Open Research Indicators: sector priorities

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Contributors: Conceptualization: Neil Jacobs and Marcus Munafo. Investigation: Neil Jacobs. Methodology: Neil Jacobs. Visualization: Neil Jacobs. Writing - original draft: Neil Jacobs. Writing - review & editing: Neil Jacobs, Marcus Munafo, Emma Henderson, and Valerie McCutcheon.

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Executive summary

Pilot projects are planned in 14 institutions that are members of the UK Reproducibility Network (UKRN), to explore the potential and value of indicators of open research to inform how those institutions plan, implement and evaluate their support for open research. The views of both institutions and individuals in the UK academic research sector were sought, to establish which aspects of open research should be priorities for monitoring in those pilots.

A total of 29 responses were received, which identified 83 discrete priorities. The results of that exercise were that the following aspects of open research were prioritised:

- Sharing research data
- Sharing research software
- FAIR research
- Open Access to publications
- Open research beyond publications
- The use of persistent identifiers
- Metadata and technical standards
- Links across the scholarly record
- Pre-registration
- Reward and recognition
- Training and awareness
- Equality, diversity and inclusion

Some of the priorities are on technical infrastructure, which may also enable the other priorities, and there are existing principles and initiatives informing open infrastructure.

The pilot institutions reviewed this list and selected a sample of the priorities as likely to be the focus of those pilots. These were around research data sharing, pre-registration and recognition and reward.

Background and aims

The UKRN leads a multi-year Open Research Programme to promote the uptake of open research practices across the UK sector, including training, revisions to institutional recognition and reward policies and procedures, sharing practice among institutions, and monitoring / evaluating progress against our aims. It has committed to provide and assess solutions such as dashboards and reporting tools to institutions, to help them plan, deliver and evaluate the effectiveness of their support for open research practices. Such tools may also help the programme to evaluate its progress.

There is a long, international history of efforts to monitor aspects of open research for a range of purposes, including to check compliance with policies, to inform planning for interventions to promote openness, and to help to evaluate those interventions. While these efforts initially focused on aspects of open access, they have become broader over time.

Much of the attention in this field has been on the use of indicators for research assessment (cf CoARA, DORA, Leiden Manifesto, etc). For example, the potential of research metrics and indicators for assessment has been reviewed by the Metric Tide reports (2015 and 2022), and is one subject of ongoing international projects such as GraspOS and OPUS.

However, the focus of the work reported here is not on the use of indicators to support research assessment. Instead, it is on how research institutions develop and use indicators to inform their planning and organisational development to support open research.

There are some relevant lessons from the 'assessment' literature, such as the 'dimensions' of responsible metrics from the Metric Tide (robustness, humility, reflexivity, etc.). There are also more general frameworks such as INORMS SCOPE, the preliminary work done by the UK Committee on Research Integrity, and the monitoring framework being developed for the UNESCO Open Science Recommendation, all of which are relevant to indicators for planning and organisational development in support of open research. There is also more specific work to identify the most important open research practices that should be monitored to inform planning; for example, Cobey et al (2023) have published the results of a Delphi study into this topic in clinical research.

In order to develop dashboards and reporting tools for institutions, UKRN set out in 2023-2024 to:

1. Identify the aspects of open research that were priorities for the UK research sector;
2. Receive commentary on how best to monitor these priorities from 'solution providers';
3. Discuss priorities with funders and publishers, to provide context;
4. Agree relevant identifiers that would be reliable, valid and ethical;
5. Design and run pilots at a set of UKRN institutions.

Note: "Solution providers" refers to teams who might be willing and able to work with institutions and UKRN to pilot indicators.

The work reported in this paper relates to (1), and this paper thereby is an input into (2). In other words, the aim of the work reported in this paper was to establish what priorities the UK research sector have for monitoring open research. These priorities might relate to the factors influencing open research, the nature and extent of open research, and/or the impact of open research.

Methods

The following methods were used to identify the sector's priorities for aspects of open research to monitor.

