



**How do
we
measure
success
for Open
Science?**

OAI13 Conference, 7th September 2023

Breaking boundaries. Empowering researchers. Opening Science.

PLOS is a nonprofit, Open Access publisher empowering researchers to accelerate progress in science and medicine by leading a transformation in research communication.

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Accepts:
Magazine, Methods article, Registered report, Research article, Systematic reviews & meta-analysis



PLOS Climate

Accepts:
Methods article, Research article, Systematic reviews & meta-analysis



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Magazine, Methods article, Research article, Systematic reviews & meta-analysis



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Clinical trial, Methods article, Research article, Systematic reviews & meta-analysis



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Accepts:
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Accepts:
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Accepts:
Clinical trial, Magazine, Methods article, Research article, Systematic reviews & meta-analysis



PLOS ONE

Accepts:
Clinical trial, Methods article, Protocol, Registered report, Research article, Systematic reviews & meta-analysis



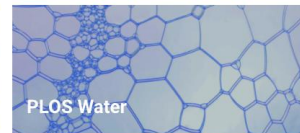
PLOS Pathogens

Accepts:
Clinical trial, Magazine, Methods article, Research article, Systematic reviews & meta-analysis



PLOS Sustainability and Transformation

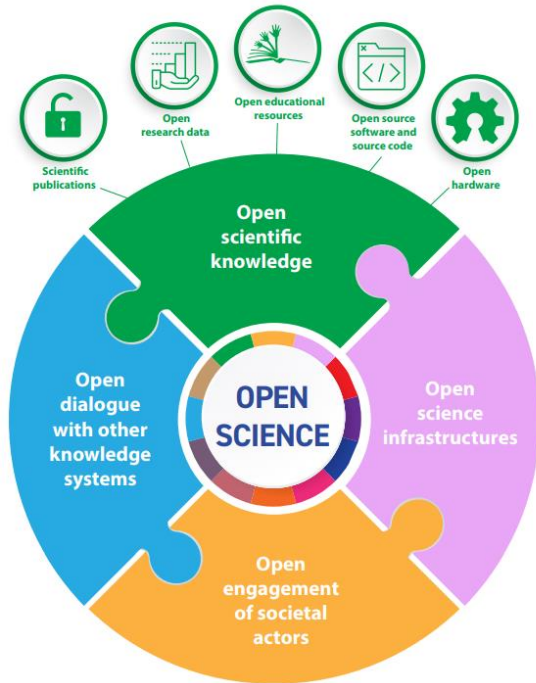
Accepts:
Magazine, Methods article, Research article, Systematic reviews & meta-analysis



PLOS Water

Accepts:
Methods article, Research article, Systematic reviews & meta-analysis

PLOS journals promote Open Science *practices**



Code sharing policy



Published Peer Review History



Data availability policy



ORCID and CRediT adopted



Open licences



Sharing of protocols on protocols.io



Facilitated preprint deposits



Registered Reports

*"Open Science practices" here = ~the "Open scientific knowledge" section of the UNESCO Recommendation on Open Science

What we are trying to achieve

Goals:

- (i) Increase adoption of Open Science practices
- (ii) Increase the benefits of adopting Open Science practices

Solutions:

Anything that helps achieve these goals (e.g. policy, technology, product, outreach, workflows, guidance)

