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# Evaluating the Efficacy and Impact of a Pilot Programme for FAIR Data Stewardship at a UK University

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## Abstract

Increasingly, funders, publishers, and institutions expect researchers to comply with the FAIR principles to ensure that data is findable, accessible, interoperable, and reusable. In an institutional context, however, questions remain as to how organisations can move beyond a broad commitment to FAIR, coupled with support for researchers to comply nominally with related grant conditions, to a more embedded and sustainable approach with a meaningful and pervasive impact on the FAIRness of research outputs. A data stewardship model offers one way to achieve this, yet in contrast to universities in mainland Europe and especially in the Netherlands, the UK is substantially lacking in such infrastructure at an institutional level, hampering efforts to evidence its potential impact within UK institutions and thereby advocate for its adoption. This article examines efforts to address this challenge via a recent project at the University of Sheffield to establish a pilot support service around FAIR data stewardship. It also provides a case study of how the benefits and impact of such an intervention might be identified and articulated through an evidence-led evaluation.

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# Introduction

Increasingly, funders, publishers, and institutions expect researchers to comply with the FAIR principles (Wilkinson et al., 2016) to ensure that data is findable, accessible, interoperable, and reusable (Andrews Mancilla et al., 2019; Kvale, 2021; Wendelborn, Anger, & Schickhardt, 2023). This expectation promotes transparency, reproducibility, and the efficient sharing of research outputs, with benefits for research quality and integrity as well as equitable access to knowledge across and beyond research communities (Borgman, 2012; Fecher, Friesike, & Hebing, 2015; McKiernan et al., 2016; Munafò et al., 2017; Norris & O'Connor, 2019; Pierce et al., 2019). In an institutional context, however, questions remain as to how institutions can move beyond overarching articulations of a commitment to FAIR and support for researchers to comply nominally with grant stipulations, to a more embedded and sustainable approach. Such an approach would offer practical, comprehensive, and meaningful support that sought to counterbalance the time and workload barriers researchers face in integrating the FAIR principles into their work (Abele–Brehm et al., 2019; Huang et al., 2012; Perrier, Blondal, & MacDonald, 2020; Tenopir et al., 2011), as well as addressing the disparities in practice and awareness that exist across disciplines (Akers & Doty, 2013; Calamai & Frontini, 2018; Teperek et al., 2018; Thoegersen, 2018).[1]

A number of European institutions have developed an infrastructure around data stewardship to provide researchers with specialised, subject-oriented support in managing, processing, and curating data in accordance with the FAIR principles. Institutions in the Netherlands including the universities of TU Delft, Utrecht, Leiden, and Maastricht employ dedicated data stewards embedded in different subject areas, often coordinated by at least one colleague located in library services, providing centrally coordinated yet domain-specific support (Rousi, Boehm, & Wang, 2023; Teperek et al., 2018).[2] Given that infrastructure forms the base level of Nosek's 'Strategy for Cultural Change' in open science, developing services that facilitate more tailored support for FAIR data practices could be considered crucial in embedding cultural change in the way researchers handle and share data (Nosek, 2019). Such infrastructure is, however, yet to emerge consistently in the UK, with support around research data, within university libraries, at least, primarily restricted to such valuable yet necessarily time-limited services as curating data deposits to institutional repositories and providing feedback on data management plans (DMPs). Given the nascent state of FAIR data stewardship services at UK institutions, it is challenging to accumulate the evidence of value and impact that might inform their further development—something of a Catch-22 situation, since data stewardship is already often overlooked and sidelined in research projects. Additionally, many researchers may not yet fully recognise the benefits these services can bring.

This article explores efforts to demonstrate the value and impact of FAIR data stewardship services through a recent pilot project at the University of Sheffield (TUoS). It also presents a case study illustrating how the impact of such an intervention can be identified and articulated. In brief, the University of Sheffield Library launched a pilot FAIR Stewardship Service aimed at supporting researchers to comply with the FAIR principles. Using a survey and interviews, we sought to evaluate the service's effectiveness, gain a deeper understanding of its impact, and assess the potential for establishing it as a standard service offered by the institution. The evaluation of this service is particularly relevant in the context of higher education, where,

[1] Although the listed articles focus on data sharing, the success of such efforts depends fundamentally upon the FAIR principles, making these studies' findings applicable to this context.

[2] For a broader discussion of the landscape of data stewardship internationally, see Rousi, Boehm, and Wang (2023).

especially in the UK, data stewardship as a service and professional role within the research landscape is only partially recognised or not recognised at all. Thus, we aim to demonstrate the importance of evidence-based investigation and evaluation in this domain to inform the development of more comprehensive dedicated data stewardship services in UK universities.

# Background/Significance

## Data Stewardship in a UK Context

Before expanding on the University of Sheffield's pilot FAIR Stewardship Service, it would be useful to sketch out the broader landscape of data stewardship support in the UK.[3] As Wendelborn, Anger, and Schickhardt (2023) observe, data stewardship is a term to which heterogeneous meanings are attached. By data stewardship support, we do not here refer to the general data management support offered by university libraries or research services—support that might include checking submissions to an institutional data repository, providing feedback on data management plans, or delivering training on good practice in research data management, important as these activities are in facilitating the effective management and curation of research. Instead, we refer to the bespoke and often ongoing support provided to researchers and project teams by a dedicated research data steward—support with any of the processes of 'looking after data' before, during, and after a project, including the stages of data collection, management, storage, archiving, and/or sharing. This may include data management planning, but also activities such as help in developing protocols or standard operating procedures (SOPs), guidance on documenting datasets, or creating processes to aid in the monitoring and enforcement of data governance policies.[4]

In the report 'Professionalising data stewardship in the Netherlands [...] Dutch roadmap towards national implementation of FAIR data stewardship', Jetten et al. highlight eight key competence areas for data stewards: policy/strategy, compliance, alignment with FAIR, services, infrastructure, knowledge management, network, and data archiving (2021, p. 21). Work defining the shape and scope of existing models and concepts of data stewardship globally has also been conducted by the Research Data Alliance Professionalising Data Stewardship Interest Group (RDA PDS-IG) and offers a useful reference point for charting the functioning of such models at a local, institutional, and national level, and beyond (Ayres et al., 2022).[5] The Research Data Alliance has also recently launched a Data Steward Career Tracks Working Group to support the recognition and professionalisation of those in these roles.[6] While, as demonstrated in Jetten et al.'s model, FAIR might be considered only one competence area for data stewards, our view is that not only are the FAIR principles and the practice of data stewardship closely intertwined—with an awareness of FAIR underpinning good practice in, for example, infrastructure and data archiving—but also that data stewardship offers one of the key mechanisms for disseminating and embedding FAIR data practices.

