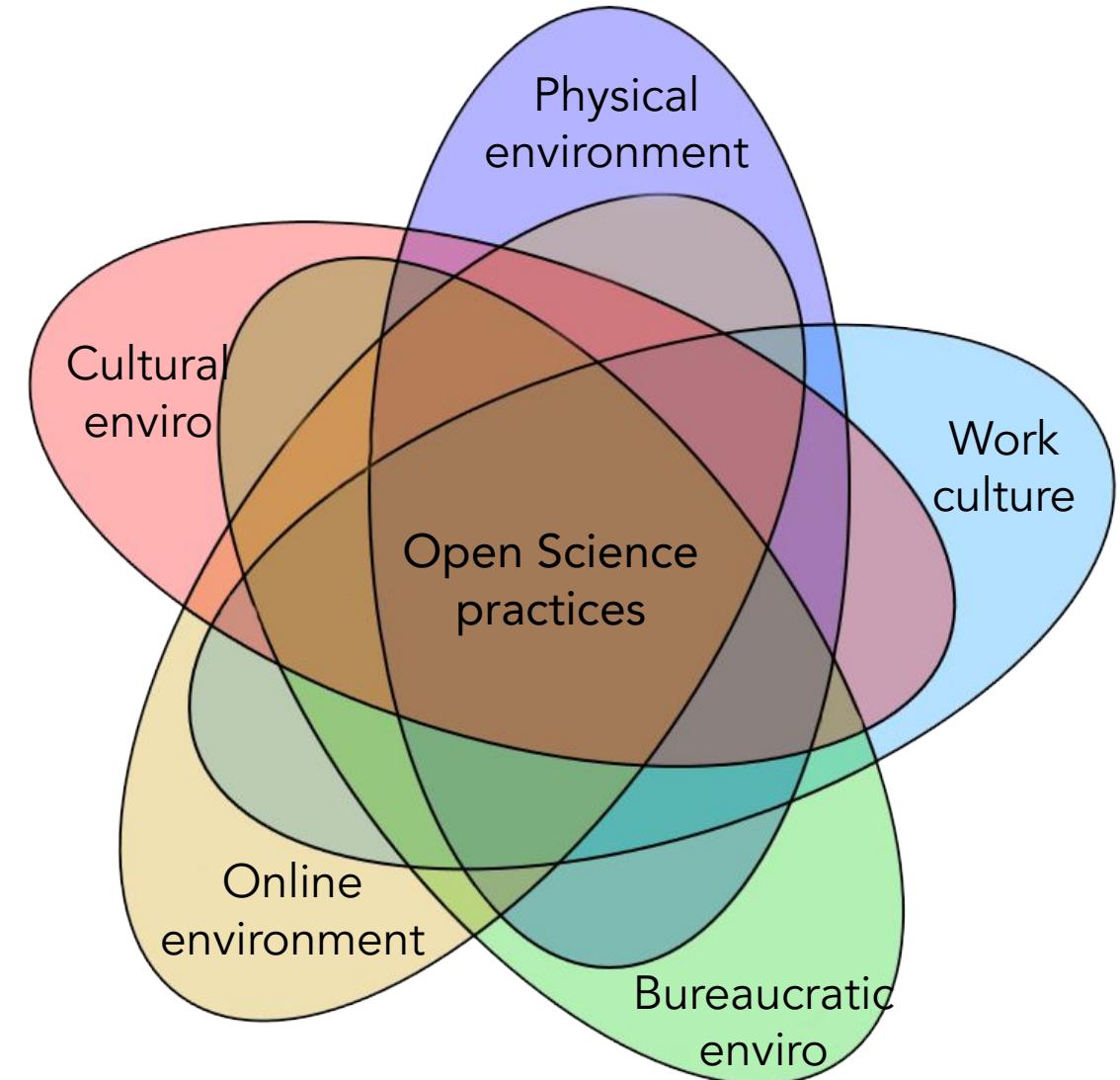
Still Needed: Positive Examples

- Need for more positive examples to dispel “urban myths” and lurking ghosts
 - Need enthusiastic champions and mentors
 - Effective personal networks
-
- What else can help foster open research cultures and maximize their support?



2. Infrastructures that Support Openness

- Many institutions struggle with legacies of low-resourcing
- Strategic resource distribution often means that OS activities are under-funded
 - Lack of finances to fund Open Science practices
 - Lack of ICT infrastructures
 - Lack of technical support
 - Lack of guidance

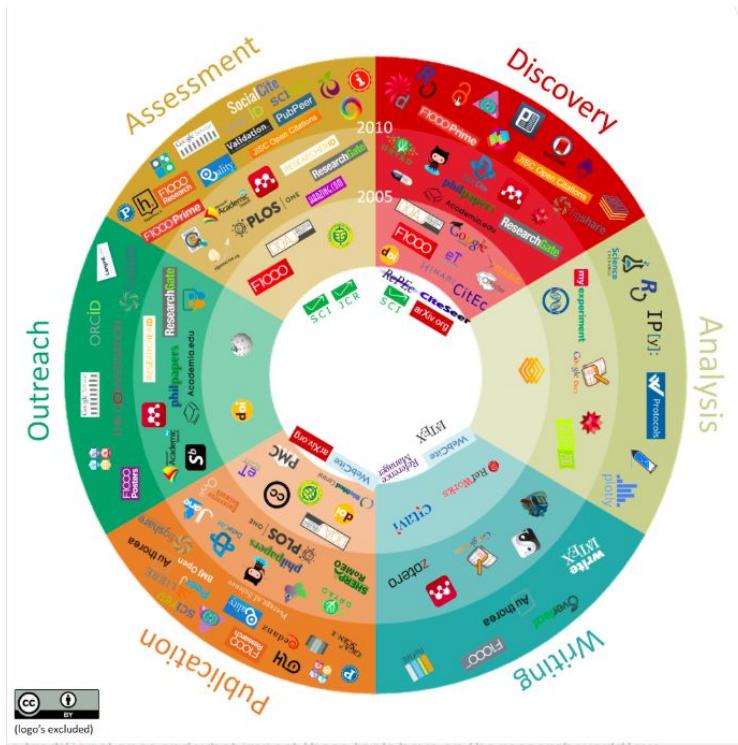


Just Because the Resources Are Online ...



