EUROPEAN UNIVERSITY ASSOCIATION

A closer look at research data practices in European universities

Follow-up to the 2020-21 EUA Open Science survey

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Introduction

This report is the last one of a series of three follow-up reports to the main EUA 2020-2021 Open Science survey report. The other two follow-up reports examined Open Science in academic assessment and Open Access in more depth.

This report presents the detailed results of the EUA 2020-2021 Open Science Survey and focuses on research data practices at universities in Europe. How is the research data landscape changing in the higher education sector? How are universities supporting the emergence of a good and FAIR research data management culture at institutional level?

These and other questions (omitted from the main survey report) are addressed here, to provide further insights into university research data experiences.

The term 'research data' covers the diverse set of information, knowledge and results generated by, and which at the same time support, research projects in different scientific fields. In recent years, research data has taken on increasing importance, because it facilitates the transition to Open Science. The implementation of good research data management practices is key to ensuring that research results can be shared and reused by the greater research community.

Different guidelines have been created to support universities and other Research Performing Organisations (RPOs) in this process, notably the FAIR data principles, which offer guidance on ensuring research data is made Findable, Accessible, Interoperable and Reusable. Nevertheless, FAIR data does not mean 'Open' data: the decision to share publicly funded research data without restrictions should be guided by the principle of "as open as possible and as closed as necessary".

In the wider European context, research data is at the heart of the European Open Science Cloud (EOSC), which will provide a common ecosystem where data can be accessed, shared and reused; by federating existing and new research data infrastructure and e-infrastructure. As key contributors of research outputs, service providers and e-infrastructure hosts, universities have a key role to play in implementing EOSC. Results from the EUA 2020-2021 Open Science survey show that 7 out of 10 institutions are aware of the potential benefits of engagement with EOSC. However, at the time of data collection, only a minority planned to link their infrastructure to EOSC services. More actions will have to be planned to ensure universities engage in developing EOSC.

Several European-level initiatives were implemented to promote the uptake of (FAIR) research data management practices at universities. The European Commission notably decided to require draft Data Management Plans (DMPs) for all project proposals submitted to Horizon Europe. Compliance with the FAIR data principles is now also required by the Model Grant Agreements for EU-funded projects. As similar measures are also being adopted by national funders, universities will increasingly need to ensure that their students, researchers and staff have the skills to carry out research data-related practices and to comply with new European and national funding requirements.

Research data is also acquiring more importance in the wider discussion around digitalisation. Equipping future graduates, researchers and society at large with the skills needed to support the digital transition is becoming a priority on European, national and institutional agendas. Research data management and FAIR data are part of this skillset; and research data processing and management careers are increasingly in demand in both the academic and private sectors. A recent EUA survey exploring universities' innovation capacity and their role in supporting the digital transition shows that research data management and staff uptake of digital skills are two important challenges for universities pursuing the digital transition through their innovation activities. The survey also highlights how the digital transition is being largely implemented through universities' research activities. The right skills and infrastructure will therefore be key enablers that help universities create opportunities to facilitate the digital transition.

EUA has long advocated the importance of sharing and reusing research data. In 2019, EUA became a partner in the Fostering FAIR Data Practices in Europe (FAIRsFAIR) project, which aims to supply practical solutions for the use of the FAIR data principles throughout the research data life cycle. As part of the project, EUA led a Work Package on FAIR Data Science and Professionalisation, contributing to the development of practical tools to support the uptake of FAIR-data related skills in university curricula at bachelor's, master's and doctoral levels. As highlighted by the EOSC Executive Board Skills and Training Working Group, a comprehensive skills and education strategy is crucial to ensuring the mainstreaming of Open Science practices at institutional level, and for the broader objectives and ambitions of EOSC. As part of the FAIRsFAIR project, a mapping exercise showed how universities need clear guidance and tools to tackle the absence of skills and training related to FAIR research data. So the project partners developed the adoption handbook 'How to be FAIR with your data: a teaching and training handbook for higher education institutions', which gives universities ready-to-use materials to support the implementation of new opportunities for FAIR education.

Since 2020, EUA has been an observer to the EOSC Association (EOSC-A) and is a member of the EOSC-A's Task Force on Research Careers, Recognition and Credit. Fostering the active engagement of universities with EOSC is a key action point on the EUA Open Science Agenda 2025. EUA recently developed a Platform for EOSC-A to bring members closer to EOSC and its Association's activities. This aims to facilitate information exchange and experience sharing between EUA members who are also EOSC-A members and observers.

