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## D6.3 Policy Recommendations and Strategy Report

Maria Fernanda Rollo, Maria Do Rosário Jorge, João Fernandes, Filipe Guimarães da Silva, Inês Queiroz, Pedro Lucas

► **To cite this version:**

Maria Fernanda Rollo, Maria Do Rosário Jorge, João Fernandes, Filipe Guimarães da Silva, Inês Queiroz, et al.. D6.3 Policy Recommendations and Strategy Report. [0] NOVA - Universidade Nova de Lisboa. 2019. hal-02467855

**HAL Id: hal-02467855**

**<https://hal.science/hal-02467855v1>**

Submitted on 5 Feb 2020

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## D6.3 Policy Recommendations and Strategy Report

# DESIR

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## DARIAH ERIC Sustainability Refined

INFRADEV-03-2016-2017 - Individual support to ESFRI and other world-class research infrastructures

Grant Agreement no.: 731081

Date: 31-12-2019

Version: 1.0



DESIR has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731081.

Grant Agreement no.:	731081
Programme:	Horizon 2020
Project acronym:	DESIR
Project full title:	DARIAH-ERIC Sustainability Refined
Partners:	<p>DIGITAL RESEARCH INFRASTRUCTURE FOR THE ARTS AND HUMANITIES</p> <p>GEORG-AUGUST-UNIVERSITAET GOETTINGEN STIFTUNG OEFFENTLICHEN RECHTS</p> <p>UNIVERSITEIT GENT</p> <p>UNIWERSYTET WARSZAWSKI</p> <p>FACULDADE DE CIENCIAS SOCIAIS E HUMANAS DA UNIVERSIDADE NOVA DE LISBOA</p> <p>CENTAR ZA DIGITALNE HUMANISTICKE NAUKE</p> <p>GOTTFRIED WILHELM LEIBNIZ UNIVERSITAET HANNOVER</p> <p>INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET AUTOMATIQUE</p> <p>KING'S COLLEGE LONDON</p> <p>UNIVERSITY OF GLASGOW</p> <p>KNIHOVNA AV CR V. V. I.</p> <p>HELSINGIN YLIOPISTO</p> <p>SIB INSTITUT SUISSE DE BIOINFORMATIQUE</p> <p>UNIVERSIDAD NACIONAL DE EDUCACION A DISTANCIA</p> <p>UNIVERSITY OF HAIFA</p> <p>UNIVERSITY OF NEUCHÂTEL</p>

Topic:	INFRADEV-03-2016-2017
Project Start Date:	01-01-2017
Project Duration:	36 months
Title of the document:	Policy Recommendations and Strategy Report
Work Package title:	Trust
Estimated delivery date:	31-12-2019
Lead Beneficiary:	FCSH-UNL
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Keywords:	Trust, sustainability, DARIAH communities, policy recommendations



## Revision History

Version	Date	Author	Beneficiary	Description
0.1	20.12.19	Maria Fernanda Rollo Maria do Rosário Jorge João Fernandes Filipe Guimarães da Silva Inês Castaño	FCSH-UNL	First draft
0.2	23.12.19	Marco Raciti	DARIAH	Second draft
0.3	30.12.19	Joana Malta	FCSH-UNL	Third draft
1.0	31.12.19	Marco Raciti	DARIAH	Final version, deliverable submitted

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## Executive Summary

European Commission aims to develop a more sustainable environment for research infrastructures ecosystem, and to ensure that the benefits and impacts are widely perceived by research communities and led to research excellence. This vision is reflected in a range of international and European documents. Recent work conducted by the OECD<sup>1</sup> and European Commission<sup>2</sup>, particularly by ESFRI<sup>3</sup> and e-IRG, have stated the need to make structural changes in the EU framework for research infrastructures (RIs).

In line with this strategic vision, DARIAH intends to establish itself as a sustainable research infrastructure. DESIR (DARIAH ERIC Sustainability Refined) work package 6 TRUST contributes to DARIAH's long-term sustainability by measuring acceptance and impact of DARIAH in new cross-disciplinary DARIAH communities and core groups. This was the base to define the theoretical and methodological framework that supported the research here presented. Therefore, this report focuses on the development of recommendations and strategies to support and increase confidence in DARIAH services and infrastructure, aiming at contributing to a major DESIR goal, which is to enlarge DARIAH by engaging new cross-disciplinary communities and considering their specific requirements.

The proposed recommendations could set the basis for a broader debate within the DARIAH and RIs landscape on the actions to be taken at all decision levels in order to address a vision for longer-term sustainable RI. So, this report intends to be a policy document that aims at inspiring the future path of DARIAH, contributing to its sustainability and to fulfil the mission for which it was created.

The recommendations stem from the analytical work developed from the contributions of multiple sources of information: an academically-driven multi-country survey (see D6.2); thirty-three qualitative interviews in three different countries; a workshop with DARIAH national coordinators held in Warsaw; contributions from DESIR partners who lead other work projects within the project; and DESIR Winter School "Shaping New Approaches to Data Management in Arts and Humanities". After defining the entire set of recommendations, they were grouped according to three main strategic frameworks (sustainability, scope and DARIAH Strategic Plan) and visually displayed in a "Recommendations & Community Engagement Tool" (<https://dariah.peopleware.pt>), an open platform that supports DARIAH, strengthening the link with arts and humanities communities.

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<sup>1</sup> OECD. «Strengthening the effectiveness and sustainability of international research infrastructures». OECD Science, Technology and Industry Policy Papers, December 8, 2017. <https://doi.org/10.1787/fa11a0e0-en>.

<sup>2</sup> European Commission. «Sustainable European Research Infrastructures: a call for action». European Commission, 2017.

<sup>3</sup> ESFRI. «Long-Term Sustainability of Research Infrastructures. Vol.2». ESFRI, October 2017.

The new DARIAH Strategic Plan for the next seven years, which will be followed by the publication of a Strategic Action Plan, represents a big opportunity to address sustainability, both as a conceptual level and in terms of organizational and operational configuration. Therefore, the main findings are summarized in seven key recommendations, linked with the strategic pillars of the recent published DARIAH Strategic Plan:

1. Promote research excellence with inclusive, collaborative, bureaucracy free and community-driven approach.
2. Ensure the integration of tools, services, data and resources within DARIAH community and with other Research Infrastructures (e.g. by gathering them on a platform such as the Marketplace).
3. Foster a collaborative learning environment and anticipate the skills of the future through a joint strategy for education and training (e.g. DARIAH-CAMPUS).
4. Establish a flexible, participatory and effective governance model with a clear and sustainable business plan.
5. Strengthen DARIAH's representation in European and International policy arena, expanding its visibility and cooperation outside EU borders.
6. Broaden and extend DARIAH's role, action and benefits towards the strengthening of scientific citizenship in Europe.
7. Set up means for monitoring and bringing communities together, while respecting diversity on an institutional, scientific, disciplinary and methodological level.

The work developed in the DESIR project - particularly this set of recommendations - could be a contribution to foster the implementation of guidelines and short and long-term actions to improve DARIAH's sustainability and firmly establish it as a long-term leader and partner within arts and humanities communities.

Nature of the deliverable		
✓	R	Document, report
	DEM	Demonstrator, pilot, prototype
	DEC	Websites, patent fillings, videos, etc.
	OTHER	
Dissemination level		
✓	P	Public
	CO	Confidential only for members of the consortium (including the Commission Services)
	EU-RES	Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)
	EU-CON	Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)
	EU-SEC	Classified Information: SECRET UE (Commission Decision 2005/444/EC)

## Disclaimer

DESIR has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731081. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

## Introduction

This report presents the results, as well as the methodologies, of all the activities carried out in the scope of the last two tasks of WP6 within the DESIR project, which were: Task 6.3 - Develop Recommendations and Strategies how to Increase Trust and Trustworthiness; and Task 6.4 - Identify and Target New Cross Disciplinary Communities.

According to what was established in the DESIR proposal, at this stage WP6 should develop a methodology in order to produce evidence-based recommendations on how to increase trust, confidence and credibility of DARIAH as an organization and as an infrastructure, taking into consideration the real challenges of awareness, and also to target new communities, launching activities such as workshops where these communities can be heard about their needs and concerns regarding digital research infrastructures, tools and services.

To meet these goals, a methodology integrating different complementary instruments and analyses was used to produce valid information that supported the definition of recommendations for the sustainable development of DARIAH as a community-driven infrastructure for the Arts and Humanities. The methodology included several tools to collect information: i) 33 in-depth, qualitative and semi-structured interviews to key informants, institutional representatives and national political decision-makers in three different European countries (Portugal, Germany and Croatia), ii) two group discussions on digital infrastructures sustainability and on the community's needs and concerns, as well as iii) contributions from other work packages.

After analysing all the collected data, a database was built in order to organize and classify all the recommendations and, finally, a data visualization tool - the Recommendations & Community Engagement Tool - was generated to allow the whole community to consult, contribute and benefit from these results.

First, the methodology applied to this research will be described in depth and detail, mentioning the tools that allowed the production of the results presented afterwards. The methodology considered the need to synthesize all the recommendations and to meet three major concerns: i) integration, articulation and operationalization of different data sources; ii) dissemination of the results; and iii) the need to build a tool to engage with the community in a transparent and participatory manner .

Secondly, the main results in terms of recommendations for the sustained development of DARIAH will be presented. Since the data visualization tool makes it possible to filter the recommendations according to a large set of dimensions and categories, the main results will be presented selecting one of the several possibilities available: highlighting the relation between the main recommendations and what is already planned for the future of the infrastructure according to the DARIAH Strategic Plan.

## A methodology to develop recommendations for a sustainable research infrastructure

With the main objective of defining a set of recommendations that support a strategic vision for the sustainable development of DARIAH infrastructure, in this phase the research was mainly based on qualitative methodologies, including in-depth interviews, an interview to each DESIR partner, a group discussion in a session of DARIAH National Coordinators meeting, and a group discussion in the Winter School *Shaping New Approaches to Data Management in Arts and Humanities*.

The recommendations collected from all of these different sources were organized in a database that generated an interactive data visualization tool aiming to facilitate the systematic analysis and future consulting and updating of the results.

### In-depth qualitative interviews

The in-depth qualitative interviews were the main source of information to develop recommendations and strategies to increase trust, to enlarge DARIAH community and to ensure its sustainable development.

A first step was the selection of interviewees. The interviews were addressed to different levels of decision and different stakeholders. Concerning individual key informants, the selected interviewees were researchers with a Digital Humanities background, scholars with some work on this subject and researchers who were involved in digital infrastructure projects. Researchers from different disciplines were targeted, but also researchers with a cross-disciplinary background. Besides key informants, national or institutional decision-making actors in the area of research infrastructures were interviewed. At the institutional level, we sought to interview representatives of higher education institutions, directors of research units, representatives of cultural heritage organizations and coordinators of Digital Humanities projects. At the national decision level, we considered agents related to the Ministries of Science or Higher Education, representatives of science funding agencies or responsible for implementing national scientific policies.

After selecting the interviewee profiles, the guidelines of the scripts were defined in order to guide the semi-structured interviews. The scripts contained a series of questions that, in each case, could be slightly adjusted according to the interlocutor's pathway, activity or decision-making capacity (See the structure of the script for each decision level in Annex 1).

Concerning the individual level, the in-depth interviews aimed 1) to describe the use of digital research infrastructures and digital humanities tools, 2) to analyse the needs, concerns and expectations of researchers that should be met by the new digital tools, and 3) to identify proposals and recommendations for the sustainability of research infrastructures.

At the institutional decision-making level, the main purposes were 1) to understand the institutional strategies related to digital research infrastructures and its implementation, 2) to analyse the activities recently carried out in the institutional concerning this subject, and 3) to produce recommendations for a sustained development of digital research infrastructures for the arts and humanities.

At the national political level, the in-depth interviews conducted aimed 1) at knowing and understanding the national strategies concerning digital research infrastructures, 2) at analysing what is planned and expected concerning the future of these research tools, and 3) at defining recommendations for the sustainable development of digital research infrastructures.

The semi-structured interview methodology was applied in three selected countries from different regions in Europe in order to produce comparable results in each. The countries chosen were Portugal (southwestern Europe), Germany (central and northern Europe) and Croatia (southeastern Europe). 17 interviews were conducted in Portugal by the WP6 coordinating institution (NOVA FCSH) between December 2018 and March 2019. In Germany, the Göttingen State and University Library team (DESIR project partner) performed 7 interviews, and in Croatia, the national coordinator DARIAH of the University of Zagreb conducted a total of 9 interviews. In these two countries, interviews were conducted between May and September 2019.

The next step consisted of treating the content produced through in-depth semi-structured interviews. Firstly, there was an effort to transcribe all interviews and to translate the texts into English. After this moment, and using the NVivo qualitative analysis software, the corpora were analysed identifying all the excerpts in which the previously defined analysis categories (common in the three countries) were referenced. These categories were as follows (see detailed categories of analysis in Annex 2):

- DARIAH (positive points; negative points on communication, organization, contents and objectives; recommendations on communication and dissemination, on contents, on objectives and strategy, on organization);
- Dimensions of sustainability (accessibility, credibility, durability, equal access, interoperability, usability);
- Cross-disciplinarity;
- Open access / open science;
- Digital Humanities;
- Difficulties for researchers, at the institutional level and at the national level.

Subsequently, all interview content was analysed according to country and according to each category of analysis, producing all the descriptive analysis presented in Annex 3.



## DESIR partners contributions

The recommendations also resulted from the integration of the contributions of all DESIR work packages. Thus, the partners were asked to answer a set of questions related to their own objectives. A structured script was defined according to each WP goals (see Annex 4) and it was possible to analyse the contributions from WP3: Growth (Finland, Spain, Israel, United Kingdom, Switzerland, and Czech Republic; WP4: Technology; and WP7: Teaching (see the descriptive analysis in Annex 5).