Currently, attention to data stewardship in a UK context is primarily focused on identifying and seeking recognition for staff whose existing roles contain an element of data

[3] For a discussion of the findings from an international survey of data stewardship services, see Ayres et al. (2022).

[4] For a number of overlapping definitions of data stewardship from key organisations in this area, see Jetten et al. (2021).

[5] For work on the career tracks of data stewards, primarily in a European context, see Newbold et al. (2024).

[6] https://www.rd-alliance.org/groups/data-steward-career-tracks-wg/activity/

stewardship.[7] Institutions like the University of Manchester[8] and UCL[9] are developing data stewardship networks to identify such colleagues (who may be technical, research, or professional), collate role descriptors, and facilitate the professional recognition of data steward-related roles in a comparable way to that achieved over previous years by research software engineers with the support of initiatives like the Hidden REF.[10] Data stewardship networks can help to build the evidence and profile to increase professional recognition for those in data steward-related roles, a key process in the normalisation and embedding of open research in institutions, as Jetten et al. (2021) note.[11] Indeed, the University of Sheffield initiated its own data stewards network in the academic year 2024/25, recognising its value in supporting the sharing of good practice and dissemination of relevant training and skills.[12]

Data stewardship networks are, however, only one component of the necessary work around data stewardship at an institutional level, and do not address the need for a dedicated data stewardship infrastructure as detailed above. The work of universities in mainland Europe and especially in the Netherlands, in which dedicated data stewards are employed and embedded in subject areas at a faculty-specific level, offers a gold standard in this regard, but in the present landscape, this appears to be a level of provision not currently within the reach or immediate priorities of UK institutions. Therefore, we argue, a need exists for exploratory work to further establish and evidence the value and benefits of such an infrastructure in this context, as well as the specificities it must accommodate.

## Working towards FAIR Data and Software at the University of Sheffield

At the University of Sheffield (TUoS), a commitment to FAIR data and software is an integral part of the institution's commitment to open research as articulated in its 2021 statement on the topic: 'We aspire to [an] open research culture that values a diverse range of contributions and adheres to the FAIR principles to enable the results of our research to be of maximum benefit to society (findable, accessible, interoperable and reusable).'[13] In order to achieve these aims, a university-wide FAIR Roadmap was developed in 2021 to initiate a series of projects to facilitate FAIR data and software practices. These include activities led by the University Library with the aim of supporting researchers to apply the FAIR principles at a practical level to research outputs across all disciplines. Building on scoping work that developed discipline-specific checklists on good practice around FAIR (Adams, Jones, & Foster, 2023), in 2023 we created an evolving FAIR Guidance Resource in the form of a Google site containing advice for researchers at each stage of the research cycle, in addition to sections containing specialised guidance according to data type (e.g., qualitative, sensitive, ethnographic data).[14] This resource

[7] One counterexample to this is UCL's Advance Research Computing Data Stewards, who 'provide consultancy on various levels of data-related problems from data engineering and wrangling to designing distributed data systems', with significant support funded from project grants—https://www.ucl.ac.uk/advanced-research-computing/data-stewards

[8] https://www.openresearch.manchester.ac.uk/projects/data-stewardship/

[9] https://www.ucl.ac.uk/advanced-research-computing/research-data-stewardship-community-practice

[10] https://hidden-ref.org/

[11] Examples of inter-institutional data stewardship networks, albeit outside the UK, include Sonraí, the Irish Data Stewardship Network, (https://datastewards.ie/) and the Data Stewards Interest Group in the Netherlands (https://www.dtls.nl/about/community/interest-groups/data-stewards-interest-group/).

[12] https://sheffield.ac.uk/library/research-data-management/data-steward-network

[13] University of Sheffield Statement on Open Research (2021): https://www.sheffield.ac.uk/openresearch/university-statement-open-research

[14] University of Sheffield FAIR Guidance Resource (2023): https://sites.google.com/sheffield.ac.uk/fair-guidance/home

was informed by one of the conclusions of the scoping project, which found that a proportion of the guidance required around FAIR was consistent across disciplines, while also noting that a differentiation according to data type was required in order to provide the necessarily tailored support. We identified data type rather than discipline as the key differentiator in response to the finding that as each discipline may contain a number of different methodologies and research types, developing a single set of guidelines for a given discipline was in many cases unfeasible.

Engagement with the research community at TUoS during this work raised community awareness of the FAIR principles—awareness that was only at a nascent stage in some areas[15]—and highlighted the need for an enhanced level of guidance and support for researchers seeking to implement them. In response, and in recognition of the need for exploratory work in this area as detailed above, the Library recruited a dedicated Research Data Steward, who, with the support of our wider research data management team, designed and delivered a pilot FAIR Stewardship Service for University of Sheffield researchers.

## The Pilot Service

To support researchers at the University of Sheffield in aligning their data with the FAIR principles, the University Library established the FAIR Stewardship Service as a pilot in autumn 2023. This service aimed to make research data and software more available to, and reusable by, others, and was also used to gauge the current appetite for such a service among researchers at the institution, as well as to aid in plotting the path the service should take going forwards.

