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RESEARCH REQUIREMENTS. A SURVEY ON THE REUSE OF DIGITAL CULTURAL HERITAGE

Report



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The Task Force members contributed to the design of the survey and to part of its analyses.

The dataset used for the analyses was cleaned by Milena Dobрева with the support of Achira Bhattacharyya, PhD student at UCL | University College London, Qatar. They also provided part of the visuals.

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Please note descriptions of the visuals are written to support the use of tools for those who may use equipment such as screen readers.



Introduction

The Europeana Research Community was launched in December 2018 and, then as now, was the largest community within the Europeana Network Association. Since its beginning, the community has aimed to lead its members towards a better understanding of researchers' needs where they concern the use of digital cultural heritage and digital tools. The assumption was that increasing the awareness of such needs across the cultural heritage sector was a necessary step to improve the features of digital collections and to make Europeana.eu a platform more suitable for research purposes.

In April 2019, the Research Requirements Task Force was set up to investigate those needs. In the first instance, the Task Force focused on the design of a survey, which was conducted in September and October 2019 under the title: *Reuse of digital cultural heritage: understanding researchers' needs*. The survey was structured to provide an overview of the profiles and research interests of the respondents; their behaviours in searching for, accessing and reusing the digital cultural heritage assets they need; the issues they encounter; and the skills and training they would like to have. The survey also contained a specific set of questions on the European Open Science Cloud, launched in November 2018 and developed as the major initiative of the European Union for sharing research data and services to facilitate the reuse of such data. At the time, Europeana was already active in exploring the possibility for the cultural heritage sector to be represented in this context as a relevant provider of data and services.

The survey received 377 responses, a number that encouraged confidence about the relevance of the information collected. The main targets were researchers in the Humanities and Social Sciences, who are – as it is well known – the most inclined to the reuse of digital cultural heritage for their scientific activity. However, the Task Force also invested efforts to reach researchers in Information Sciences and Computer Sciences, as they play an important role in the cultural heritage sector where it comes to the set up of digital collections, and in academia where it comes to the practice of the so-called Digital Humanities.

Afterwards, the Task Force focused on the analysis of the survey results and, to this end, made use of a cleaned dataset with the answers provided by 288 respondents (the other sets of answers had been removed as incomplete). This was the progress made until the outbreak of the COVID-19 pandemic, which required several adjustments in the professional and personal life of everybody.

Nevertheless, the pandemic brought something new to the work of the Task Force. While forcing museums, libraries and archives to remain closed, it proved – perhaps as nothing before – the importance of digital collections in sustaining research and making textual and audio-visual resources available to researchers. It also seemed to bring to light new requirements in e-Education, that is in teaching academic courses with digital resources and tools.



The Task Force came to end in August 2020. The aim of this report is to share the essence of the Task Force's experience and main takeaways, in the belief that they still deserve to be brought to the attention of the Europeana Network Association, the Europeana Aggregators' Forum, and the wider cultural heritage sector. The survey results have already begun to inform Europeana Foundation's work in the technical area and the planning of outreach activities towards research communities.

August 2021



Survey: Reuse of Digital Cultural Heritage: Understanding Researchers' Needs

Section 1 - Research description

Q1: Please specify your research field in its corresponding area

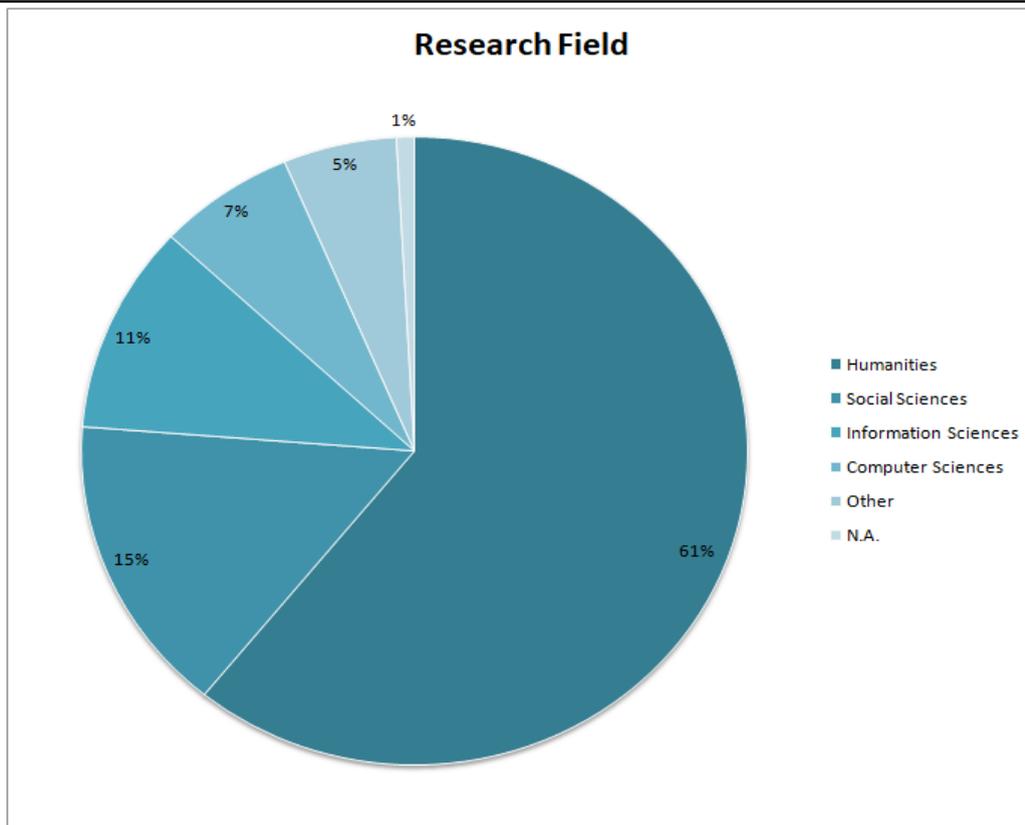


Figure 1 - A pie chart showing responses to the question 'Please specify your research field in its corresponding area.' 61% responded Humanities, Social Sciences 15%, Information Sciences 11%, Computer Sciences, 7%, Other 5%, N.A., 1%.

61% of the respondents placed themselves in the broad field of Humanities, which comprises disciplines such as History, Philology, Archaeology, Art history, Literature and Linguistics. Social Sciences, Information Sciences and Computer Sciences were represented by smaller samples of users, but it is worth noting that about 10% of the respondents highlighted the interdisciplinarity of their research by selecting more than one category. It is the case, for instance, of researchers of the so-called 'traditional disciplines' who are also used to computational methods, such as GIS or 3D digitisation in Archaeology, or Natural Language Processing in Literature or Linguistics.



Section 2 - Accessing/ processing/publishing cultural heritage assets and datasets

Q3: Do you use any of the following digitised cultural heritage assets in your research?

Most used digitised cultural heritage assets

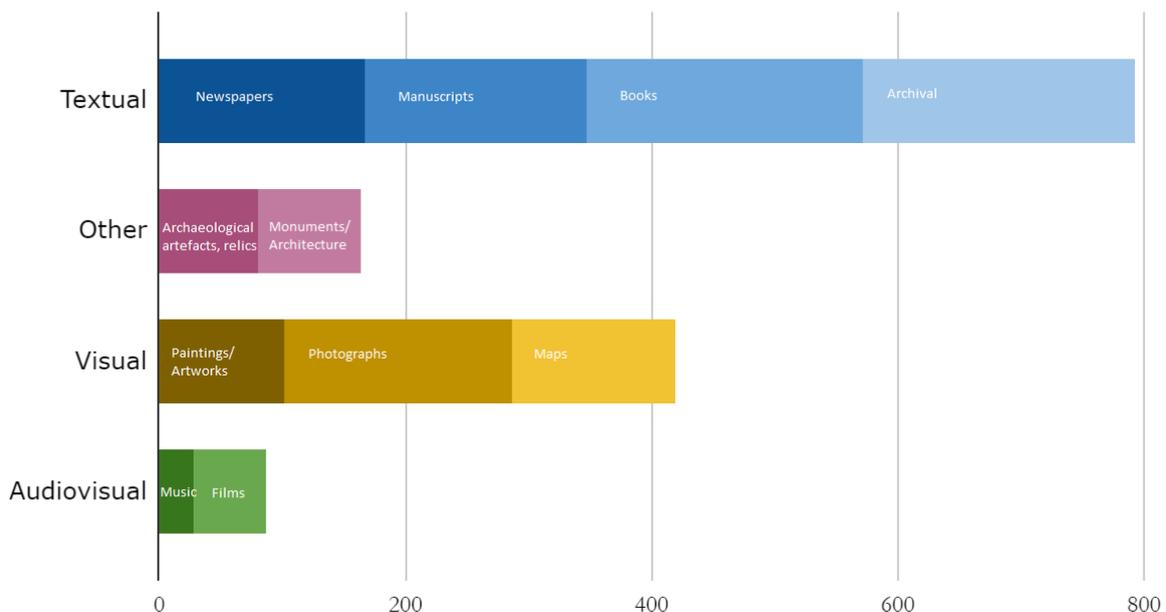


Figure 3 - A bar chart showing responses to the question 'Do you use any of the following digitised cultural heritage assets in your research?' The highest response was for textual (newspapers, manuscripts, books, archival), then visual (paintings/artworks, photographs, maps), then other (archaeological artefacts/relics, monuments/architecture), then audiovisual (music/films).

Respondents indicated a strong preference for textual resources, meaning books, newspapers, archival resources and manuscripts. The next highest preference was for visual resources, meant as photographs, maps and paintings/artworks. Archaeological artefacts and monuments/architectural digitised assets (3D objects) are in third place, while audiovisual materials, meant as films and music are at the bottom of the researchers' list of most used digital objects. Therefore, it seems that cultural heritage institutions should invest more effort in generating textual and 3D assets to meet researchers' needs. Also, the metadata of the resources added to Europeana.eu should allow a more precise categorisation of such resources so as to not confuse the typology of the resource with the type of media, especially when the type of media is an image, while the resource is actually a textual one.



Q4: How do you access these digitised resources?