## National Coordinators Committee Meeting

The WP6 team was invited to present the main results of the DESIR survey in the DARIAH National Coordinators Committee meeting that took place in Warsaw on 15 May 2019, during the DARIAH Annual Event “Increasing visibility and promoting sustainability of DARIAH”<sup>4</sup> (see the slides presentation in Annex 6).

The WP6 participation in the National Coordinators Committee meeting also included a workshop, in which the National Coordinators were asked to gather in small groups and to discuss several questions, which were:

1. How can we increase DARIAH visibility considering the different target audiences?
2. What is the role of National Coordinators in increasing visibility of DARIAH?
3. How should DARIAH support NCC to overcome these challenges?
4. How could the visibility of DARIAH by research communities be monitored?

The National Coordinators’ opinions and answers were conveyed by a spokesperson for each small group, recorded and transcribed. The results were integrated in the Recommendations Database and presented in this report (see Annex 7). After the qualitative analysis of these results, they were sent to all the national representatives of DARIAH via the Chair of the DARIAH-EU NCC.

## DESIR Winter School

The DESIR Winter School *Shaping New Approaches to Data Management in Arts and Humanities* (<https://desirschool.sciencesconf.org>), held in Lisbon in December 2019, was organized by DARIAH and NOVA University (see D 7.5 for further information). It aimed at gathering PhD students, scholars and other stakeholders (such as research managers) interested in the issues raised by sustainable practices to open up data in the arts and humanities and it brought together the collaboration of national and international experts in the data management field.

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<sup>4</sup> <https://dariah-ae-2019.sciencesconf.org/>

The Winter School was organized in seven thematic sessions and three visits (see detailed program Annex 8). The program was defined in order to address a theme that interests the researchers community nowadays. In fact, the analysis done in behalf of WP6 shows that data management is one of the main challenges that Humanities will need to respond to in the near future. Therefore, the aim was to share knowledge, research outputs and other scholarly resources in ways that are tuned for long-term availability and maximal use and reuse. This are recognized as essential practices but also key challenges for arts and humanities research. In the last couple of years, this need has also been recognized in a strong political drive in the European Union giving rise to support structures but also policy imperatives for research data management. As a result, research data management emerged to be a new field of expertise to explore and establish in all range of disciplines.

The fact that the concept of data in the arts and humanities domain is far from being a straightforward one adds further complexities to the implementation of such policies in the arts and humanities domain. To meaningfully address the real data needs of the diverse communities of arts and humanities scholars in terms of skills, infrastructure and best practices, we need to keep a reflexive and open exchange about the function of data in specific research questions and fields of enquiry.

The DESIR Winter School provided an opportunity for arts and humanities scholars as well as for research managers to learn about how to maximize the potential of their scholarly resources and to take practical steps in opening up their research in ethically and legally responsible ways. We aimed at opening spaces for co-creation and giving the possibility for attendees to test and experiment with ideas, skills, tools and emerging community practices. To this end, we covered a wide selection of topics ranging from the optimal implementation of FAIR data in the arts and humanities, issues around ethics, Intellectual Property Rights and licensing, data and software citation practices, open research notebooks and innovative publishing practises in the arts and humanities.

The main goals of the Winter School were to:

- Introduce scientific and academic communities in the arts and humanities to the principles and practices of responsible research and Open Science
- Strengthen the skills of the arts and humanities communities in research data management, curation, sharing, preservation and reuse
- Enable R&D and Higher Education institutions to develop research data strategies and policies
- Foster national and international collaboration amongst the diverse research communities in the arts and humanities
- Introduce participants to innovative publishing practices and venues in the arts and humanities, such as data journals, overlay journals etc.

Also we aimed to create an exchange with perspectives from both junior and senior scholars, librarians, data managers, editors and publishers, therefore applicants with mixed technical skills and humanities or social sciences background were encouraged to apply.

The 20 participants were selected from a larger group of 71 applications, considering the following criteria: (i) alignment of current activity to Winter School goals; (ii) quality of the CV; (iii) statement of interest. The final group of participants was a group of researchers and data managers with different academic backgrounds, from different disciplines, with different institutional affiliations and engaged with cross-disciplinarity and open science principles.

A satisfaction survey was defined and applied at the end of the Winter School (Annex 9). Additionally, the participants were gathered in three groups to discuss their needs, concerns and expectations in relation to digital research infrastructures and particularly regarding data managing. The driven question for the group discussion was the following:

- What do you expect from a research infrastructure in terms of:
  - Networking;
  - Data management support;
  - Services and tools?

The contributions of each group discussion were recorded and transcribed (see Annex 10) in order to analyse the results and integrate them in the Recommendations Database.

## Recommendations Database

After the data processing and analysis of the information collected from each source, a database was built gathering all the inputs related to suggestions, contributions, and recommendations. This activity produced a database with almost 200 entries and each entry was i) first described in terms of "Goal", "Recommendation", "Problem/Challenge"; ii) and secondly, classified and organized according to the operational and strategic dimension/categories - organized as described below:

### Operational dimensions/categories

Source
DESIR Partners
GLAM stakeholders
Higher Education Institutions stakeholders
National Coordinators
Repositories Managers

Research Infrastructures Managers
Researchers & Research Infrastructure Users
Research Institutions stakeholders
Research Funding Organisations stakeholders
Publishers
Academic librarians

Level of responsibility
Individual
Institutional
National

Responsible Entity
Academic/Research Libraries
GLAM sector
Policy Making Organisations
Publishers
DARIAH
Research Infrastructures
Research Funding Organisations
Researchers
Higher Education Institutions
Research Performing Organisations

Beneficiaries
Academic/Research Libraries
GLAM sector
Industry / Private sector
Policy Making Organisations

Publishers
Research Infrastructures
DARIAH
Research Funding Organisations
Research managers
Researchers
Scientific Societies & Academies
Higher Education Institutions
Research Performing Organisations

### Strategic dimensions/categories

<b>Sustainability</b>
Accessibility
Credibility
Durability
Equal access
Interoperability
Usability

<b>Scope</b>
Dissemination
Enlargement
Objectives and Strategy
Organization
Robustness
Training/Education
Services

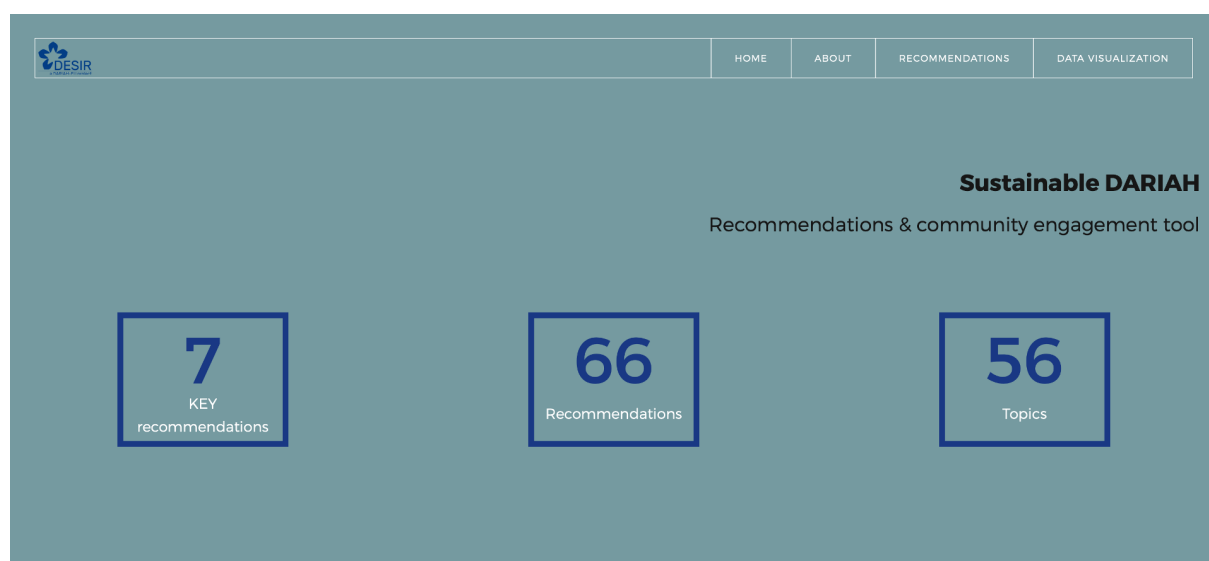
DARIAH Strategic Plan
1. Creator (Marketplace)
2. Transformative (Training and Education)
3. Connector (Communities and Networks)
4. Complementary (Policy and Foresight)
Monitoring (Measuring our Success)

## Recommendations & Community Engagement Tool

The “Recommendations & Community Engagement Tool” (<https://dariah.peopleware.pt>) is an interactive and collaborative platform developed to share and translate the recommendations dataset to a broader audience, in a user-centered and participatory-based approach.

The homepage provides a brief presentation of the tool and highlights three main indicators (see Figure 1):

1. Total number of recommendations;
2. Number of key recommendations;
3. Number of topics (metadata) used.



### KEY RECOMMENDATIONS

Figure 1 - Screenshot of the homepage of Recommendations & Community Engagement Tool”, retrieved December 19, 2019, from <https://dariah.peopleware.pt>.

To capture the attention of the users the option was to present exclusively the contents of the key recommendations on the homepage (see Figure 2), complemented by a shortcut for the list mode of the recommendations (data records) and to the statistics area (data visualization).

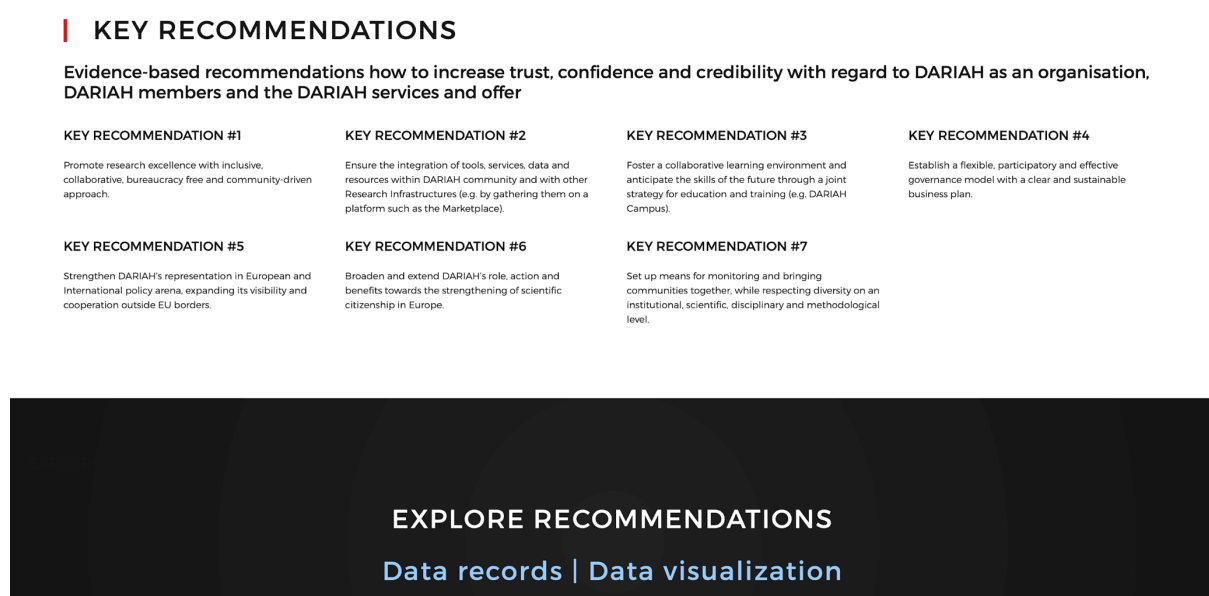


Figure 2 - Screenshot of the homepage of Recommendations & Community Engagement Tool", retrieved December 19, 2019, from <https://dariah.peopleware.pt>.

The results can be findable and explored through two different modules:

1. Recommendations module;
2. Data Visualization module.

The first one was designed in a classic layout where the results are sequentially shown by default (see Figure 3). Having enriched metadata it is possible to get specific results by using the filters on the top (by categories or choosing the topics inside each category).

## Recommendations

Q Advanced search

Search: ID Recommendation Category Topic Clear filters

↓ ID Recommendation

R01	Foster the use of open access software in the context of digital humanities.	[All]	[All]	Q
R02	Strengthen the articulation between research infrastructures, federating the access to services and resources to the community.			Q
R03	Having a brief and clear list of benefits and showcases explaining how useful can DARIAH be to the community and what services can DARIAH provide.			Q
R04	Define and execute a joint strategy for training, directed to different targets, as a way of securing the social sustainability of a research infrastructure. Based on a survey conducted under the DESIR project, the early-career researchers group appears as the priority target (where the lowest rates of digital humanities practices are found).			Q
R05	Raise awareness among Higher Education Institutions to the importance of offering formal training programs aimed at developing competences in the digital humanities.			Q
R06	Raise awareness about the importance of supporting social sciences, arts and humanities, among national decision makers.			Q
R07	Promote linguistic diversity, endowing DARIAH's country members with linguistic technologies which are now demanded by a 'knowledge society'.			Q
R08	Provide unified access to learning resources produced by scholars and institutions affiliated with DARIAH so that users can find what they need more easily.			Q
R09	Promote DARIAH through its representatives and improve contacts with countries at a higher level.			Q
R10	Support potential DARIAH partners in identifying new communities and core groups by publishing and disseminating research opportunities.			Q

Count 66

Display 10 Page 1 of 7 total 66

Start 1 2 3 4 5 6 7 End

Figure 3 - Screenshot of the Recommendations page of "Recommendations & Community Engagement Tool", retrieved December 19, 2019, from <https://dariah.peopleware.pt>.