Open Science Practices we're targeting to increase adoption

1

Protocols



2

Code



3

Research data



4

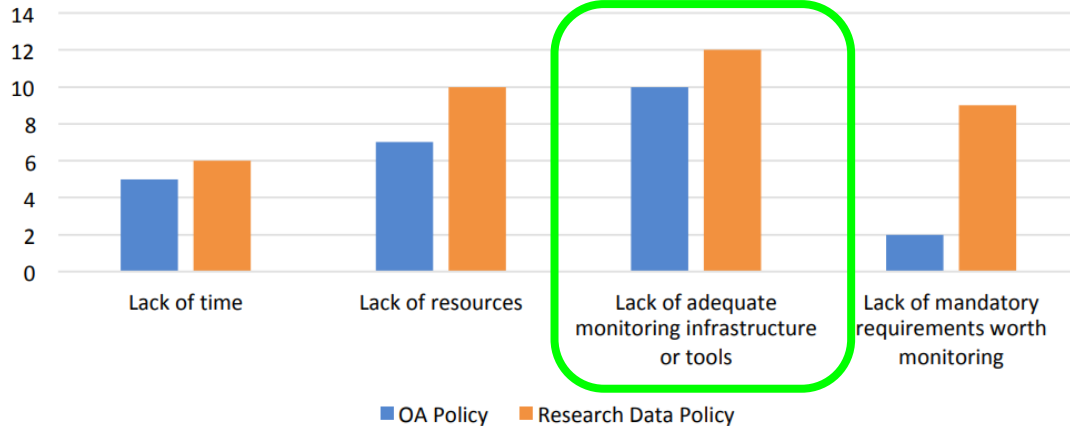
Preprints



Methods

We need better tools to measure (Open) Science

Fig. 26 – Factors preventing funders from monitoring their Open Science policies (n = 25)



Fosci, Mattia, Richens, Emma, & Johnson, Rob. (2019). Insights into European research funder Open policies and practices. Zenodo. <https://doi.org/10.5281/zenodo.3401278>

Quotes

“It's very labour-intensive!”

– Representative of a European university

“A very manual process”

– Representative of a North American funder

Hrynaszkiewicz, I. & Cadwallader, L. (2021, September 27). A survey of funders' and institutions' needs for understanding researchers' open research practices. <https://doi.org/10.31219/osf.io/z4py9>

Goals of the Open Science Indicators project

Read the
Scholarly
Kitchen
blog post:



1

Improve ability to measure success of solutions

2

Understand different communities and co-create new solutions

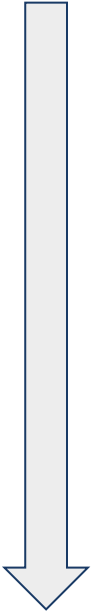
3

Support Open Science initiatives outside PLOS with reliable data

4

Increase adoption of Open Science practices globally

Shorter term



Longer term



Open Science Indicators principles (abridged)

1. Use established community definitions/ standards
2. Measure what is happening, not just what we want to happen
3. Be interoperable
4. Be scalable
5. Take an Open Science approach (open data, methods, etc)
6. Use Open Science Indicators responsibly

Hrynaszkiewicz and Kiermer (2022):
<https://doi.org/10.6084/m9.figshare.21640889.v1>

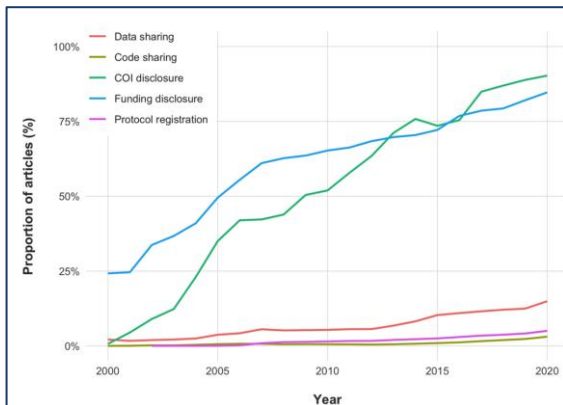


Requirements informed by the work of others

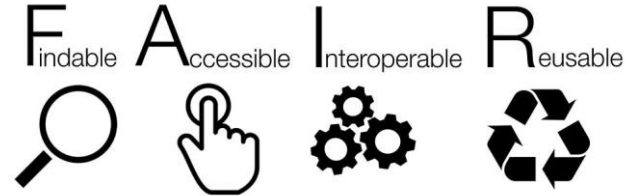
Charité dashboard; BIH QUEST Berlin



A screenshot of some of the metrics automated in the Charité Dashboard on Responsible Research

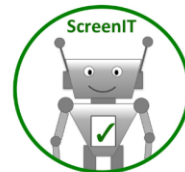


Seghiou et al
(2021) PLoS
Biol 19(3):
e3001107



Quality Assurance

Automated screening tools



Automated screening of scientific manuscripts can help authors to identify and fix common problems, such as failing to state whether experiments were blinded or randomised, using potentially misleading bar graphs to present continuous data, or failing to acknowledge study limitations. Tools can screen a manuscript and provide authors with customised feedback in seconds. This makes automated screening a valuable strategy for improving transparency and reproducibility on a large scale, across many fields.