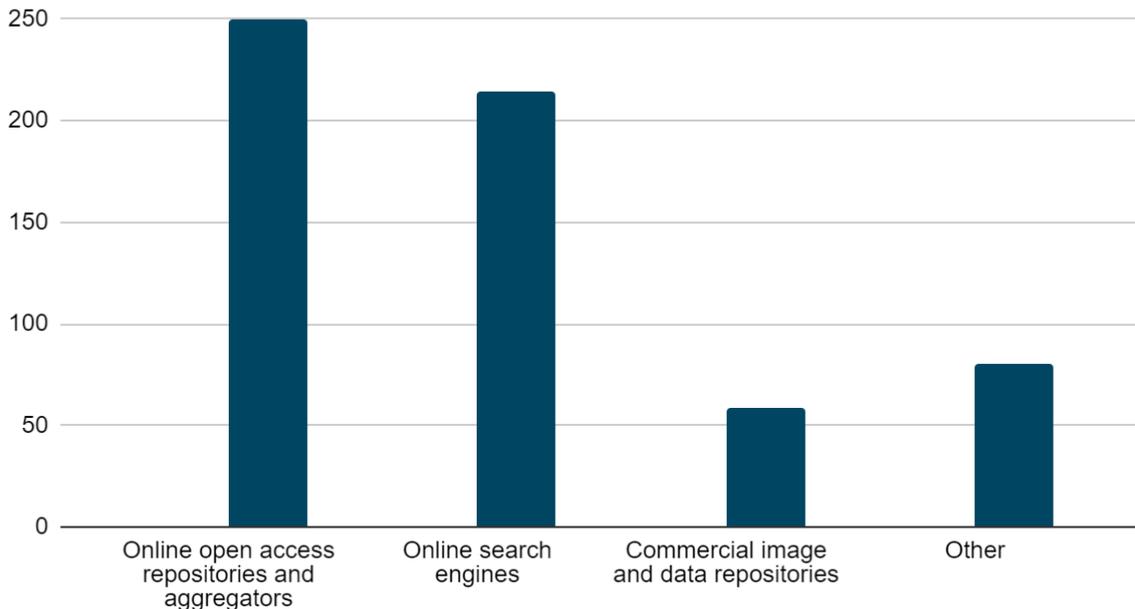


Figure 4 - A bar chart showing responses to the question ‘How do you access these digitised resources?’ The highest response was for online open access repositories and aggregators, then online search engines, then other, then commercial image and data repositories.



Figure 5 - A word cloud showing responses to the question ‘How do you access these digitised resources?’ The largest words include archive, libraries, collection, databases, museum, institutions.

The direct use of online open access repositories and aggregators, surprisingly, surpasses that of online search engines. This might be due to the quite high level of requirements that research implies. There are a few responses that relate to the fact that users come across material they need but it is not digitised yet. This motivates researchers to take over the digitisation of materials and to exchange or share them with other researchers.



Q5: What tools are you using for collecting and analysing data? Please provide examples.

The answer to this question was provided in the form of free text; a manual processing step was performed in order to create an overview of the provided answers (267 in total). They can be grouped in the following categories:

- Databases and data repositories: 28.5%
- Data and metadata editors: 11.2%
- Statistical data analysis: 12.7%
- Information and knowledge extraction: 10.9%
- GIS tools: 7.9%
- Image/3D visualisation and processing: 5.2%
- No or regular office tools: 19.9%
- Other/custom tools: 3.7%

It is not surprising that 28% of the answers report that the data used for the research work is either accessed from online data repositories or collected in respondents' own databases, as this is a prerequisite for any research activity. Approximately 20% of the answers, instead, reported that no or regular office tools were used to edit or reorganise the research data.

Q6: Are you aware of the Europeana APIs?

Awareness of API among Europeana Research Community Members

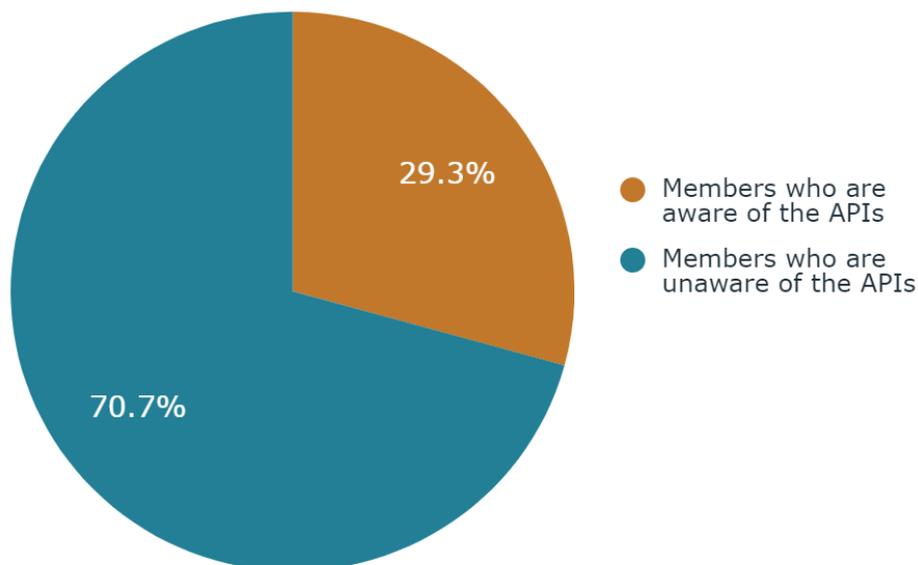


Figure 6 - A pie chart demonstrating awareness of API among Europeana Research Community Members. 70.7% of Members are unaware of the APIs, 29.3% are aware of the APIs.



While the set of APIs is one of the flagship services offered by Europeana, the analysis of this result should take into account that most of the respondents are researchers in the Humanities, who usually need the support of IT experts to use the APIs. The analysis has been restricted to the members of the Europeana Research Community, by crossing the answers to this question with those to Q. 27.

Q7: What kind of computational methods or processes do you use or intend to use in your research?

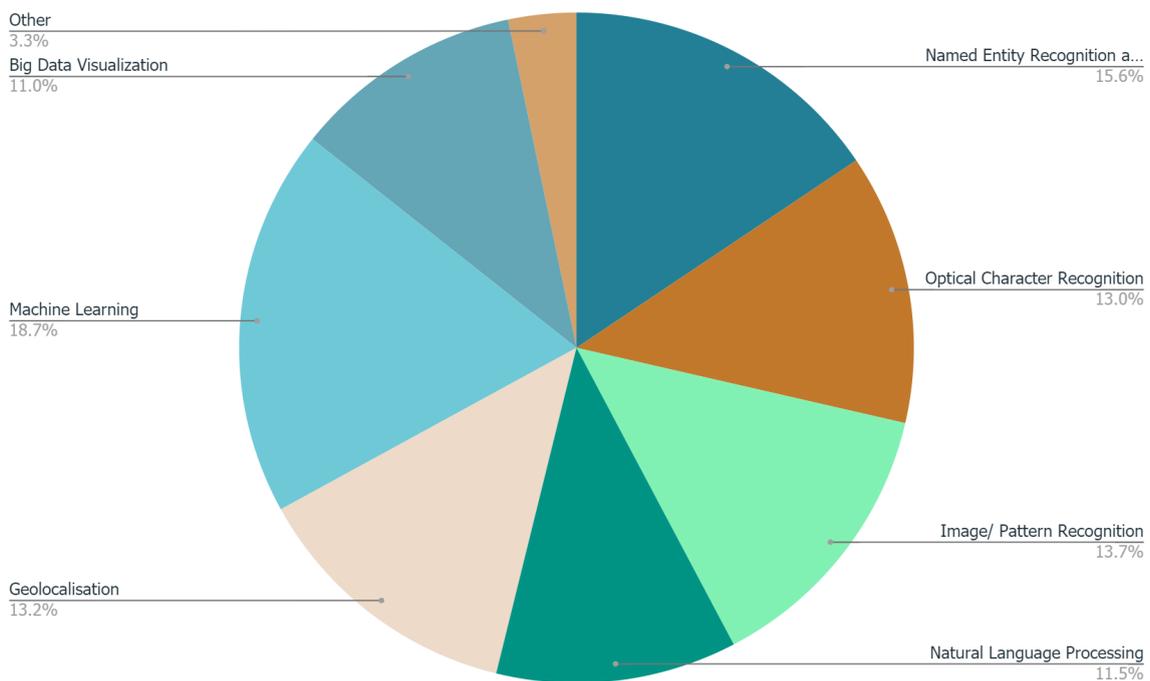


Figure 7 - A pie chart showing responses to the question 'What kind of computational methods or processes do you use or intend to use in your research?'

The answers reflect a fair equilibrium between tools currently used in processes and methods. On an individual answer level, Machine Learning (18,7%) comes first, but after clustering the responses, the biggest group seems to specifically relate to language resources (40,1%):

- Named Entity Recognition: 15.6%
- Optical Character: 13%
- Natural Language: 11.5%

Image/Pattern Recognition (13,7%) was expected to be higher since Europeana.eu offers access to millions of images. But it should be taken into account that these methods, processes and tools might be used in a combined way and in different domains.



Machine Learning (18,7%), Geolocation (13,2%) and Big Data Visualisation (11%) are relevant for the analyses of both textual and visual resources.

Q8: What kind of tools would you need for your research that you don't have access to right now?