Each recommendation/record has a specific page (see Figure 4) with the following information:

- The full description of the recommendation;
- The problem or the constraint that is at its origin and that was perceived during the interviews;
- An excerpt functioning like an evidence;
- The metadata associated.

## Recommendations

Recommendation Metadata

RECOMMENDATION

ID R01

**Recommendation** Foster the use of open access software in the context of digital humanities.

**Problem Addressed** Reduced use of open source software, particularly among cultural institutions.

**Open Science** No

**Excerpts** "The great majority of organizations that focus on cultural heritage does not have a technology team that can implement open source tools. Thus, we need to create "ready-made" solutions, because the organizations do not have the resources to hire tech-experts that could implement new solutions on different levels (servers, compilations, JAVA, etc.)."

Total metadata entries 24

Figure 4 - Screenshot of a record/recommendation page of "Recommendations & Community Engagement Tool", retrieved December 19, 2019, from <https://dariah.peopleware.pt>.



The second way of exploring the results is to use the data visualization section of the website, structured in three visualization modes:

- The global view (see Figure 5), having the distribution of the recommendations by categories and topics;
- The combined view (see Figure 6), allowing to combine categories and topics and get specific results;
- And a taxonomy view (see Figure 7), grouping the recommendations as a tree graph.

Explore recommendations by categories

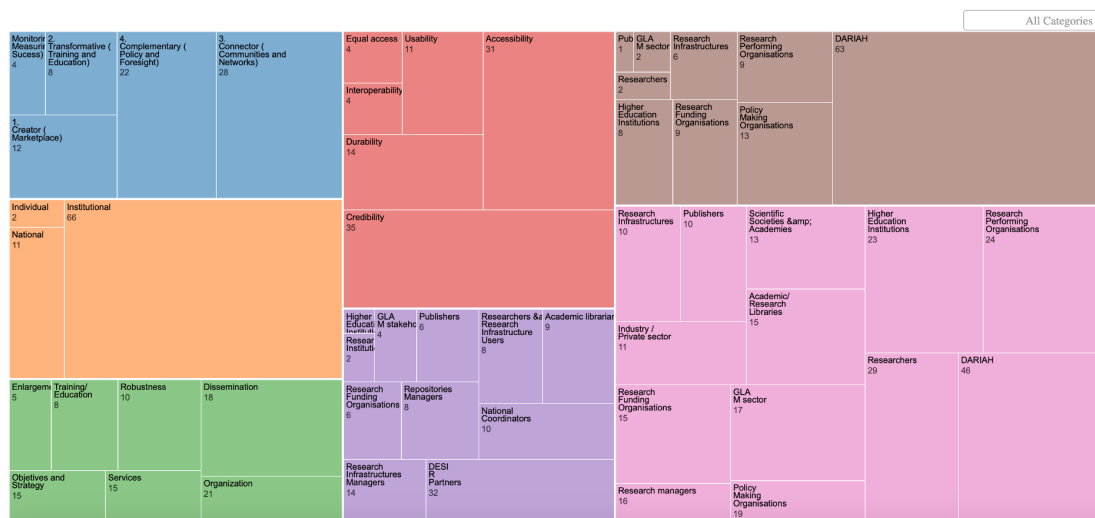


Figure 5

Screenshot of the data visualization page (global view) of “Recommendations & Community Engagement Tool”, retrieved December 19, 2019, from <https://dariah.peopleware.pt>.

Beneficiaries by Scope (total: 344)

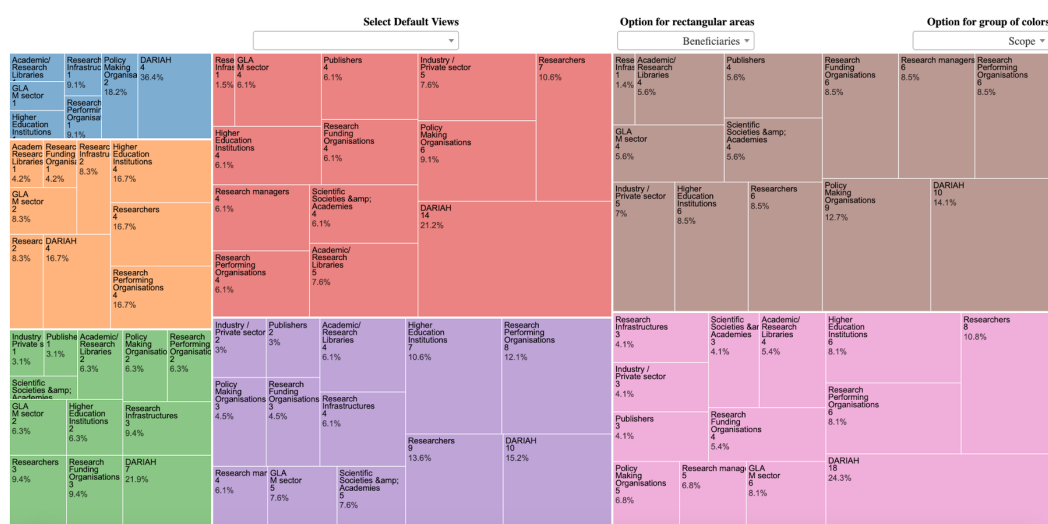


Figure 6 - Screenshot of the data visualization page (combined views) of “Recommendations & Community Engagement Tool”, retrieved December 19, 2019, from <https://dariah.peopleware.pt>.

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## Explore recommendations by Taxonomy

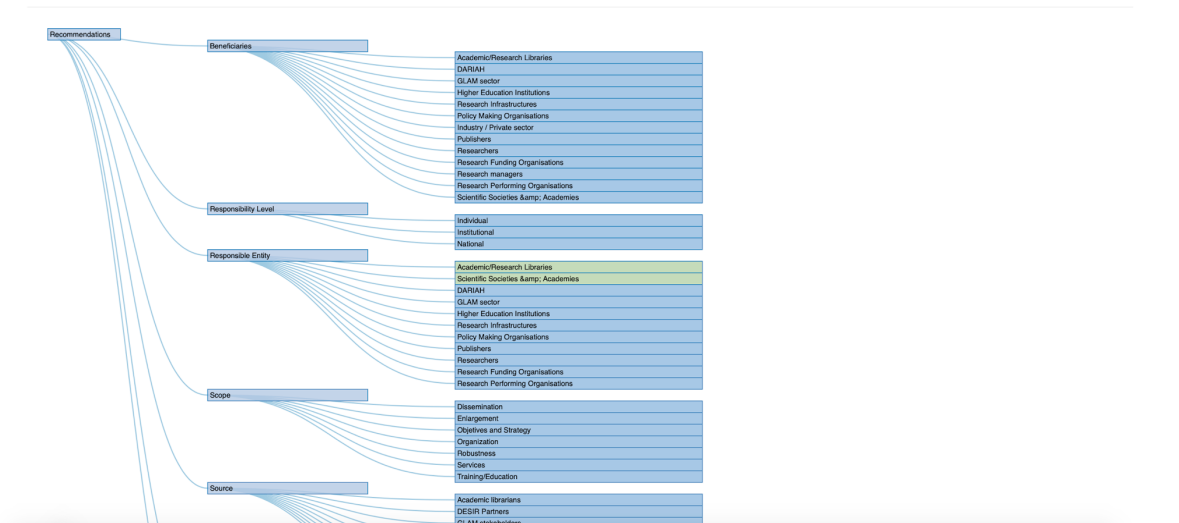


Figure 7 - Screenshot of the data visualization page (taxonomy) of “Recommendations & Community Engagement Tool”, retrieved December 19, 2019, from <https://dariah.peopleware.pt>.

## Recommendations for DARIAH sustainability

The methodology presented previously aimed to produce the data to support the evidence-based recommendations on how to increase trust, confidence and credibility with regard to DARIAH as an organisation, DARIAH members and the DARIAH services and offer.

The consultation on DARIAH's sustainability provided a unique opportunity to engage in a transparent and constructive manner with all key stakeholders on the issues of sustainability and trust.

The full set of recommendations - total of 66 - is organized by strategic dimension and linked with DARIAH Strategic Plan<sup>5</sup> (see Figure 8). It is aimed at policy makers, funders, research infrastructures, research performing institutions, higher education institutions, GLAM<sup>6</sup> sector and researchers wishing to improve the sustainability of RIs.

<sup>5</sup> [https://www.dariah.eu/wp-content/uploads/2019/08/Strategic-Plan\\_2019-2026.pdf](https://www.dariah.eu/wp-content/uploads/2019/08/Strategic-Plan_2019-2026.pdf)

<sup>6</sup> GLAM is an acronym that indicates galleries, libraries, archives and museums.

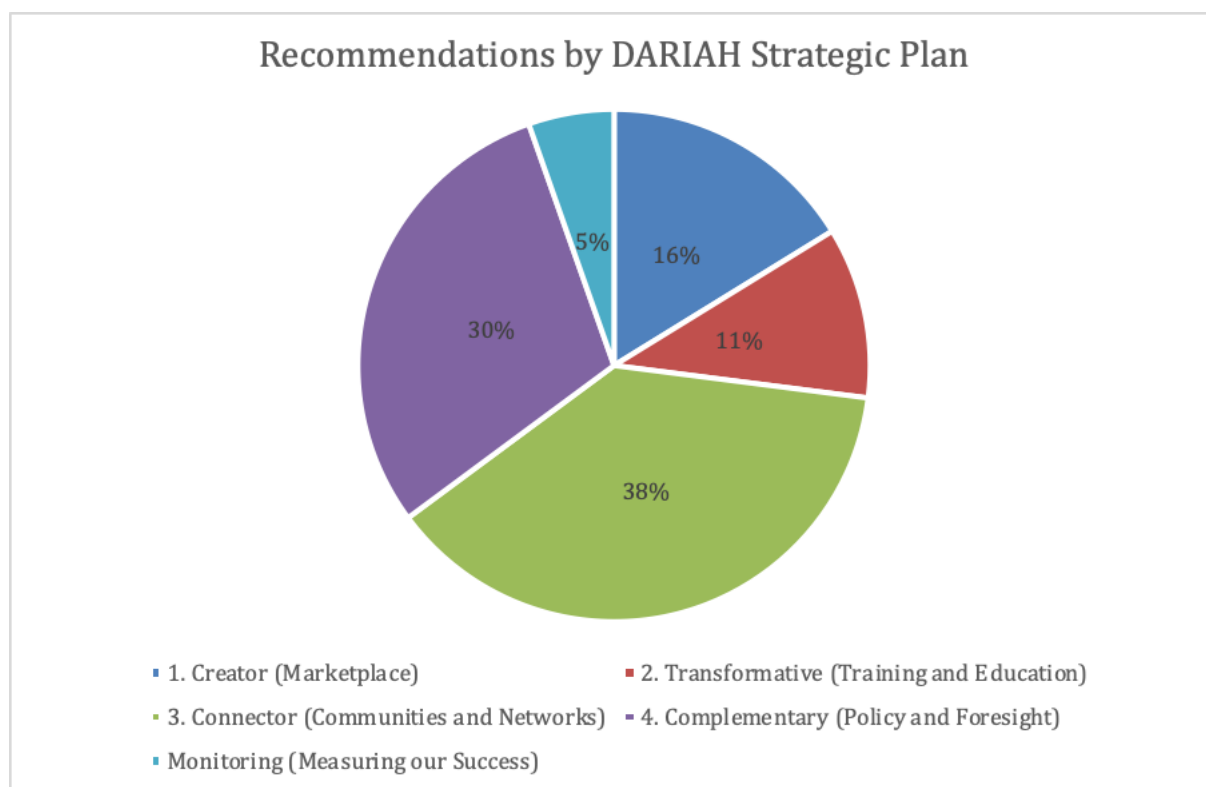


Figure 8 - Distribution of the recommendations by DARIAH Strategic Plan categories.

The DARIAH Strategy 2019-2026 builds upon a 2-year exercise in strategic thinking and action, guided by the 2017 Strategic Action Plan. The strategy represents DARIAH's organizational priorities and services rooted in four pillars:

1. DARIAH As Creator: Build a Marketplace – a component of the European Open Science cloud – to facilitate fluid exchange of tools, services, data and knowledge
2. DARIAH As Transformative: Build access to education and training in a coordinated fashion;
3. DARIAH As Connector: Build Working Groups, Hubs and other forms of Transnational and Transdisciplinary organization, deepening the connection with its communities;
4. DARIAH As Complementary: Build bridges between research policy and communities of practice and strengthening DARIAH's voice in policy and advocacy.

A fifth area/pillar – Monitoring – was added to ensure the alignment of the recommendations with the need of measuring DARIAH's success.

### Recommendations on DARIAH as Creator (Pillar 1)

Provide accessible, (re)usable and intelligible tools and services for social sciences, arts and humanities in a simple way represents a big challenge for RIs sustainability. Not only to fulfil

the needs of the researchers but also to addresses long-lasting organizational and scientific challenges that hinder collaboration and coordination throughout the constellation of initiatives, projects and services already under way with the European Open Science Cloud goals.

Concerning technology and robustness, the usability of a given infrastructure is a key question to increase use. To this end, the infrastructure should allow users to: i) find effortlessly the services and information they are looking for or need; ii) easily access analytic instruments, information, international networks and funding opportunities; iii) get to know training opportunities that may support their use; and iv) achieve a wide set of information, through the interoperability of systems, as well as to cross tools, infrastructures, repositories, databases, thus allowing cross-disciplinarity.

Some of the following common concerns are addressed by the recommendations grouped in this topic:

- Complexity and heterogeneity of concepts, standards and practices;
- Lack of harmonization and interoperability between systems;
- Limited quality of data for supporting decision-making processes;
- Technological and infrastructural obsolescence;
- Paper dependency on research methods;
- Overlapping and redundancy of services provided by different stakeholders.

