Toolkit for Transparency, Reproducibility & Quality in Energy Research
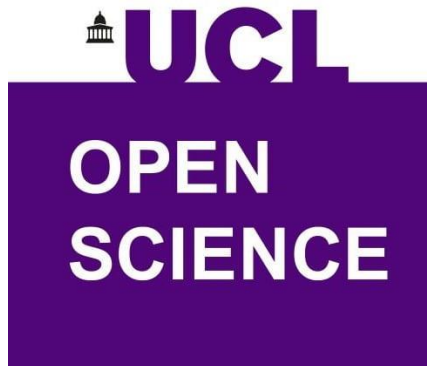
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🏛**UCL**

OPEN SCIENCE

UCL Open Science Conference 2021
April 2021

Our presentation

Our context and journey into transparency

Challenges for applied multidisciplinary research areas

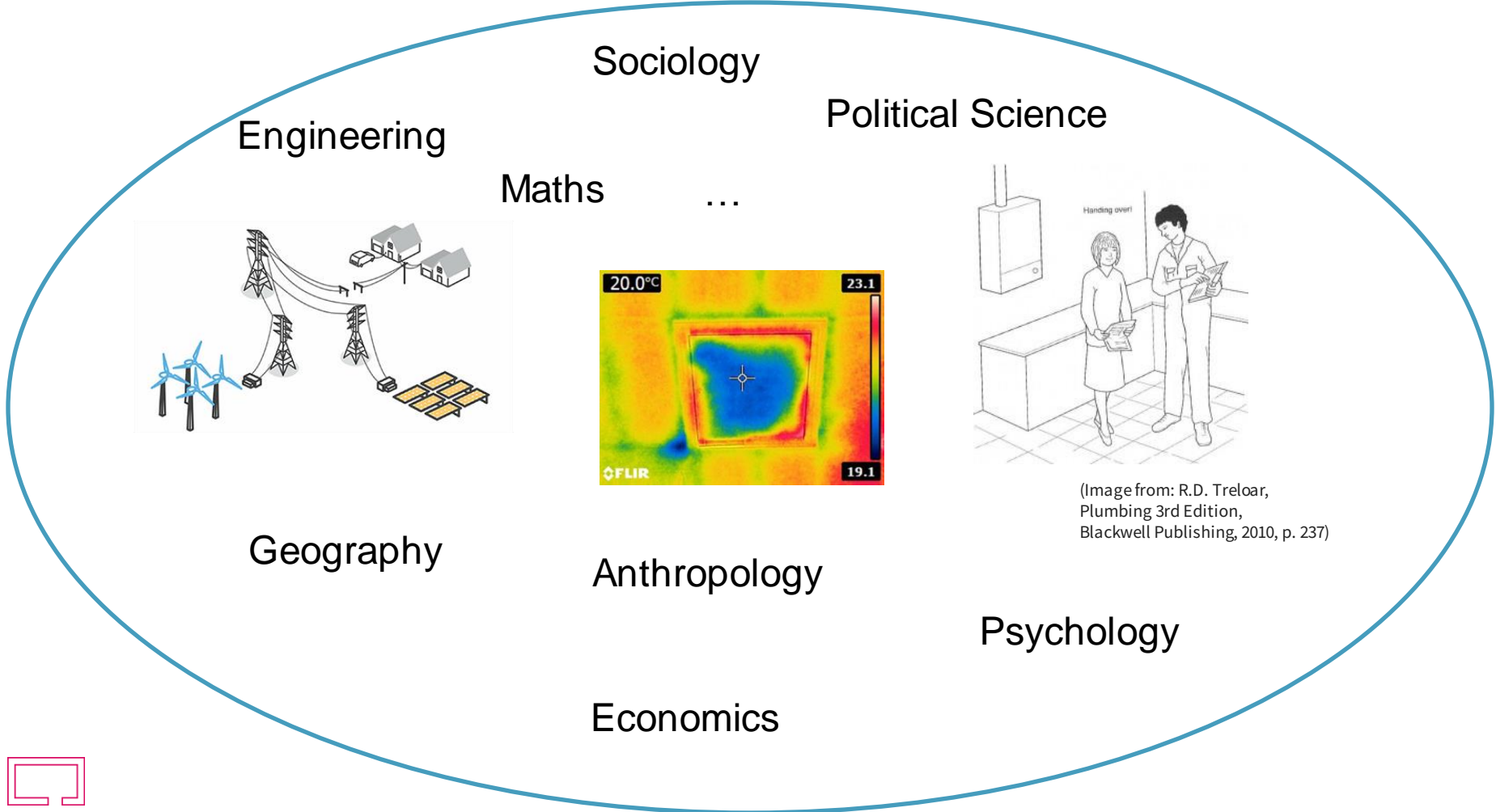TReQ: transparency, reproducibility, and quality – what and when?