.... doesn't mean they're accessible

2a. Lack of Resources



WILEY

HOME MY DASHBOARD AUTHORS - REVIEWERS - EDITORS - HELP - REGISTER LOGIN

Open Science > Open Access > For Authors > Publication Charges > Waivers and Discounts

Open Access Open Data Open Practices Open Collaboration Open Recognition & Reward

Waivers and Discounts

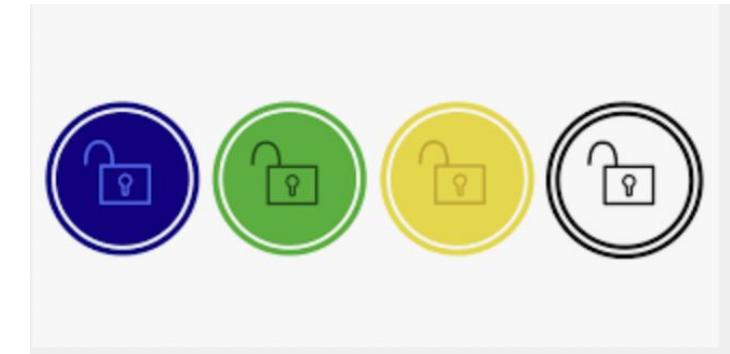
For authors publishing in Wiley Open Access journals, Wiley offers waivers and discounts to authors based in developing countries.

To ensure that editorial decisions are never influenced by ability to pay, it is Wiley policy that editors of open access journals are not involved in correspondence with authors regarding payment of Article Publication Charges (APCs). The automatic waiver system will be managed by administrative staff not involved in decisions regarding article acceptance. We ask authors not to discuss any issues concerning payment with editors.

In addition to the Research4Life countries listed below, some journals may offer additional waiver initiatives. These additional waivers will be managed by the editors and may be discussed with them.

unpaywall

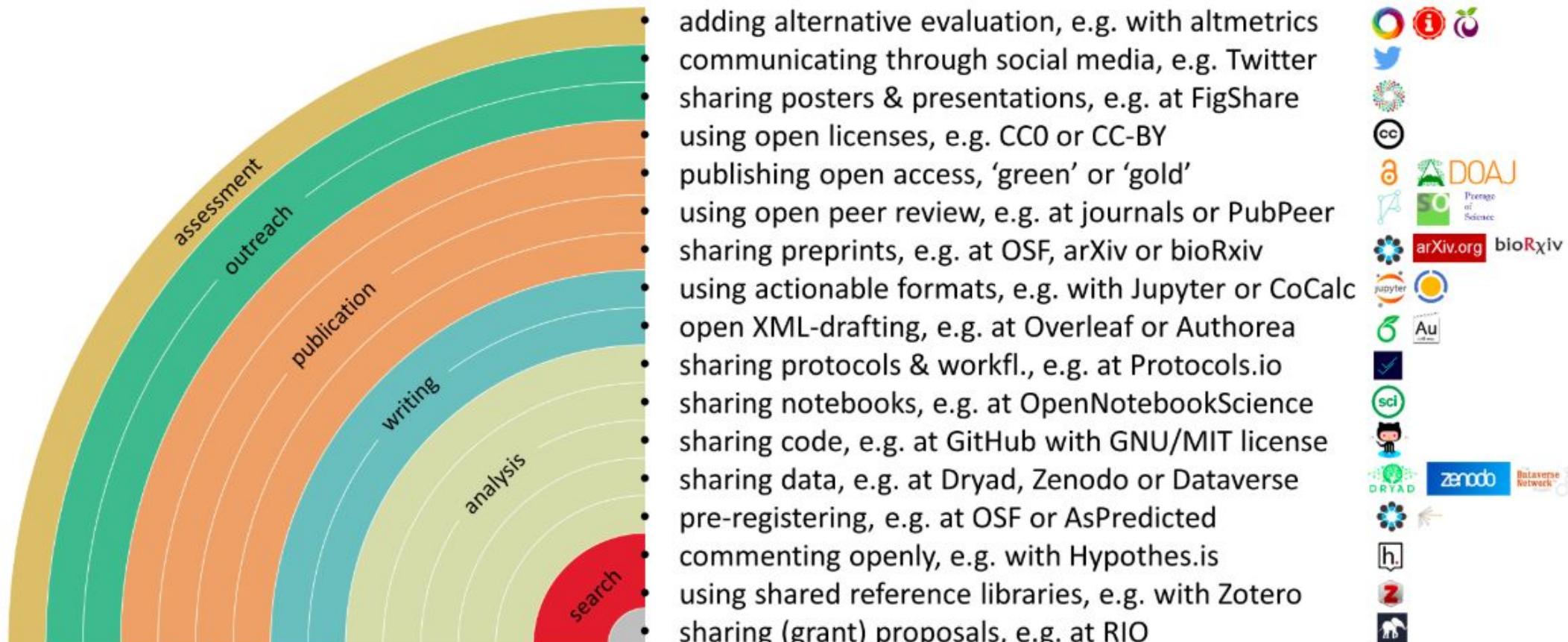
Full Text Open Access



Welcome to Sherpa Romeo

Sherpa Romeo is an online resource that aggregates and analyses publisher open access policies from around the world and provides summaries of publisher copyright and open access archiving policies on a journal-by-journal basis.