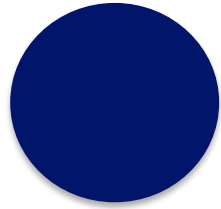
At QUEST, we have developed several new screening tools and are founding members of an international working group that combines many different tools into a powerful screening pipeline (ScreenIT).



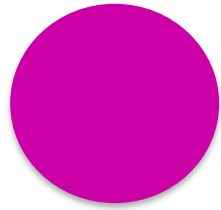
~74,000 PLOS research articles from 2019 to Q1 2023



~8,000 comparator articles from PubMed Central



Extraction from article XML plus AI/NLP-generated fields



Generation and sharing rates, sharing location, topics, country, repositories, persistent identifiers for outputs

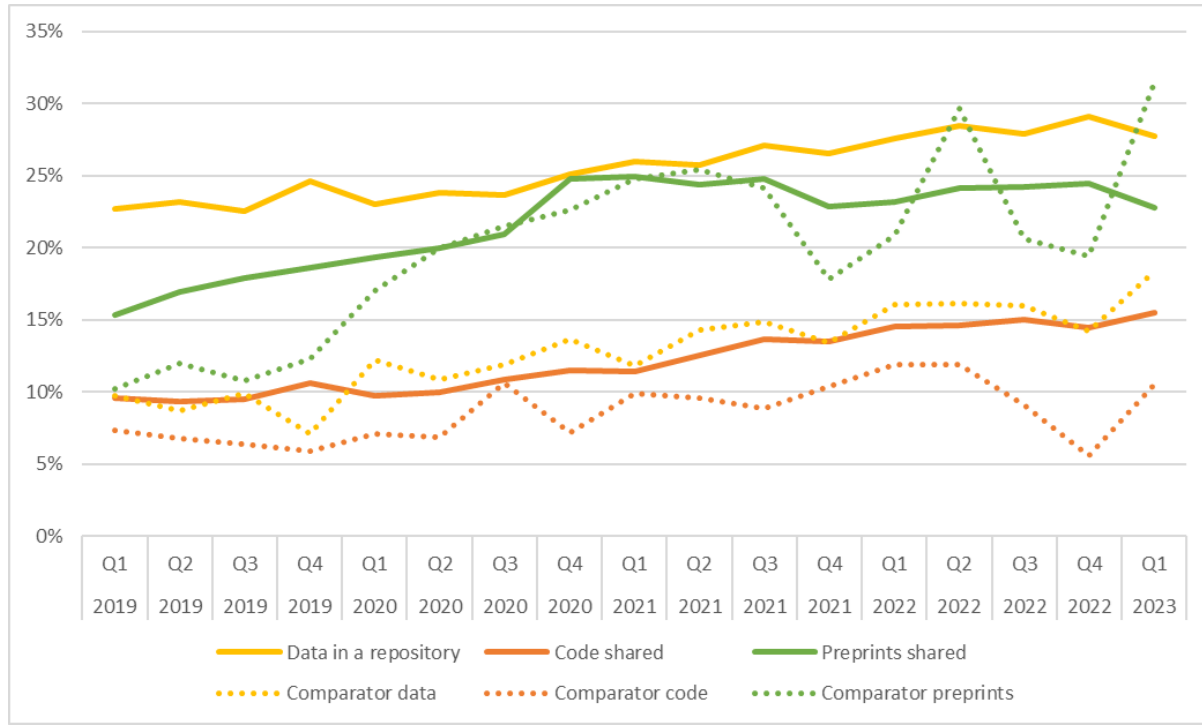