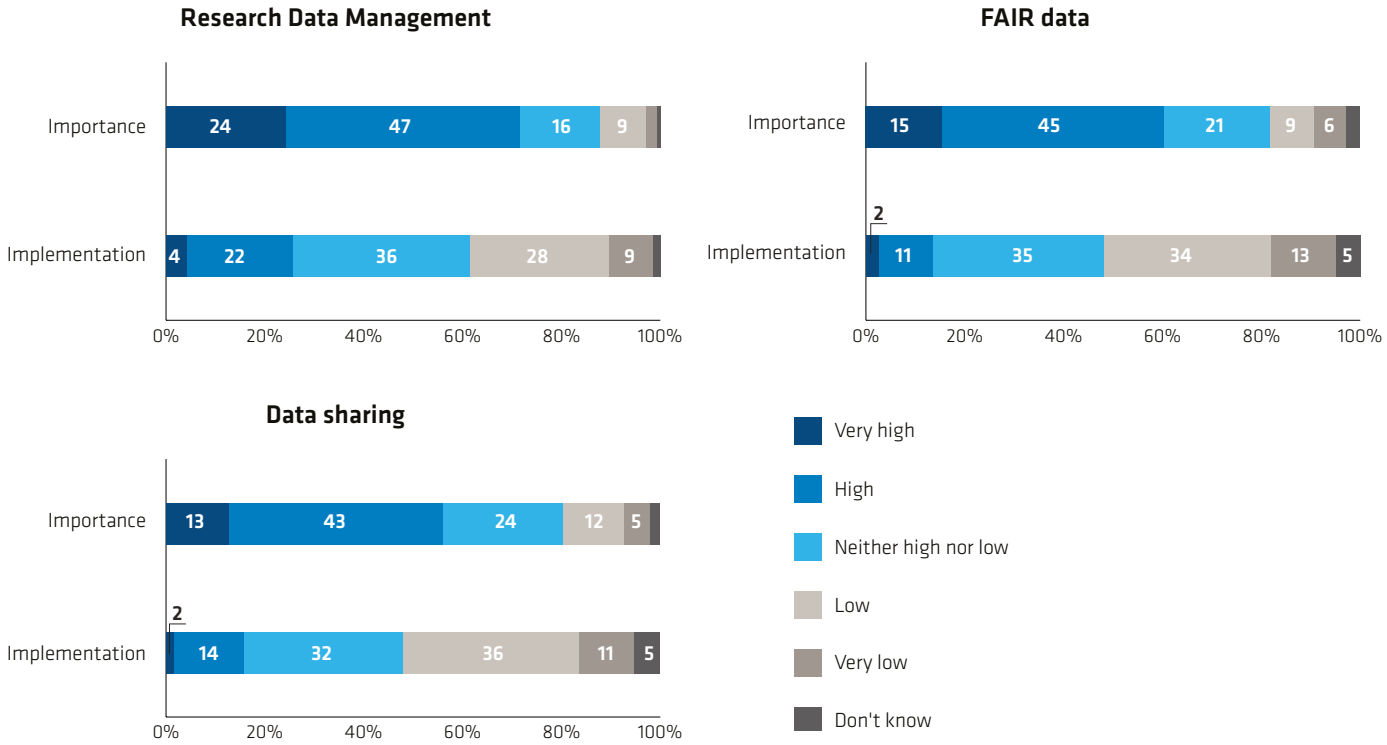
Results presented in this report and the broader EUA 2020-2021 Open Science Survey report show universities are increasingly aware of the need to provide the policies, infrastructure and skills required to manage and potentially share research data. However challenges still prevent the implementation of (FAIR) research data practices at institutional level. This report therefore provides recommendations for universities, and outlines the potential next steps and emerging issues that EUA will address as part of its efforts to support universities in fostering the uptake of (FAIR) research data management practices and their engagement with EOSC.

Strategic priority

Results from the EUA 2020-2021 Open Science survey show that research data management (RDM), FAIR data and data sharing are gaining importance in university strategies and agendas. However, universities generally reported low levels of implementation in all research data-related areas.

Figure 1 highlights the distribution of responses regarding the importance and implementation of RDM, FAIR data and data sharing practices. RDM is seen as a very important or important element by 71% of respondents, but its implementation lags strikingly behind: only 26% of respondents indicate very high or high levels of implementation. Similarly, FAIR data is considered very important or important by 60% of the surveyed institutions, but only 13% report high levels of implementation. Finally, 56% of respondents report that data sharing is a very important or important priority for their institutions, while only 16% report very high or high levels of implementation.

Figure 1 – Distribution of the importance and implementation of research data-related areas
Number of respondents:271-272/272.
Note: data from the 2020-2021 EUA Open Science Survey report.



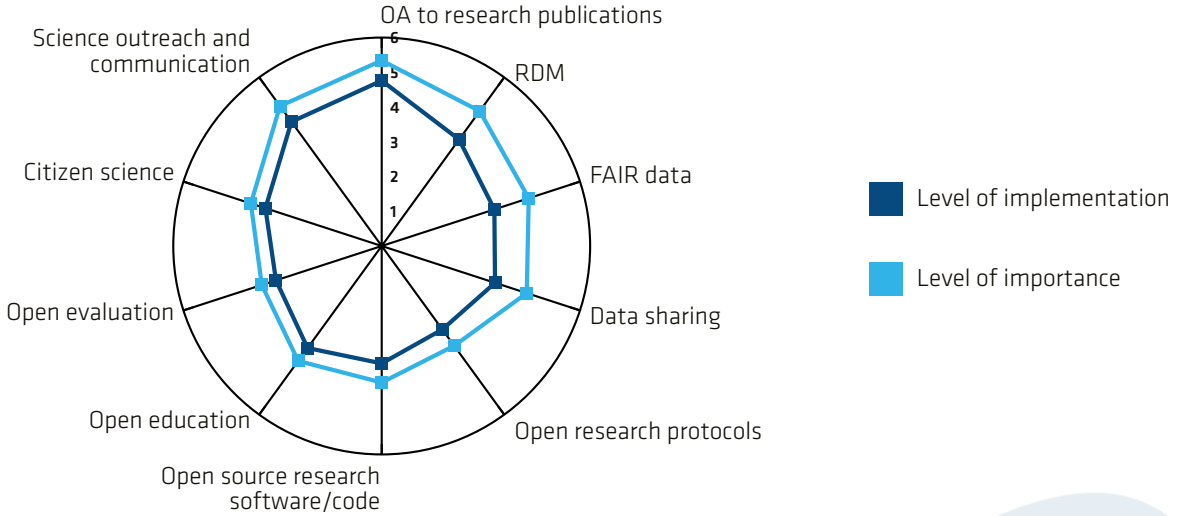
Interestingly, Figure 2 shows gaps between importance and implementation in all areas of Open Science. Open Access to research publications and science outreach and communication are given very high importance and score high levels of implementation. Both areas have been integrated in institutional strategies, and universities have had enough time to create measures that support their implementation. However, citizen science and Open Education are given low importance and achieve even lower levels of implementation. This may reflect a need to integrate these areas in institutional agenda before actions are taken to support their implementation. Strikingly, high levels of importance are only met with low levels of implementation in the areas of research data, FAIR data and data sharing.