In August 2023 and February 2024, the Research Data Steward, supported by colleagues, delivered faculty-specific seminars about FAIR stewardship to researchers in all five faculties. These sessions aimed to inform researchers about the FAIR principles and to promote the new pilot FAIR Stewardship Service. Researchers then had the opportunity to sign up for free consultations to gain assistance in making their own work more FAIR, and in the weeks following the seminars, a number of such researchers met with the team to discuss or receive guidance on how best to align their projects with the FAIR principles. The service offered a combination of short, consultation-based support and ongoing advice and guidance on a project over a period of time. In scope were all aspects of the data lifecycle, including help with data management planning, developing protocols or SOPs to support the creation, management, standardisation, or sharing of data, help in preparing data for sharing using the FAIR principles, and aligning data management practices with legislation and institutional or funder policy. Meeting researchers at their point of current practice and awareness, it also provided tailored support with the management, storage, and potential sharing of specific data types, including qualitative, sensitive, and practice-based research outputs. In terms of the project-focused and potentially 'hands-on' aspect of the support, it might be categorised as 'embedded' rather than 'co-ordinator' data stewardship according to the taxonomy drawn by Whyte et al. (2023).

This support was provided by the Research Data Steward, one of the authors of this article, whose background in supporting research disciplines in health and related research proved valuable as a grounding in a range of research methodologies, from co-produced qualitative research to large-scale clinical trials.[16] While it would have been ideal to employ a number of data stewards with a range of disciplinary backgrounds, financial constraints and the preliminary

Additional initiatives in support of FAIR data and software practices included the development of a suite of video case studies showcasing the work of researchers who employ these across a range of disciplines—see Adams (2022).

[15] E.g., non-STEM disciplines in which the practices and philosophy of open research are historically less developed.

[16] For discussion of subject specialisation vs general data management expertise as a qualifying skill set for data stewardship, see Kvale, 2021.

nature of the work precluded this. The pilot was framed as 'FAIR stewardship' rather than 'data stewardship' to emphasise the overarching aim of increasing the FAIRness of the institution's data outputs, though in retrospect, this may have limited recognition of the service's scope and significance among researchers less familiar with this terminology.[17]

Over ten months, support was provided to 19 researchers/project teams across 13 subject areas, from music to materials science and engineering. Some examples of the support provided to projects under the pilot scheme include:

- Supporting a practice-based research team in the Faculty of Arts and Humanities to develop consent processes that enable data sharing, and advising on data repository usage and copyright matters, as well as best practice in archiving web-based data.
- Supporting a project in the Faculty of Social Sciences containing multiple data capture elements to develop and embed best practice in data collection, management, and storage.
- Reviewing and providing feedback on a standard operating procedure developed by a research team in the Faculty of Health to enable data from clinical trials to be shared.
- Research data management support for a Professional Services project involving participatory action research, including support with data management planning, securing ethics approval, and plans for onward sharing.
- Support with the appropriate archiving and storage of legacy data in the Faculty of Health.

# Methods

## Evaluating the Pilot Service: Methodology

We conducted an evaluation to explore the effectiveness of the support and training provided by the pilot FAIR Stewardship Service. We sought to understand researchers' perceptions of the service they received, and gather preferences and recommendations for improvement. Additionally, the evaluation questions were designed to help inform a scheduled review of the pilot that would explore potential future directions for the service. Key questions here included the feasibility of integrating these services, or time and resources for other data management processes, into research grant applications, how frequently this was already happening, and the level of appetite among research grant applicants and holders to do so.

We conducted the evaluation project from May to July 2024. To comprehensively evaluate the service and generate recommendations for improvement, we used a mixed-methods approach, combining a quantitative survey and qualitative interviews. The survey sought to gather broad data from all participants of the faculty FAIR seminars, including those who received tailored support from the FAIR Stewardship Service, while interviews provided in-depth insights from the latter group. Participation in the survey and interviews was voluntary. Ethical approval was obtained via the University of Sheffield's Ethics Review Procedure (Application no. 059879).

[17] For a discussion of the close affiliation between data stewardship and FAIR practices, see Bangert et al. (2020) and Mons (2018).

### Survey

The survey was created using Google Forms and distributed by email in May 2024 to 200 staff members across all faculties at the University of Sheffield who had expressed interest in attending the faculty FAIR seminars. The survey contained three sections. The first asked questions about the relevance and informativeness of the faculty FAIR seminars. In the second, which was visible only to individuals who subsequently received support, we asked about the usefulness and quality of the support provided. The third section, visible to all respondents, sought recommendations for improving the available support, identified barriers in researchers' fields to complying with FAIR principles, and gauged interest and confidence in integrating these services or other research data management tasks into research grant applications. This section also inquired about the frequency with which these integrations currently occur and whether researchers would be interested in joining a data stewardship network. Due to the relatively limited sample size and response rate, we conducted survey analysis using descriptive statistics, and performed data exploration. Figures were created in RStudio.

### Interviews

We conducted semi-structured interviews with five staff members who received support and indicated their interest in being interviewed via the survey. We sent an information sheet, consent form, and questions to the interviewees prior to the interview.[18]

The three overarching questions sent to researchers in advance were:

1. Can you tell me about your research project and what type of data you are using in your work?

2. Can you tell me about your experience with the FAIR Stewardship Service? What impact did the support you received have on the project?

3. How important do you think research support services of this kind are? In your opinion, what level of need for the FAIR Stewardship Service exists among the research community?

We also asked follow-up questions for each topic to provide clarification.

The questions aimed to gain a better understanding of the projects and data the researchers were handling, provide detailed insights into their experience with the service, and assess their satisfaction. Additionally, questions sought to determine participants' views on how such a service should be provided and paid for in the future, whether by the institution itself or from another source, such as a dedicated and grant-funded project role.