DataSeer

**The OSI
dataset so
far**



The results show increases in OS practices over time

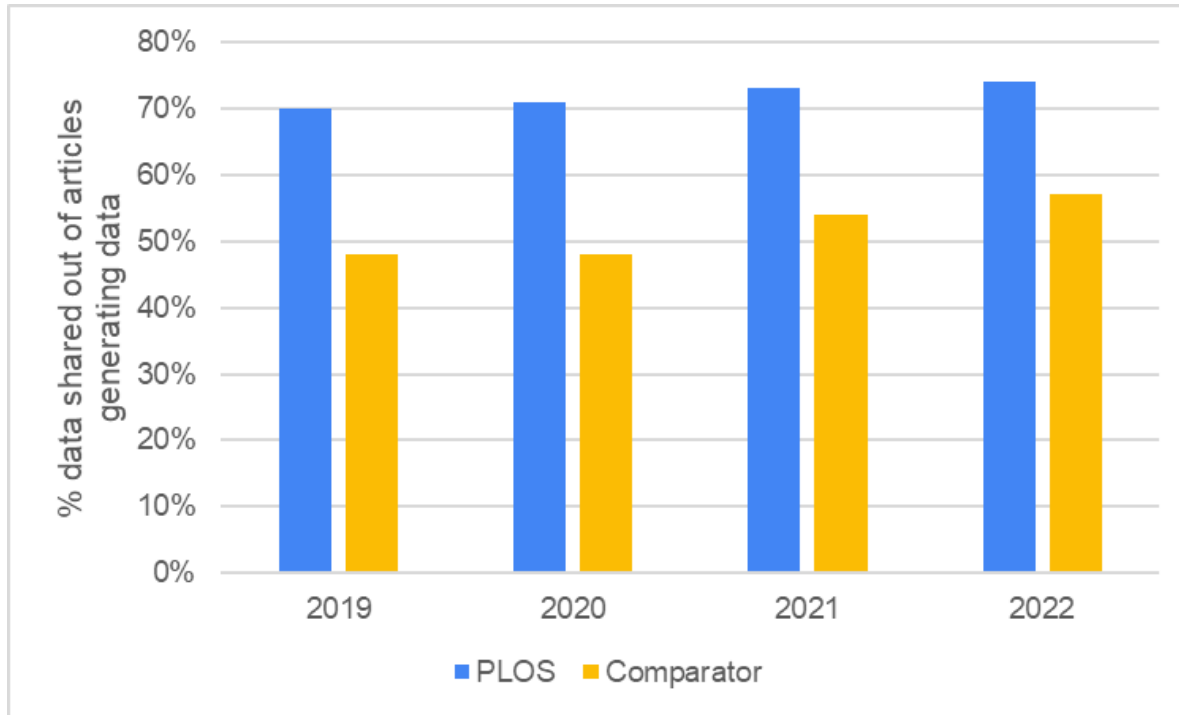


Measures multiple OS practices in publications:

- PLOS & non-PLOS content
- Ongoing analysis updated regularly
- Protocols to be added
- Comparator cohort to be expanded



Overall data sharing rates by any method

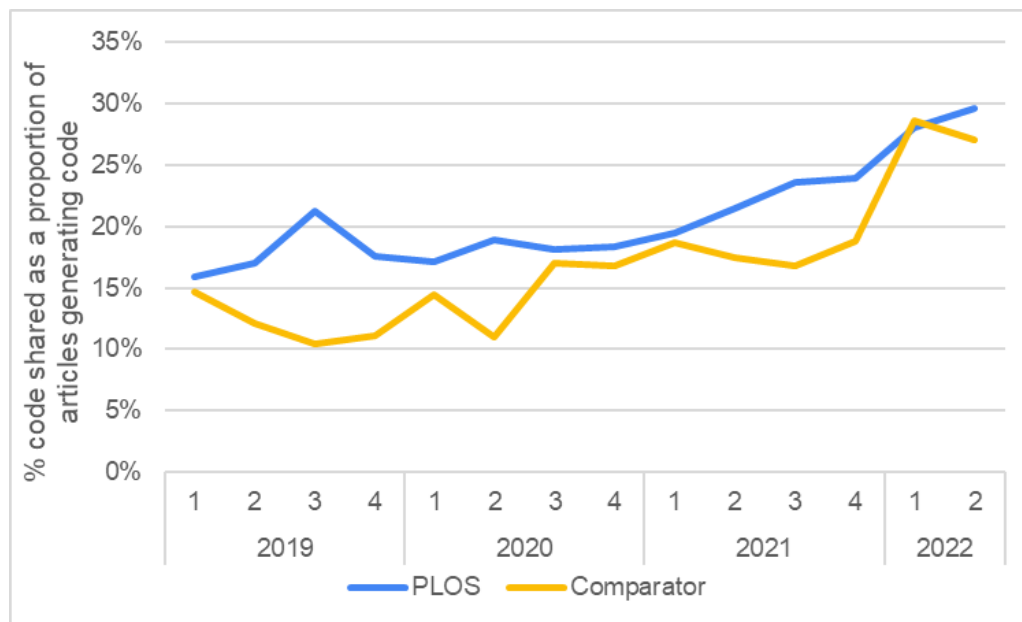


Likely reasons data are not shared:

- Ethical/ legal restrictions
- Lack of detection (poor metadata)
- Non-compliance with mandatory policy
- Lack of mandatory policy

How much code is generated and shared?