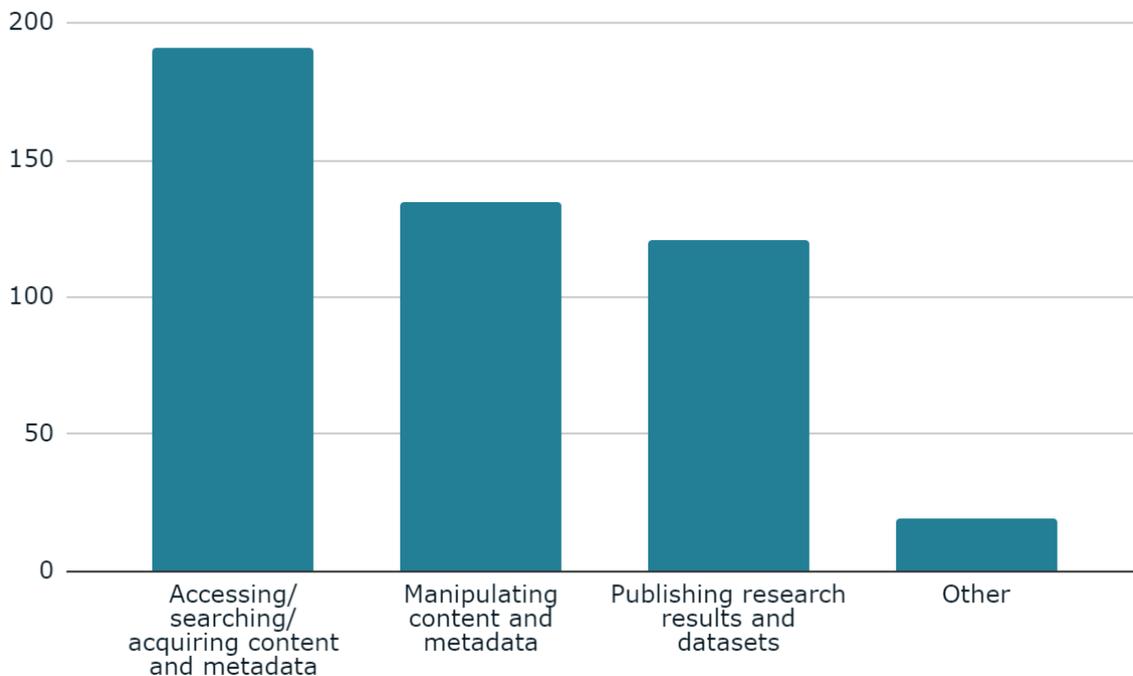


Figure 8 - A bar chart showing responses to the question 'What kind of tools would you need for your research that you don't have access to right now?' The highest response was for accessing/searching/acquiring content and metadata, then manipulating content and metadata, then publishing research results and datasets, then other.

The answers to this question follow the life cycle of research. The biggest need that emerges is access to content and metadata. This might imply that more than 40% of the respondents feel they do not have access to enough content and metadata. Almost 30% of the answers reflect the need for tools to manipulate content as well as metadata. Having access to tools to publish research results and datasets is still quite problematic. The usefulness of the research repositories developed in the past few years should be assessed on a longer-term.

Q9: How do you publish your research results?

A majority of the respondents claim to publish their research data in journal papers and conference proceedings. However, since publishing research data in journal papers or conference proceedings is (still) in its infancy, especially in the humanities (61% of the respondents, cf. Q1) this seems rather unlikely. We suspect that most respondents refer to the act of publishing statistics (and analysis) based on the data generated in their research.



Section 3 - Problems/Issues

Q10: Do you find the resources you need in a digital form?

As large parts of our cultural heritage are not yet available in a digital form, not surprisingly the vast majority of the respondents indicate they only find the resources they need in a digital form partially.

Q11: Do you experience any problems in accessing and getting permission to reuse digital cultural objects in your research?

Most respondents experience problems in accessing and getting permission to reuse digital cultural objects in their research.

Q12: Which of the following issues do you experience in reusing digital cultural datasets in your research?

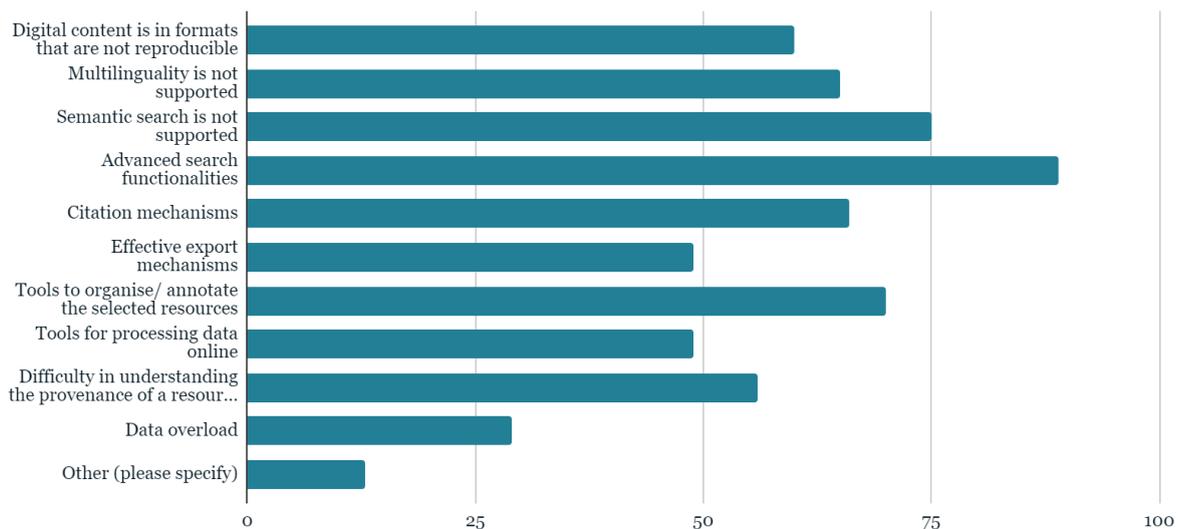


Figure 9 - A bar chart showing responses to the question 'Which of the following issues do you experience in reusing digital cultural datasets in your research? The response options are digital content is in formats that are not reproducible; multilinguality is not supported; semantic search is not supported; advanced search functionalities; citation mechanisms; effective export mechanisms; tools to organise/annotate the selected resources; tools for processing data online; difficulty in understanding the provenance of a resource; data overload; other (please specify).

The answers to this question provide a very useful overview. Advanced search functionalities, followed by semantic search, are the most common issue experienced by the respondents. This piece of information could be interpreted as reflecting a lack of such functionalities and/or their limited effectiveness in the attempts to refine the search. It reflects dissatisfaction towards functionalities that should be considered an essential complement to a digital collection.



Beyond this, the response brings again to light the need for tools to manipulate the selected resources, especially by organising and annotating them. Finally, it is understandable that in research contexts, respondents would like to be facilitated in citing the resources that they intend to reuse, as the citation mechanisms in the case of digital resources are not standardised yet; and that they also need to understand the provenance of such resources as the resources' reliability and verifiability are instrumental to their usefulness.

Q13: Which of the following tools and services would be beneficial for your research?

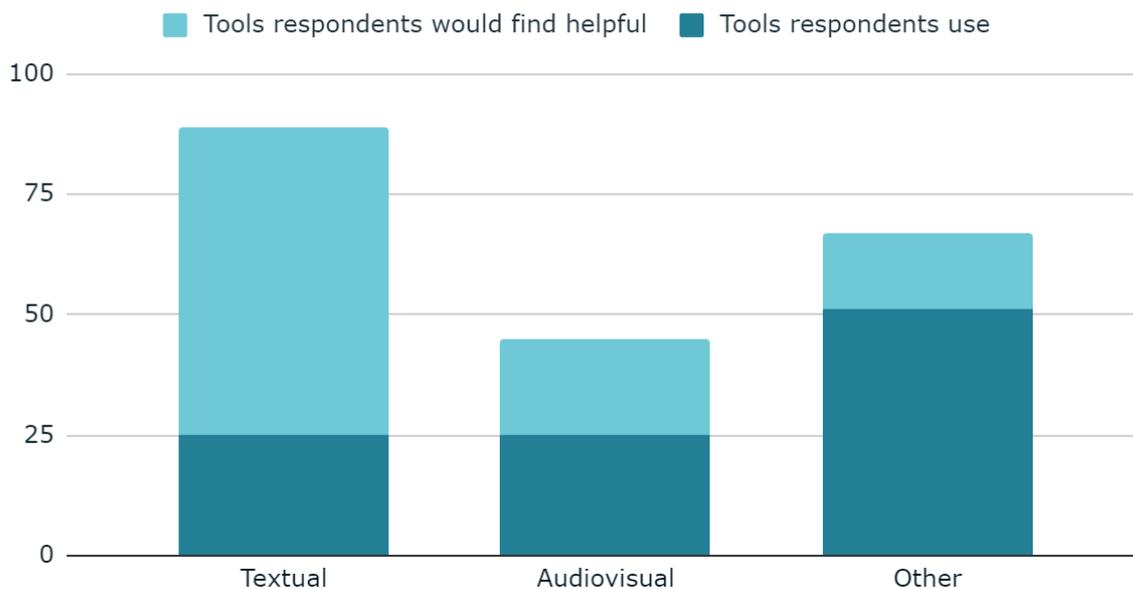


Figure 10 - A bar chart showing responses to the question 'Which of the following tools and services would be beneficial for your research?'. The highest response was textual, then other, then audiovisual.

There seems to be a clear need for more tools and services which can be used on textual resources. This might be related to the strong preference for such resources demonstrated by the responses to Q3. On a side note, the high ranking received by "Other" might be explained by the fact that researchers do not always consider images as audiovisual resources, which recall more easily, instead, film, video and audio.



Section 4 - Skills/Training

Q14: Do you have sufficient skills to use digital tools/ computational methods for your research?