The follow-up interviews lasted between 20 and 40 minutes. We recorded and transcribed these interviews using institution-approved Google Meet software. We then anonymised and analysed the interview transcripts.

## Results and Discussion

### Survey and Interview Participants and Response Rates

We invited 200 staff members who expressed interest in attending the faculty FAIR seminars to complete the survey. Of these, 135 researchers attended the seminars, and 12 requested

[18] These materials can be found in Zagrodzka et al. (2024). This dataset also contains all of the primary qualitative and quantitative data referred to in the article.

additional support. We received 24 survey responses (response rate = 12%), with six from researchers who requested additional support. Additionally, three respondents reported not attending the seminars or requesting additional support. The reasons given for not attending the seminars included other commitments (n = 2) and having learnt about FAIR principles elsewhere (n = 1). The survey responses were evenly distributed across the faculties: Social Sciences, Arts and Humanities, Engineering, Health, and Science.

We went on to conduct follow-up interviews with five out of the six survey respondents who had requested and received additional support. All interview participants were from different departments, and represented a wide range of data types, including sensitive and qualitative data, survey data, secondary bibliographic data, and data issuing from participatory research.

## Evaluation of the Faculty FAIR Seminars

We evaluated feedback from the faculty FAIR seminars based on three key metrics in the survey: informativeness, relevance, and the extent to which the seminars increased understanding of the FAIR principles (see Figure 1). Participants who attended the seminars (n = 21) rated them on a scale from 1 to 5, with 1 indicating 'not at all' and 5 indicating 'very much', in terms of informativeness, relevance, and the increase in their understanding of the FAIR principles. The results show high ratings across all three metrics. The majority of respondents rated the seminars highly in terms of informativeness, with equal numbers of participants giving ratings of 4 and 5. Most participants rated the relevance of the seminars to their work positively, with a significant proportion giving high ratings. Additionally, the ratings indicated that the seminars significantly increased participants' understanding of the FAIR principles. The distribution of responses across these metrics suggests that the seminars were perceived positively in terms of their content and impact on participants' knowledge. A few responses indicated minimal learning, possibly due to the respondents' prior understanding of FAIR principles.

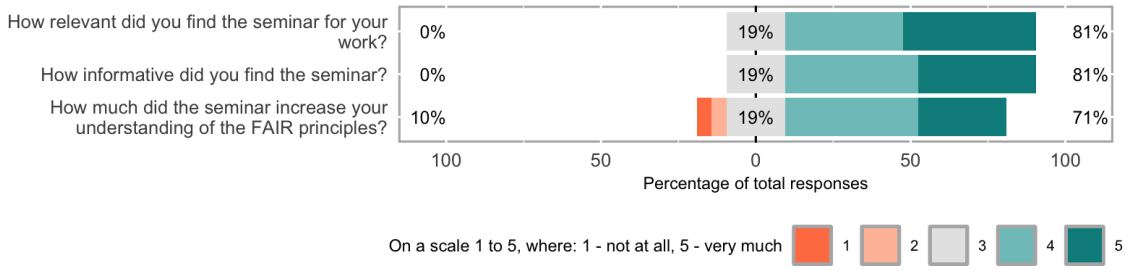


**Figure 1.** Evaluation of faculty FAIR seminars. Responses are presented on a Likert scale of 1 to 5, where 1 indicates 'not at all' and 5 indicates 'very much'. The percentages for each question, displayed from left to right, represent those who selected lower ratings (1–3), those who chose the middle option (4), and those who selected higher ratings (5).

## The FAIR Stewardship Service Section—Assessment and Suggestions for Improvement

The survey assessed feedback on the FAIR Stewardship Service using three key metrics: usefulness of the support received, satisfaction with the scope of the support, and likelihood of recommending the service to colleagues or peers (see Figure 2). Participants who requested the support (n = 6) rated the FAIR Stewardship Service on a scale from 1 to 5, with 1 indicating 'not at all' and 5 indicating 'very much', in terms of the usefulness of the support received,

satisfaction with the scope of the support, and likelihood of recommending the service to colleagues or peers. The results show high ratings across all three questions.

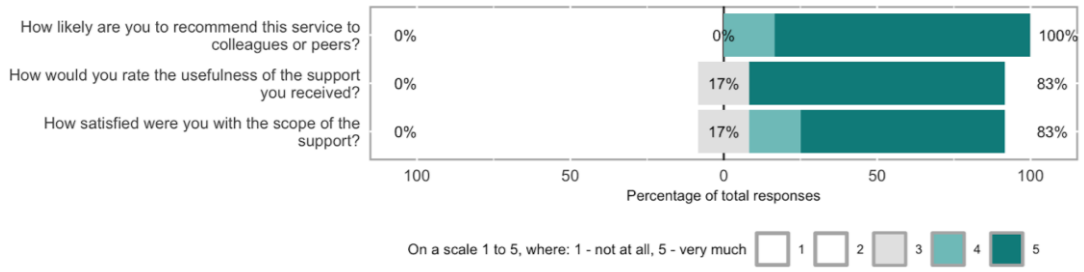


**Figure 2.** Evaluation of the FAIR Stewardship Service. Responses are presented on a Likert scale of 1 to 5, where 1 indicates 'not at all' and 5 indicates 'very much'. The percentages for each question, displayed from left to right, represent those who selected lower ratings (1–3), those who chose the middle option (4), and those who selected higher ratings (5).