FAIR management and research data sharing are relatively new concepts, but universities increasingly recognise their strategic importance. The results presented in the 2017-2018 EUA Open Access Survey report show how only 21% of the surveyed institutions had adopted a research data management policy. The 2016-2017 EUA Open Access Survey report revealed equally low figures. Research data management policies only exist at 19% of respondent institutions. The integration of research data-related provisions in university policies and strategies is a positive step. However, the recent recognition of the strategic importance of research data practices needs to be accompanied by concrete actions to support institutional-level implementation.

Figure 2 – Importance and implementation of various areas of Open Science

Number of respondents: 265-270/272.

Note: scores represent mean values. Higher values indicate a higher level of importance or implementation. Data from the 2020-2021 EUA Open Science Survey report.



Infrastructure

Figure 3 presents the different types of research data infrastructure used by respondents. Most (82%) reported using some kind of data storage infrastructure. The figures drop slightly for data repositories (78%) and Data Management Planning (DMP) tools (70%). All of this infrastructure is either internal, external, shared or a combination of all three.

Most of the surveyed institutions mostly use internal research data infrastructure. However, such relevance may decrease if responses indicating purely internal infrastructure are compared against responses indicating external, shared, and combined infrastructure. Data storage percentages vary from 37% for purely internal infrastructure, to 45% for external, shared and combined infrastructure. The gap is wider for data repositories (29% for internal infrastructure and 49% for the rest) and DMP tools (26% for internal infrastructure and 44% for the rest).

Additional analysis explored whether the infrastructure landscape changes when only considering responses by members and observers of EOSC-A (n=26). Despite the limited sample, Figure 4 shows that almost half of these institutions use combined infrastructure for data storage and data repositories. DMP tools are also more widely available at these members than in the original sample. In particular, this is the case for external DPM tools. And the number of institutions with no research data infrastructure drops significantly.

Figure 3 – Types of research data infrastructure
Number of respondents: 270/272.
Note: data from the 2020-2021 EUA Open Science Survey report.

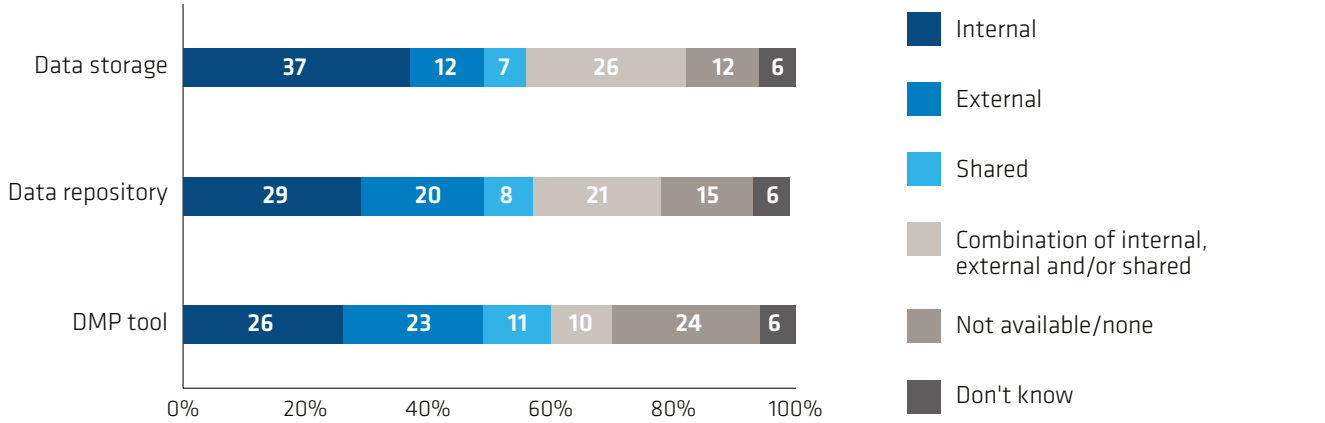
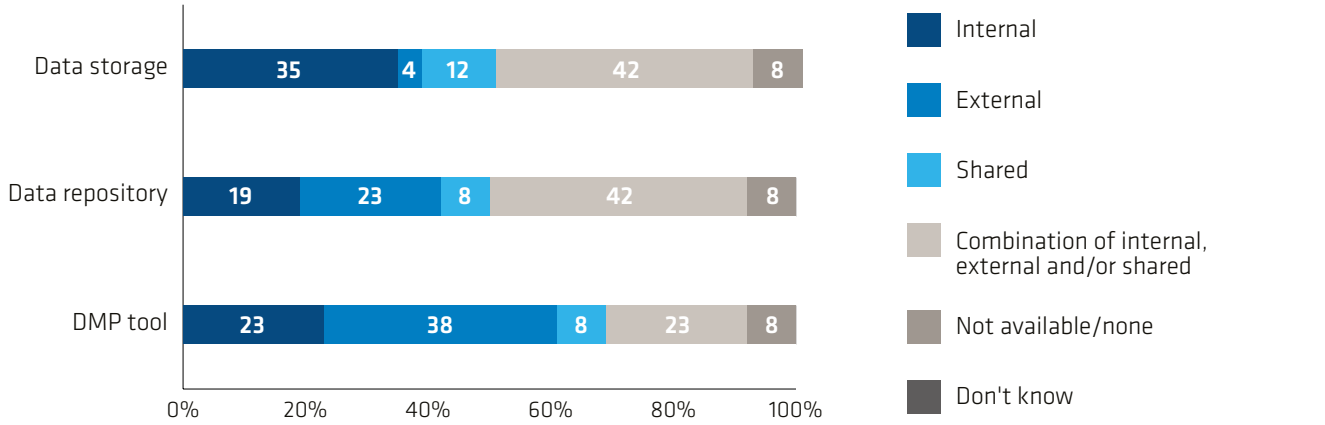


Figure 4 – Types of research data infrastructure available at EOSC-A members
Number of respondents: 26/272.
Note: only EOSC-A members or observers were included in this sample.