To establish a broad, shared understanding of, and support for, the project rationale, scope, aims and lifecycle, UKRN drafted a background paper and hosted a public webinar at which there were speakers from a wide range of different potential 'solution providers', as well as an institutional perspective.

The webinar also launched a "call for priorities". This outlined the project and requested responses from both UK research institutions and individual staff within them. The questions were developed by reference to the INORMS SCOPE framework and sought to encourage its use locally and to enact its principles within this project. They were:

- Have you used the INORMS SCOPE Framework or similar to develop your response?
- What one aspect of open research would you prioritise to monitor?
- What elements of organisational development in an institution would benefit from monitoring this aspect of open research?
- Who would be affected by monitoring this aspect of open research or by the related organisational development?

Respondents could propose up to five aspects of open research as being their priorities. The call for priorities was open for around six weeks.

While the call was open, a group of UK institutions and a group of solution providers were established, all of whom were committed to the initiative.

Institutions

University of Bristol
Cardiff University
University of Edinburgh
University of Exeter
University of Glasgow
University of Hull
King's College London
University of Leeds
University of Leicester
University of Liverpool
Newcastle University
University of Reading
University of Sheffield
University of Sussex

Solution providers

Provider	Relevant link(s)
BIH / Quest Center	https://www.bihealth.org/en/quest/projects and https://www.bihealth.org/en/quest/service
Centre for Journalology	https://ohri.ca/journalology/
COKI	https://openknowledge.community/about-coki/
CORE	https://core.ac.uk/ and https://bsdtag.kmi.open.ac.uk/
COS	https://www.cos.io/
CWTS	https://www.cwts.nl/
Digital Science	https://doi.org/10.6084/m9.figshare.21997385.v2 and https://www.dimensions.ai/products/all-products/dimensions-research-integrity/
Elsevier	https://lab.icsr.net/ and https://researchcollaborations.elsevier.com/
Jisc	https://www.jisc.ac.uk/research
OpenAIRE	https://monitor.openaire.eu
OurResearch	https://ourresearch.org/ and https://openalex.org/
PLOS	https://theplosblog.plos.org/2023/04/open-science-indicators/
SciScore	https://sciscore.com/

In addition, discussions are ongoing with the University of Manchester and its partners in its Open Research Tracker project.

Once the call was closed, the responses were shared with the institution group, who reviewed them, identified common themes, and proposed thematic clusters where institutions and solution providers might work together.

Findings

The call for priorities elicited 29 responses, of which 25 were either from UK institutions or from staff working within them (the target group). A total of 21 institutions were represented in the responses. These 25 responses identified 41 aspects of open research between them, 20 of which were from organisational responses and 21 from individual responses. Many of the aspects of open research indicated several discrete priorities and so, when disaggregated there were 38 discrete priorities from organisations and 45 from individuals, making a total of 83 discrete priorities. All data is given in the Annex.

Figure 1 presents the discrete priorities graphically, grouped into broad clusters. Organisational responses have a blue outline, and individual ones an orange one. From informal correspondence, we suspect that some of the individual responses were labelled such simply because of insufficient time to authorise them being labelled as organisational responses.

The main, broad clusters identifiable from this exercise are as follows (colours as in Fig 1):

- **Sharing research data**
- **Sharing research software**
- **FAIR research**
- **Open Access to publications**
- **Open research beyond publications**
- **The use of persistent identifiers**
- **Metadata and technical standards**
- **Links across the scholarly record**
- **Pre-registration**
- **Reward and recognition**
- **Training and awareness**
- **Equality, diversity and inclusion**

While these are presented as separate clusters they do, of course, overlap and/or relate to each other in other ways, in some cases quite deeply. In some cases, the clustering can be debated, for example FAIR research often implies, among other things, the use of metadata and technical standards, and of persistent identifiers, and those enable links across the scholarly record. Nevertheless, these are conceptually separable.

From the responses, the main elements of organisational development in an institution that were cited as likely benefiting from monitoring aspects of open research were:

- By organisations – policies, training, engagement, support, guidance, strategy, reporting, compliance, incentive structures, infrastructure, data integration and reuse.
- By individuals – policies, procedures, guidance, training, infrastructure, cultural strategies including celebrating good practice.