Interviews with respondents who received support from the service give further weight and specificity to these findings. All interviewees described the pilot FAIR Stewardship Service as highly effective in supporting researchers with diverse data management needs and significantly enhancing the rigour and transparency of their methodologies. Participants highlighted the service's prompt and well-informed responses, often exceeding their expectations. The consultations not only provided practical guidance on making data FAIR but also helped researchers to incorporate FAIR principles into their current project workflows. The service was described as 'essential' (P02), 'excellent' (P05) and 'really beneficial' (P01). When describing the support received, Participant 04 noted:

> 'They gave us some really helpful feedback and suggestions for improvements as well as answering my questions and talked about the practicalities of how we would make our outputs more FAIR. They were, of course, immediately able to tell me what we needed to do, and they said, well, actually, the first thing you need to think about is the long-term preservation of your research outputs. And they've also told me things about how we can make our research outputs more accessible.' (Participant 04, interview)

Another participant considered the support extremely significant in terms of improving their research practice: 'It's really transformed the way that I'm actually going to approach this project and approach the data that I'm actually gathering and how I'm going to record that along the way' (P02). Likewise, Participant 04 considered the significance of the guidance as equal to that provided by other key services across TUoS, stating: 'the service is very important. I would put this area alongside [...] other types of governance practices in the University' (P04).

Some interviewees were enthusiastic to incorporate the knowledge they gained at an early stage of their projects, as an early integration was recognised as preventing future complications and ensuring data is prepared for public access, enhancing the overall quality and integrity of research outputs.[19] Interviewees also commented on the extent to which they valued the flexibility and tailored nature of the support, as evidenced in this statement from Participant 02:

[19] See especially the interview with Participant 02: 'I'm glad I approached it early on, because I feel if I got in a year or two into this project and then was trying to retrospectively apply FAIR principles, I think I would have tied myself up in knots, and it would have been really, really hard to do so.'

> 'I loved, I suppose, how flexible it was and that it was such a tailored meeting [...] I love attending kind of workshops and that kind of stuff, but sometimes the level at which it starts can be... it's hard to get a balance cause everyone's coming from a different starting point, [whereas] that stewardship service, it met me where I was at and exactly where I was at that point of time, which was hugely beneficial [...].' (Participant 02, interview)

Some interview participants considered the impact of the FAIR Stewardship Service to extend beyond individual projects, fostering a broader cultural shift towards open and transparent research practices. Others articulated a recognition that by making data FAIR, researchers can enhance their work's visibility and impact, aligning with funder requirements and advancing open science practices. Participant 02, for example, observed that 'a lot of funders I think are more gearing themselves down this route, and it does look like [...] in the future [... ] that application of FAIR is going to become even more important.' Consequently, this participant reported incorporating additional time into grant proposals to ensure data is converted into FAIR formats. This shift is particularly important for fields like qualitative research, where data management can be complex because of ethical and copyright considerations,[20] and where FAIR practices historically have a lower degree of traction (Calamai & Frontini, 2018; Jeng & He, 2022; Late, Skov, & Kumpulainen, 2024; Longley Arthur & Hearn, 2021; Thoegersen, 2018; Tóth–Czifra, 2020).

## Barriers to Implementing the FAIR Principles

Most survey respondents indicated that they are familiar or very familiar with the FAIR principles (see Figure 3). A good understanding of the principles is necessary to identify barriers and aspects of FAIR that are difficult to comply with; therefore, responses highlighting those barriers could be considered useful and relevant in informing how services could address these barriers in support, training materials, or other activities. As Figure 3 details, when all 24 survey respondents were asked to rate their understanding of the FAIR principles on a scale from 1 to 5, with 1 indicating 'very unfamiliar' and 5 indicating 'very familiar', the majority of respondents reported a good understanding of FAIR, but the responses suggest there are still gaps in understanding, indicating perhaps a need for more training or better-tailored support and resources for specific disciplines.

[20] See, for example, interviews with Participants 02 and 03.

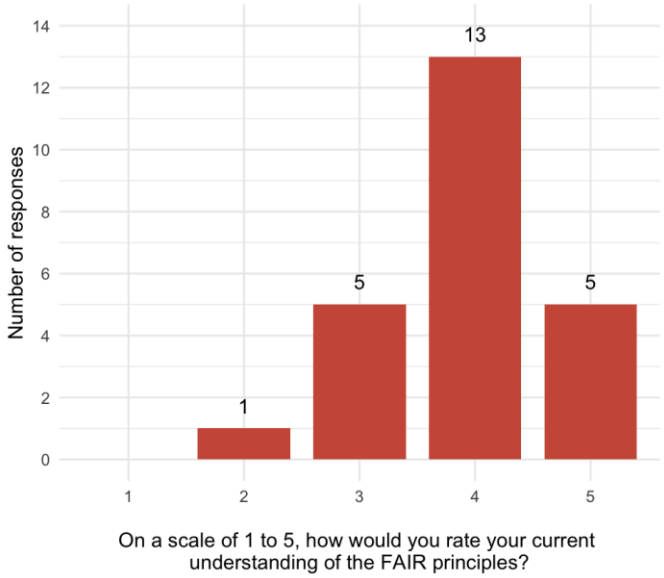


**Figure 3.** Understanding of the FAIR principles.

Figure 4 demonstrates that the primary barriers and challenges to making data FAIR were a lack of time (n = 10), followed by a lack of knowledge of how to apply the FAIR principles (n = 5), and a lack of familiarity with the FAIR principles (n = 3).

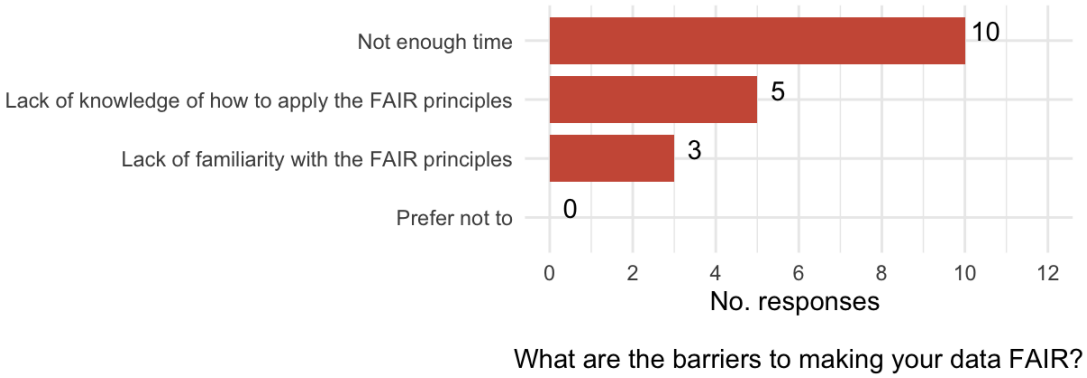


**Figure 4.** Barriers to making data FAIR.

The most challenging aspect of adhering to the FAIR principles, according to the survey (see Figure 5), is preparing a dataset for sharing or publication (n = 13). This is followed by creating rich metadata (n = 9). Moderate difficulties were reported for using standardised file formats (e.g., CSV, TXT, JSON) (n = 7) and ensuring compatibility of the data format with existing tools, software, and infrastructure (n = 6).