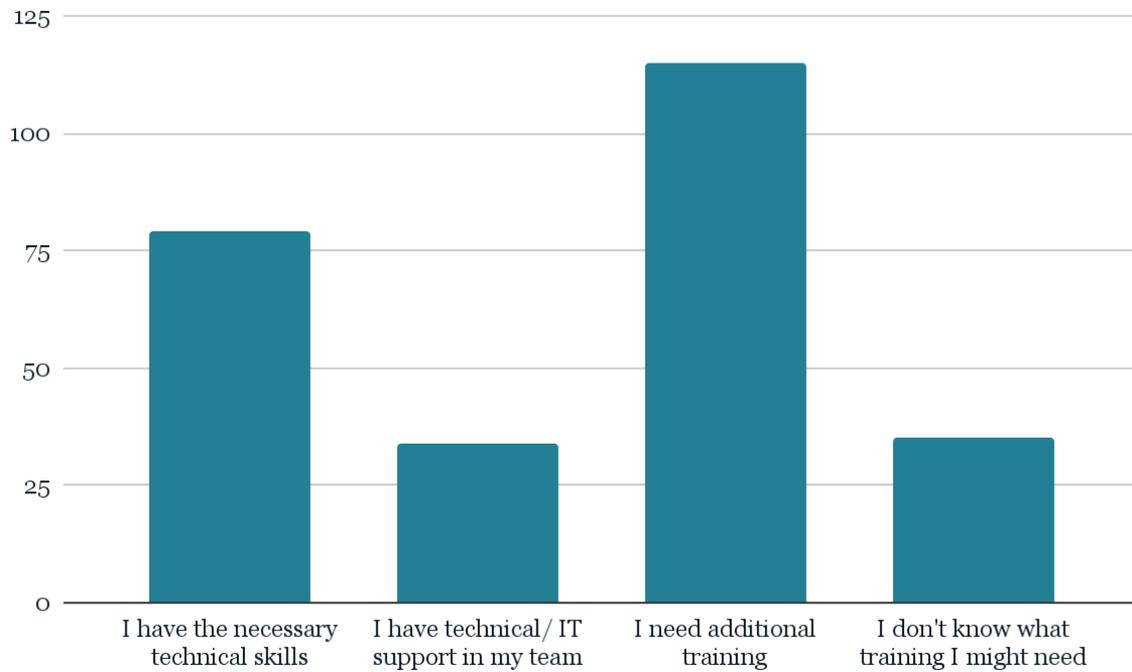


Figure 11 - A bar chart showing responses to the question 'Do you have sufficient skills to use digital tools/ computational methods for your research?'. The highest response is 'I need additional training', then 'I have the necessary technical skills', then 'I don't know what training I might need', then 'I have technical/IT support in my team'.



Q15: If you need additional training, what kind of training would you need?

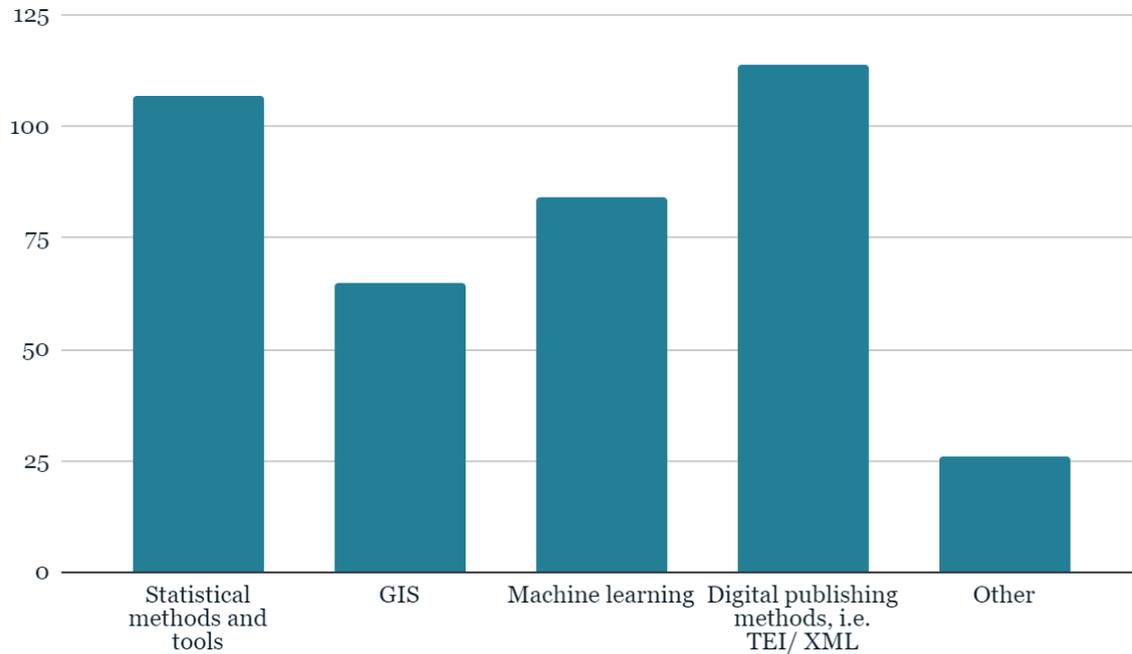


Figure 12 - A bar chart showing responses to the question 'If you need additional training, what kind of training would you need?' The highest response is to digital publishing methods, i.e. TEI/XML, then statistical methods and tools, then GIS, then other.

Q16: Regarding data management and processing of digital cultural heritage, which of the following training would be very helpful/ helpful/ less helpful/ not helpful for your work?

Apply open/FAIR data principles in cultural heritage domains

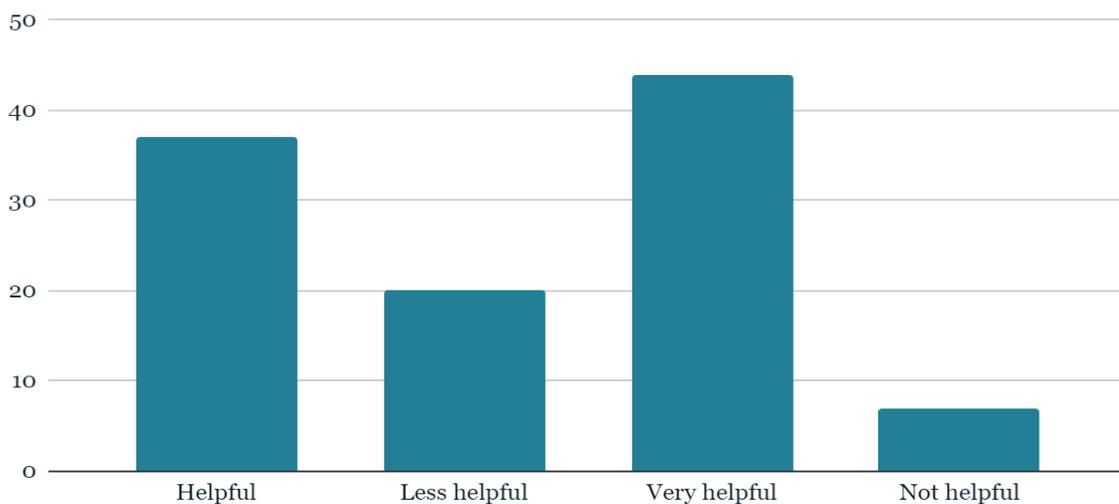


Figure 13 - A bar chart showing responses to the question 'Regarding data management and processing of digital cultural heritage, which of the following training would be very helpful/ helpful/ less helpful/ not helpful for your work?'



helpful for your work. The highest response to the option 'Apply open/FAIR data principles in cultural heritage domains' is very helpful, then helpful, then less helpful, then not helpful.

Define and implement a Data Management Plan

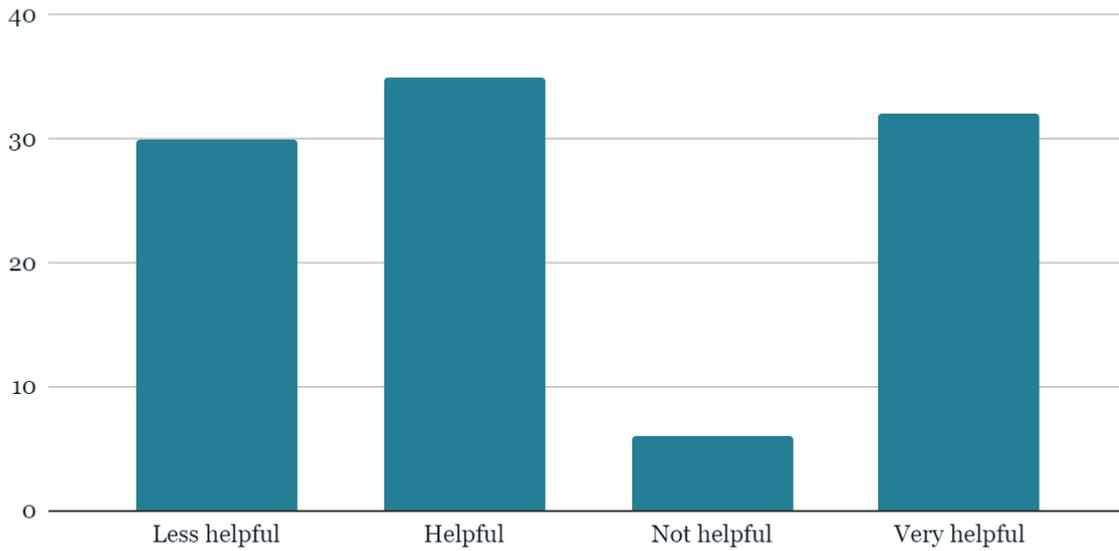


Figure 14 - A bar chart showing responses to the option 'Define and implement a Data Management Plan'.. The highest response is helpful, then very helpful, then less helpful, then not helpful.

Manage datasets of a large project

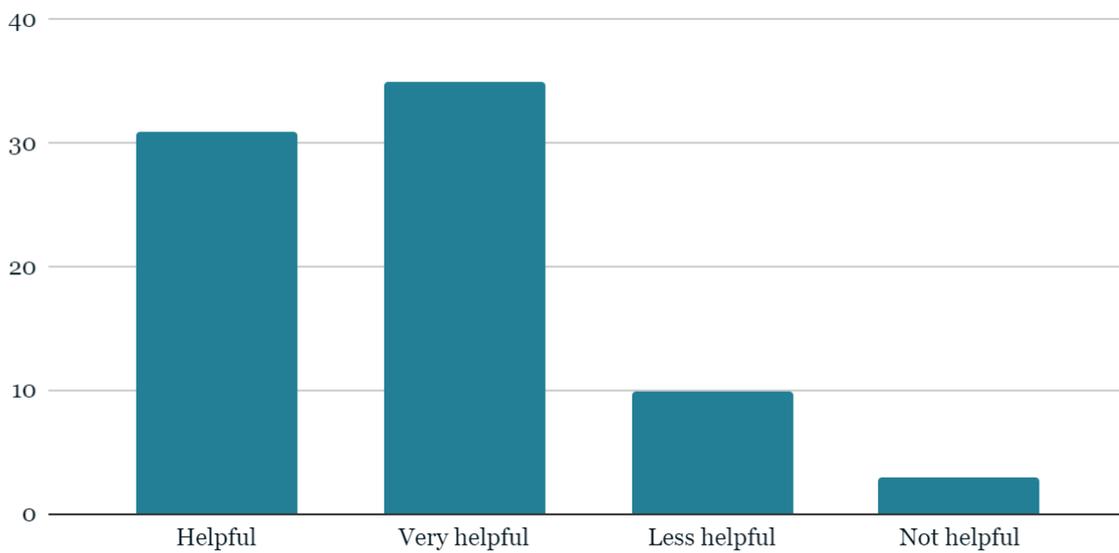


Figure 15 - A bar chart showing responses to the option 'Manage datasets of a large project'. The highest response is very helpful, then helpful, then less helpful, then not helpful.