#### List of recommendations

R1. Foster the use of open access software in the context of digital humanities.

R2. Strengthen the articulation between research infrastructures, federating access to services and resources to the community.

R7. Promote linguistic diversity, endowing DARIAH's country members with linguistic technologies which are now demanded by a "knowledge society".

R13. Support the creation of standards and best practices regarding the preservation, management and curation of digital infrastructures' data (see R19).

R38. Develop a digital framework to support policies and practices for the citizen science ecosystem.

R44. Promote a wider use of Massive Open Online Courses' platforms, in order to increase DARIAH's visibility and strengthen its community in the intra and extra-European territories.

R45. Develop open peer-review and post-publishing mechanisms in research infrastructures and institutional repositories.

R49. Promote common standards and best practices for documentation and tools/resources and, by this, enable long-term sustainability.

R50. Improve the structure and the contents available at DARIAH's website, making it easier, clearer and more intuitive to its users.

R54. Ensure that every DARIAH tool and service is available in the common infrastructure, gathering them in a platform such as the Marketplace.

R57. Promote the development of strategic joint e-services in digital humanities between DARIAH members.

R58. Support the establishment of a research data management competency center in DARIAH countries to assist policymaking, standards adoption, tool delivery, background information, awareness and community building.

## Recommendations on DARIAH as Transformative (Pillar 2)

In the last decades, the commitment to education and training has achieved extraordinary results throughout the world, but the structural deficit of qualifications remains strong and socially unequal.

The deficit on skills in all age groups limits the potential for innovation and creativity, threatening the social and territorial cohesion of Europe. The general deficit of qualifications, the asymmetry in the access to education and the low rate of data literacy represents some of the main difficulties for the modernization of European Higher Education Area and European Research Area.

The challenges posed in the knowledge creation imply substantial changes in the way institutions and researchers look at the research they produce, with an impact on platforms and tools to support scientific activity.

Generally, with greater or lesser weight, the skills in the field of Digital Humanities are scarce among its communities. Additionally, the results presented in D6.2 (survey) have shown that the percentage of digital humanities users is lower in early-career researchers.

Bearing this context in mind, the subset of recommendations dedicated with training and education is instrumental to discuss how might DARIAH foster the development of collaborative learning environments/landscapes and anticipate the skills of the future in the social sciences, arts and humanities communities.

### List of recommendations

R4. Define and execute a joint strategy for training, directed to different targets, as a way of securing the social sustainability of a research infrastructure. Based on a survey conducted

under the DESIR project, the early-career researchers group appears as the priority target (where the lowest rates of digital humanities practices are found).

R8. Provide unified access to learning resources produced by scholars and institutions affiliated with DARIAH so that users can find what they need more easily.

R13. Support the creation of standards and best practices regarding the preservation, management and curation of digital infrastructures' data (see R10).

R14. Raise awareness among Higher Education Institutions to the importance of offering formal training programs aimed at developing competences in the digital humanities.

R20. Advertise best practices in the areas of Intellectual Property Rights and licensing.

R44. Promote a wider use of Massive Open Online Courses' platforms, in order to increase DARIAH's visibility and strengthen its community in the intra and extra-European territories.

R56. Foster and support specific training for research Infrastructures' experts and managers.

R60. Support mobility mechanisms and schemes for Research Infrastructure's staff between DARIAH members and different RIs.

### Recommendations on DARIAH as Connector (Pillar 3)

One of the main obstacles to the engagement of diverse stakeholder organizations is the lack of interface platforms and collaborative projects that could provide structured approaches to research performing organizations, non-governmental organizations, policy makers, industry and academia, bridging the gap between the identification and analysis of social, economic and cultural needs/challenges and the knowledge-producing institutions that can contribute to addressing them.

Usually this barrier is evidenced through difficulties with communication, value perception, unclear goals and ultimately in the low use of research infrastructures.

The dissemination issue has an intimate link to awareness. One of the major challenges RIs in the near future is to increase awareness and visibility within their communities / potential users. Thus, it is essential that DARIAH knows how to communicate effectively and intelligently with the communities in order to establish itself as a fundamental tool in the European Digital Humanities landscape.

With the main purpose of enhancing its presence within the community, a discourse able to increase the effective use of DARIAH should be defined. The advantages of using DARIAH, the available services and tools, as well as the definition of DARIAH as an infrastructure should be easy to explain and easy to understand. The website of DARIAH should play an important role in increasing awareness, making clear what may be useful for each individual and clarifying the immediate doubts that can arise.

Also, society's expectations towards science are increasing. Training, research and social engagement fronts overlap and frontiers gradually fade between academia and society.

The recommendations identified for community engagement could be an important step to achieve social sustainability of the RIs. This paradigm requires a collaborative work and action to address adequate mechanisms of institutional collaboration, co-creation and co-governance, bureaucracy free and scientific oriented.

Social sustainability really matters. DARIAH will have conditions to last long only if people see it as a useful tool, and they will use it only if the infrastructure appears to be trustworthy and it is effective in communicating with the community.

#### List of recommendations

R10. Support potential DARIAH partners in identifying new communities and core groups by publishing and disseminating research opportunities.

R11. Implement a contact system which is clearer, more direct and more efficient, and which improves the links between DARIAH and its National Coordinators.

R12. Promote an annual work agenda with clear KPIs for the National Coordinators.

R15. Account travel expenses of National Coordinators attending international meetings as eligible for funding purposes.

R16. Create common spaces that can foster the participation and dialogue between the technological dimension and research in Social Sciences, Arts and Humanities.

R18. Make DARIAH's organizational model of working groups more flexible and less vertical.

R19. Establish DARIAH as a structure that can support EU fundraising for the development of Digital Humanities' projects.

R21. Develop funding models which are adequate and adapted to infrastructures for small communities.

R22. Create mechanisms for support, follow up and engagement among DARIAH users and stakeholders.

R24. Deepen the interaction among scientific and cultural institutions.

R25. Establish clear guidelines/procedures about the organizational model of DARIAH.

R29. Have a brief and clear definition of DARIAH, so that every National Coordinator and accession countries can explain it in the same way to their communities.

R30. Define a set of clear objectives and goals for DARIAH.

R31. Assimilate best-practices and examples from research infrastructures with a higher level of experience and consolidation.

- R32. Build DARIAH as a researcher-driven infrastructure with a strong focus on usability.
- R33. Providing a method of approaching each scientific community according to their discipline and specific needs and considering the different audiences.
- R34. Provide a "Welcome & Implementation Kit" addressed to the new members.
- R36. Reinforce contents that can help using the infrastructure and provide them through the different stakeholders / interfaces already existing in the universities (e.g. libraries, research support units).
- R40. Label and brand all the national resources, activities and services as DARIAH.
- R41. Adapt DARIAH orientations, at the European level, to each national context.
- R42. Ensure that all the national in-kind contributions are useful for DARIAH and labelled as DARIAH at the institutional and national level.
- R43. Define a multiannual events representation. Participate in the main national and European/international conferences of each scientific discipline, looking for an opportunity to disseminate DARIAH in those fora.
- R47. Disseminate DARIAH among the documentation services of academic and scientific research institutions.
- R51. Implement a clear and comprehensive Business Plan, resulting from a participatory and collaborative process with all stakeholders.
- R53. Advertise DARIAH as a long-term sustainable infrastructure, as a way of fostering trust among its users.
- R58. Support the establishment of a research data management competency center in DARIAH countries to assist policymaking, standards adoption, tool delivery, background information, awareness raising and community building.
- R64. Focus communication more strongly by appealing more to individual users.
- R66. Research infrastructures should develop towards granting content accessibility to all its potential users and have a multilingual scope.

## Recommendations on DARIAH as Complementary (Pillar 4)

Research and innovation processes developed exponentially throughout the twentieth century, following the need and the tendency for the democratization of access to knowledge and its benefits for society, in short to improve the quality of life of people.



Expressions such as "social responsibility", "responsible research (RRI)", "public engagement", "collaborative research", "co-creation" or "citizen science" are today an evolution in how science is thought, created, communicated and appropriated.

This evolution, and its recent integration in the context of Open Science, has crystallized the distinction between the creation of knowledge, the understanding and use of knowledge and the dissemination and communication of knowledge.

This vision has been recently promoted and developed within the framework of the European Commission, particularly as embodied in the concept of Responsible Research and Innovation and Horizon 2020, but simultaneously acquiring unique characteristics, becoming autonomous practices and projects of citizen science, where citizens take on the role of scientists, actively contributing for scientific projects, notably by gathering and analysing large bundles of data, aiming to respond to real life issues that arise from the identification of need and challenges of society itself.

The following recommendations are a useful guide to help DARIAH's strengthening its voice and position in European and national decision-level bodies.

#### List of recommendations

R3. Have a brief and clear list of benefits and showcases explaining how useful can DARIAH be to the community and what services can DARIAH provide.

R5. Raise awareness about the importance of supporting social sciences, arts and humanities, among national decision makers.

R9. Promote DARIAH through its representatives and improve contacts with countries at a higher level.

R10. Support potential DARIAH partners in identifying new communities and core groups by publishing and disseminating research opportunities.

R14. Place DARIAH as an active supporter of open science at the European level, helping its members in the implementation of national strategies and policies.

R17. Advocate European policies that promote the sustainability of research infrastructures.

R19. Establish DARIAH as a structure that can support EU fundraising for the development of Digital Humanities' projects.

R23. Strive for political resolutions aiming at longer funding cycles for research infrastructures.

R30. Define a set of clear objectives and goals for DARIAH.

R35. Demonstrate the social and economic value of DARIAH to the industry and the greater public.

R37. Increase DARIAH visibility and relevance in the citizen science agenda setting.

R39. Develop an European advocacy plan for digital citizen science in social sciences, arts and humanities.

R43. Define a multiannual events representation. Participate in the main national and European/international conferences of each scientific discipline, looking for an opportunity to disseminate DARIAH in those fora.

R48. Identify potential new national cooperating partners.

R52. Implement a common strategy for raising regional funding by promoting DARIAH's integration in the Research and Innovation Strategies for Smart Specialisation (RIS3).

R53. Advertise DARIAH as a long-term sustainable infrastructure, as a way of fostering trust among its users.

R55. Maintaining and exploiting the potential of open science to increase visibility of DARIAH outputs.

R59. Strengthen DARIAH's position/representation in european higher education and scientific umbrella organizations.

R61. Expand the visibility of DARIAH outside EU borders.

R62. Support enlargement and promote activities that increase awareness of DARIAH advantages promoting regular communication and digest of examples of activities for all DARIAH co-operating partners.

R63. Develop DARIAH's profile in new and innovative technology areas.

R65. Allocate funds only to research infrastructures that can guarantee continuity and preservation, and that have demonstrated connection to institutions such as universities, libraries or other knowledge institutions.

## Recommendations on DARIAH Monitoring

In order for DARIAH to be a community-made infrastructure, its use by researchers and its impact on their research must be permanently monitored to understand its effects and its success as a user-oriented tool.

It will be useful in the future to set up a monitoring system for DARIAH infrastructure, building a dashboard of quantitative and qualitative indicators that should be analysed over time. This system should also make it possible to monitor the execution of tasks under the strategic plan and allow some action to be corrected in a timely manner to generate the best possible benefits.

Monitoring is the only possible way to produce valid and credible data to inform about the development of the infrastructure and its penetration in the target community.

### List of recommendations

R26. Create indicators to allow an analysis over time and to determine the “trust trajectory” in research infrastructures.

R28. Establish a standard feedback form/questionnaire to be given to all the participants in DARIAH training measures to respond to.

R29. Develop a permanent methodology to monitor, measure and validate users’ opinions and reactions about DARIAH’s services and tools, in order to assess DARIAH users’ trust on the already existing services.

R46. Promote the adoption of scientific evaluation mechanisms that are in tune with open science practices and models, simultaneously complying with institutional, scientific, disciplinary and methodologic diversity.

### Distribution of recommendations by complementary strategic frameworks

This section provides two complementary ways of observing the results, by connecting the recommendations with the 6 dimensions of sustainability (accessibility, credibility, durability, equal access, interoperability and usability) developed under the DESIR project and with the 7 organizational building blocks that might support the operationalization / institutionalization of the concept (dissemination, enlargement, objectives and strategy, organization, robustness, training/education, and services).

As mentioned above, the data collected was coded after conducting the interviews and then grouped based on a controlled vocabulary. The goal was to explore ways for integrating data and knowledge related to the recommendations on sustainability and suggest different analytical approaches.

The following charts show the distribution of the recommendations by the sustainability (Figure 9) and Scope (Figure 10) categories.

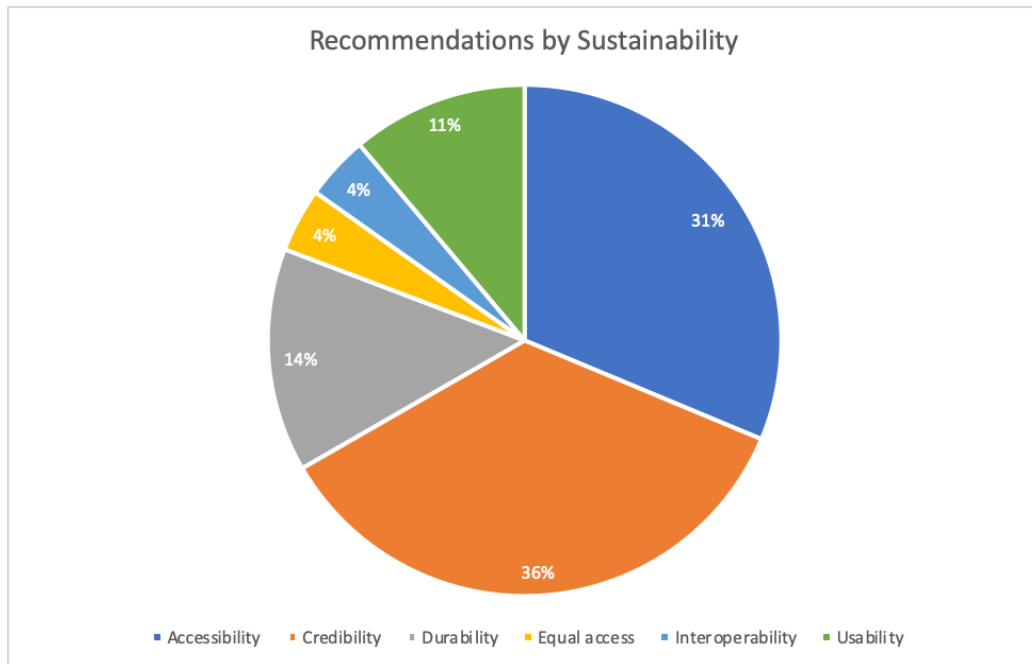


Figure 9 - Distribution of the recommendations by Sustainability categories.