Subject area	Code generation
Public health and medicine	49%
Biology & life sciences	76%
Computational biology	95%
All of PLOS	53%



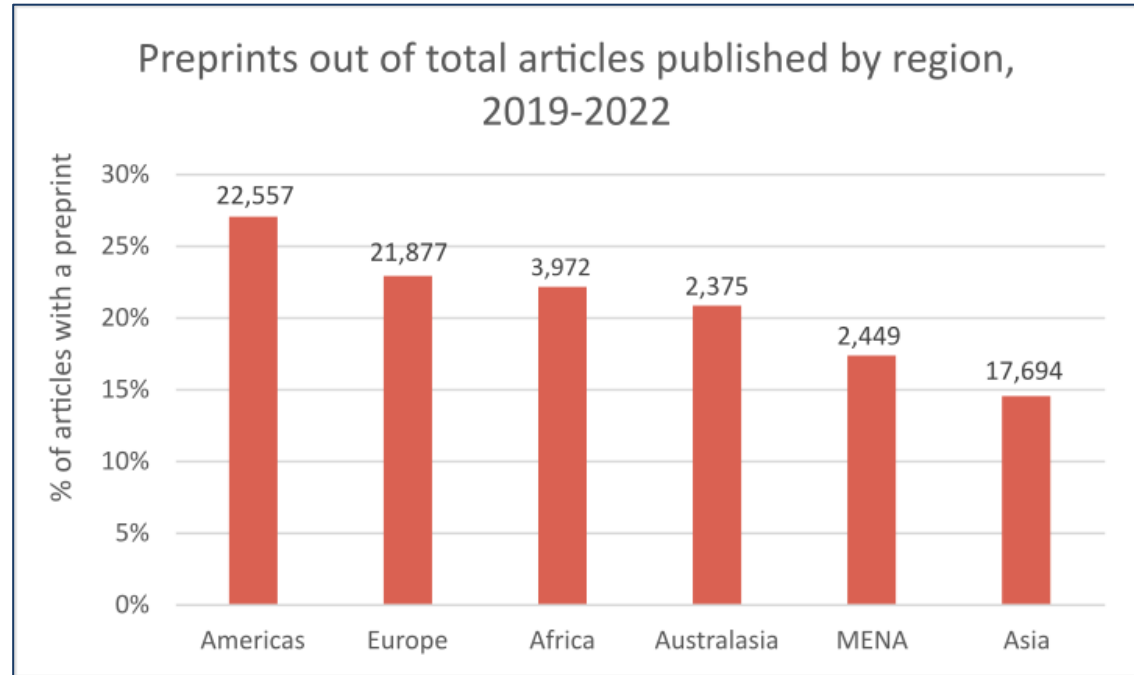
Most common repositories used for research data

	PLOS		Comparators	
	n articles	Rank	n articles	Rank
Github	4458	1	262	1
Open Science Framework	2650	2	57	6
figshare	2470	3	90	4
Zenodo	1562	4	74	5
NCBI Bioproject	1361	5	155	3
Gene Expression Omnibus	1347	6	169	2
Dryad Digital Repository	1136	7	45	7
Harvard Dataverse	706	8	9	21
NCBI Sequence Read Archive	481	9	41	8
Demographic and Health Surveys	451	10	14	16

Preprint posting by geographic region

Possible segmentation:

- By country region
- By subject area
- Funder and institution segmentation possible with knowledge of the relevant article DOIs (ranking is not promoted or directly enabled with the dataset)
- Institutions and funders have begun to conduct their own analyses