Develop data science skills (use advanced data processing and analysis methods)

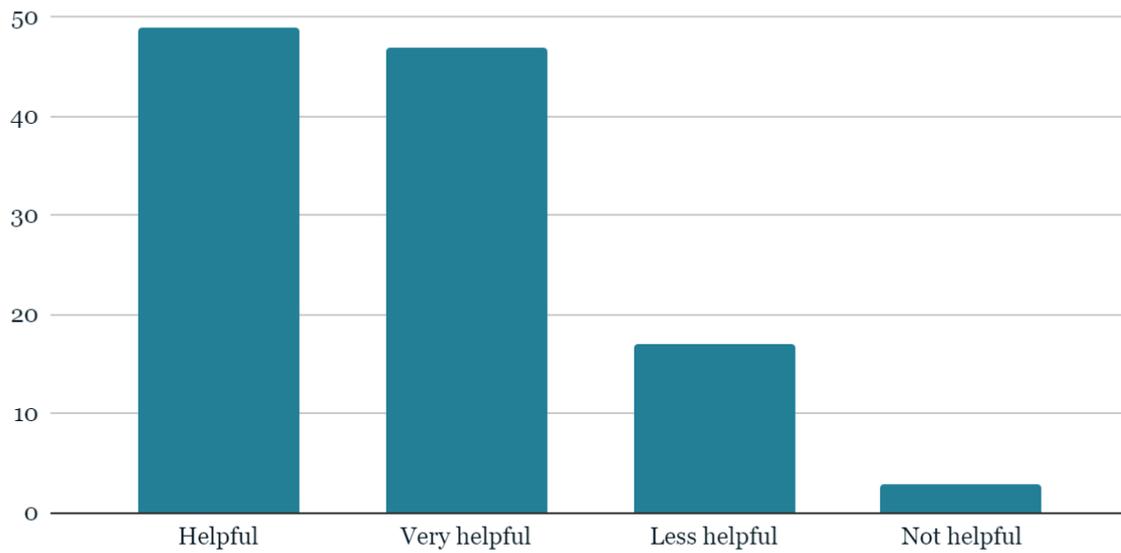


Figure 16 - A bar chart showing responses to the option 'Develop data science skills (use advanced data processing and analysis methods). The highest response is helpful, then very helpful, then less helpful, then not helpful.

Produce metadata for cultural heritage institutions' datasets

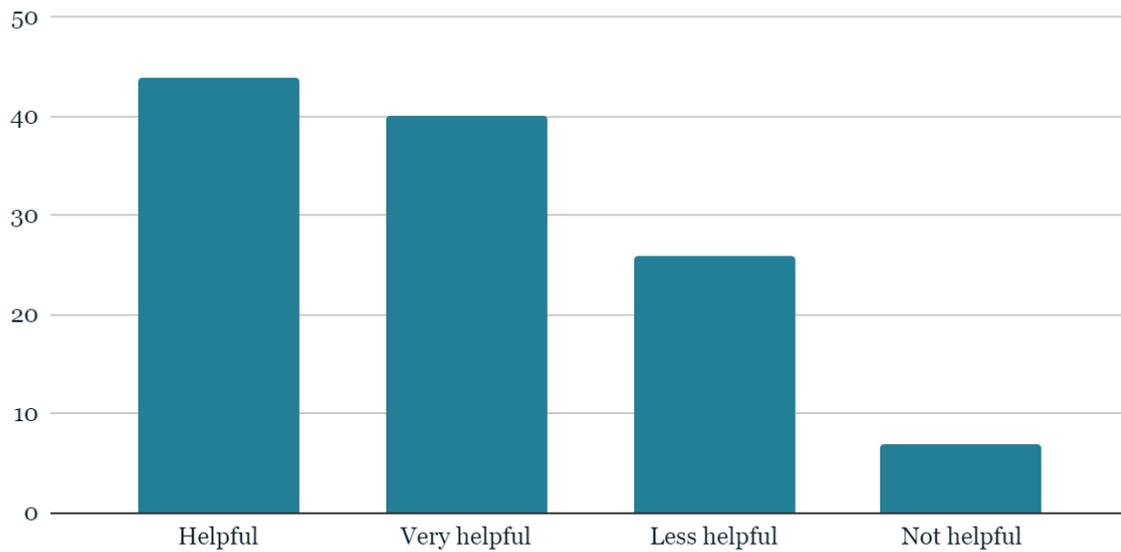


Figure 17 - A bar chart showing responses to the option 'Produce metadata for cultural heritage institutions' datasets'. The highest response is helpful, then very helpful, then less helpful, then not helpful.

Use domain vocabularies to describe datasets

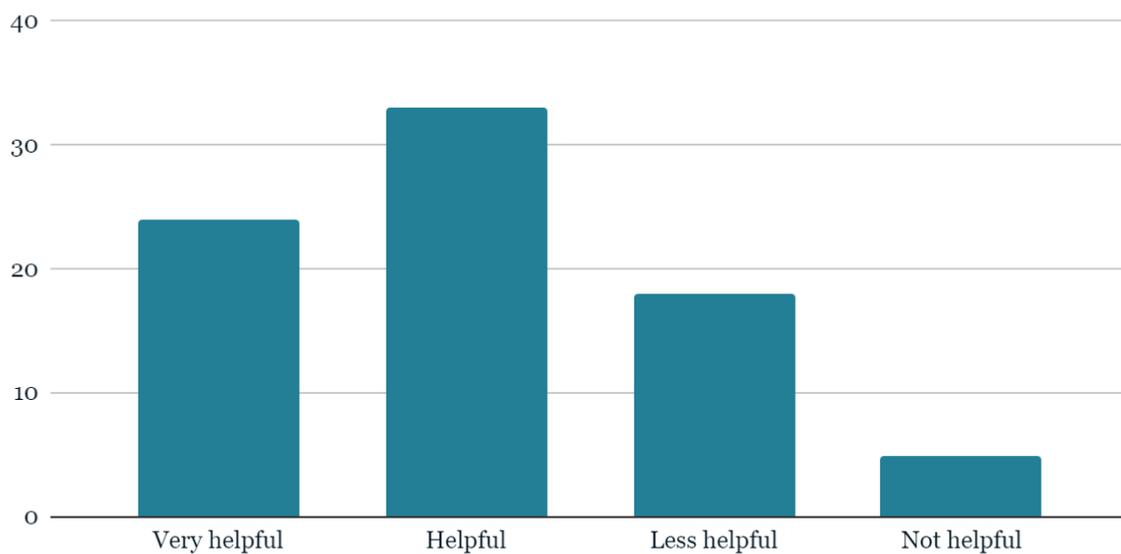


Figure 18 - A bar chart showing responses to the option 'Use domain vocabularies to describe datasets'. The highest response is helpful, then very helpful, then less helpful, then not helpful.

Deposit project datasets in a digital repository

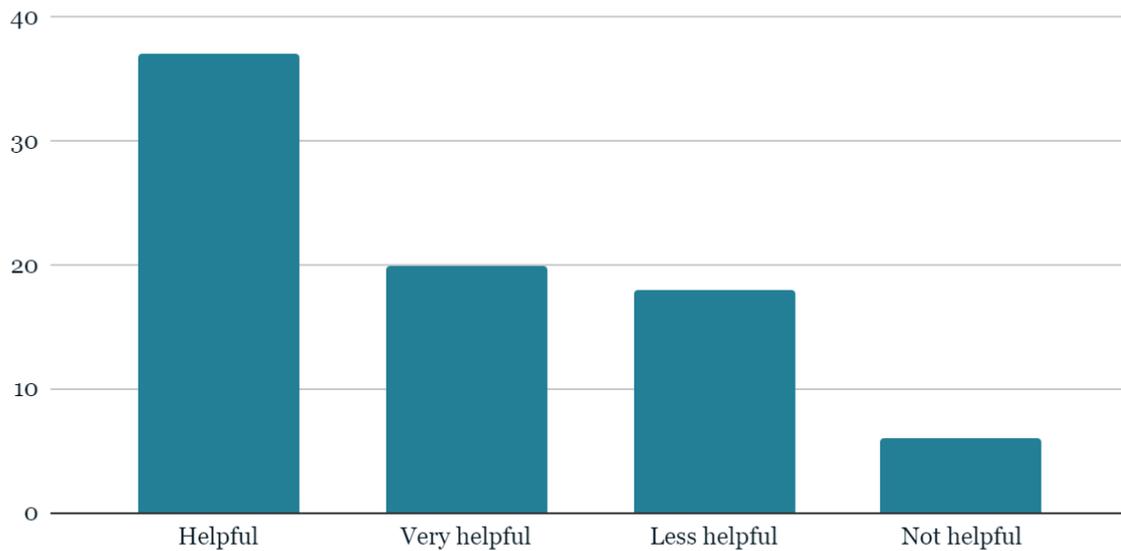


Figure 19 - A bar chart showing responses to the option 'Deposit project databases in a digital repository'. The highest response is helpful, then very helpful, then less helpful, then not helpful.