While there is some divergence, with institutions highlighting procedures more and individuals highlighting culture more, the main impression is that the lists of priorities were quite similar.

The main stakeholders cited as likely to be affected were researchers and professional support staff directly supporting open research. ‘Affected’ could mean many things, including benefiting from monitoring these aspects of open research, or perhaps incurring risks or costs, or having changed working practices or relationships.

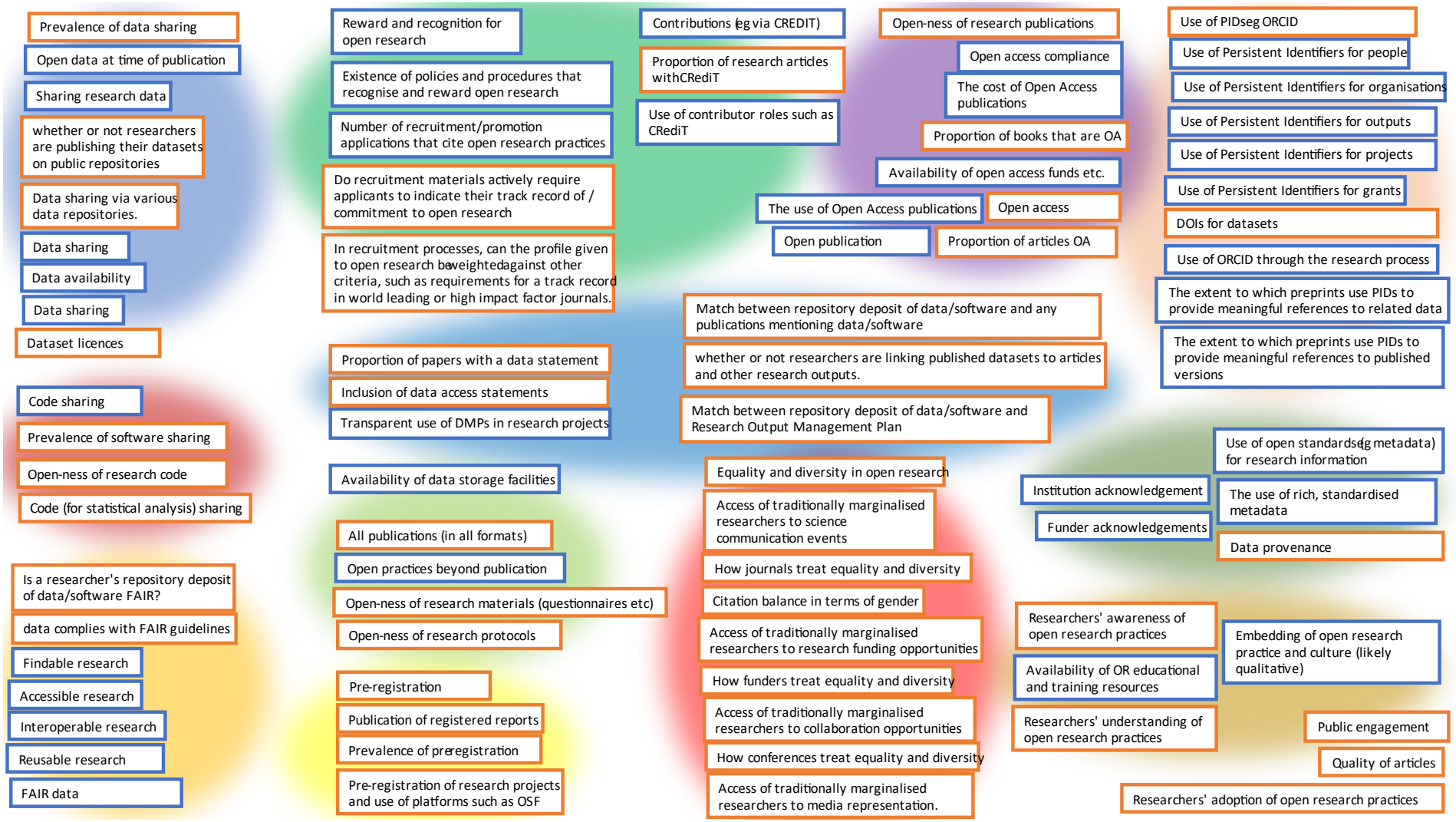

Figure 1: Discrete priorities identified by organisations (blue outline) and individuals (orange outline) responding to the UKRN call for priorities