You can make your workflow more open by ...



2a. Knowing Where to Look

- Repositories can enable data sharing without institutional investment
- Many Open Access databases can provide data. I.e.
 - Global Partnership for Sustainable Development Data www.data4sdgs.org
 - Listing of Open Access Databases www.loadb.org
- Research4Life programme
 - Journal access
 - AGORA – access to global online research in agriculture www.fao.org/agora/en/
 - HINARI – access to research for health programme www.who.int/hinari/en/
 - OARE – online access to research in the environment www.web.unep.org/oare/
 - ARDI – access to research for development and innovation www.wipo.int/ardi/en/
- *NB. Logging in necessary via institutional ID and can require institutional network/VPN*



2b. Lack of Expertise and Training



Forums

If you're looking for a forum in your native language, please check out the local user groups page at the [Python Wiki](#).

- [Python Forum](#) (English)
- [Python-Forum.de](#) (German)
- [/r/learnpython](#) (English)

Support Networks



RESEARCH DATA ALLIANCE

Academic support networks - organisations and NGOs

There are many international organisations and NGOs providing support to academics, ranging from free resources and access, training, Networking and subject-specific advice. Some useful organisations are listed below

AuthorAID www.authoraid.info

Eifl (Electronic Information for Libraries)
www.eifl.net

Equator Network www.equator-network.org

CoDATA (Committee on Data of the
International Council for Science)
www.codata.org

Global Health Network <https://tghn.org/>

Global Young Academy
<https://globalyoungacademy.net/>

Healthcare Information for All www.hifa.org

INASP www.inasp.info

Mendeley network

<https://www.mendeley.com/research-network/community>

MedicineAfrica <http://medicineafrica.com/>

OWSD (Organisation for Women in Science in the
Developing World) www.owsd.net

Scholars at Risk Network
<https://www.scholarsatrisk.org/>

ResearchGate <https://www.researchgate.net/>

Research4Life <http://www.research4life.org/>

TWAS (The World Academy of Sciences for the
advancement of science in developing countries)
<https://twas.org/>

Indepth Network <http://www.indepth-network.org/>

International Health Policies
<http://www.internationalhealthpolicies.org/>

Wessex Global Health Network

<http://www.wessexghnetwork.org.uk/>

Still Needed

- Local investment in Open Science infrastructures may take time
 - However, global infrastructures and practices are changing rapidly
 - Need more LMIC voices in these discussions to make sure that they work for researchers in lower-resourced contexts
-
- What else can help researchers overcome resource limitations?



3. Personal Concerns

- As researchers we have concerns about implementing some Open Science practices
- These concerns are legitimate, and often relate to cultural and regulatory challenges
 - Concerns about being scooped
 - Concerns about scrutiny of data and methods
 - Misuse of data
 - Unintended harms

REASONS WHY RESEARCHERS ARE HESITANT TO SHARE THEIR DATA	
42%	Intellectual property or confidentiality issues
36%	My funder/institution does not require data sharing
26%	I am concerned that my research will be scooped
26%	I am concerned about misinterpretation or misuse
23%	Ethical concerns
22%	I am concerned about being given proper citation credit or attribution
21%	I did not know where to share my data
20%	Insufficient time and/or resources
16%	I did not know how to share my data
12%	I don't think it is my responsibility
12%	I did not consider the data to be relevant
11%	Lack of funding
7%	Other

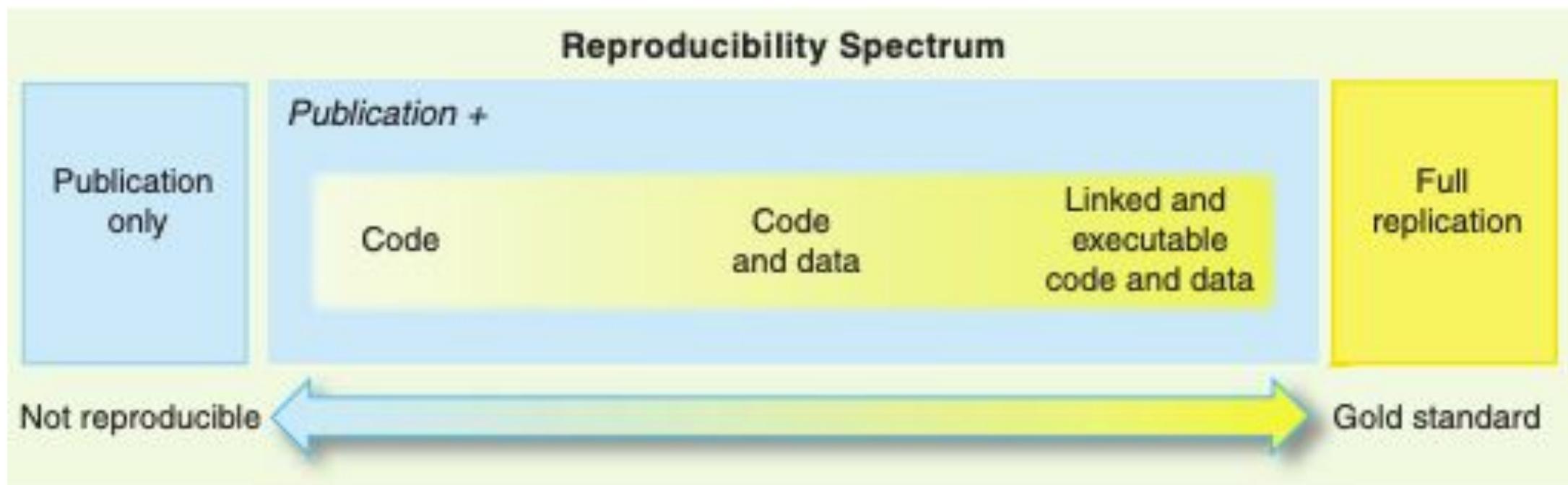
3a. Knowing Your Rights/Responsibilities