Manage a digital repository of cultural heritage institutions' data

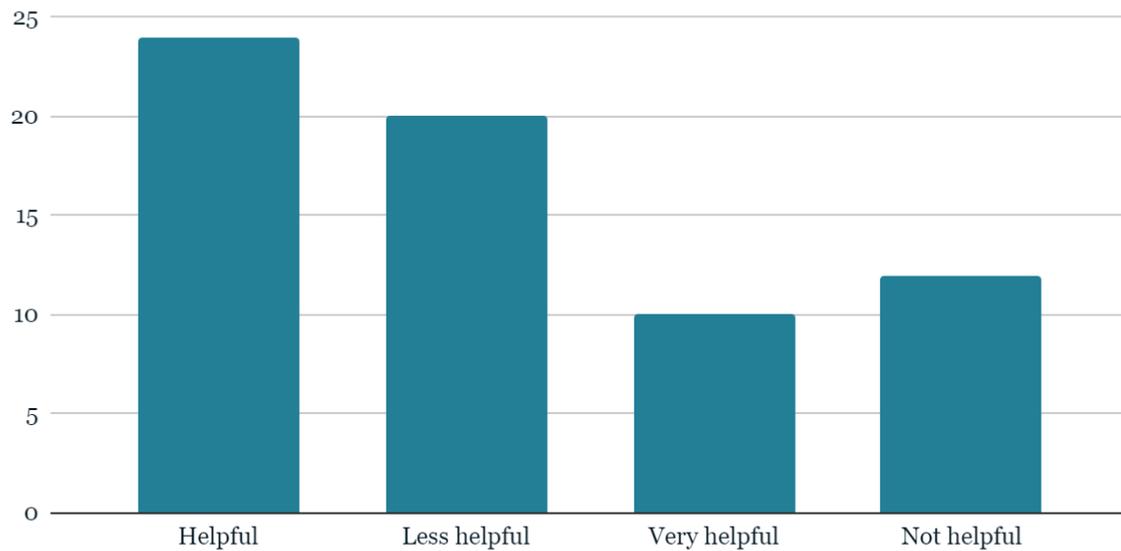


Figure 20 - A bar chart showing responses to the option 'Manage a digital repository of cultural heritage institutions' data'. The highest response is helpful, then less helpful, then not helpful, then very helpful.

Apply licences correctly and clear IPR issues

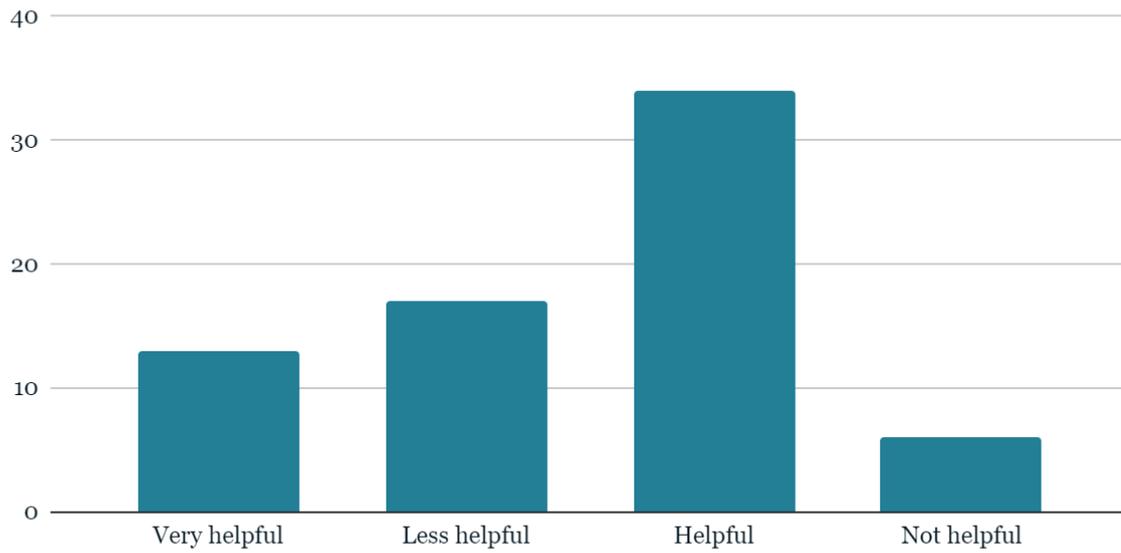


Figure 21 - A bar chart showing responses to the option 'Apply licences correctly and clear IPR issues'. The highest response is helpful, then less helpful, then very helpful, then not helpful.



Section 5 - Awareness of the European Open Science Cloud (EOSC)

Q.17: Are you aware of EOSC services? Are you using them?

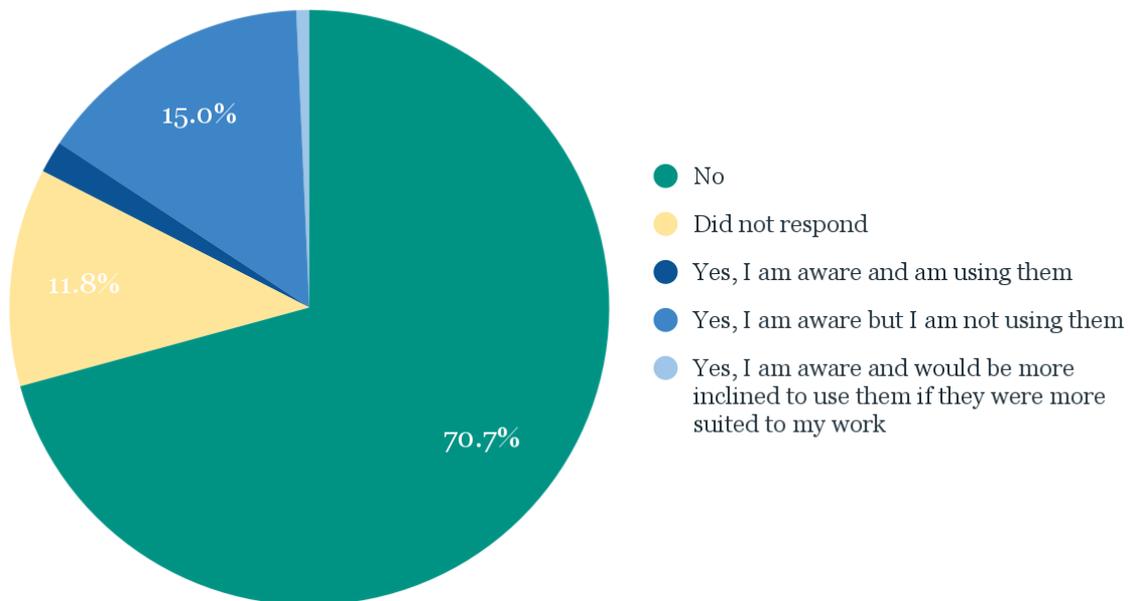


Figure 22 - A pie chart showing answers to the question 'Are you aware of EOSC services? Are you using them?' 70.7% responded no, 11.8% did not respond, 15% responded 'Yes, I am aware but I am not using them' and the rest report 'Yes, I am aware and am using them' or 'Yes, I am aware and would be more inclined to use them if they were more suited to my work'.

The responses reflect limited knowledge of the EOSC in the sectors targeted by this survey.

Q18: Which kind of services are most useful for bringing cultural heritage assets in the EOSC? (Open Question)

35 respondents indicated potential EOSC services that cultural heritage could benefit from. Among them, approximately 1/3 indicated long-term data storage as the main service, followed by tools for processing and data analysis, and then 3D modelling, annotation, data citation and enrichment services. Respondents also mentioned free access to scientific publications and to repositories based on linked data. A few respondents made very specific suggestions such as permalinks to make datasets compatible with pre-existing ontologies, repositories for spatial data, harmonisation of access to data, thesauri, shared policies for data management, training, registries of cultural heritage databases and services to aggregate and interlink content metadata, text and corpora annotations, services for metadata quality assurance and discoverability.



Q19: Which 'core' services could EOSC provide to ensure sustainability and harmonisation across different providers? (Open Question)

Most of the 33 respondents recognise the importance of coherent (or at least transparent) policies for data reuse and of harmonised description standards for cataloguing services, including a multilingual data structure with recommended standard descriptors – a respondent suggests an ontological unification with CIDOC CRM. Answers also include the availability of computing power (HPC), long term data storage, scalable data mining, trusted digital repository with DOI minting, seamless network of regional repositories.

Q20: How could Europeana help implement the FAIR principles within the EOSC landscape? (Open Question)

The answers provided by the 33 respondents are diverse in this case. Approximately $\frac{1}{3}$ of them do not know or are uncertain about how Europeana can implement FAIR principles. Others recognise a great importance to advocating the FAIR principles by providing guidelines and tools to measure how FAIR datasets are. Some respondents recognise the possibility of merging Europeana and cultural heritage institutions' repositories as a service under EOSC, and providing institutions with training on data stewardship to participate in this initiative. One respondent highlights the suitability of more complete and rich metadata to promote more meaningful scientific reuse.

Q21: How could Europeana support cultural heritage institutions in implementing the FAIR principles? (Open Question)

Training is by far the most recurrent answer.

Q22: What tools and research applications for content analysis, enrichment, and quality assurance should be integrated into a potential Cultural Heritage Cloud? (Open Question)

Out of the 34 answers, 10 respondents replied that they do not know or do not have precise information. The remainder of the respondents provides suggestions of specific tools and services, e.g. the Social Sciences and Humanities Open Cloud (SSHOC), the ARIADNEplus project, The Getty Research Institute's Art & Architecture Thesaurus® Online, and artefacts (Encyclopédie collaborative en ligne des objets archéologiques), or classes of tools, e.g. data visualisation tools, annotation tools, online environments for curation and research, and mapping tools. One respondent suggests tools that do not require too much specialist training. Two respondents bring up the issue of data authenticity and metadata accuracy. The majority of the answers suggest or directly indicate quantitative or data-driven methods and tools, rather than qualitative ones. Examples include data metrics, speech and image recognition software, statistical



analysis, and machine learning tools for data analysis. Five respondents' answers include data visualisation of various kinds.