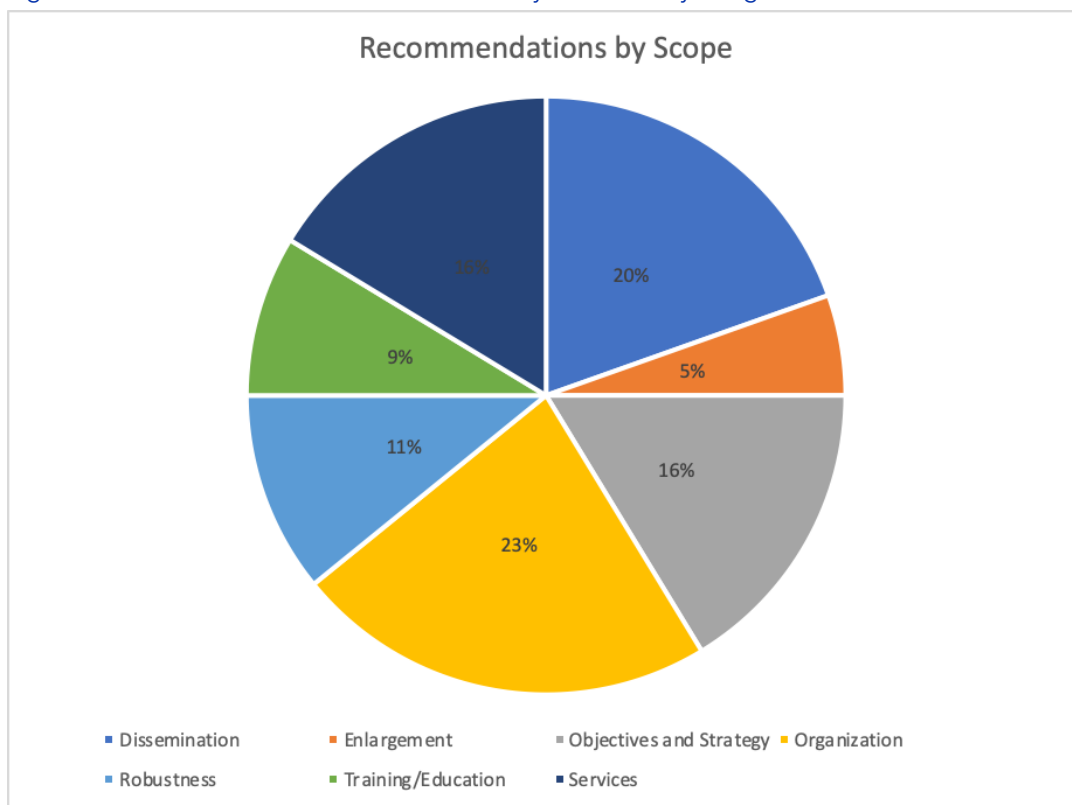


Figure 10 - Distribution of the recommendations by Scope categories.

## Distribution of recommendations by operational frameworks

For operational purposes the recommendations were also classified by its sources, level of responsibility, responsible entity and beneficiaries.

The graphical representation of the statistics are presented below and can be found in the Recommendations & Community Engagement Tool” (<https://dariah.peopleware.pt>).

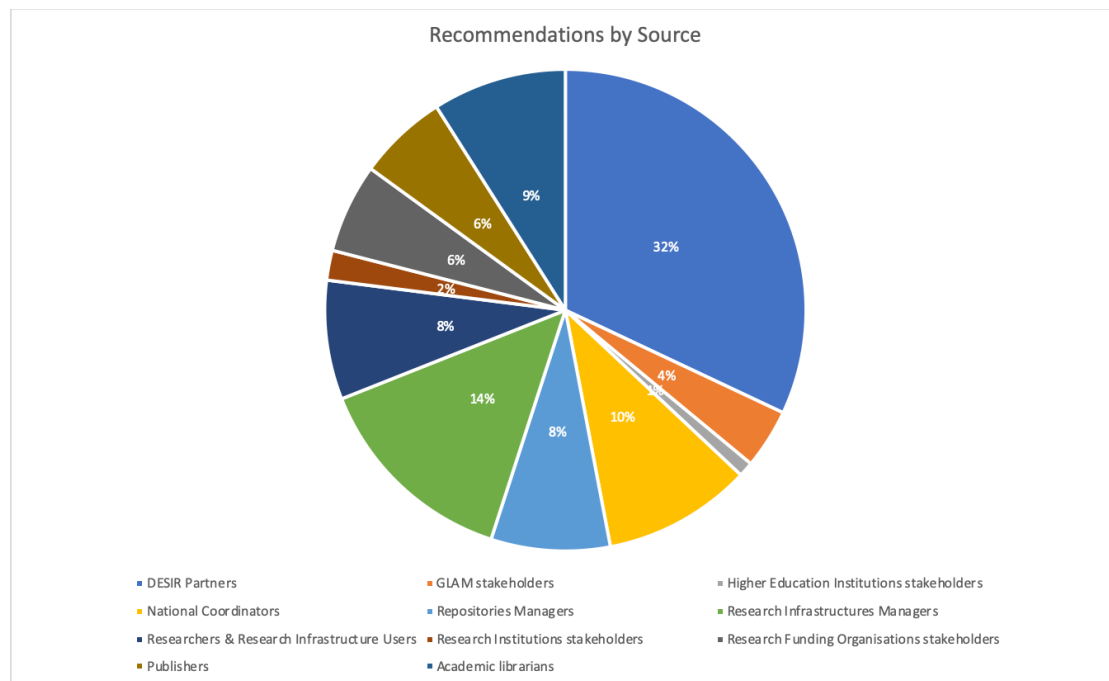


Figure 11 - Distribution of the recommendations by Source categories.

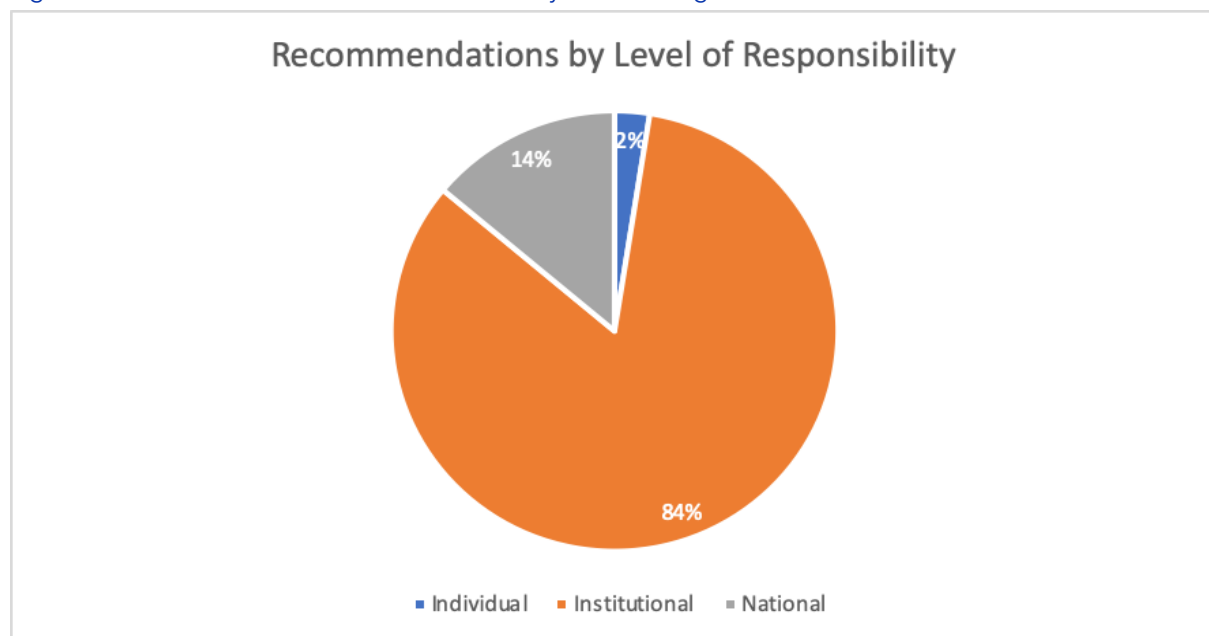


Figure 12 - Distribution of the recommendations by Level of Responsibility categories.

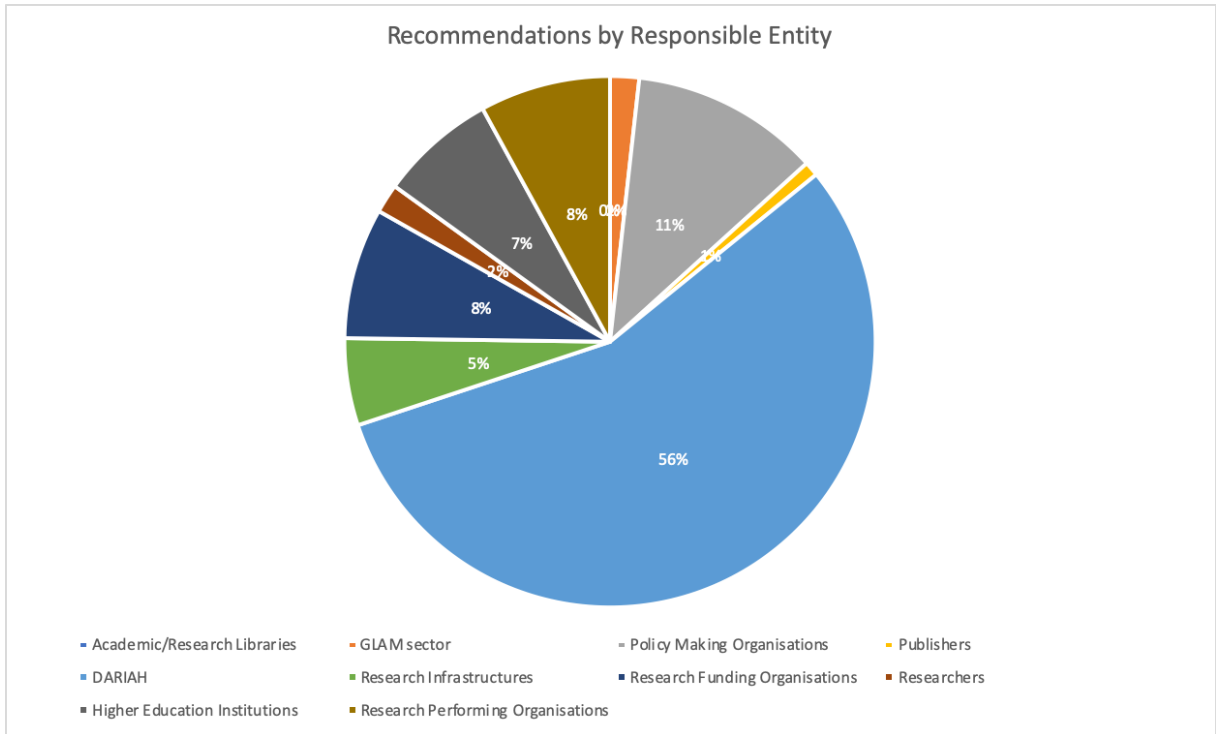


Figure 13 - Distribution of the recommendations by Responsible Entity categories.

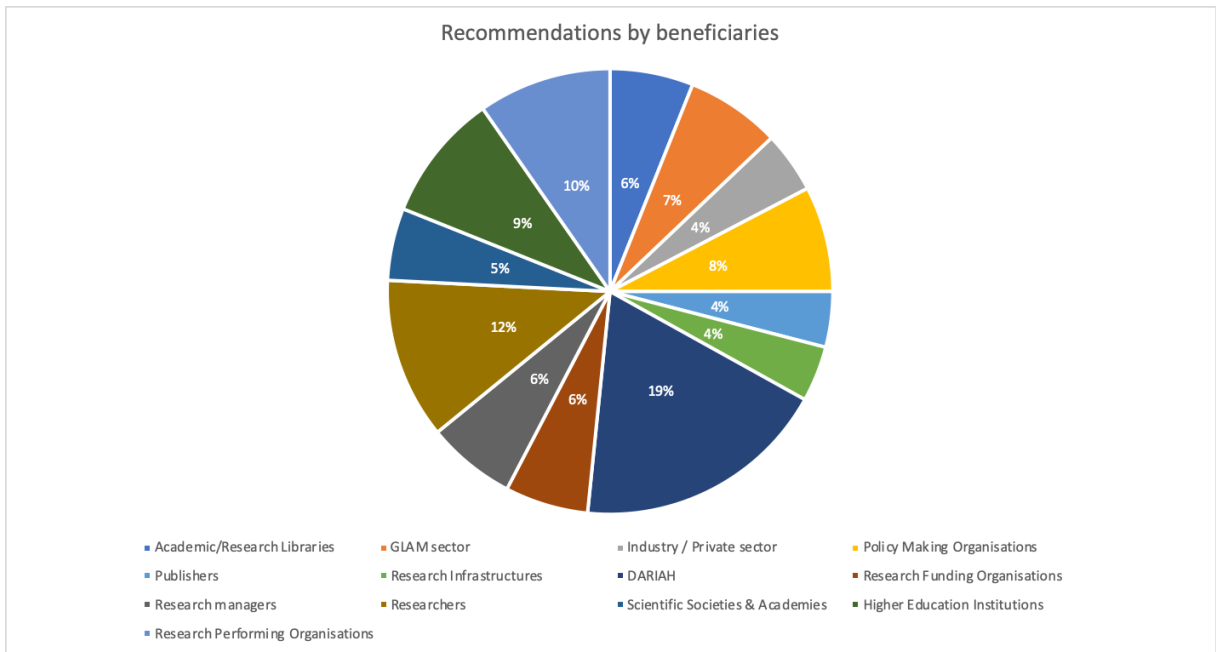


Figure 14 - Distribution of the recommendations by Beneficiaries categories.