Discussion

There were only 25 responses to the call for priorities, from 21 institutions, so care is needed in interpreting the findings. There was some diversity among the 21 institutions (e.g., only 12 were from the Russell Group of research intensive universities) and, unsurprisingly perhaps, many of those who responded were affiliated with the UKRN and had expressed interest in being part of the pilot group. Nevertheless, it is clear that the whole sector was not represented in the responses, and the priorities therefore cannot be taken as those of the sector.

The purpose of the exercise within the UKRN Open Research Programme was to help the pilot institutions identify where they might focus the pilots, to identify areas of common interest and therefore potential collaboration between institutions, and to start the discussion with solution providers. After reviewing the priorities, the pilot institutions agreed to focus on the following four areas:

1. open and/or FAIR data (their completeness, reusability, reproducibility, etc)
2. data accessibility statements (their existence, completeness, accuracy, etc.)
3. pre-registration (its existence, completeness, different kinds, etc.)
4. the use of CRediT (a binary yes/no, but also perhaps the breadth of contributions thereby recognised – i.e., how 'well' CRediT is being used)

To assess alignment between the priorities identified in various strands of the UKRN Open Research Programme, and with emerging international consensus, Table 1 compares:

a. the priorities from this survey, that is, what a sample of the sector prioritises to monitor to inform its organisational planning and support;
b. the 14 open research practices covered by the recent UKRN Open and Transparent Research Practices (OTRP) survey, conducted in 15 institutions;
c. the UKRN open research programme topic schema for training, based on a survey of UKRN institutions and reported earlier in 2023;
d. The open science practices prioritised for biomedicine in the Delphi study reported by Cobey at al (2023).

Note: the results of the OTRP survey will be reported later in 2023.

This comparison, while necessarily a judgement and arguable in some cases, nevertheless suggests that the four areas selected for indicator pilots do largely represent topics emerging within the Programme as being consistently highlighted for attention.

Some of the other priorities for indicators – for example those around metadata and persistent identifiers – can be seen as the infrastructure that enables reliability and efficiency in other indicators, and so they are in some sense intermediate. However, the transparency and accountability in this infrastructure is itself an important issue that is receiving attention both within the UKRN Programme and internationally, for example:

- The work outline for CoARA Working Group Expression of Interest number 26, which aims to use a community-based governance framework, to build trust and promote the expansion of critical open infrastructures.
- The Principles of Open Scholarly Infrastructure are intended to guide providers of information services, including those which provide data on which open research indicators may be built, on issues of governance, sustainability and insurance (in which openness is key).

- The Metric Tide report noted that “there is a need for greater transparency and openness in research data infrastructure. A set of principles should be developed for technologies, practices and cultures that can support open, trustworthy research information management”.
- Stakeholders in the Netherlands have drafted Seven Guiding Principles for Open Research Information, to guide institutions and others on how best to manage information about research, for example in collaborations with solutions providers.
- Open research infrastructure is one of the four pillars of the UNESCO Open Science Recommendation.

UKRN and others have further work in development in this area.