<https://theplosblog.plos.org/2023/04/open-science-indicators/>

MENA = Middle East and North Africa

OSIs are being reused/ cited by others

Research Integrity in the UK

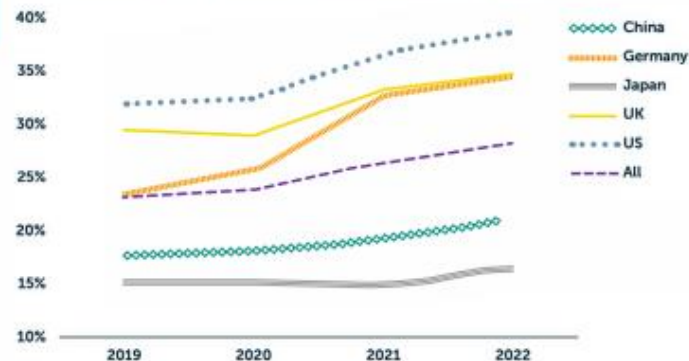
Annual statement 2023

“[T]he PLOS Open Science indicators correspond to a significantly higher quality considering the criteria we introduced..The corpus is well delimited and the indicators are regularly updated. The text mining process is comprehensive...”

Bassinet et al. (2023). <https://hal.science/hal-04121339v2>

Figure 3

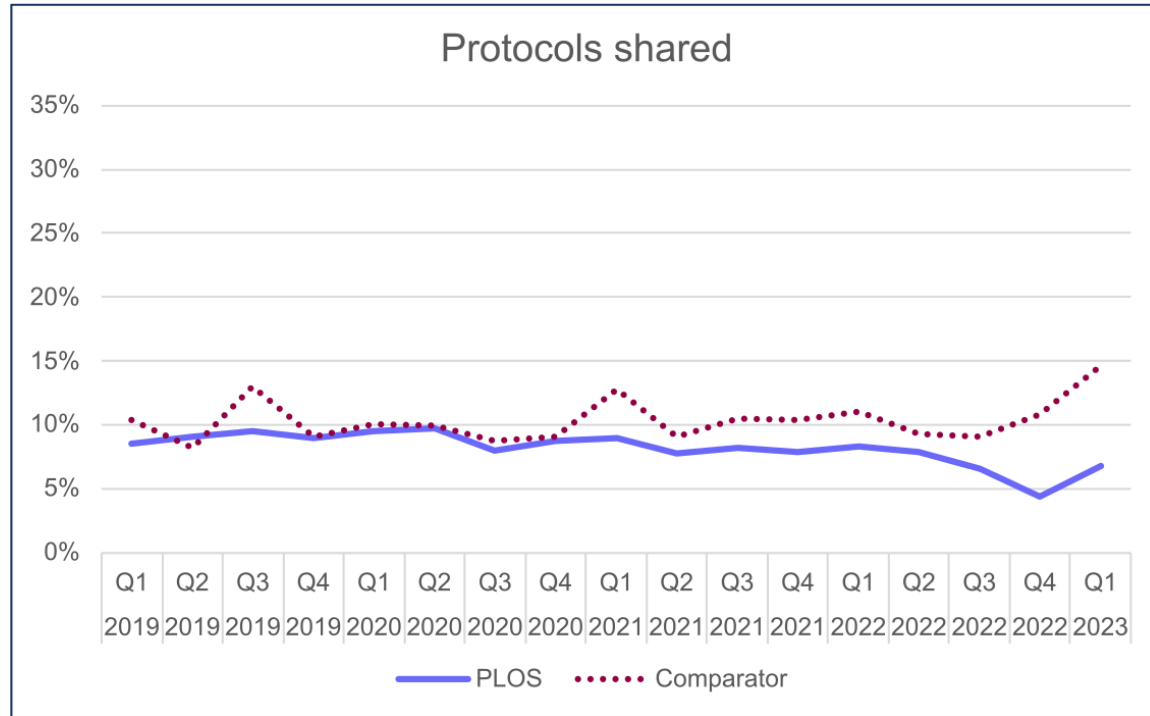
Trends in data sharing in a repository for PLOS articles, 2019-2022



UK Committee on Research Integrity. (2023). Research Integrity in the UK: Annual statement 2023. Zenodo. <https://doi.org/10.5281/zenodo.8117154>



New indicators in development



- **Protocol sharing** OSI (beta) will be available soon
- Detects protocols shared on specific platforms, as journal articles, in supporting information
- **Preregistration** OSI in development

What's next?

Access the
OSI dataset
and methods
on Figshare:



1

Explore interest in cross-industry and community collaboration

2

Quarterly public data releases & new indicators (protocols is next, then preregistration in 2024)

3

Increase scope/ content coverage

+

4

Provide alternative formats?

You tell us

ihrynaszkiewicz@plos.org





**Thanks
for
listening**

Questions? ihrynaszkiewicz@plos.org