## Conclusion

At the European level, long-term sustainability of research infrastructures is considered a key policy priority. Research infrastructures have become a strategic and privileged interface for supporting and promoting science and innovation.

However, the current landscape of RIs keep struggling with the operational implementation of the term sustainability. The challenges are well-known: lack of long-term funding; one-size fits all approach; lack of disciplinary and international cooperation; the risk of RIs atomization; policy uncertainty; duplication of services and tools; lack of social appropriation of RIs.

Public policies are crucial to establish a stable and predictable environment for the RIs, as well as cultural and social changes within the scientific communities, particularly in the social sciences, arts and humanities.

The strategies to increase trust, to enlarge DARIAH community and to ensure its sustainable development should be addressed to different levels of decision (different social actors): individual level (DH users/researchers), institutional level and decision-making level. The qualitative analysis - making use of in-depth qualitative interviews and discussion groups - had a great importance to obtain results at individual level and institutional and decision-making level.

The configuration of the key recommendations derived from the concern and awareness perceived in the DARIAH community that the development of this RI should stem from the community's willingness to share information, in a bottom-up way.

The recommendations towards the dimensions of DARIAH sustainability are important contributions to the effective openness of DARIAH to the community. The policy recommendations proposed resulted from the inputs of DARIAH community as well as the broader researchers community.

The 66 policy recommendations summarize the bulk of the information gathered as a first step towards the integration into DARIAH Strategic and Action Plan for the following years:

1. Promote research excellence with inclusive, collaborative, bureaucracy free and community-driven approach.
2. Ensure the integration of tools, services, data and resources within DARIAH community and with other Research Infrastructures (e.g. by gathering them on a platform such as the Marketplace).
3. Foster a collaborative learning environment and anticipate the skills of the future through a joint strategy for education and training (e.g. DARIAH Campus).
4. Establish a flexible, participatory and effective governance model with a clear and sustainable business plan.

5. Strengthen DARIAH's representation in European and International policy arena, expanding its visibility and cooperation outside EU borders.
6. Broaden and extend DARIAH's role, action and education benefits towards the strengthening of scientific citizenship in Europe.
7. Set up means for monitoring and bringing communities together, while respecting diversity on an institutional, scientific, disciplinary and methodological level.

Among all we would like to point out that some findings/insights:

- Research Infrastructures, and DARIAH in particular, need to properly engage with society, territories and people (e.g. expanding the dynamics of citizen science, shared science, scientific responsibility).
- Nevertheless, political and cultural leaders need to understand the importance of their existence.
- It is vital to inspire and help young researchers to make science and to contribute through it to the society using RI.
- The access to research infrastructures must be a priority in the education and training programs in all academic levels and in all European regions. A broader and generalized offer - reinforcing the articulation with Higher Education Institutions - is the path to guarantee equal opportunities and diversity aspects.
- Humanities - and RIs - should persist in renewing their methodological and epistemological dynamics in order to adapt to ongoing changes, contributing in particular to the reflection and interpretation of the transformation of their own learning and research processes. Digital infrastructures will play a decisive role in this process and should position themselves as a leading and inspiring entities.
- The open science, the generalized availability of open research tools and the simplification of DH infrastructures were also key recommendations addressed by the auscultation process.
- The upcoming 'sixth' wave of innovation - focused on sustainability - will imply a profound change in society habits (doing a lot more with a lot less). Humanities, RIs and DARIAH should be prepared to respond promptly and appropriately to the growing social challenges with which we are going to be confronted.
- The sustainability of DARIAH will be affirmed by its quality, its ability to bring people and projects together and to serve the academic and scientific community and society at large.
- DARIAH has to play a politically active role, catalysing the role and importance of the arts and humanities, in collaboration with other research infrastructures.



- It is also identified the strong need for a clear governance model and monitoring the entire lifecycle of DARIAH as a RI.
- Sustainability of a research infrastructure is generally acknowledged as the capacity to remain operative, effective and competitive over its expected lifetime (OECD). In DESIR, this definition is translated into an evolving 6-dimensional process, divided into the following challenges: dissemination; growth; technology; robustness; trust; and education.
- Analysing the sustainability of a research infrastructure also leads to a deeper reflection on the following dimensions: accessibility, usability, credibility, interoperability, and durability.
- The involvement and active collaboration of the Arts and Humanities and their RIs in the 2030 Agenda (17 Sustainable Development Goals) and the mobilization for the five missions planned for the next Research and Innovation Framework Program - Horizon Europe (Climate Change, Cancer, Oceans, Smart Cities, Soil and Food) call for a stronger action of the DARIAH, making use of the intrinsic cross-disciplinary nature of its own community.

## ANNEXES

### ANNEX 1: Interviews semi-structured scripts

#### SCRIPT 1 - Key informants

##### Objectives of Individual interviews with key informants

- Characterizing the use of digital infrastructures: identifying the platforms used in the different phases of the investigation.
- Understanding the potentialities and difficulties of access and/or use of digital humanities in all phases of the research process, the advantages and disadvantages of its use, trust in the validity of information, pertinence, topicality, usefulness, temporal and scientific coverage.
- Analysing the needs, concerns and expectations of the users and new users, namely with regard to cross-disciplinary research, open access and equal opportunities of access, in terms of gender, age, academic degree, affiliation, years in academic research, scientific area.
- Analysing the advantages and disadvantages of using DARIAH services and instruments from the researchers' point of view;
- Identifying proposals and recommendations for a sustainable digital humanities infrastructure, in terms of continuity, credibility, usability, integration of academic and non-communities and open access.

##### Introduction/Presentation of the DESIR project

DESIR is a project funded by the European Commission that sets out to strengthen the sustainability of DARIAH and firmly establish it as a long-term leader and partner within arts and humanities communities. The DESIR consortium is composed of core DARIAH members, representatives from potential new DARIAH members and external technical experts.

This is why it is essential to know the opinions of researchers and key persons working in Digital Humanities. We recognize that you, and the work you developed in this area, will be very helpful in order to analyse Digital Humanities use and to define future strategies for this area.

This interview will be subject to qualitative analysis, and therefore we will record it. Nevertheless, we guarantee the absolute confidentiality of the collected information. The

results will be disseminated as a project report, submitted to the European Commission and eventually as scientific papers.

**Structure:**

(Brief presentation of the objectives and structure of the interview.)

1. Brief explanation of the profile of the interviewee and what kind of experience he/she has on digital humanities infrastructures.
2. Characterizing the use of digital infrastructures: identifying the platforms used in the different phases of the investigation.
3. What are the advantages and disadvantages of its use?
4. What are the main difficulties of access and/or use of digital humanities in each phase of the research process?
5. At what extent these DH infrastructures encourage:
  - a cross-disciplinary research?
  - the open access?
  - equal opportunities of access, in terms of gender, age, academic degree, affiliation, years in academic research, scientific area?
6. What are the difficulties and advantages concerning open access?
7. What proposals and recommendations for a sustainable Digital Humanities infrastructure in terms of:
  - Continuity
  - Credibility
  - Usability
8. How can these infrastructures can support a positive attitude towards open access?
9. How can these infrastructures can contribute to the integration of academic and non-academic communities?

10. What kind of support could improve the use of Digital Humanities? What recommendations can we address towards different levels of decision to guarantee its sustainability?

- At institutional level (university, research unit, library, cultural heritage institutions)
- At political/national level of decision (Ministry of Science/Research/ Education): what kind of measures should be taken?

11. (If the interviewee knows DARIAH):

What are the advantages and disadvantages of using DARIAH services and instruments from the researchers' point of view?

- trust in the validity of information?
- pertinence?
- topicality?
- usefulness?
- temporal and scientific coverage?
- continuity?
- credibility?
- usability?
- a cross-disciplinary research?
- the open access?
- equal opportunities of access, in terms of gender, age, academic degree, affiliation, years in academic research, scientific area?
- integration of non-academic communities (new partners, citizens...)

12. The results of a DESIR survey point out a very low level of use and knowledge of DARIAH.

- What could be done, by your institution, to improve this situation?
- And what could be done by DARIAH?

13. Other comments (give the interviewee the opportunity to add any other content related to the theme)

**Note:** the topics above should be asked depending on the experience and knowledge of the interviewee. The order is indicative. If he/she answers a question that is below, the interviewer should allow and continue the interview with the non-mentioned topics.

## **SCRIPT 2 - Institutional decision-makers and representatives**

### **Objectives:**

1. Understand the institution's strategy concerning digital research infrastructures and its implementation:

- Identify the main strategic lines of the institution;
- Identify the difficulties encountered and how to overcome them;
- Balance of the institution's activity;
- Understand whether the research infrastructures are identified as a strategic area by the institution.

2. Analyse the activities recently carried out concerning research infrastructures:

- Identify the activities carried out;
- Identify the difficulties in implementing them.

3. Analyse the strategy for the future of digital humanities in the institution:

- Identify the foreseen activities in the next years;
- Identify the foreseen difficulties in implementing them and proposals on how to overcome these difficulties.

4. Define recommendations for the sustained development of research infrastructures in the institution.

### **Structure:**

(Brief introduction referring the institution objectives)

1. Considering the objectives of this institution, which strategic lines would you highlight?

2. What were the main recent activities that contributed to the achievement of these objectives?

- Which difficulties were encountered?
- Which results? Which impact?

(Reference to the project and its purpose of developing research infrastructures that offer equal access opportunities to the researchers)

3. Concerning digital research infrastructures (digital humanities), which activities were carried out? Which investments?

- Which difficulties were encountered and how were they overcome?
- How did the institution consider the need to ensure equal access in these following situations:
  - i. Young researchers (masters and PhD students);
  - ii. Researchers with no permanent affiliation to the institution;
  - iii. Researchers with a cross-disciplinary approach;
  - iv. Men and women.

4. In the future, which activities are planned for the development of digital humanities by the institution?

- Which investments will be made?
- What difficulties are anticipated and how can they be overcome?

5. What kind of support could national decision-makers give to the development of the digital humanities in this institution?

- What policies for the development of the digital humanities?
- What recommendations?
- What recommendations to ensure equality of opportunity and access?

**SCRIPT 3 - National decision-makers and actors responsible for the policy implementation**

## Objectives:

1. Understand the national strategy concerning digital research infrastructures and its implementation:

- Identify the activities carried out in recent years
- Identify the difficulties encountered and how to overcome them;
- Results of the policy implementation.

2. Analyse the strategy for the future of Digital Humanities in the country:

- Identify the foreseen activities in the next years;
- Identify the foreseen difficulties in implementing them and proposals on how to overcome these difficulties;
- Identify the potential of national policy implementation.

3. Define recommendations for the sustained development of research infrastructures.

## Structure:

1. How do you characterize the national policies developed in recent years concerning digital research infrastructures?

- What activities were carried out? What investments?
- What difficulties were encountered?
- Which results? Which impact?

(Reference to the project and its purpose of developing research infrastructures that offer equal access opportunities to the researchers)

- How was taken into consideration the need to ensure equal access in these following situations:
  - i. Young researchers (masters and PhD students);
  - ii. Researchers with no permanent affiliation to the institution;
  - iii. Researchers with a cross-disciplinary approach;
  - iv. Men and women.

2. In your opinion, which are the main lines that characterize the national strategy for the digital research infrastructures in social sciences, human sciences and arts?

- Priority of investment when compared with other disciplines.
- What are the potential of the existing strategic vision for digital research infrastructures?
- Among the actions that are planned to be carried out under this strategy, which ones do you highlight?
- What are the expected difficulties? Are they the same as they were before the current strategy?
- How will the issue of equal access be considered?

3. In the future, how do you think the role played by these research infrastructures will be? What changes and what consequences for science?

- Difficulties and potential.

4. What recommendations do you have for the sustained development of digital research infrastructures?



## ANNEX 2: In-depth interviews categories of analysis

- Personal characterization and professional trajectory
- o DH activities
- o Education
- DARIAH
- o NCC characterization
- o Negative points
  - § Criticism on communication
  - § Criticism on organization
  - § Criticism on contents
  - § Criticism on objectives
- o Positive points
- o Recommendations
  - § Recommendations – communication and dissemination
  - § Recommendations – contents
  - § Recommendations – objectives and strategy
  - § Recommendations – organization
- o Relation NCC – DARIAH
- o Working groups
  - Dimensions of sustainability
- o Accessibility
- o Durability
- o Credibility

- o Equal access
- o Interoperability
- o Usability
  - Cross-disciplinarity
  - Open access / open science
  - Implementation of a research infrastructure
  - Digital Humanities
- o DH – articulation between SSH and technology
- o DH – articulation with cultural heritage organizations
- o DH – concept
- o DH – courses, degrees
- o DH – other infrastructures
- o DH – situation in Portugal
  - Difficulties
- o Difficulties – institution level
- o Difficulties – researchers
- o Difficulties – national level
  - Roadmap for the research infrastructures
  - Differences between SSH and other academic fields regarding research infrastructures
  - Infrastructures from other academic fields
  - Scientific validation and evaluation
  - Scientific communication

## ANNEX 3: In-depth interview analysis

### PORTUGAL

#### DARIAH – Negative points on communication and dissemination

The criticisms that were made on the dissemination of the infrastructure's objectives are coupled with broader criticisms on the infrastructure's communication with researchers and other entities. Some respondents think that there is a big lack of awareness about research infrastructures by their potential users, namely in the humanities, arts and social sciences. Digital research infrastructures need a lot of time and a lot of investment to be known and recognised in the academic context, and for this reason it is necessary to be intelligent in communicating the infrastructures to the researchers and invest greatly in the dissemination.