Respondents were also asked about the availability of equipment, facilities and laboratories at their institution. The results presented in Figure 5 show that most (53%) reported not providing open registries of research equipment, facilities and laboratories. While 53.2% reported participating in equipment, facilities and laboratory sharing initiatives.

While these results may seem complementary, it is interesting to note how the situation changes when analysing the relationship between these questions. Indeed, the institutional availability of open registries of research equipment, facilities and laboratories is significantly related to participation in equipment, facilities and laboratory sharing initiatives[1] (Table 1). Of the 140 institutions that do not provide open registries of institutional research equipment, facilities and laboratories, only 39% report participating in equipment, facilities and laboratory sharing initiatives, while the remaining institutions reported not participating in any sharing initiatives (44%) or not knowing of any (16%). Similarly, the vast majority (87%) of the 76 institutions who do provide open registries of institutional research equipment, facilities and laboratories also reported participating in equipment, facilities and laboratory sharing initiatives, with only 4% not participating in any type of sharing initiatives and 9% unaware of such activities.

Figure 5 – Institutional availability of equipment, facilities and laboratories

Number of respondents: 264/272 and 267/272.

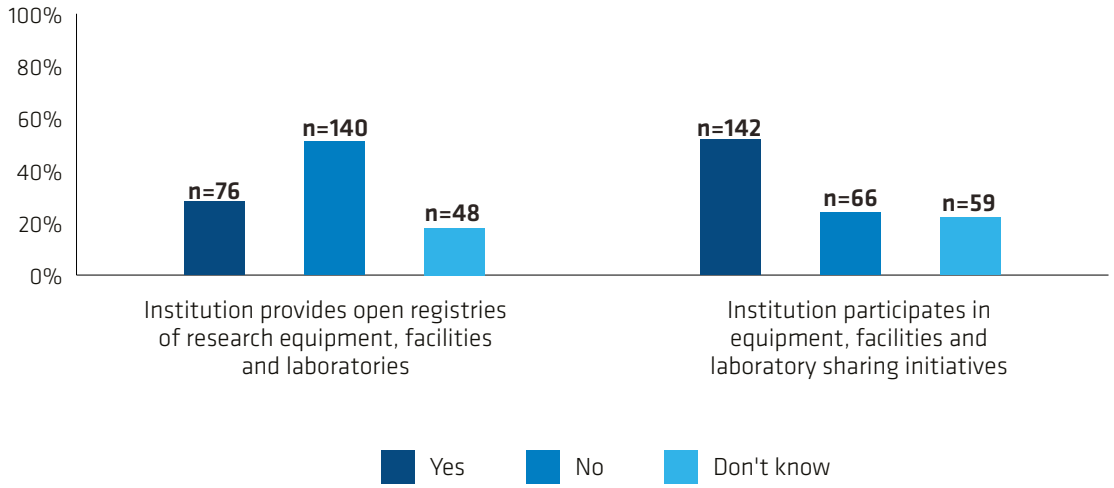


Table 1 – Relationship between the availability of open registries of research equipment, facilities and laboratories and participation in equipment, facilities and laboratory sharing initiatives

		Institution participates in equipment, facilities and laboratory sharing initiatives		
		Yes	No	Don't know
Institution provides open registries of research equipment, facilities and laboratories	Yes	87%	4%	9%
	No	39%	44%	16%
	Don't know	40%	0%	60%

1 A chi-square test of independence was performed: χ^2 (4, N= 264)= 109.19, p<.001, V= .455.

Research data support services: staff, funding and support for researchers

This chapter explores the institutional availability of research data support services, taking three core aspects: staff, funding and support for researchers, into account.

Availability of dedicated research data support services

Figure 6 shows that 51% of the surveyed institutions (n= 136) reported the existence of dedicated research data support services at institutional level. It is important to highlight how the question specifically mentioned "dedicated" services, i.e. services that are predominantly focused on providing support and guidance for research data-related activities. Institutions that noted the absence of dedicated support services (43%, n= 115) should therefore not be considered as lacking any kind of research data support services, as will be shown in the following charts.

Respondents who reported the existence of dedicated research data support services were then asked about the level at which these were implemented. Figure 7 shows that dedicated research data support services are primarily implemented at institutional/university level (94%), followed by faculty/department level (32%), research unit level (24%) and disciplinary level (11%).

Figure 6 – Existence of dedicated research data support services
Number of respondents: 269/272.
Note: data from the 2020-2021 EUA Open Science Survey report

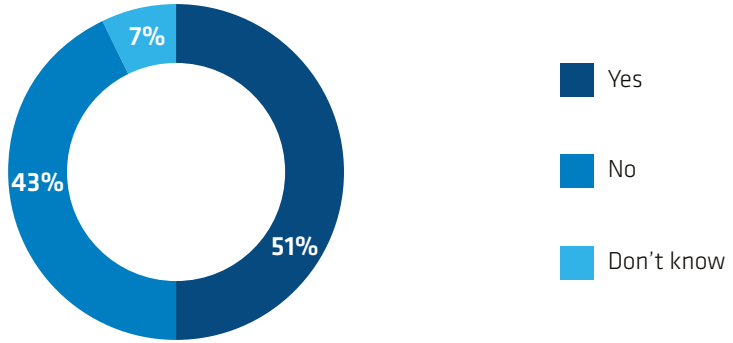
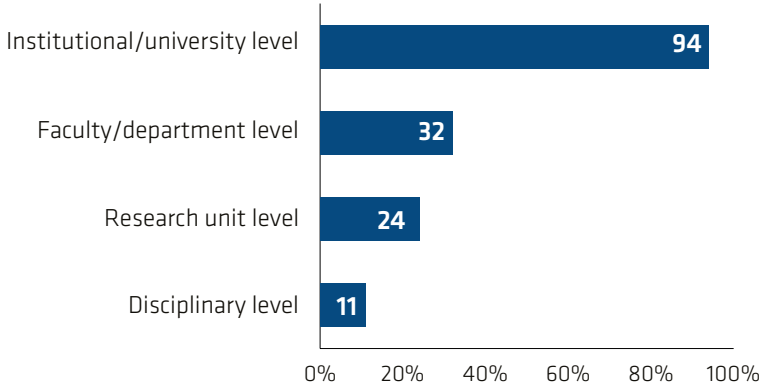