ACM Code of Ethics and Professional Conduct

3b. Openness as a Continuum

"Your primary collaborator is yourself 6 months from now, and your past self doesn't answer emails" (Russ Poldrack)



3c. Managing Risk

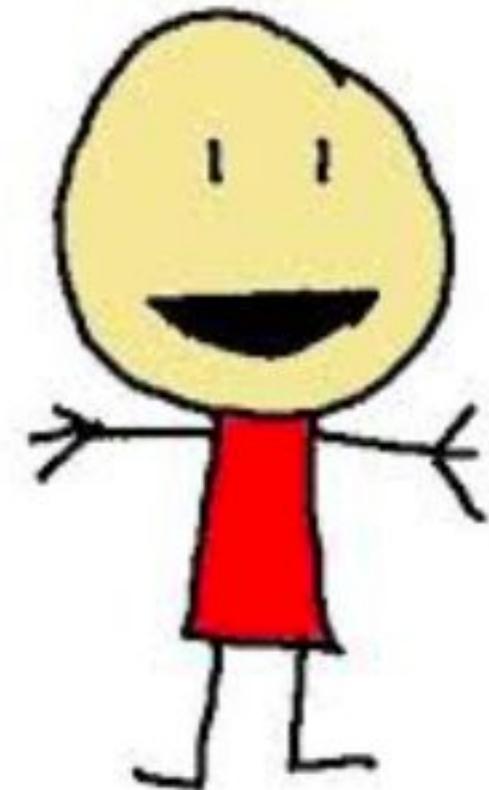
- Unintended harms are an unavoidable element of research
- Using trusted infrastructures can offset some concern as they set requirements on users and contributors
- Discuss concerns with peers – often they will have good advice



Still Needed: More Evidence

- Lack of evidence of LMIC concerns
 - Tendency to treat LMICs concerns as “same as HIC but more”
 - Need more evidence about what is working, what is preferred and what is still needed
 - Creating, joining and interlinking networks of support is key to fostering Open Science
-
- What else can help researchers overcome concerns about being open?

Internet Hug



Please wrap arms around monitor now

Openness Is A Lifelong Journey

-  Publish Preprints
-  FAIRify data
-  Make code available
-  Publish Lab-Notebooks
-  Use version control
-  Preregister your project
-  Do science communication