Next steps

Our context

Bartlett School of Environment, Energy and Resources
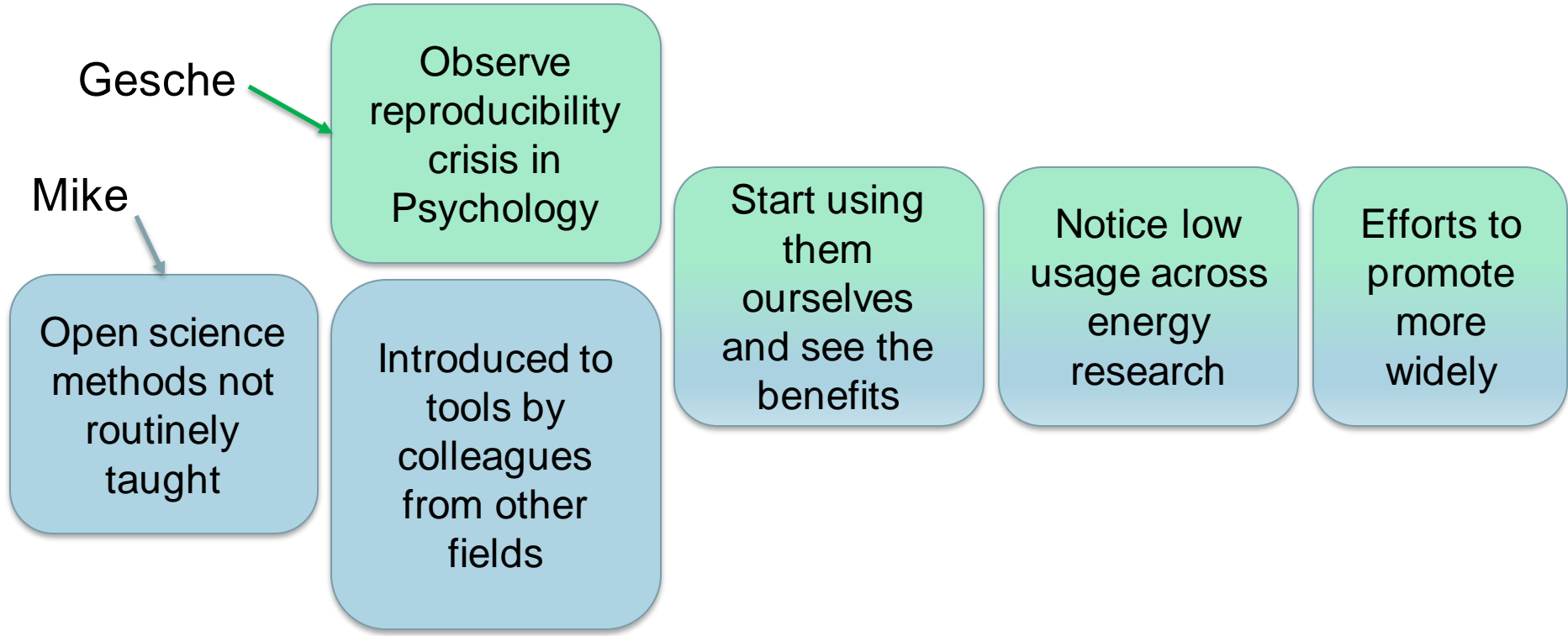
Focus on energy / resource use / emissions reduction

Sociology

Political Science

Engineering

Maths

…

Geography

Anthropology

Psychology

Economics

(Image from: R.D. Treloar, Plumbing 3rd Edition, Blackwell Publishing, 2010, p. 237)

Our journey

Gesche

Mike

Observe reproducibility crisis in Psychology

Open science methods not routinely taught

Introduced to tools by colleagues from other fields

Start using them ourselves and see the benefits

Notice low usage across energy research

Efforts to promote more widely

Challenges in applied multidisciplinary research (like energy)

Time and money

Rapid change

Wide range of methods

Not using own data

Why focusing on TReQ?