It was also pointed out that the DARIAH website is not being effective as a vehicle for communicating the infrastructure. A researcher who often uses digital tools considers that there is an excess of information on the website and that its content is poorly directed. An infrastructure user would expect to find in it an organized listing of the activities supported or developed by DARIAH, the associated projects or all the available tools. Those who access the website do not easily get answers to their doubts about the mission and practical usefulness of this research infrastructure.

If it is true that an infrastructure will only have a sustained future if the scientific community uses it, it is also true that this community will hardly use an infrastructure that is unknown. A clear statement of the purpose of the digital infrastructure is critical to build a community of users, and the website needs to be instrumental in transmitting the message to researchers. Some interviewees acknowledge that the products and advantages of DARIAH are not well publicized. An interviewee considered that:

*"The serious problem of DARIAH is in being able to sell its image in a correct and informed way to the people with whom it articulates."* (Portuguese National Coordinator)

The same interviewee believes that dissemination – not the definition of objectives – is the main weakness, because she is sure that the infrastructure itself has a concrete idea of what it intends to build.

#### DARIAH – Negative points on contents

One of the interviewees considers that the main flaw in DARIAH's web page concerns its wide dispersion of information, which makes it difficult for a user to understand if the presented tools or solutions can meet their specific needs. Concerning his own experience, he accessed DARIAH to browse for tools that could facilitate his work in processing and analysing biographical data of historical figures. Even though he was convinced that these tools have been developed before he was not able to find a useful solution on the website. Thus, this

researcher considers that DARIAH has not reached its goal of gathering tools that can be useful for the research practice of its potential users.

Another interviewee, a library specialist working on data curation, argues that an infrastructure such as DARIAH needs to be able to provide the tools that its users need to accomplish their tasks, and that such technological solutions should be provided as “plug and play” tools, i.e., ready to use. In his opinion, the majority of smaller organizations and researchers do not have the *know-how*, from the user’s standpoint, to implement the solutions that can be found in DARIAH.

*“In 2019, if I browse for a technological solution that allows me to build a directory of collections, I will look for a turnkey solution. I will not go study computer languages to understand how to install it.”* (Library Specialist)

Furthermore, another respondent regrets that there are not more networks coming out of DARIAH that could apply to international projects. According to her, DARIAH should give a better contribution to the development of contact networks among researchers, one that could allow a higher number of international networks, with a European scale.

### **DARIAH – Negative points on objectives**

The interviewees had a critical stance regarding the clarification of DARIAH's objectives. It was argued that the immediate priority of this research infrastructure should be the dissemination, as clear and simple as possible, of the objectives and advantages of using DARIAH. This is an essential message that, from the point of view of some respondents, DARIAH is not being able to convey effectively. This may be particularly serious if this lack of clarification of the objectives and advantages also exists in the relationship between DARIAH and the entities in the member countries that are responsible for financing the national participation in the infrastructure.

### **DARIAH – Negative points on organization**

From an organizational point of view, one of the interviewees considers that there is not enough support to the institutions in charge of national coordination. In her opinion, DARIAH should strive for a stronger presence in the countries that integrate the infrastructure by promoting more initiatives in these territories and contributing for a growing community of users. Another criticism concerns, precisely, the absence of fundamental countries (such as Spain or the Czech Republic) that, on the account of the prestige of their universities or cultural institutions, should be present in the group of DARIAH’s country members. Furthermore, it should be better at integrating the smaller countries in the network.

The wide range of profiles among the institutions in charge of national coordination was also mentioned, namely their different focuses: universities or research centres (oriented towards scientific research or education), partners such as libraries (whose tasks are oriented towards data curation) and science academies (which should guide scientific strategies at a national level). The big diversity among these players can compromise the harmony of each country's presence.

Another potential problem that was identified concerns travel funding, namely for the representation of member countries at the DARIAH meetings. For the more peripheral countries, travel funding for DARIAH's yearly meetings can constitute a problem and compromise their continuity or hinder the inclusion of new country members.

Travel funding was also considered problematic in regard to DARIAH working groups. The absence of travel funding to attend the meetings can create an obstacle to the participation of some researchers in these working groups. One of the interviewees argues that DARIAH should have a funding structure for this purpose, thus aiding a more effective participation of researchers coming from Europe's outlying countries.

The way of functioning of the working groups is also subject to some criticism. One of the researchers participating in one of DARIAH's working groups complains that, in fact, there is a rather low level of interdisciplinarity inside these networks, and shows some concerns for the absence of norms for the inclusion of new participants in the groups. One other interviewee also mentioned this problem, arguing that the working groups could be more open and could extend to a wider community of researchers.

*"I don't see much openness in the groups, in the sense of reaching out to more people in the countries." (Portuguese National Coordinator)*

Regarding the difficulties felt by some of the researchers in being physically present at their working group meetings, there should be a structure in place which could, effectively, make all the information circulate among the participants. In such a way that no one should be excluded from benefiting from the network's resources on the account of not being able to travel to these meetings.

### **DARIAH – positive points**

Naturally, there is also a large number of advantages and achievements in DARAHA that are recognized by the interviewees. *Networking* is one of these positive aspects that are mentioned by several respondents. The participation of some researchers in the working groups, for example, or the participation of certain institutions in the DARIAH network, is relevant to guarantee the visibility and integration of the researchers, and their institutions, in wider networks.

*“Research and knowledge, nowadays, are not local: they are increasingly global.”* (Director of Information Services at a University)

Participation in international networks and infrastructures allows the harmonization of best practices and, thus, the optimization of research practices. For smaller or peripheral countries, this kind of participation is particularly important, in order to guarantee the integration and access to what is happening at an international scale.

There is also a wide acceptance of the infrastructure’s underlying values, as well as its mission and goals. The existence, in Europe, of a benchmark infrastructure for arts, humanities and social sciences is extremely important because it reflects principles of interdisciplinarity and brings together a large number of communities, from different areas, to develop joint work and make use of the same instruments.

Research infrastructures, such as DARIAH, are useful as platforms that intend to assemble resources and information for the researchers. The director of a research unit praised the existence of an infrastructure that can concentrate information about conferences, funding opportunities, training opportunities in digital humanities, or tools and services that can support research. Once there is an increasing necessity to integrate digital tools in arts and humanities’ research practices, one of the interviewed researchers highlights the emergence, at a European scale, of infrastructures that congregate a series of useful tools and technological solutions.

One of the participants in DARIAH’s working groups refers that, because of his participation in the network, he started using some tools, on a daily basis, which were highly beneficial to his work, and which he discovered through his contact with researchers from other countries. This is one of the examples of how a digital infrastructure, comprising researchers from different academic backgrounds, can contribute to the adoption of common best practices and to the mitigation of the gaps that can exist among the different national contexts.

Another interviewee synthesizes a generally favourable stance in regard to DARIAH:

*“It is an interesting initiative. The products, as a final result, have some interest.”* (Specialist Librarian)

### **Recommendations – communication and dissemination**

Among the recommendations about dissemination, the ones that concern DARIAH’s website stand out. A Portuguese national coordinator considers that the website should be a true means of dissemination, easy to read, user-friendly and it should allow to find tools and the promoted activities.

Other interviewees acquainted with DARIAH’s website also recommend that it should be rebuilt in order to make clear what are the infrastructure’s purposes. According to the

coordinator of a university library, this is one of the reasons for the diminished acknowledgment and utilization of DARIAH among the scientific community. She recommends that DARIAH should disseminate, publicize and provide the researchers with resources and contents that can be useful to the projects they are developing in their research units. The directors and people in charge of research units need to be familiar with DARIAH in order to recognize its advantages.

In DARIAH's website one cannot understand clearly what is the infrastructure's purpose and what are its goals. She goes further to suggest the recast of how the infrastructure is organized and how the texts are written. Even if one considers that DARIAH's concept, in itself, cannot be made as clear as in other infrastructures, it is important, nevertheless, that it is rethought and clearly communicated.

A representative from a cultural heritage institution considers very important to improve the access to DARIAH, by bettering and standardizing its interfaces which, according to him, show many characteristics of the countries where they were designed (France and Germany).

On another account, a representative of a cultural heritage institution considers that it is fundamental that DARIAH becomes represented at international fora, where all the players in this area of studies meet. According to him, DARIAH should be present at the IFLA (International Federation of Library Associations) – a worldwide library organization that promotes a congress every year – so that it can make itself known, to go to the different sessions and *“have its five minutes of fame and say that ‘we exist and here are our solutions’”*; and it should be present at the congresses of the National Council of Archives, which is a similar organization. It is his opinion that these cultural heritage and information institutions should include in their strategies being present at these international fora, where they can accomplish new partnerships. For example, IFLA has a global database for Libraries that is not owned by anyone else. Furthermore, it can be explored what is being done by each section and subsection of IFLA: what projects and collaborations are taking place, how do they cooperate with other networks, etc.

The recommendations about DARIAH's communication put forward by the Portuguese national coordinator concerned, mainly, Basecamp. She suggested that the number of sent messages should be reduced, and that these messages should be selected according to the interests of the receivers. Further, some informations regarding scientific activities are not conveyed by DARIAH. For example, the access to new databases developed by it partners, or training activities. This interviewee considered that it is fundamental that DARIAH pushes for a new form of showing itself, particularly in regard to its need to show to the different research unit coordinators the advantages of funding the infrastructure. This is particularly relevant in the Portuguese case since, from now onwards, the national participation fees should be paid from these units' budgets, and not by the national agency supporting research, as it took place up until now.

The University Library coordinator suggested a specialist approach to the promotion of research institutions such as DARIAH, with teams of marketing and communication. Nevertheless, as a library coordinator, she has promoted several information and debriefing sessions aiming to motivate researchers to use the available online resources – which are paid by the national scientific funds, such as B On – as well as other resources which the faculty has to pay yearly. Furthermore, she has also promoted an *ad hoc* training session focused on the infrastructures provided by the faculty. These training sessions had, nevertheless, a low participation rate with most participants being Phd candidates or master students rather than doctorate researchers. Simultaneously to this *ad hoc* training session, and aiming to increase the adherence to the infrastructures that exist in the faculty, they have adopted other strategies such as integrating the training material in the syllabus of research methodology courses. These initiatives have fostered a closer proximity between the students and the library's support services.

She also considered that a training session that would grant a DARIAH certification to the attendees could be useful. This certification would be a guarantee of the quality of the service that is offered to the community, since the instructors in charge of the training sessions would be, in theory, qualified to do it. This is even more relevant if it is taken into account that master and PhD researchers would have a higher degree of demand.

Furthermore, the library coordinator recommends that the communication between DARIAH and its institutions should be encouraged. This communication should be established with the research units and directed to researchers – particularly when the institutions have a wide range of research units covering different study areas, some being more inclinable to utilize the infrastructure's resources and facilities. This communication can take place through debriefing sessions, training sessions, or by being present at fairs and other events. Researchers are the best channel to deliver the information since, if it is directed exclusively to the leaders of research units, there is a high probability that there will be no quorum or public. Granting communication channels with the researchers in general, or with the management of research units, in the broad sense, will allow that the information reaches the higher levels of decision making in the institutions.

The necessity of reaching national researchers and to promote DARIAH can be tackled by being present in events, fairs, congresses: in sum, to make a *roadshow* and explain what is DARIAH. For example, in Portugal, these could be events such as FCCN Days, librarian congresses or the congresses of the Portuguese Association of Digital Humanities. Debriefing sessions about DARIAH, its goals and ambitions, could take place at these events, as well as in congresses of the social and human sciences.

An institutional responsible considers that being a DARIAH member should be well promoted amongst the national decision makers as the best form of guaranteeing visibility and participation in broader networks. Taking into account that research and knowledge are increasingly global, participating in infrastructures such as DARIAH is important and it allows to harmonize best practices among the members, and to learn from the other members'



experience. It also allows to take advantage of the knowledge and infrastructures that exist globally and make it available nationally. Even though a large number of themes in the Humanities have a local scope there is often the necessity to nurture collaborations and to make the results visible. Thus, the best way of promoting DARIAH amongst the decision makers in funding institutions is by evincing how the infrastructure will facilitate and improve the research work, and how it will make this work more visible and with greater impact, by using its tools. This responsible also believes that training and capacitation could lead to a more generalized utilization of the infrastructure: if researchers know about it then they can start using it. He further exemplifies referring to his experience with the institutional repository: when teachers disseminate this infrastructure there are always utilization peaks. At a national level, it is necessary to have more dissemination and training. Moreover, infrastructures should improve their usability.

*"... that is very important... in sum, showing to the different institutions that they can use the platform, and that they actually use it. If we are developing a very good platform but, in the end, nobody uses it, then it does not make sense. I believe that, even among researchers, a lot of times these platforms are not known (and outside research environments it is even worse). It is fundamental to carry that dissemination work, afterwards, promoting it among other institutions, and making them use the platform – they can even promote it next to institutions that can make new data available in the platform. (...) This networking efforts, with the various institutions, are essential."* (Researcher responsible for creating a research infrastructure in Biological Sciences)

This interviewee a member of a DARIAH working group and considers that these should serve as an access point and have a less vertical structure. She believes that the members of the working groups should also be able to participate in the decision-making processes which concern the operation of the groups.