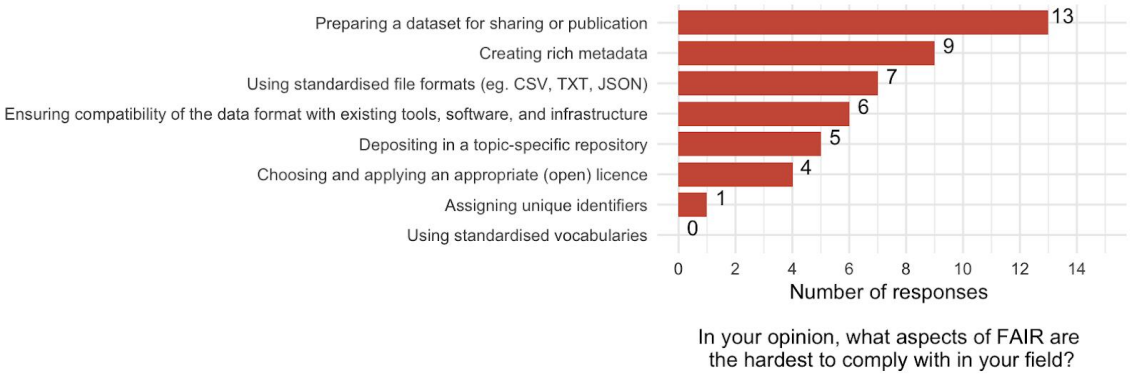


**Figure 5.** FAIR compliance challenges.

The responses in the survey align with those of the interviewees. Participants mentioned that they face significant barriers in implementing FAIR practices, primarily due to time and resource constraints. Participant 01 noted, for example, that tasks such as creating rich README files, codebooks, and ensuring the reproducibility of code are time-consuming and often relegated to low priority amidst other academic responsibilities ('That's all going to take time. [...]. That will be a bit of a barrier because it always gets pushed to the bottom of the pile when you've got marking to do or lectures to prepare or the actual paper to write and stuff like that'). Technical challenges exist, especially in managing complex or sensitive data like social media interactions or recordings of vulnerable groups, as noted by Participant 02: 'There's a lot of very convoluted guidance around social media data that I've found so far, just around the ethics of it alone and let alone how do you move beyond that and how do you apply FAIR principles to that.' These challenges, also observed in work by Bishop and Gray (2017), are compounded by a lack of adequate support or detailed guidance on ethical compliance and metadata creation, making the FAIRification process daunting and difficult to navigate without substantial assistance.

As noted by Participant 03, researchers in fields like the arts and humanities face specific difficulties related to copyright, data ownership, and the legal status of repositories, which can deter them from fully committing to FAIR principles (Participant 03, for example, described what they termed 'huge issues of power and ownership related to the dataset that we are producing' in the field of recordings of musical performances within specific groups).[21] There is a pressing need for clearer guidance on legal and ethical matters, enhanced institutional backing with dedicated resources, and targeted training. By addressing these barriers through the provision of tailored and relevant support, the FAIR Stewardship Service can better support researchers in making their data more open and accessible, ultimately fostering a culture of transparency and collaboration in research.

## Costing FAIR Stewardship Services

We asked survey respondents to indicate the stages at which support would be most useful for research projects in terms of FAIR compliance, allowing for selection of multiple answers (see Figure 6). The highest number of respondents (n = 20) indicated that support would be most useful when preparing data for publication, archiving, or sharing. This is followed by respondents who believe support would be most beneficial at the beginning of the project/during the planning process as part of the data management plan (n = 17). These results suggest that it might be beneficial to highlight support services around FAIR data to researchers

[21] On this topic, see also Longley Arthur and Hearn (2021) and Tóth–Czifra (2020).

at both stages of their projects: at the beginning, for example, amongst new researchers, and closer to the end of the projects. Raising awareness about the services amongst researchers during the time they are writing grant submissions could potentially empower more to request support in costing the services into their grant bids, as the majority of respondents indicated their interest in doing this, though a significant proportion also remained unsure (see Figure 7).