Figure 7 – Level at which dedicated research data support services are implemented
Number of respondents: 136/136.
Note: this question was only visible to respondents who answered "Yes" to the previous question (Figure 6). Multiple choice question.



Institutions that reported a lack of dedicated research data support services were asked whether members of staff were responsible for providing research data support, in addition to their other tasks, and the level at which this support is available. Figure 8 shows that this situation is common at universities and that non-dedicated support services are primarily implemented at institutional level (55%) and research unit level (40%).

The data shown in Figure 8 allows additional analysis. While Figure 6 shows that 115 respondents (43%) do not provide dedicated support services, Figure 8 makes clear that these institutions do provide researchers with some kind of support to help them manage, store and curate their data.

Availability of specific research data support staff

Most of the surveyed institutions reported establishing specific research data support roles, specifically at library level (36.5%), at institutional/central level (36.2%) and at faculty/department level (17.7%). However, 32% noted that these specialist support roles were yet not available.

Most respondents reported that the total number of staff in research data support roles varied from 1 to 10 full-time equivalents (FTEs), as shown in Table 2. In particular, 2 FTE was the most common answer (n=25).

Figure 8 – Level at which non-exclusively research data support services are implemented

Number of respondents: 115/115.
Note: this question was only visible to respondents who answered "No" to the previous question (Figure 6).

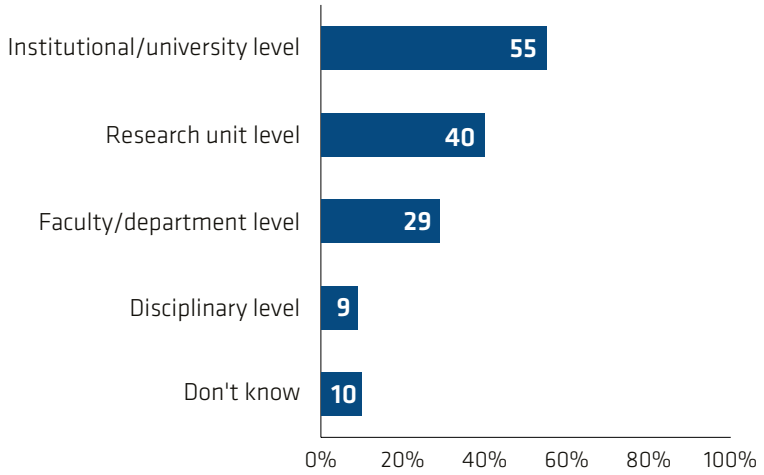


Figure 9 – Existence of specific research data support staff at institutional level

Number of respondents: 271/272. Multiple-choice question.
Note: data from the 2020-2021 EUA Open Science Survey report

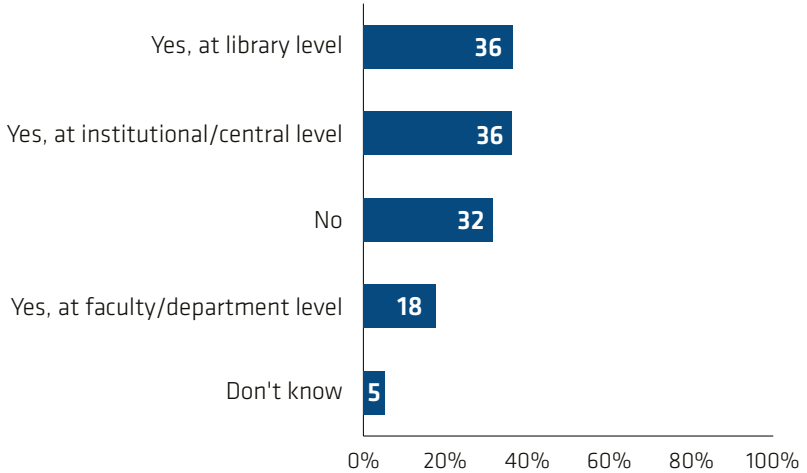


Table 2 – Total members of staff occupying research data support roles (in FTEs)
Respondents: 128/272. Open-ended question.

Total number of staff (in FTEs)	Number of institutions
Less than 1 FTE	14
Between 1 and 10 FTEs	104
More than 10 FTEs	10

In the comments, many respondents reported challenges when calculating the exact number of FTEs employed for research data support activities. This was mentioned by institutions that did not hire specific research data support roles but entrusted these responsibilities to existing members of staff. It was therefore difficult to establish the exact time dedicated to research data management activities as these were conducted as additional tasks.

Some 43 institutions provided additional information about the internal distribution of research data support FTEs. Of these, 33% noted the existence of dedicated staff, while 28% reported having both specific roles and other staff performing research data support activities. A considerable 40% of respondents mentioned RDM responsibilities being entrusted to existing members of staff, mainly at university libraries (n=17), IT departments (n=7) and in research administration (n=3). These results are in line with the findings of the 2017-2018 EUA Open Access Survey report, which showed that libraries, IT departments and research administration bodies were frequently involved in coordinating research data management and/or Open Access to research data activities (cf. Figure 37 in that report).