Q23: Do you envisage an open marketplace where data and tools for cultural heritage are freely available? If yes, could you suggest possible scenarios? (Open Question)

The 40 responses include four answers that indicate that the respondent does not know, or does not have an opinion. Of the remaining replies, two-thirds are positive (21), and 8 reply negatively to this question. Several respondents reply that such resources are already available. Two respondents remark on the use of the term 'marketplace,' suggesting that it should be more of a commons. Several respondents indicate the need for a 'window' or portal of sorts for existing services to make it easier to find resources that are available. Examples of sites to learn from that respondents suggest are: AEGARON: Ancient Egyptian Architecture Online, and GBIF | Global Biodiversity Information Facility. On the question of possible scenarios, beyond existing examples, one respondent suggests institutional membership payment and support through grants, and another respondent points out that museums should not pay fees to commercial products in this domain.

Q24: Would you like to share recommendations or ideas on how your research activities might be better supported by cultural heritage institutions, aggregators, Europeana, and policymakers? E.g. I think Europeana should work more closely together with research infrastructures in the context of EOSC.

In addition to the offer of support and training which already emerged from the responses to other questions, the prevalent response is that Europeana should be more connected to the world of research infrastructures, as suggested in the question itself. Among some interesting detailed responses, one at least deserves to be quoted: 'For research, questions of representativeness, trustworthiness and bias are of paramount importance. [...] Europeana may establish protocols with universities and research institutions to promote the dissemination of results and projects.'

Section 6 - Profile of the respondents

Q25: In which country is your institution based (location of the organisation you are working for/ where you are professionally based)? If this is not a European country, please use the field "Other" and specify.

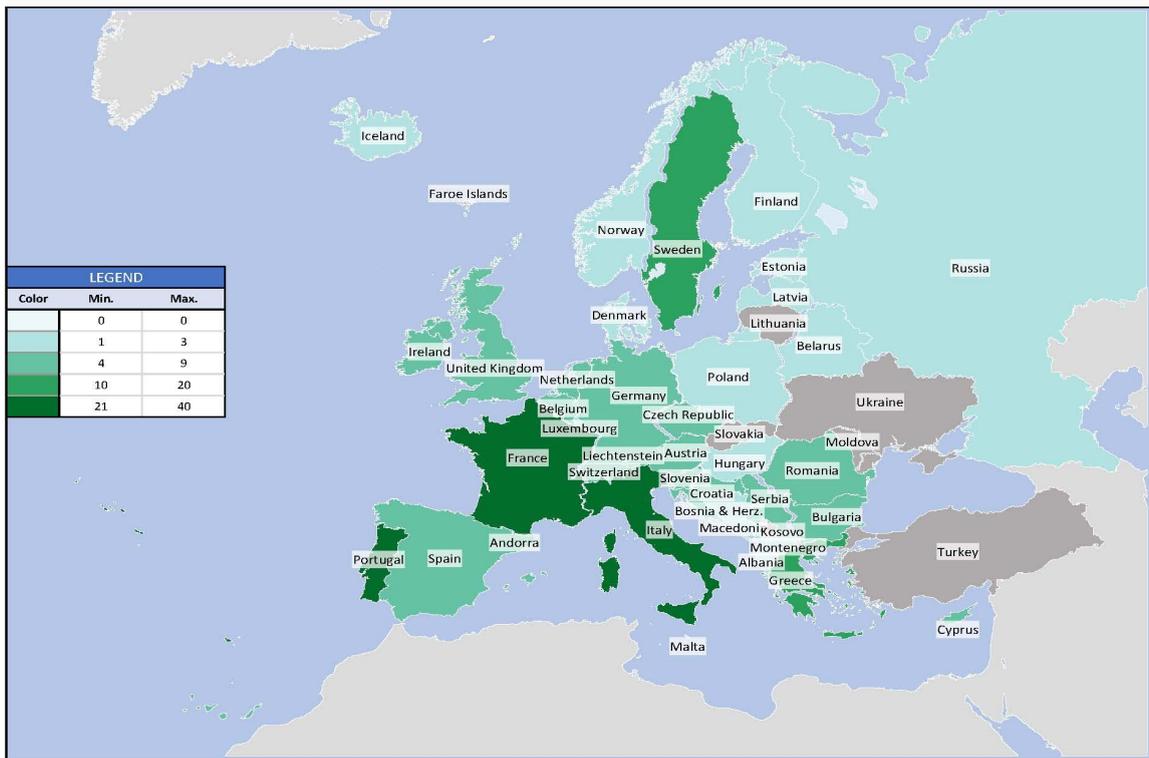


Figure 23 - A map showing where respondents' institutions are based.



Q26: Are you a member of the Europeana Network Association?

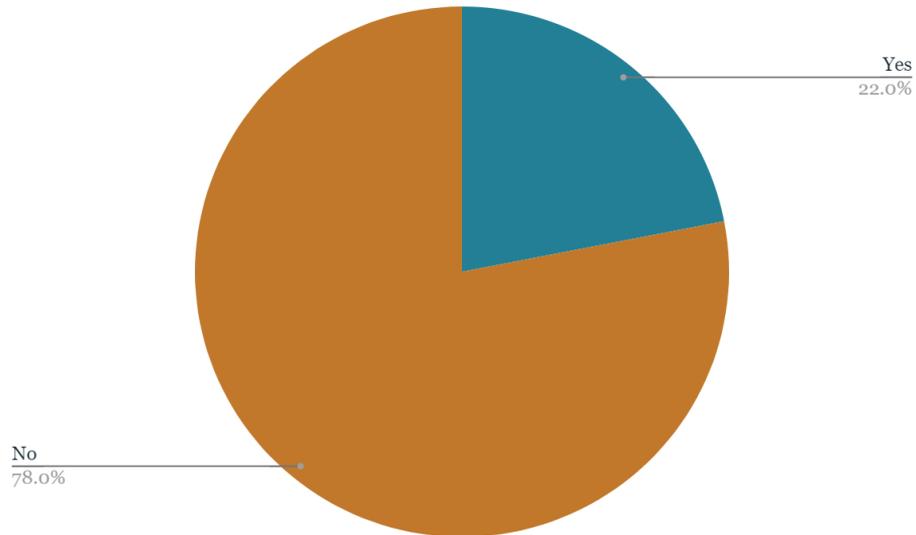


Figure 24 - A pie chart showing responses to the question 'Are you a member of the Europeana Network Association?' 22% respond yes, 78% respond no.

Q27: If yes, are you a member of the Europeana Research Community?

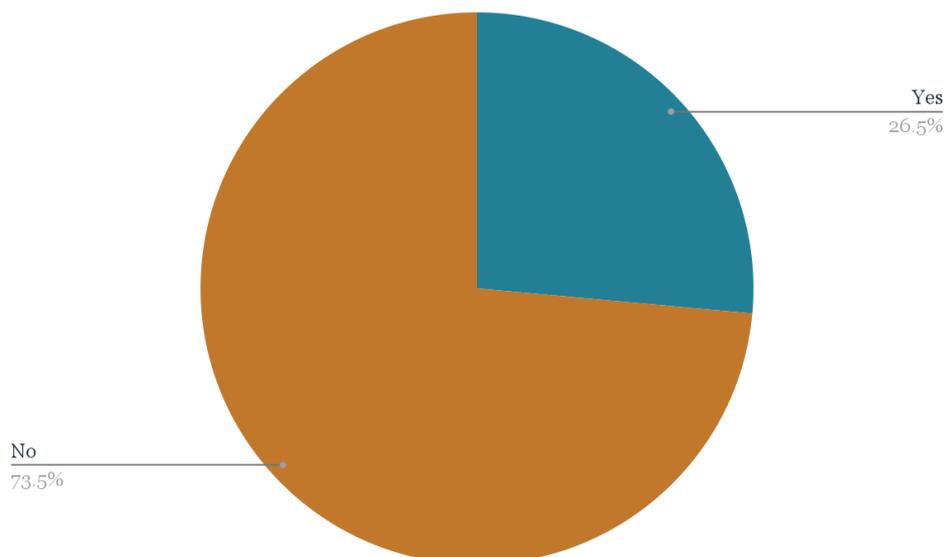


Figure 25 - A pie chart showing responses to the question 'If yes, are you a member of the Europeana Research Community?' 26.5% respond yes, 73.5% respond no.



Q28: What level of research are you conducting?

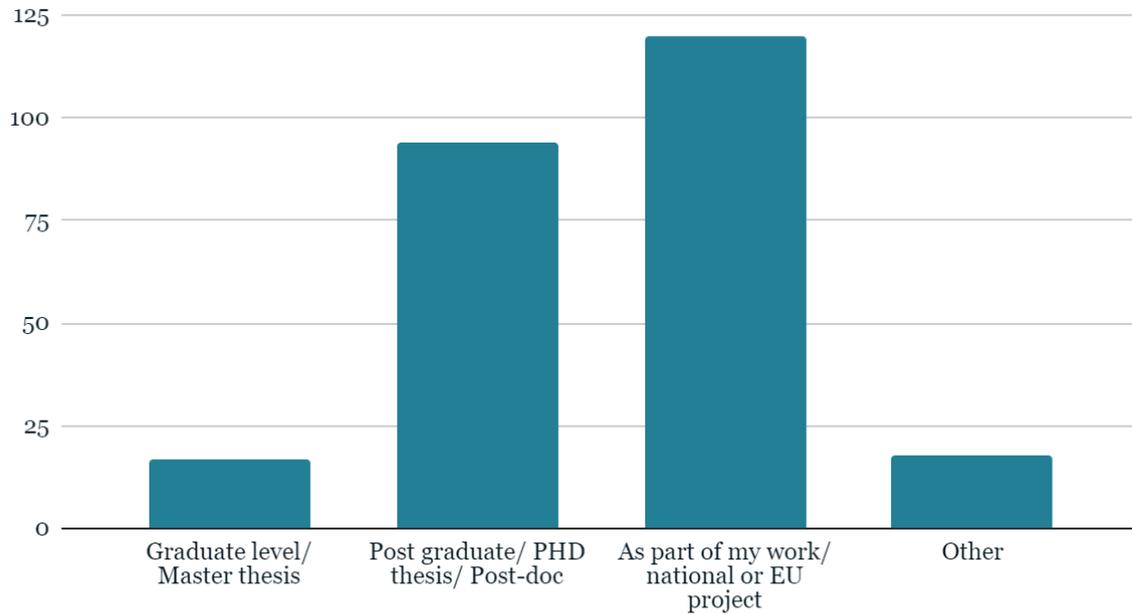


Figure 26 - A bar chart showing responses to the question 'What level of research are you conducting?'. The highest response is as part of my work/national or EU project, then post graduate/PHD/thesis/post-doc, then other, then graduate level/master thesis.