Transparency: 'the principle that every […] scientist should make the essential components of his or her work visible to fellow scholars'. *(Moravcsik; 2014: 48)*

Reproducibility: Independent studies testing the same thing should obtain broadly the same results.

Quality: How 'good' the research is - posing important questions, using appropriate methods, assessing bias and considering alternative explanations for findings.

TReQ approach

Applicable	• For wide range of multidisciplinary research
Flexible	• Can be modified easily • Not imposing constraints
Easy	• Low barrier to entry • No specialist knowledge needed

Preregistration

Preprints

Reporting guidelines

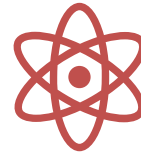**Sharing data/code**

Focus on benefits

1) Preregistration

What

A document which specifies details of the research and analysis before researchers see the outcome data

Science benefits

Could help to overcome the 'file drawer problem', 'cherry-picking', 'p-hacking'

(Warren, 2018; Chambers et al., 2014)

Researcher benefits

Better conducted studies

Faster analysis after data collection

Putting an early stake to the area one is working in

Potential for early external input on design/analysis

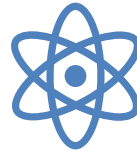*(van't Veer & Giner-Sorolla, 2016; Wagenmakers & Dutilh, 2016)*

2) Preprints

What

Publishing your manuscript before journal submission.

Science benefits

Increased access to science

Earlier access to findings (but "buyer beware")

(Suber, 2013; Sheldon, 2018)

Researcher benefits

Receiving feedback before submission to a journal and hence improving the paper

Show earlier that you are working in a certain area
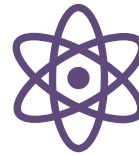
Earlier citation

3) Reporting guidelines

What

Reporting guidelines set out the details of studies that should be reported in publications.

Science benefits

Aid reproducibility

Help to judge quality

Help synthesis

Researcher benefits

Helps to structure writing

Sense of comfort you are not omitting key details

Helps to anticipate/address reviewer comments

Helps with better studies (when using them at design stage)

4) Data and code sharing

What

Making data and code openly available.

Science benefits

Increase efficiency

Detect errors/fraud

Researcher benefits

Stimulates collaboration

Gives more citations

Makes it easier to reuse and revisit code and data

*(Pfenninger et al., 2017; Piowar & Vision, 2013; Vandewalle, 2012)*

The TreQ list

A checklist for reporting of tools that promote transparency, reproducibility, and quality of research

*Huebner, G. M., Fell, M. J., & Watson, N. E. (2021).*
http://doi.org/10.5334/bc.67

Tools	Delete as applicable	Comments
Pre-registration		
This study has pre-analysis plan.	Yes No	*Explanation if no:*
If yes		
URL		*{insert link}*
Was it registered before data collection?	Yes No	*Explanation if no:*
Does the paper mention and explain deviations from the PAP?	Yes No Not applicable (no deviations)	*If yes, specify section of paper, or explanation if no:*
Reporting guidelines		
This paper follows a reporting guideline.	Yes No	
If yes		
Which one?		*{insert name and citation, include in reference list}*
Open Data and Code		
Data/code are publicly available	Yes, data and code Yes, data only Yes, code only No	
Does the paper make a statement on data and code availability?	Yes, on data and code Yes, on data only Yes, on code only No	*Refer to relevant section or include here:*
If yes		
What is / are the link(s)?		*{insert link(s)}*
Have steps been taken to ensure the data are FAIR?	Yes No	
Has meta-data been uploaded?	Yes No	
Preprints		
Have you uploaded a preprint?	Yes Planned following submission No	
If yes		
What is the link?		*{insert link}*
If planned		
Which preprint server/location?		

When to use the tools

Modified from Chambers et al. (2014).