Let's go back to our
notes and see what
resources we can fill in

Learning to Look at
the Bigger Picture

Looking at the Bigger Picture: Ethical Challenges of Data Science



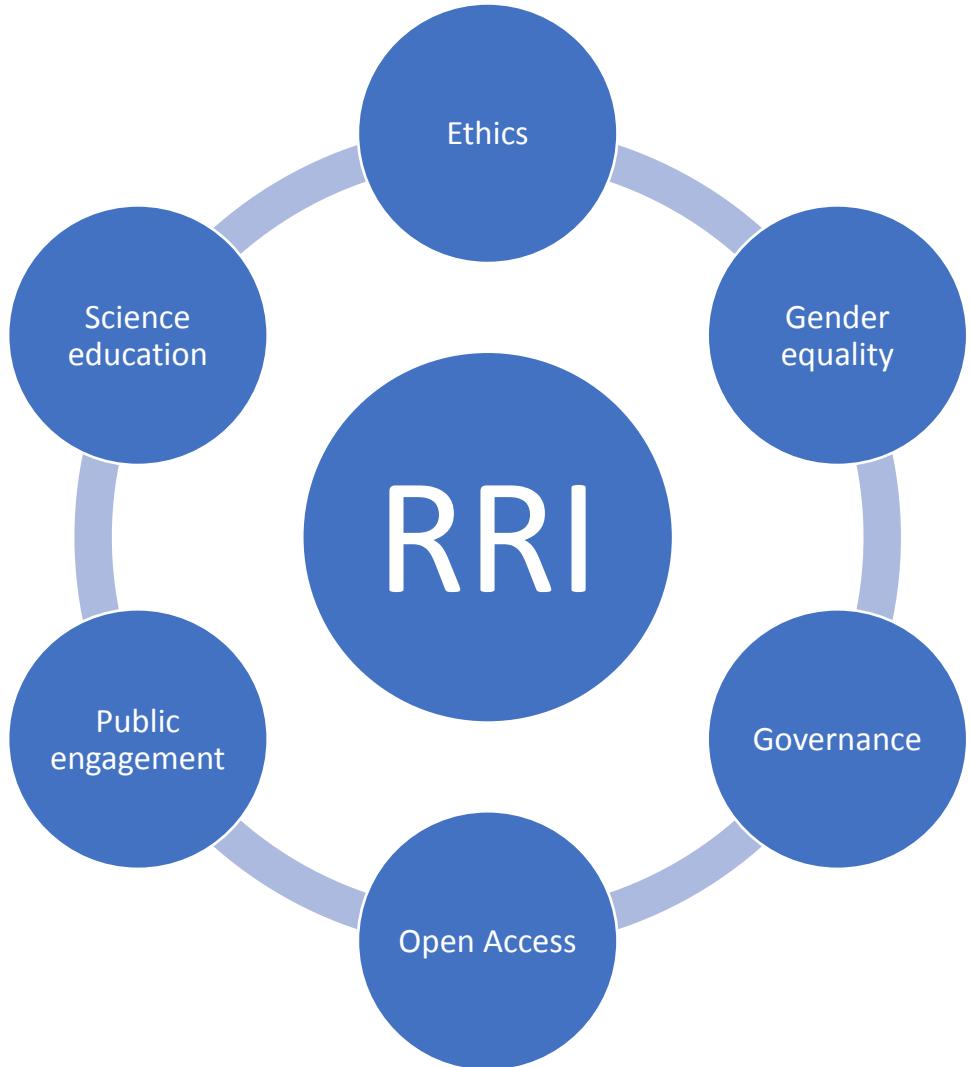
Challenges Beyond the Research Context

- technology affects communication, collaboration and knowledge exchange within scientific, work and home settings
- need to help people to use those innovations *more productively and safely*
- need to improve ways in which new technologies can be designed and developed to be *more responsive* to societal acceptability and desirability

Not just about being open/closed. It's about being intentionally open.

How can we be sure that openness will lead to a better future?

Dual-Use and Responsible Research and Innovation



How can we be sure the technologies that we develop are contributing to societal good and won't cause harm?

Societally Responsible and Inclusive Technologies

- We all have a responsibility to ensure that technologies are beneficial for society
- Any technology should:
 - Not increase the marginalization of certain members of society
 - Appropriately reflect society as a whole
 - Be accessible to members of the society to facilitate informed decision-making
 - Uphold the values and morals of society



BENEFICENCE



NONMALEFICENCE

RRI and Digital Technologies

- Key to understanding responsible technologies is recognizing the *human involvement* in the development procedure
 - Make decisions about what data to select
 - Design algorithms to achieve desired computation results
 - Design interfaces for users

Everyone holds a world view that shapes how they understand the world

This can lead to accidental or intentional inclusions of bias into the design of technologies

Bias

Bias

- Inclination or prejudice for or against one person or group, especially in a way considered to be unfair

Discrimination

- Unequal treatment of persons on the basis of 'protected characteristics' such as race, sexual identity etc.

Bias in algorithms

- Unjustified and/or unintended deviation in the distribution of algorithm outputs, with respect to one or more of its parameter dimensions

Causing Harm Through Bias and Discrimination

- The data that you select in your analyses can produce biases
- The algorithms that you design can perpetuate biases and stereotypes
- The websites, platforms, sharing pathways that you design, endorse or populate can perpetuate discrimination
- The data you generate can be re-used, re-combined, re-purposed in unexpected ways
- This can lead to technologies that *harm* the societies that they are supposed to be helping

Value Ladened Nature of Algorithmic Design

"Algorithms are inescapably value-laden. Operational parameters are specified by developers and configured by users with desired outcomes in mind that privilege some values and interests over others...[O]peration within accepted parameters does not guarantee ethically acceptable behaviour... for example, profiling algorithms that discriminate against marginalised populations"

(Mittelstadt, Allo, Taddeo, Wachter, Floridi, 2016)

Unethical Algorithms

- What are developers assuming about the world when they design digital technologies?
- What real world implications are there when we ignore these assumptions?



Courts use risk algorithms to set bail: A step toward a more just system?

PROGRESS WATCH Court systems in more than two dozen US cities and states are using algorithms that assess flight risk without considering race, gender, or socioeconomic status, in an attempt to remove implicit bias from the equation.

By Gretel Kauffman, Staff | AUGUST 3, 2016



PRO PUBLICA DATA & DESIGN / POLICY & ECONOMICS Dylan Fugate was rated low risk. (Josh Ritchie for ProPublica)

Machine Bias

There's software used across the country to predict future criminals. And it's biased against blacks.

by Julia Angwin, Jeff Larson, Surya Mattu and Lauren Kirchner, ProPublica

May 23, 2016

Northpointe and COMPAS

Example 1: Algorithmic Decisions on Bail

In 2014, then U.S. Attorney General Eric Holder warned that the risk scores might be injecting bias into the courts. He called for the U.S. Sentencing Commission to study their use. "Although these measures were crafted with the best of intentions, I am concerned that they inadvertently undermine our efforts to ensure individualized and equal justice," he said, adding, "they may exacerbate unwarranted and unjust disparities that are already far too common in our criminal justice system and in our society."

The sentencing commission did not, however, launch a study of risk scores. So ProPublica did, as

Eliminating Human Bias?

- In the early 2000s the US criminal justice system began using risk assessments to assist decision-making
- Software was supposed to overcome human bias of bail committees
- Assessments based on algorithmic calculations to predict, for instance, how likely an individual is to re-offend or fail to attend court for sentencing.
- Used to determine whether an individual should be granted bail or how long their sentence should be
- 'Low risk' offenders given shorter sentences and perhaps even kept out of jail entirely.