Q29: What type of organisation are you working or conducting research for?

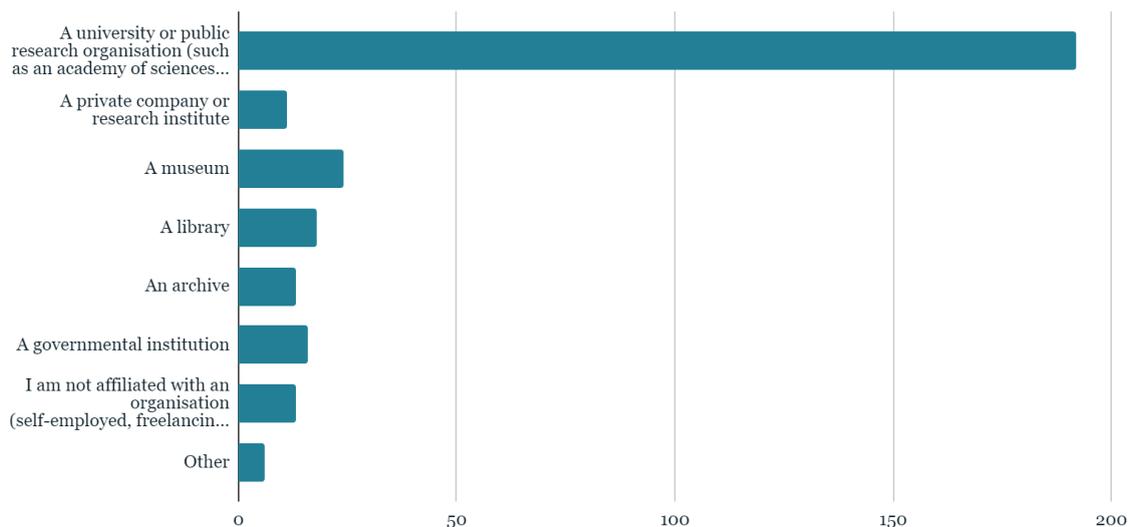


Figure 27 - A bar chart showing responses to the question 'What type of organisation are you working or conducting research for?'. The highest response is a university or public research organisation, such as an academy of sciences. Other responses are a private company or research institute, a museum, a library, an archive, a governmental institute, I am not affiliated with an organisation, other.



Q30: What best describes your current position in the organisation?

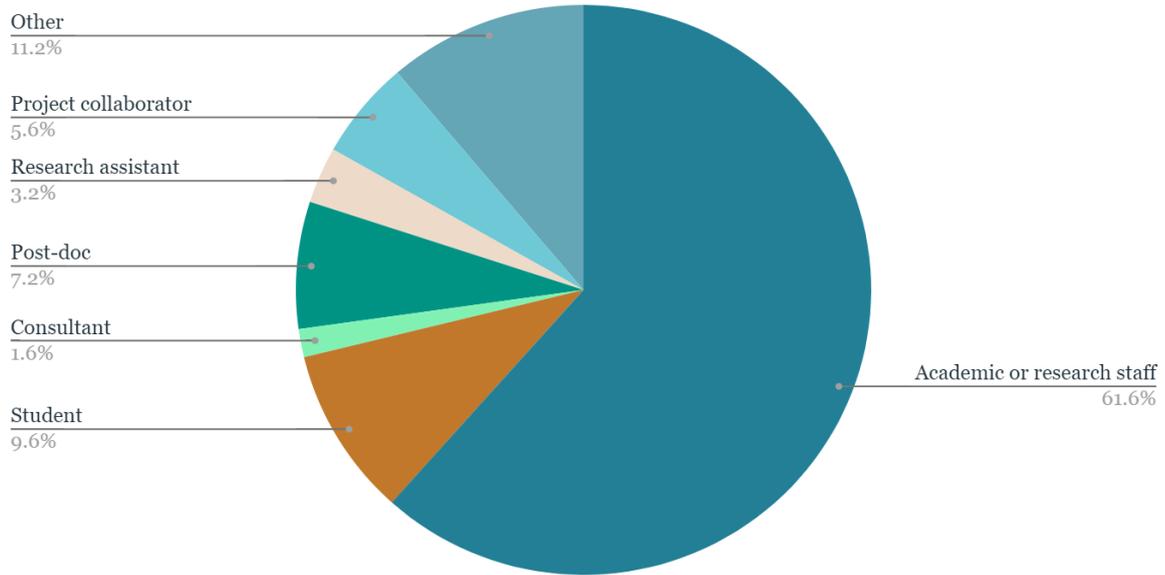


Figure 28 - A pie chart showing responses to the question 'What best describes your current position in the organisation?'. 61.6% responded academic or research staff, 11.2% responded other, 5.6% responded project collaborator, 3.2% research assistant, 7.2% post-doc, 1.6% consultant, 9.6% student.

Q31: Do you work alone or in a team?

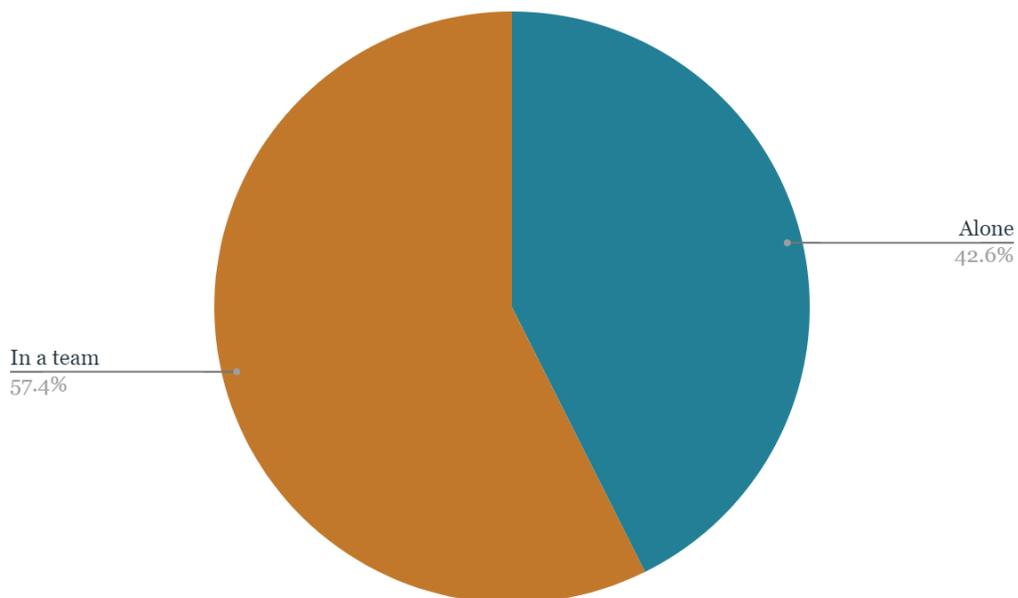


Figure 29 - A pie chart showing responses to the question 'Do you work alone or in a team?' 42.6% respond alone, 57.4% respond in a team.



Interview with Jennifer Edmond, President of the Board of Directors in DARIAH

The Task Force interviewed Jennifer Edmond to gain a more qualitative understanding of researchers' needs in relation to digital cultural heritage, complementing the data received from survey responses. We include the interview in full below for interest.

What are the most important ways in which your organisation/infrastructure use digital collections?

One of DARIAH's most important purposes is to ease the exchange of research data within the arts and humanities community. These data collections are, from our perspective, largely composed of digital collections of, and related to, cultural materials. Our role in this is multidimensional: first, we seek to improve documentation and digital transformation processes carried out by researchers, encouraging the access to and enhancement of such data in sustainable, reusable ways. We seek to support institutions that hold collections to improve, align and open their holdings. Finally, we aim to directly influence but also inform our community about the policy environment that shapes the range of activities that can be undertaken with regard to digital collections.

Which types of digital items and tools do your organisation/infrastructure most commonly use, and why?

In this we follow the very broad interests of our community (visible at least in part through the list of our Working Groups). Historical archives, literary collections and linguistic data are major components, but considering the wide variety of sources (institutions, but also researcher projects), levels of preparation (unstructured text to TEI encoded documents to structured data prepared for use in GIS systems) and media (lots of text, but also visual, sonic, 3D models, etc.), the overall picture is quite heterogeneous.

In the digital scenario, which changes would you like to see in five years?

Our primary concern within DARIAH is that the traditions of access to and sharing of cultural data, gated by the policies of individual institutions, are far out of step with the current impetus toward opening up research data. Traditions of shared ownership and the lack of a strong affiliation with the terminology of data management in the arts and humanities are significant barriers that could cause Arts and Humanities to be left behind in terms of the trajectory of research policy.

In what way could Europeana.eu better support the research in your field?

Europeana is an excellent window into European cultural heritage, but only in certain niche areas (historical newspapers, for example) are the metadata and depth of collections rich enough to support research. There is a lot of archival and library



material (in the institutions, but in researchers' private data lakes as well) still 'hidden' from researchers working digitally, which needs a trusted platform to be exposed and shared.

In your opinion, what changes does the COVID-19 pandemic suggest to the cultural heritage sector and to your organisation/infrastructure?

COVID-19 has accelerated the pace and visibility of research sharing, in the sciences and in arts and humanities as well (for example around the experiences of the 1918 flu pandemic, and the development and distribution of earlier vaccines). Cultural researchers and their institutions are not as well optimised as other disciplines, however, for rapid and applied responses. This is an emerging challenge, but also a great opportunity for arts and humanities to be able to contribute essential perspectives in times of great social challenges that cannot be solved by the STEM disciplines alone.



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