Further analysis can be achieved by comparing these results against the specific characteristics of the respondents, including institution type, profile and the total number of researchers. Table 3 presents the most common answer (mode) in each of the selected categories, showing, perhaps unsurprisingly, how universities more focused on research activities tend to assign more FTEs to research data support roles.

Table 3 – Research data support staff (in FTEs) by type, profile and number of researchers
Respondents: 127-128/272. Open-ended question. Note: only one response was received from institutions which define themselves as an "open university (e.g. distance learning university)". The answer provided was 0.5 FTE.

Type of institution *N=127*	Most common answer (in FTEs)
Comprehensive institution (*n=86)*	2
Specialised institution (e.g. medical science, music and arts school) (*n=15)*	1
University of Applied Science (*n=7)*	1
Technical university/University of technology (*n=18)*	3

Profile of institution *N=128*	Most common answer (in FTEs)
Mostly research-intensive (*n=16)*	5
Mostly teaching-led (*n=11)*	1
Both research-intensive and teaching-led (*n=101)*	2

Total number of staff (in FTEs)	Number of institutions
<100 (*n=6)*	2
100-500 (*n=22)*	2
500-1000 (*n=22)*	1
>1000 (*n=78)*	5

Funding sources

Respondents were asked how their institutions handle the costs needed to cover data management infrastructure and services. Table 4 illustrates the most common sources of funding mentioned by the respondents in answering this open question. It is important to note that most mentioned a combination of different types of financial support, rather than a single source of funding.

Generally, the institutional budget is the most common resource used to cover costs related to RDM infrastructure and services. In most cases (n=62), part of the central budget is made available for RDM-related activities. Only a minority (n=14) of the institutions reported having a specific budget at unit/department level.

Regional and national sources of funding are also used: 39 institutions mention receiving some type of support from their national ministries. These came from national initiatives to support the transition to Open Science and/or national digitalisation priorities. However, such funding is yet to become common across Europe. Further analysis of some of the countries that do provide this type of support shows that only a limited number of universities indicated receiving national/regional support. This suggests that, while national and/or regional funds may be available, they are not well known in the higher education sector.

Table 4 – Sources of funding for institutional data management infrastructure and services

Number of respondents: 134/272.
Note: open-ended question, multiple answers possible.

Sources of funding	Number of institutions
Institutional budget	76
• Central budget • Individual unit budget (including libraries, faculties, IT departments)	62 14
Regional and national funding	39
National, European and international projects	31
Costs shared with other universities	10
Costs borne by individual research teams or researchers	2

"In [our region], the [...] Open Science Board [...] provides resources to establish policy for Open Science. Part of these resources can be used to develop infrastructure for long-term storage and archiving, and to recruit data stewards with the necessary RDM knowledge."

"We have no special fund for data management infrastructure and services. The associated costs are given from the central budget of the institution. If the costs associated with this activity increase in the future, it will be necessary to look for new sources of funding for these activities with the active contribution of the Ministry of Education and Science."

"Some of these costs will be shared through collaboration with other universities. Additional funding has been granted within the university budget to build up infrastructure and staff expertise."

"Long term storage and archiving was already taken care of for purposes other than Open Science. The main issue is staff costs. Re-allocation of librarian and computer management staff towards Open Science is a partial solution. Sustainability is still an open question."

"Currently there's a transition ongoing from individual researcher's costs to university level. It is planned that central services and their management will be free of charge to the researcher."

National, European and international funding for individual research projects were also mentioned by 31 institutions. Interestingly, 10 respondents reported the existence of cross-institutional schemes to share the costs of RDM infrastructure and activities between partner universities. This particularly relates to the development of shared data infrastructure and consortia agreements. Finally, only two respondents indicated RDM-related costs being borne by individual research teams or researchers. However, it is important to note that both institutions also mentioned intending to provide more sustainable funding sources in the short-term.

Funding sustainability was a common concern. This issue was emphasised in answers where national, European and international project grants were the only or main source of funding for the provision of RDM-related infrastructure and services.

Support for researchers

As the main 2020-2021 EUA Open Science Survey report detailed, universities are providing a diverse set of support activities to help researchers manage their data. Figure 10 illustrates how training for researchers and the creation of a dedicated website including relevant information on RDM are the most common support actions, selected by, respectively, 75% and 62% of the respondents. In terms of specific support for producing and sharing FAIR data, 40% of the surveyed institutions indicated provisions for supporting compliance with legal and ethical requirements and the FAIR principles, while 35% provide support for publishing FAIR outputs on their own or through recommended repositories. However, only 7% of the respondents indicated providing funding for FAIR implementation.

These findings show a positive trend when compared with the results presented in the 2017-2018 EUA Open Access Survey report, where only 56% of those surveyed indicated providing training to researchers and only around 40% provided institutional RDM webpages.

Figure 10 – Institutional support for research data management, FAIR data and data sharing provided to researchers

Number of respondents: 255/272. Multiple-choice question.
Note: data from the 2020-2021 EUA Open Science Survey report.

Institutional research data initiatives

Respondents were asked about institutional-level initiatives to foster research data activities in the last three years. Most described combinations of training, policy and knowledge-sharing initiatives to reinforce (FAIR) research data practices. Their answers to the open-ended questions are categorised in Table 5 and illustrated below.

Development or improvement of Open Science and research data management policies was the most common answer, followed by training activities for researchers and staff and the creation or enhancement of research data infrastructure. Other initiatives included participation in national, European and international projects, the establishment of new institutional units (e.g. centres for RDM, Open Science departments, skills centres) and the creation of specific task forces and/or working groups.