Proprietary Software to Determine Risk?

- Risk assessments are now used across a wide number of states at all stages of the legal process
- Software and scores provided by for-profit companies such as Northpointe
 - Scores derived from 137 questions, either answered by defendants or pulled from criminal records
 - Questions related to factors such as personal offender history, family offender history, drug taking amongst friends and personal views on offending. Race was not one of the questions.
- Criteria through which the scores are generated is proprietary to Northpointe and not released – *no insight into how the algorithm generates risk assessment scores*

Looking at the Data

- **61%**: individuals rated likely to reoffend being re-arrested (including misdemeanours such as driving with an expired license)
- **20%**: individuals rated likely to commit a violent crime actually doing so in the future
- **2x**: More black people were almost twice as likely to be falsely labelled as at risk of future offending than white people
- **<**: More white people were mislabelled as low risk more often than black people;
- Even when statistical tests were run to isolate the effect of race from criminal history, recidivism, age and gender, black people were:
 - **77%** more likely to be labelled as at risk of committing a future violent crime than white people
 - **45%** more likely to be labelled as at risk of committing any kind of crime

Is the Software Unethical?

- Equally right at predicting reoffending vs unequally wrong at mislabelling
 - *Unequally wrong* for false positives in different populations = unfair (Pro Publica argument)
 - *Equally right* in predicting reoffending = fair (Northpointe argument)

Northpointe, the company that sells COMPAS, said in response that the test was racially neutral. To support that assertion, company officials pointed to another of our findings, which was that the rate of accuracy for COMPAS scores — about 60 percent — was the same for black and white defendants. The company said it had devised the algorithm to achieve this goal. A test that is correct in equal proportions for all groups cannot be biased, the company said.

Base populations have different levels of reoffending so algorithm cannot be equally wrong and equally right for both populations

Monkey Cage
A computer program used for bail and sentencing decisions was labeled biased against blacks. It's actually not that clear.

By Sam Corbett-Davies, Emma Pierson, Avi Feller and Sharad Goel
October 17, 2016



Most Read Politics

- 1 'Poor man's version of Don King': Trump continues his war of words with LaVar Ball
- 2 Analysis President Trump and accusations of sexual misconduct: The complete list
- 3 White House military personnel removed amid investigation into contacts with foreign women during Trump's Asia trip

Even the Smallest Decisions Can Introduce Bias

- What definitions of *fairness* can be applied to algorithms?
 - Different definitions (Northpointe vs ProPublica) of fair can lead to different levels of acceptance
- Bias originates with selection of data and categories used to generate scores
 - it would be possible for any algorithm to be both equally wrong and equally right for black and white populations.
- Treatment does not take into account complex societal issues associated with these categories = biases

Campaigning for Justice: ProPublica

- Increasing amount of discussion about use of Northpointe COMPAS in judiciary
 - Proprietary algorithms determining individual futures
 - Inability to scrutinize processes through which decisions are made unjust
 - Uncritically accepting algorithmic decisions can mean that the justice system is failing in duty of care



Women less likely to be shown ads for high-paid jobs on Google, study shows

Automated testing and analysis of company's advertising system reveals male job seekers are shown far more adverts for high-paying executive jobs