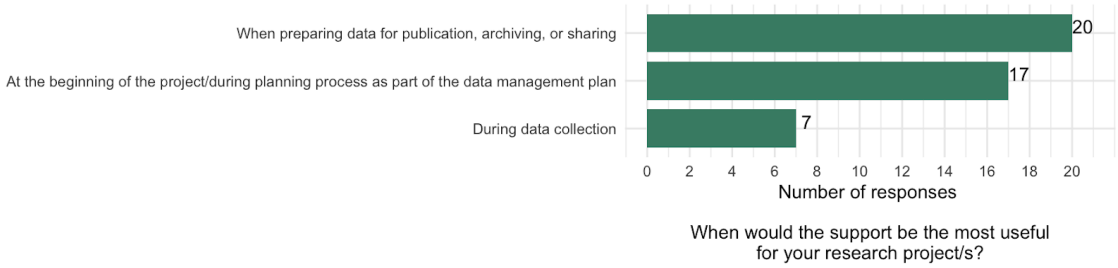


**Figure 6.** Timing of useful support for research projects.

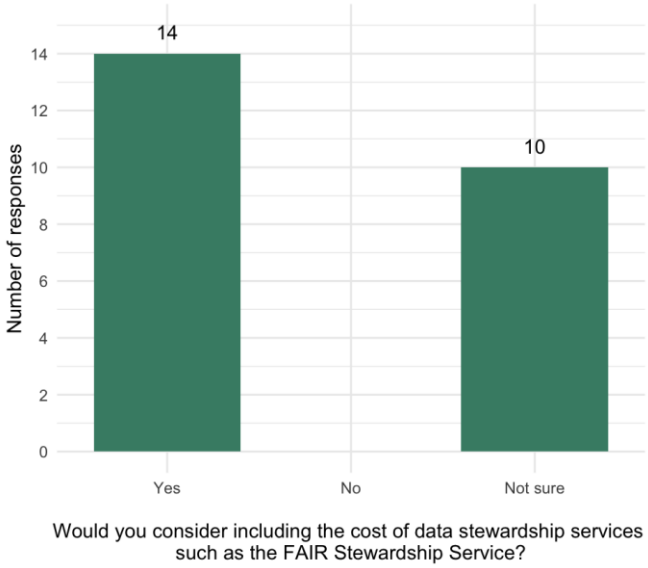


**Figure 7.** Stewardship services in grant bids.

Moreover, the survey results, illustrated in Figure 8, explore respondents' willingness to allocate funds from an existing grant to access data stewardship services if they were not explicitly budgeted for. The majority (n = 18) were unsure whether they would be willing to reallocate existing project funds towards paid-for data stewardship services.

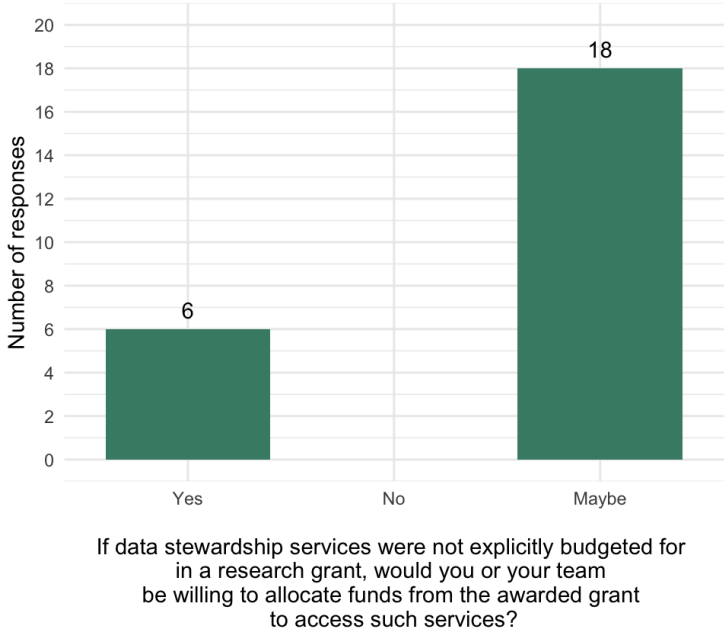


**Figure 8.** Allocating funds for data stewardship services.

Interviewees likewise indicated that the service is worth paying for; however, they expressed only a tentative willingness to include the costs of the FAIR service in their grant proposals. They voiced uncertainty about how grant reviewers would perceive these costs, with concerns that it might negatively impact funding chances. For instance, Participant 01 commented that 'You're kind of relying on the reviewers and to be on board with [...] allocating some resources to this sort of service. [...] So I think some researchers will probably see a slight risk if you're actually costing in some of these services.' Such responses, together with survey respondents' equivocation about whether they would consider costing data stewardship services into a grant, suggest a need for both institutions and funders to raise awareness of funders' expectations regarding research data management and allowable costs, as well as highlighting uncertainties about how to quantify these processes. The results also indicate that there may be some way to go in normalising bespoke data stewardship provision before such an approach can gain substantial traction with the TUoS research community.

Progress might be achieved in this respect through the provision of clear institutional support and guidance on how researchers can incorporate FAIR data management costs into grant proposals and why it would be beneficial to do so. One interviewee also contested the ease of use of data stewardship as a paid-for rather than centrally funded initiative, commenting that 'I think that if the university provides a centralised resource, [...] researchers would find it easier to approach them, not having to worry about the costing issue' (Participant 04). This respondent also reflected on what an institutional data stewardship service might optimally look like from a staffing perspective, adding that 'understandably, the question may be whether you need more than one member of staff who has the expertise within a departmental level or at faculty level.'

## Additional Suggestions on Developing the Services

We received many suggestions on what services respondents would like to have access to and what else could be offered. According to the survey (see Figure 9), respondents showed interest in all of the proposed services, including training for members of the project team (n = 13), time

of a dedicated data professional on a consultation basis (n = 12), and time of a dedicated data professional to complete the work (n = 11).

In the survey's free-text responses, we received numerous valuable suggestions regarding potential services that could be provided. Among them are: checking draft data management plans, which we currently offer, and hosting drop-in sessions to address specific elements of FAIR in ongoing research. Additionally, the creation of short infographics and video tutorials could raise awareness and provide additional training, along with links to field-specific open access resources. Other recommendations included developing models for metadata, and offering hands-on and in-person support with actual data preparation for publication, spreadsheet management, detailed annotations, and providing resources for interdisciplinary researchers. This key point was echoed in interviews, with one interview participant noting that 'practical, in person, hands-on help' would be especially beneficial (Participant 01) and another advocating for 'targeted sessions for specific groups of staff, maybe for programme managers, people who are responsible for [...] research work programmes, to raise awareness' (Participant 04).