When to use the tools

Huebner et al. 2021.
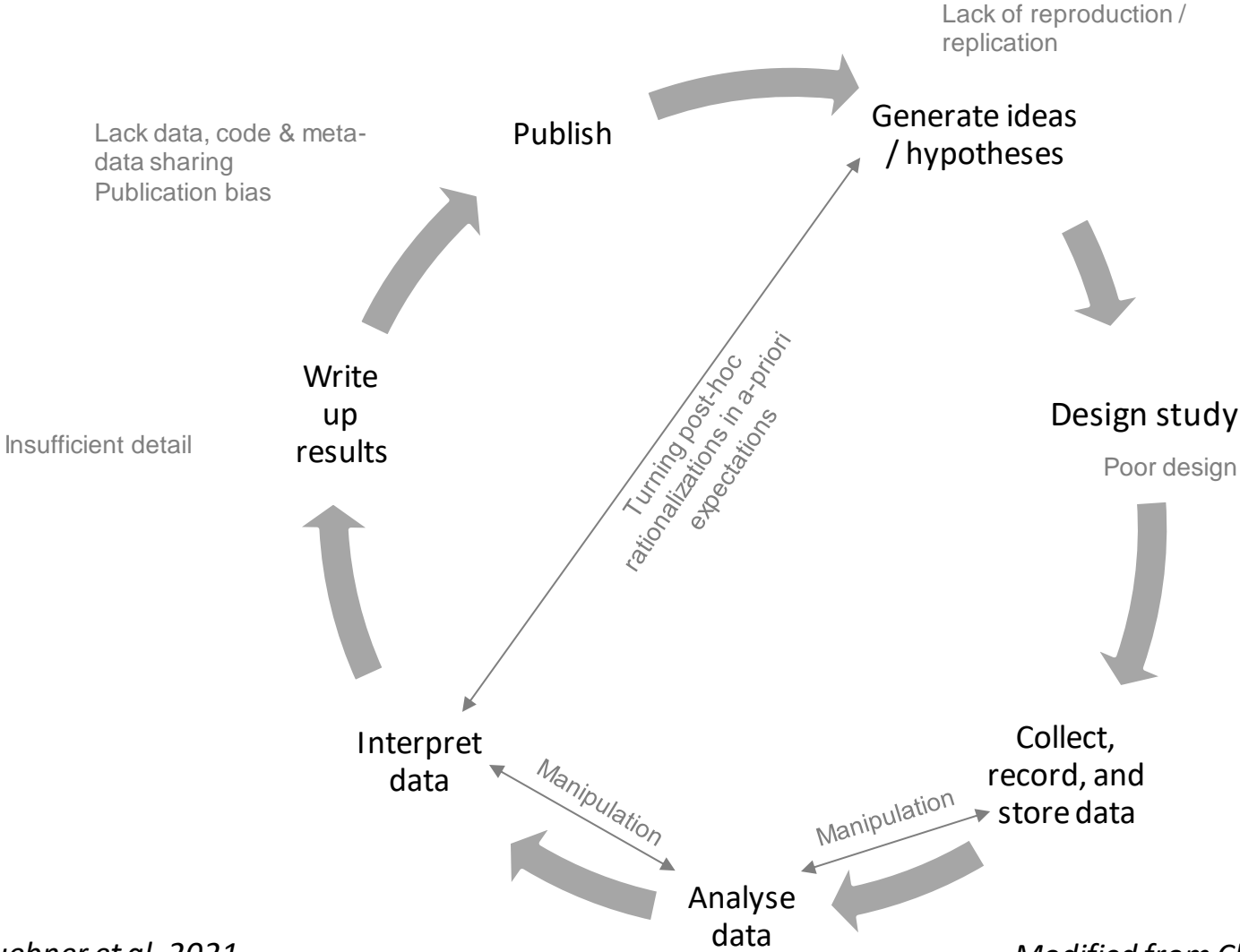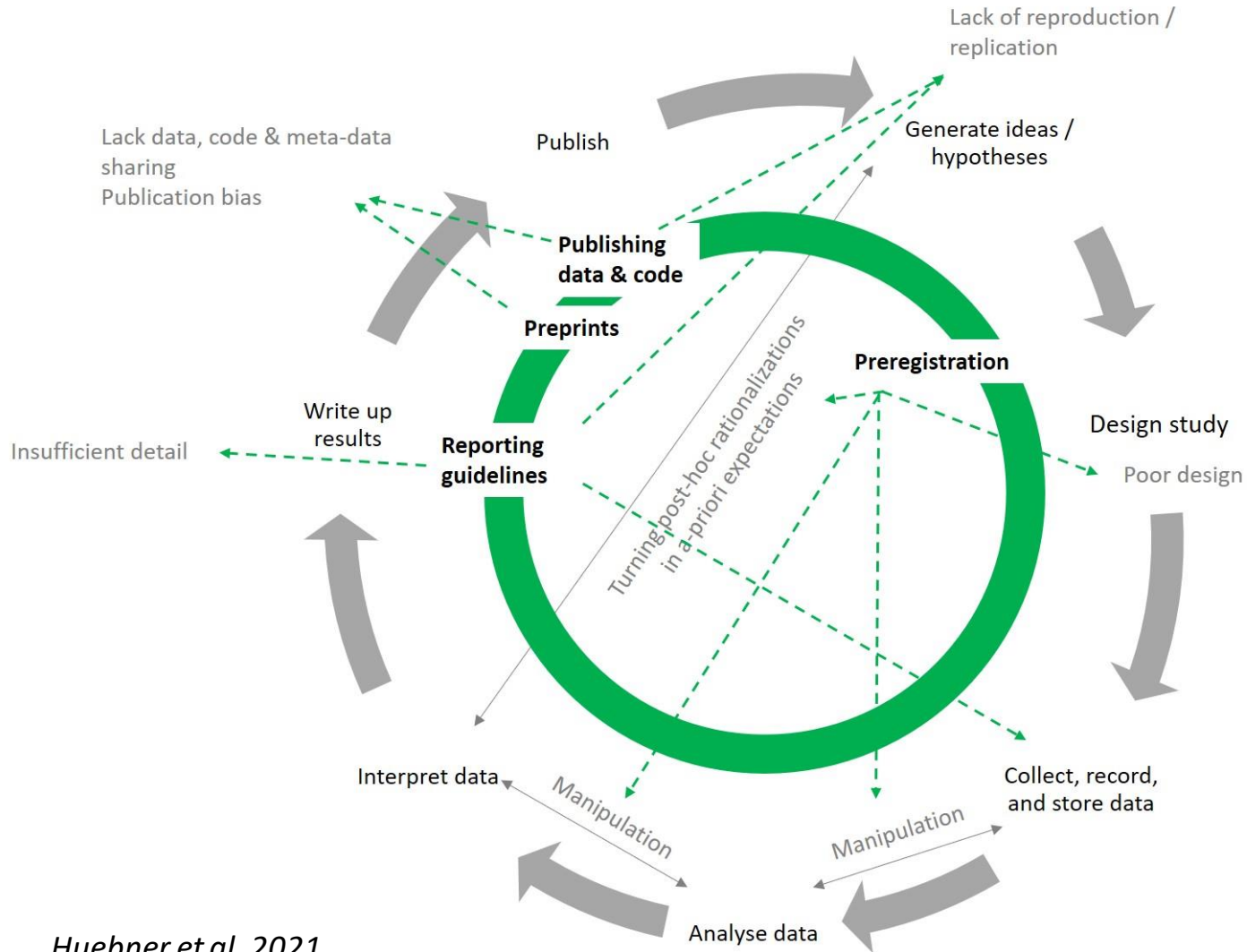
Next steps...

Create educational materials & embed practices for TReQ research in our teaching.

Run survey/workshops in our research centre to understand barriers against uptake.

Create an online resource center.

Monitor progress in our research area.

Work with others in ecosystem e.g. funders, journals.

Summary

Not every research community is the same.

Focus not just on pure reproducibility.

Challenge the idea that TReQ practices are a burden & focus on the benefits.

Promote tools that are widely applicable, flexible and easy to use.

Embed learning about TReQ practices early on.

Thanks! Questions?

Not every research community is the same

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Focus not just on pure reproducibility

@GescheHuebner
@mikefsway

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Example reporting guidelines

STUDY TYPE	REPORTING GUIDELINES	NOTES	REFERENCES
Randomised trial	CONSORT	Requires a flowchart of the phases of the trial and includes a 25-item checklist	Schulz *et al.* (2010)
Systematic review	PRISMA	Flowchart and 27-item checklist	Moher *et al.* (2009)
Predictive model	TRIPOD	22-item checklist	Collins *et al.* (2015)
Qualitative study (interviews and focus groups)	COREQ	32-item checklist	Tong *et al.* (2007)

And many more: *https://www.equator-network.org/reporting-guidelines/*