The 14 institutions that hired new staff dedicated to Open Science and research data activities also provided information about their specific roles. The most common profiles mentioned were Data Stewards, Research Data Officers/Managers, Data Administrators, Open Science Coordinators and Open Science Policy Officers.

Awareness-raising activities, including workshops, peer-learning events and information hubs were cited by 12 respondents.

Table 5 – Recent institutional research data activities

Number of respondents: 113/272. Note: open-ended question, multiple answers possible.

Type of action	Number of institutions
Development or improvement of policy on Open Science and Research Data Management	40
Training for researchers and staff	34
Building new or enhancing old infrastructure	31
Participation in national, European and international projects	20
Establishment of a new unit dedicated to research data	19
Establishment of Open Science and research data task forces and working groups	14
Hiring new staff dedicated to Open Science and research data	14
Awareness raising activities	12

"Testimonials of individual researchers are published on a dedicated website to inspire other researchers. We are also organising training activities and events to raise awareness among researchers. We expect that enhanced awareness will lead to the further implementation of Open Science [...] At institutional level, we have working groups that are considering different open science aspects: the future of scholarly publishing, research data management, rewards and incentives, open science training and skills development (including research integrity)."

"The Open Science Support Centre was established in January 2020 and will attempt to develop and implement open science practices at the university [level]. At the moment, we are implementing requirements for data management plans in institutionally funded projects, and we are planning to establish a network of „open science champions" consisting of scientists from different fields who would help us connect people across subjects and share their experience and ideas for development of open science in the university."

"In order to support all disciplines the university established a task force targeting FAIR research data management as well as support structures for funding proposals. This competence network is recruited from experts of the university library, computing centre, central administration and various scientists. It further aims to summarise former and recent activities in this field and create easy-to-use infrastructures and general governance structures."

Impact of COVID-19 on research data

Institutions were asked about the impact of the COVID-19 pandemic on research data-related activities. A total of 23 relevant responses were received and the following aspects were identified:

- A general increase in interest in Open Science and research data.
- Wider recognition of the potential benefits of Open Data.
- Increased use of institutional repositories.
- Set-backs in the development of Open Science-related policies, infrastructure and resource availability due to the emergence of other institutional priorities.

These results reflect the findings of the EUA Open Access follow-up report (cf. p. 17), which highlighted the impact of COVID-19 on institutional practices and activities related to Open Access. Particular similarities are found in increased awareness of the potential benefits of Open Science and its related areas, and the increased use of both Open Access and research data practices.

The outbreak of COVID-19 and global efforts to halt the pandemic helped highlight the importance of opening up the research process. The possibility of openly sharing research data on vaccine development was also supported by European-led actions, such as the creation of a European COVID-19 Data Platform as part of the European Commission's ERAvsCORONA Action Plan in April 2020. While the pandemic provided concrete evidence of the advantages of Open Data, the focus of the debate will soon need to shift to finding ways to ensure the sustainable and responsible use of Open Data. This will be crucial to address potential misuses of Openness, such as the spread of misinformation, potential privacy concerns, the respect of intellectual property rights, and the establishment of common validation procedures related to the distribution of sensitive data.

"Covid-19 pandemic and the resulting [switch to] home office, did result in [an] increased interest of researchers in research data management practices. Due to the reduced possibilities to work on laboratory experiments, researchers started to work on their data management practices."

"We saw more reflection on Open Science on social media. The value for open data was visible and appreciated."

"It has increased awareness of the benefits of rapid data sharing."

"Obviously the necessity to adapt to the pandemic has severely strained resources (staff and budget) for Open Science, as library and research management went into crisis management mode."

"Covid-19 has slowed down the development and implementation of Open Science policies. However, it also brought the benefits more to the fore so that, overall, we have more interest and engagement in Open Science."

"It has probably slowed down the efforts in the development and implementation of Open Science policies due to everyone having to reorient their own priorities."

Conclusions

The results presented here and in the EUA 2020-2021 Open Science survey report show that universities have become more aware of the needs involved in managing, curating and sharing their research data. Issues such as compliance with the FAIR data principles, data sharing and research data management rank high on institutional Open Science agendas. This shows that universities have welcomed the potential benefits of these relatively new concepts, as well as their role in opening up research and fostering the digital transition.

However, a diverse set of challenges still hinders the implementation of research data practices at institutional level, making research data-related areas less implemented than other more established Open Science domains, such as Open Access to research publications.

This report's findings highlight challenges for the implementation of research data practices at universities in three main areas: policies, infrastructure and the availability of staff and funding. The following sections dwell on these challenges and outline potential recommendations for universities.

Policies

Universities recognise the strategic importance of research data, and research data provisions are included in their Open Science policies. However, this is only the first step towards creating a (FAIR) research data culture at institutional level. Support measures need to be developed in order to ensure that the university community can comply with the ambitions of institutional Open Science strategies. In particular, researchers and their support staff need to be equipped with the right tools (infrastructure) and training (research data management and FAIR data skills).

The EUA 2020-2021 Open Science Survey report shows that data storage and FAIR principles compliance are still encouraged rather than required.[2] This can be detrimental to the implementation of good research data management, especially in the absence of ad hoc monitoring systems and a clear framework of incentives and rewards. Currently, research data practices still rank low among the indicators used to assess research careers (cf. Figure 1 of the EUA report on Open Science in university approaches to academic assessment) and quantitative indicators, such as the Journal Impact Factor, continue to be the main evaluation practice in academic assessment (cf. the EUA Open Science Survey 2019 report: Research Assessment in the Transition to Open Science). This approach fails to consider the diversity of outputs currently resulting from the research process, including data, protocols, algorithms and software; and the important work needed to ensure these are ready to be shared and reused. As a result, researchers still tend to perceive data management recommendations and requirements as an extra burden, rather than as a practice that helps promote the integrity and visibility of their work. Efforts are needed to ensure the creation of a more responsible and sustainable assessment system that includes incentives and rewards for researchers and therefore provides a framework that supports and fosters the implementation of research data-related practices and other areas of Open Science at institutional level.