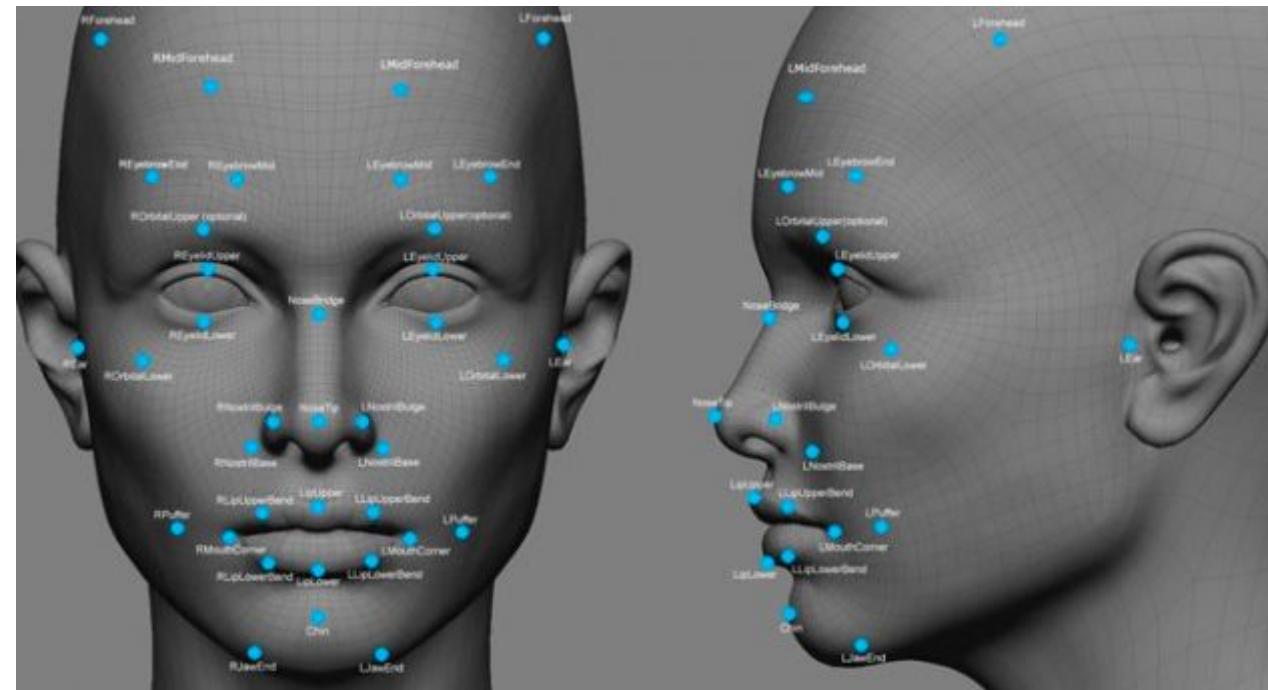


we have to think about how to rebalance the data so that that discrimination is not propagated through the algorithms. How does one come up with a fair set of data, which can actually challenge the biases that might naturally be there ...

Not as easy as it sounds ...

Example 2: Facial Recognition Software

- Joy Buolamwini (MIT)
- Software created by brand-name tech firms such as Amazon uncovered much higher error rates in classifying the gender of darker-skinned women than for lighter-skinned men.
- Other problems – unable to reliably detect Asian eyes
- Location of software companies and demographics = non-representative datasets used in algorithm development



Significant Harms From Deployment

- Called on Amazon to stop selling its facial recognition software to police.
- Caution about the fast-moving adoption of facial recognition by police, government agencies and businesses from stores to apartment complexes
- Computer vision systems that enable self-driving cars to “see” the road shows they have a harder time detecting pedestrians with darker skin tones.

Algorithmic Justice League

- Algorithmic activism
- “Naming and shaming of companies”
- “Safe Face Pledge” – addresses bias, facilitates transparency, promotes dignity and human rights

The screenshot shows the Algorithmic Justice League website. At the top, there is a navigation bar with links for Home, Safe Face Pledge, Gender Shades, The Coded Gaze, and a logo featuring the letters AJL. To the right of the logo are links for AI, Ain't I A Woman, Fight Bias, Newsletter, and a button labeled GET INVOLVED. Below the navigation bar, the text "ALGORITHMIC JUSTICE LEAGUE" is prominently displayed. On the left side, there is a small image of a smartphone screen showing a facial recognition interface with a green hexagonal overlay. To the right of the phone image is a white box containing the text "SAFE FACE PLEDGE LAUNCHED" in bold capital letters, followed by the subtitle "In partnership with the Center On Privacy & Technology". Below this, a paragraph describes the Safe Face Pledge as an opportunity for organizations to make public commitments towards mitigating the abuse of facial analysis technology. It highlights the pledge's focus on prohibiting lethal use of the technology, lawless police use, and requires transparency in government use. A link to www.safefacepledge.org is provided at the bottom of the box.



Dual/Malicious Use and Normalization

- Surveillance technology commonly used in cities, workplaces and homes
- Vary considerably wrt ethical compliance
- Use for population control (China, Uganda etc)
- Possible vulnerability for hacking via “back door” access codes

TECHNOLOGY

Huawei tested AI software that could recognize Uighur minorities and alert police, report says

An internal report claims the face-scanning system could trigger a ‘Uighur alarm,’ sparking concerns that the software could help fuel China’s crackdown on the mostly Muslim minority group

<https://www.washingtonpost.com/technology/2020/12/08/huawei-tested-ai-software-that-could-recognize-uighur-minorities-alert-police-report-says/>

Hikvision claims to have phased out minority recognition in biometric surveillance software

<https://www.biometricupdate.com/202007/hikvision-claims-to-have-phased-out-minority-recognition-in-biometric-surveillance-software>

Recognizing the Politics of Data Science

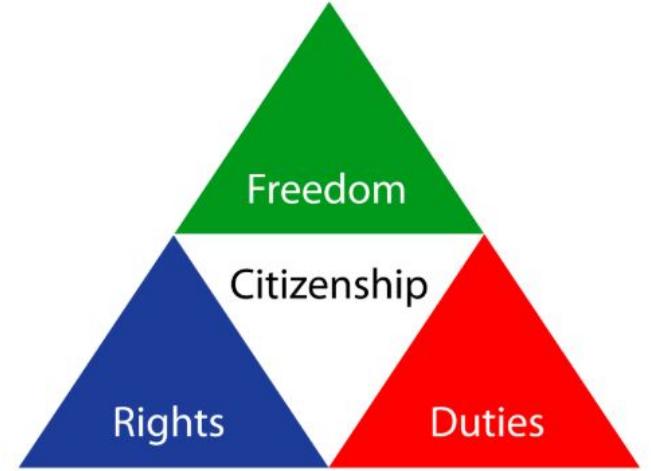
- Algorithms are inherently politicised [as connected to social policy and political power]... and reflect our current world views and social policy
- This can lead to new biases creeping in to the world that we live in as some communities are targeted, left behind or excluded from the digital revolution
- Need continual surveillance and critical reflection to make sure we are creating and deploying ethical algorithms

Ethical Data-Intensive RRI

- Should algorithms in a sense follow a higher moral values that we think are more important than giving an exact reflection of the world?
 - Ie. Gender, LGBTQ+, previously disadvantaged communities
- What is a representative sample of the population you are trying to model?
 - Should you use the data as it is?
 - Should you change the data, or not change but adapt the way we look at the data to serve our purpose of being non-discriminatory?
 - Should we purposively select for equal representation in certain marginalized categories?