Table 1: Comparison of various open research priorities

UKRN priorities for institutions to monitor open research	**Practices covered by the UKRN OTRP survey**	**Training priorities identified in the UKRN Open Research Programme**	**Core open science practices to monitor in biomedicine (Cobey et al, 2023)**
Sharing research data	Transparent qualitative data practices Defining the data, code, or other evidence on which your research findings will be based on and how this will be managed and shared before the start of data collection and analysis	Data management plans Data storage Data visualisation Data analysis Qualitative open data analysis Different challenges for different types of data (qualitative vs quantitative data; artefacts, creative recordings etc.) Open data (including FAIR principles)	Reporting whether study data were shared openly at the time of publication (with limited exceptions)
Sharing research software	Creating my own open source software / analysis code to share with others Using open source software created by others	Open code Code documentation	Reporting whether study code was shared openly at the time of publication (with limited exceptions)
FAIR research	Preparing my own data, code, or other evidence according to FAIR principles Version control of research products (e.g., data, code, any other materials used in or generated as part of the research process)	Version Control Licensing data and code	Reporting whether data/code/materials are shared with a clear license. Reporting whether the data/code/materials license is open or not
Open Access to publications	Ensuring publications are Open Access	Publication strategies Publication copyright and licencing	Reporting what proportion of articles are published open access with a breakdown of time delay
Open research beyond publications		Open protocols and methods Electronic research notebooks (aka E-lab notebooks)	Reporting whether there was a statement about study materials sharing with publications
The use of persistent identifiers		ORCID identifiers	Reporting the use of persistent identifiers when sharing data/code/materials. Reporting whether ORCID identifiers were reported.
Metadata and technical standards			
Links across the scholarly record			Reporting whether research articles include funding statements

UKRN priorities for institutions to monitor open research	**Practices covered by the UKRN OTRP survey**	**Training priorities identified in the UKRN Open Research Programme**	**Core open science practices to monitor in biomedicine (Cobey et al, 2023)**
Pre-registration	Pre-registration of research protocols (may include registered reports)	Pre-registration & Registered Reports	Reporting whether clinical trials were registered before they started recruitment Reporting whether systematic reviews have been registered Reporting that registered clinical trials were reported in the registry within 1 year of study completion
Reward and recognition	Using guidelines for recognising the specific substantive contribution of everyone involved in a research project	Open research statements required in applications for posts Guidelines for recruitment and interview panels on best practice for research evaluation Guidelines for responsible use of metrics Guidelines for evaluating open research and reproducibility in peer review Guidelines for embedding open research engagement into promotions procedures Guidelines for embedding open research engagement into individual research assessment (e.g., annual appraisals) Narrative CVs Guidelines for contributorship models to research (e.g., CRediT taxonomy)	Reporting whether author contributions were reported
Training and awareness		Training for professional services staff (library, research mgt, IT, HR…)	
Equality, diversity and inclusion			
			Reporting whether study reporting guideline checklists were used.
			Reporting citations to data
			Reporting trial results in a manuscript-style publication (peer reviewed or preprint) Reporting systematic review results in a manuscript-style publication (peer reviewed or preprint).
	Publishing pre-prints	Use of preprint repositories	Reporting the number of preprints

UKRN priorities for institutions to monitor open research	Practices covered by the UKRN OTRP survey	Training priorities identified in the UKRN Open Research Programme	Core open science practices to monitor in biomedicine (Cobey et al, 2023)
	My own data analysis is computationally reproducible	Reproducible computational environments (e.g., Docker, Binder) Use of repositories (e.g., OSF, Figshare, Zenodo, GitHub)	
		Digital humanities	
	Research co-production	Patient and public involvement panels Planning Impact Handling risks in transparency (e.g., social media storms, trolls, etc.)	
	Declaring conflicts of interest		Reporting whether author conflicts of interest were reported
	Conducting open research consistent with relevant legal, ethical, and regulatory constraints	Consent for open data Ethics and risk-assessment Intellectual property	
		Open research awards	

Conclusions

There is an emerging consensus on the aspects of open research that would be useful to monitor, to enable institutions, policy makers etc to plan and evaluate interventions and support. This is largely around sharing FAIR and/or open data and code, and recognising diverse contributions to research. However, there is also a large penumbra of aspects of open research that are seen as important in particular ways, for example they may be important to inform specific interventions, or for particular kinds of research, or as aspects of wider sector concerns, or they may be generally important but considered impractical to monitor at the moment. While the UKRN pilots will focus on areas where there is consensus among the participating institutions, UKRN will also explore ways to pursue this wider perspective.

Annex

Responses:

UKRN Open Research Indicators

Disaggregated priorities, mapped to clusters:

Priorities clusters.xlsx

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