RECOMMENDATION #1
Universities should develop measures to support the implementation of research data practices at institutional level.

Support measures should ensure that the university community can comply with institutional policy objectives, by providing the right infrastructure and skills to practice research data management. Due consideration should be given to the recognition of research data-related "activities" in university approaches to academic assessment.

Infrastructure

Most of the surveyed institutions currently have some type of research data infrastructure. The landscape presented in this report is quite diverse: universities appear to rely less on purely internal infrastructure in favour of external and shared infrastructure, or a combination of all three. Developing new and/or enhancing current infrastructure also ranks highly among institutional actions to support the transition to Open Science.

2 Cf. EUA 2020-2021 Open Science Survey report, p. 34, "Data sharing, FAIR data and research data management plans were most often included as optional or as incentives in institutional policies at 39-45% of the respondent institutions".

However, the use of Data Management Plan (DMP) tools is lower than other data storage infrastructure and repositories. This is interesting, especially as a wide variety of DMP tools are currently made available by different organisations, including those developed by the Digital Curation Centre (DCC) and OpenAIRE. More efforts should therefore be made to raise awareness of such free resources at institutional level.

As universities continue to invest in research data infrastructure, renewed attention should be paid to ensuring that they meet the data management and sharing needs of the different disciplines. Moreover, as the next section highlights, the development and reinforcement of research data infrastructure needs to be accompanied by the establishment of dedicated research data support roles that can facilitate their correct use.

More attention should also be placed on fostering university engagement with the European Open Science Cloud (EOSC). As knowledge-provider institutions and research performing organisations, universities are both key enablers and major beneficiaries of the EOSC roll-out. While universities are largely aware of these benefits, they are still deciding whether to link their infrastructure to the EOSC ecosystem (cf. the EUA 2020-2021 Open Science Survey report, pp. 38-39). Regional, national and European support will therefore be needed to address university needs and concerns.

RECOMMENDATION #2
Universities should continue to invest in research data infrastructure and explore opportunities to engage with EOSC.

Infrastructure is key to the implementation of research data practices, and universities should invest in securing the presence of infrastructures that address the needs of the different disciplines. National and European support will also be needed to facilitate university engagement with EOSC.

Availability of dedicated staff and funding

The availability of staff with the right technical expertise is crucial to supporting the implementation of research data management practices. Results presented in this report show that universities are progressively creating dedicated research data support services and hiring specific support staff. However, significant disparities still exist between countries and institutions.

The surveyed universities' experiences show how research data management responsibilities still fall largely to existing members of staff. These people are generally librarians, IT experts and research administrators and, in the absence of adequate upskilling and reskilling opportunities, they may not be able to offer researchers the right support and guidance. In many cases, specific technical skills are needed but only partially available (cf. the EUA 2020-2021 Open Science Survey report, p. 36) and new dedicated staff are therefore required. At the same time, universities who have hired specific research data support roles may still have problems meeting the growing demand for research data expertise from their research community.

Universities will increasingly be asked to invest in research data expertise. Yet, the absence of a shared recognition and definition of data professional profiles represents a major challenge. Progress is being made at European level, in terms of defining commonly recognised research data managing and processing profiles. Examples include the Framework of Actors in the EOSC Ecosystem (cf. Digital Skills for FAIR and Open Science, 2021) developed by the EOSC Skills and Training Working Group co-chaired by EUA, which can be invaluable in helping universities identify the specific research data role they need in order to address skills gaps. Additional support will be needed to create a new framework for research data careers, including the identification of key skills, clear career paths and defined accreditation mechanisms.

Finally, while results show that training currently ranks high among the support activities provided to researchers, more efforts need to be invested in training the next generation of research data professionals. This will include creating new opportunities for (FAIR) research data education at bachelor's degree, master's degree and doctoral levels.

RECOMMENDATION #3
Universities should create dedicated research data support services and hire specific data support roles.

FAIR research data management should not be considered an additional research task, but an ad hoc responsibility. Providing dedicated support and staff is essential to fostering the implementation of research data practices and a research data culture at institutional level.

When it comes to covering the costs of research data infrastructure and services, the results presented in this report reveal a diverse landscape. While most universities benefit from multiple funding sources, sustainability remains an issue. This is especially true at institutions which cannot rely on funding streams that are entirely dedicated to research data. While the institutional availability of sustainable funding may be influenced by different organisational, cultural, and legal factors, university case studies have shown the added value of regular sources of funding to support the implementation of research data-related activities and demonstrated how the investment of even limited seed-funding can be scaled up to provide long term benefits.

The creation of sustainable sources of funding to cover research data-related costs is a responsibility that needs to be shared. National Open Science strategies are trying to encourage the uptake of research data practices and national funders are increasingly mandating FAIR data management as a boundary condition for funding. National support should therefore be provided in order to ensure universities have the necessary tools and skills to comply with such national-driven ambitions. Yet, Europe is still home to significant national differences in terms of the availability of ad hoc national funding streams to advance research data practices and infrastructure and, even when these do exist, not all universities appear to be aware or benefit from them.

RECOMMENDATION #4
Universities should look for sustainable funding sources to cover the costs related to research data management.

This should include national support, as national bodies increasingly require universities to practice FAIR research data management.

EUROPEAN UNIVERSITY ASSOCIATION

The European University Association (EUA) is the representative organisation of universities and national rectors' conferences in 48 European countries. EUA plays a crucial role in the Bologna Process and in influencing EU policies on higher education, research and innovation. Thanks to its interaction with a range of other European and international organisations, EUA ensures that the voice of European universities is heard wherever decisions are being taken that will impact their activities.

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