Design Decisions Can Cause Real-World Harms

- Unlikely that Northpointe or Amazon developers were trying to maliciously introduce bias
- Designing to the best of their ability within their worldview using data that was readily available
- Small decisions and lack of critical reflection led to large real-world harms
- *Even the smallest decision, developer or task can have significant impact*



Ethics at the Centre of Data Science

- Research practices and the tools that underpin them have ethical implications
 - Even the smallest tools, practices and decisions can have significant ethical consequences
-
- Get independent researchers to check your code/data selection/results to expose biases
 - Always critically examine the decisions you're making in your research and ask "why do I think that way"?
 - Be critical of the code and results you're using – how did they get to the point they did?
 - Think about how other cultures will respond to your decisions

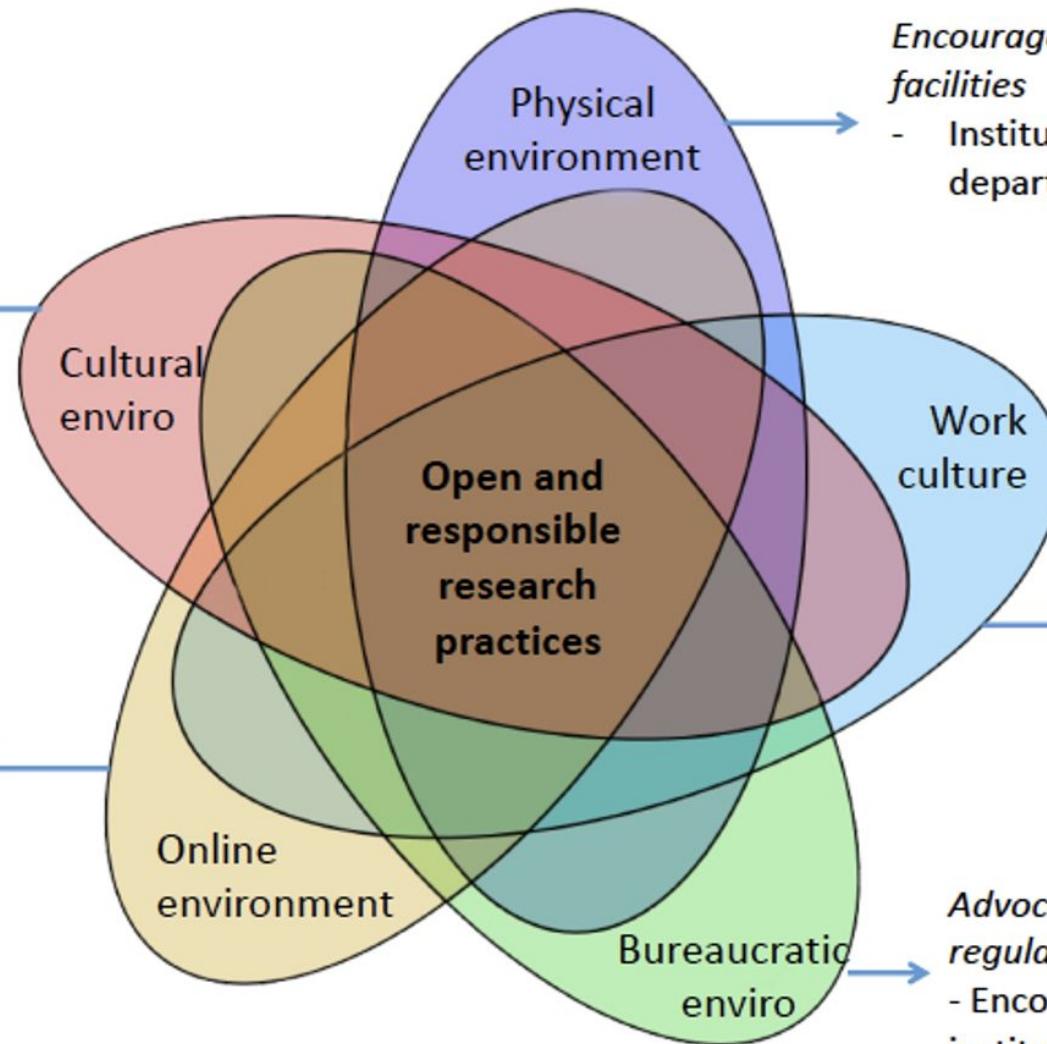
Extending Data Science Citizenship Responsibilities

Engage with public on data-related issues

- Use expertise to engage with common concerns and misconceptions
- Contribute to public skill development

Scrutinize data and platforms currently in use for biases

- and re-use data
- Carefully scrutinize your own code and design for biases
- Flag up platforms are exclusionary
- Biases in algorithms etc
- Advocate for improving community resources



Encourage development of open storage facilities

- Institutional repositories, centralized departmental sharing

Improve openness and responsibility in your work environment

- Advocate for RDM practices
- Engage colleagues in discussions on RCR, RDM, FAIR
- Encourage data dissemination beyond disciplines

Advocate for development of data regulatory frameworks

- Encourage development of data policies at institutional and policy level

Outline for Next Week

Over the course of next week, reflect on the tools that you are going to be taught. Think about:

1. How you can safeguard *beneficial* outcomes of your activities in data gathering, infrastructure building and data dissemination?
2. How can you discuss these issues with your colleagues and peers?
3. How can you scrutinize the systems/datasets you will work with to make sure that biases do not creep into your research systems?
4. How can responsible and open science citizen strengthen these activities?

Thank You

Please feel free to contact me with any further questions!

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