Additional suggestions that emerged from the survey responses included training and advice on managing third-party confidential data, general training for newcomers, bespoke training for specific projects, and communication efforts to highlight the usefulness of these services to arts and humanities fields. Participants expressed a need for better guidance on dealing with sensitive data, social media data, and legal issues related to data mining and copyright. Further suggestions included integrating FAIR principles into existing academic curricula for undergraduates and postgraduates, and using schemes that reward FAIR data practices, such as badges indicating research integrity. Promoting the time-saving benefits and the potential for enhancing research quality through newsletters, departmental emails, and seminars could further increase engagement. Researchers also recommended more collaboration between the FAIR service and other University support services, such as the Copyright and Licensing, Ethics, and Contracts teams, to provide comprehensive, joined-up support and guidance.

These comments highlight the degree to which some existing services could be more fully promoted, as some suggested services (e.g., checking DMPs and metadata, and sharing examples of best practices via case studies) are already available at the University of Sheffield.

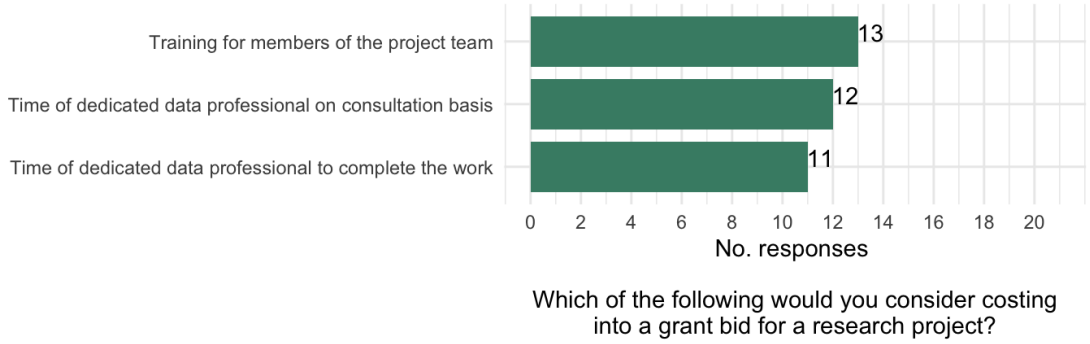


**Figure 9.** Costing considerations for grant bids.

## Conclusions and Limitations

The following conclusions are subject to the limitations of the study, which include the small number of participants (n = 24 survey respondents), the subset of staff from which participants were drawn (colleagues who had signed up to attend a seminar on FAIR and therefore to an extent already expressed an affirmative or at least neutral stance towards the concept), and the

extent to which the further subset of respondents to the survey are arguably likely to be oriented positively towards support in this area. One additional limitation that should be noted is the significant time gap of nine months between the initial FAIR faculty seminars and the distribution of the survey. Together, these limitations mean that the below conclusions can only be taken as indicative.

Subject to these limitations, the FAIR Stewardship Service has demonstrated substantial value in supporting researchers across various disciplines by enhancing their data management practices and integrating FAIR principles into their workflows. The personalised consultations and practical guidance provided by the service have not only helped with data management needs but in some cases encouraged a broader cultural shift towards open and transparent research. To further improve support around FAIR, it would be beneficial to expand the scope of services offered, with key potential points of development including the provision of more extensive hands-on support with data management and preparation, something which could potentially be integrated into future versions of the service as a paid-for service funded from project grants. Enhanced promotion of existing services, including those that are already available but may have been overlooked—feedback on data management plans, for example—is also likely to be productive in increasing engagement and awareness among researchers, as might further integration of the support with interdependent services and infrastructure at an institutional level. Suggestions for a potentially expanded service also included specialised training for specific disciplines, and more accessible resources like infographics, which could be integrated into the FAIR Guidance Resource.

Despite the positive reception of the service, significant barriers to compliance with FAIR remain. Time constraints were the most frequently mentioned obstacle, followed by a lack of practical knowledge and experience in applying FAIR principles. These challenges are compounded by the complexities associated with managing sensitive, proprietary, or cultural heritage data, which often require careful navigation of legal and ethical issues, as Participant 02 observed (see also Longley Arthur & Hearn, 2021; Late, Skov, & Kumpulainen, 2024; Tóth–Czifra, 2020). Addressing these barriers necessitates ongoing, tailored support, including clearer guidance on legal and ethical considerations and dedicated resources to assist researchers in managing complex data. Institutional backing, such as support for including FAIR compliance costs in grant proposals, could further mitigate these challenges. In terms of developing the service, the question of if and to what extent researchers are prepared to fund data stewardship activities from project grants remains an open one. In turn, this raises the question of how equitable a service such a project-funded model would provide, if data stewardship support was only available to those in receipt of funding. This will require more exploratory work either to resolve or to more fully instantiate the required culture shift, work the current iteration of the service (now framed in terms of data stewardship rather than FAIR stewardship) is undertaking by continuing to deliver support around data stewardship whilst also documenting and showcasing the impact such support can have in transforming researchers' data management and sharing practices.

To maximise the impact of FAIR support services, it is crucial to provide timely assistance throughout the research lifecycle, particularly during the planning and data publication stages. This approach ensures that researchers can integrate FAIR principles from the outset, preventing future complications and enhancing the overall quality and accessibility of their data. By continuously evolving support offerings like the FAIR Stewardship Service to meet the diverse and changing needs of the research community, institutions can foster a sustainable culture of open research, ultimately advancing research integrity, visibility, and impact.

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## Data Availability Statement

Data supporting this publication can be freely downloaded from the University of Sheffield's research data repository, ORDA, at https://doi.org/10.15131/shef.data.27255945, under the terms of the Creative Commons Attribution (CC BY) licence.

## CRediT Contributor Roles:

- ZZ: Conceptualisation, data curation, formal analysis, investigation, methodology, visualisation, writing (original draft), writing (review and editing)
- JA: Conceptualisation, data curation, formal analysis, methodology, project administration, writing (original draft), writing (review and editing)
- RC: Conceptualisation, data curation, project administration, writing (review and editing)
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