From one of the researcher's point of view, DARIAH should invest in "supply" in order to foster "demand". Nevertheless, he believes that, at this moment, the priority should be the dissemination of the interest points and usefulness of the infrastructure itself – so that it can become a tool with potentialities that the researchers can grasp – rather than creating contents or more technical questions. Therefore, in the first place, it should be selling the product very well, since it is not known, and its potentialities are not known; and secondly there should be an investment in training. According to the same testimony, training should take place in close coordination with the universities' management offices, or, at least, the faculties'. It has to be from the top to the bottom – DARIAH and university - otherwise no one will adhere.

*"... all the infrastructures that seek to thrive should be spending a large percentage of their efforts "evangelizing" almost, that is, going through mountains and valleys..."* (Responsible for National Research Infrastructures)

According to the coordinator of a research unit, it is only through training and raising awareness to this field that one could elucidate the scientific community about what is intended to be done, and what can a digital tool offer.

*“The question is about seducing them with the interesting things that we are doing. Interesting to them. To the young. For visibility purposes. For their education, since the majority of the employees wants training.”* (Research Unit Coordinator)

According to a responsible for several national research infrastructures, if, on the one hand, the community should know DARIAH and seek its services, on the other hand DARIAH should have the resources to go to the “field”, on its own, and engage the communities in its utilization, as most as possible. DARIAH should be promoted in every opportunity: all researchers that use DARIAH and publish should make a reference to it in the acknowledgments, and DARIAH should use that information. Such as it happens in other research infrastructures, DARIAH should make its way to become known. People that utilize it know that it exists and that it is the source where they got the information from. From the moment that DARIAH’s offer becomes what it is expected from a European effort of this nature, with time, it should become manifest. It is a matter of being able, with the resources that are possible, to do two jobs simultaneously – because they need the top part (funding, engagement of EU’s member countries, European Commission), and all the community work that should be developed at the same time. After they are established, emerging infrastructures have to (or at least should) put a great effort in growing their user base, do a good curation work, and advertise the research works that are carried based on using its resources. In this sense, any academic work or scientific results which make use of the infrastructure should make reference to it. By demonstrating good examples and the usefulness of the infrastructure other researchers will follow, and they will understand that the time they invest allows them to obtain information that they could not seize otherwise, or even save time.

At a national level, the responsible for the infrastructures considers that there should be an early scheduling of the processes that will be launched and concluded, the funds that will be allocated, with very clear evaluation criteria. I.e., research infrastructures need to incorporate the principles that make them research infrastructures – the services they provide – if they are to follow those requirements.

The assertion of DARIAH’s interests has to be achieved through its palpability, with a turnkey product that will solve the needs of the researchers.

*“Therefore, I believe that it needs to be something where the added value is evident. This added value needs to be very practical, very operational, at least in an early stage. If it is only ‘wishful thinking’, it will not thrive.”* (Responsible for a Cultural Institution)

For a researcher in biological sciences, benchmark infrastructures established themselves by being recognized by researchers as a way to disseminate their results, bringing visibility to their works and their publishing efforts worthwhile.

## Recommendations – contents

The Portuguese National Coordinator's main recommendation on DARIAH's content concerns the need for training. DARIAH could provide best practice manuals – tested practices that could be disseminated. For example, DARIAH has been working with ontologies and could promote an online platform that spreads this work. Another example of content that DARIAH could provide is curation related content. Given the difficulties and costs borne by institutions for curating and digitizing elements, DARIAH could become a support structure for curation, that could reduce the costs associated with this work. Finally, it could give support for European applications that could secure other funding.

He further recommends that the content should be made available in a clear, easy-to-read, user-friendly manner on the website: whether it is the available tools, online training or face-to-face training, DARIAH activities or the various forms of support provided by DARIAH. Another concrete suggestion for the website content is the existence of a platform for finding partners to submit joint applications for research funding programs. For this to happen, DARIAH must promote more openness and dynamism. Finally, he also suggests improvements in the completion and continuous updating of the year calendar, which could function as a program of activities.

The university library coordinator considers that DARIAH could act as a support platform for national infrastructures, by disseminating good practices that could be used at a national level and which are based on the experience gained in the information system architecture, or copyright and licensing issues. The digital infrastructure's strategy to establish itself should, first and foremost, be the identification of the services that it can provide to research units and researchers, providing content, promoting training (including online training) and, for example, granting certification to training instructors. This suggestion follows the example of other European research support programs, where scientific data management infrastructures and platforms have been created, good practices and standards to promote *data sharing* were set, and answers to copyright issues were given.

A researcher with extensive experience working in the digital humanities believes that DARIAH is critical in providing content that meets the real needs of researchers. In scientific areas where there is still a very traditional attitude towards the use of physical archives, it is necessary to yield online content, such as access to historical records, and at the same time to strengthen the skills for their use.

For the head of a university repository, in the area of social sciences there are vertical infrastructures that provide a thematic approach attempting to meet the specific needs of the scientific community: DARIAH, CESSDA, ELIXIR and CLARIN, for linguistics; and horizontal approaches, such as OpenAIRE, which serve several scientific areas that need the same type of tools. For example, the infrastructure needed to run a scientific journal, on the software level, is basically the same for any area. So instead of having ten entities for different purposes,

it is possible to have someone who provides this crosscutting service to everyone. The respondent considers that it is not easy to respond to the specific needs of each area of the social sciences and sometimes this is only possible with vertical services. Nevertheless, and although there are specific needs, from a public funding point of view, it is worth it to invest in horizontal infrastructures, which can provide services to the various areas. In DARIAH's case, what needs to be understood is which are the tools and which are the areas where, in fact, there are no horizontal solutions and where these needs are truly very specific. There are demands that are common and that can be well met using generic tools, but some demands are specific, and those need specific solutions. Regarding training he argues that it is important to give generic tools and, at the same time, customize these tools to the specific needs of each area.

The interviewee refers the example of FOSTER project where, on the one hand, they developed cross-cutting content and resources, but later worked with the communities of three different areas in order to have content which was specifically tailored to their needs — which are different in each area. One of the main resources created — the *toolkit* — is a set of ten courses on various aspects of open science. These ten courses are generic but, whenever possible, disciplinary examples are presented from all areas (life sciences, humanities, etc). For example, the module on open access and institutional repositories provides examples from disciplinary repositories from all areas.

DARIAH needs to identify what is unique or can be unique about the infrastructure, or to perform very well. In addition, it needs to understand which services can be given to research units and researchers: training and capacity building; promoting good practices and standards. Regarding training, it is important to partner with others who are also doing training in open science, for example (and in these partnerships they should only cover what concerns DARIAH directly). It needs to identify and focus on what is strategic, what is unique, what adds the most value to its offer, and try to have the best possible outcome there. From this point it will create a snowball effect, starting at the top — the instruments. Once again, this will be for an elite, because it already presupposes experience in using, or being at ease with, the digital —you cannot assume that everyone has this knowledge.

The focus on training is mentioned by several interviewees. One researcher considers that this should be done in coordination with the university, or at least the faculties, in a top-down approach: DARIAH on the top, then the rectory, the faculty and from here to the rest. If researchers do not participate at a first moment, then more should be promoted so that supply leads to demand, i.e., if a workshop was not enough then you need to make more: two, three.

Content must correspond to digital platforms or digital knowledge archives, and these should tend to aggregation, or at least have common parts.

According to a researcher in Literature (with extensive work experience in digital humanities), resource sharing, whether in open access or otherwise, is very important because there are

many tools that have been applied to a particular corpus that can be useful for other corpuses. They can be used crosswise, or at least the code can often be adapted without having to be built from scratch. There is a collaborative dimension based on the infrastructure purpose as a resource management platform. People within the network should also be able to benefit from resources that have been collaboratively developed. Nevertheless, there are also other issues. Sometimes some of these tools are developed in a research context and there may be people who want to patent it, or want to restrict the access. This can raise sensitive questions, which need to be addressed from an access right's point of view.

The same interviewee states that DARIAH should also try to address the problem of resource obsolescence since they create resources "frantically", but it is often unknown how long these files, tools, platforms will be used for. There are projects that have become obsolete, often not because their content is no longer interesting, but because they have not been updated for *smart phones*, or because the tools, interfaces, are already quite outdated and some of its features are no longer active. The evolution of software and hardware is so rapid that sometimes the solutions that are created are meant to serve only for a very limited period – which limits their social and public interest. The technology that is chosen may already be obsolete and then it is much more difficult to recode or reprogram all of it – one should think, from the start, of solutions that will prevent this premature obsolescence. In addition, there is content that, when designed in the context of a research project, lacks the institutional framing necessary for long-term maintenance. If, when creating a project and a platform, or making a file, they were to be understood as an important resource, then they would be considered to move to the server, or to the services. From the outset, projects must be able to foresee this issue.

For another researcher, the main concern is DARIAH allowing that experiences, practices, contacts and networks are shared. For him, DARIAH's big advantage is getting to know the people, institutions and other projects where similar problems have already been solved.

The manager of a cultural heritage institution suggests turnkey solutions, which are easy to implement; however, with a sufficient level of flexibility which allows the adaptation to the specific characteristics of each organization.

A linguistic researcher believes that DARIAH can be very useful in providing the standards that should exist in order to work on, and prepare, data for reuse. At the present time, Europe does not fund the constitution and processing of data, it only funds its reuse. It pays for reuse, it pays for exchange and it pays for a set of activities that presuppose – on the part of those who prepare the data – that the standards exist. Therefore the issue of norms is fundamental. This interviewee adds that DARIAH should have a list of the tools that exist for this area, and should give priority to those that can be accessed without costs. Associated with these, it should also provide training materials, such as tutorials (in the form of MOOC – Massive Open Online Courses). In this teacher and researcher's opinion tutorials are very useful – short informative videos, of a few minutes, on different topics. These videos will not replace

classroom work, but they will draw attention to the underlying problems in each of these areas.

### **Recommendations – objectives and strategy**

The recommendations on DARIAH's objectives and strategies are not the result of a formal knowledge of the documents produced by the organization on this subject, but rather refer to what respondents believe should be the objectives and strategies of a digital humanities infrastructure type. The exception corresponds to the opinion expressed by the Portuguese National Coordinator.

At the national decision-making level, an officer of a national research infrastructure considered that, based on his experience, platforms considered to be on an “excellent path” have resulted from partnerships between various universities based on information sharing. These partnerships last for several years, are well-functioning and have users: thus, building infrastructures must be the result of a willingness to share and join forces. However, this process is only possible with the recognition of the infrastructure’s scientific value, the creation of working habits and continuous training throughout the years. According to his testimony, this is the only way that research units and universities will recognize the need to fund research infrastructures.

The Portuguese National Coordinator, well aware of DARIAH's objectives and strategies, considers that they are too vague and, therefore, recommends its clarification.

The coordinator of a university library considered that it is essential for DARIAH to define objectives and actions that actually benefit the work of researchers. This should be done through the provision of valid content and resources on the platform. As it happens with consolidated infrastructures among other scientific communities – such as in physics or in nanotechnology – DARIAH should establish itself as the European platform that all members of the community should know and use. To this end, it is essential to make information available to the users, and to define the benefits of its use in research practices.

*“Firstly, does it really benefit the work of researchers? Is there really any valid content and resources, within the platform, that boost the interest of researchers? (...). Because, if it isn’t there, there’s no advertising machine behind it that will make the platform stand and become used by researchers.”* (University Library Coordinator)

This interviewee recommends analyzing the experiences of older European platforms and infrastructures, some with a considerable dimension, used by all members of those communities. They are internationally recognized and, thus, have become benchmark infrastructures. Understanding how the conditions were created, at the beginning of the process, for researchers in these areas to start using the infrastructure will help to understand the reasons that led all members of that community to adopt it.



DARIAH should also aim to create the conditions for all the people that work in the arts and humanities to use the infrastructure whenever they need digital information. This goal could be reached by providing content and resources that are clearly useful to researchers.

DARIAH's mission should be clear. According to the university's library coordinator, the strategy to establish this infrastructure should, first of all: identify the services that can be given to research units and researchers, provide content, promote training (including online training), and qualification (for example, through certification of trainers). In her opinion, similarly to what has been done in other programs, DARIAH should further identify what is strategic – what is unique or can be unique – and make efforts to perform well in its purposes and achieve the best results.

A representative from a cultural heritage institution refers to his experience working on digital humanities project teams to recommend that DARIAH creates common spaces that encourage participation and non-hierarchical dialogue in the area of technology, social sciences and humanities. (CSH).

A researcher working with digital infrastructures from other scientific areas considers that funding for these research platforms will be easier if it is shown that they have been making a good work.

*"First of all, I think that DARIAH should be concerned about what it is its purpose. That is very unclear. I believe that passing this message to the academic field should be the priority. I have heard many times – to the point of exhaustion – people saying 'I don't know what DARIAH is for'. I don't know what funds have been allocated by DARIAH for this purpose but, the priority right now, rather than producing more content or delving into technical issues, should be to raise interest and have people recognize the usefulness of the infrastructure itself. I think that this is a central question to the development of the infrastructure." (Ct. Researcher with HD experience).*

A research unit coordinator with experience in the use of digital infrastructures and extensive internationalization work, considers that DARIAH should aim to support digital humanities on a national level, either through their funding or through training.

The linguistic and cultural concern was also pointed out by this interviewee, since he is part of the Southern European digital humanities group that has developed some considerations on the question of linguistic hegemony – the so-called hegemony of the "northern peoples". This hegemony takes form as a problem of linguistic homogeneity and the imposition of English. In his opinion, DARIAH should reflect upon these matters: should there be only one spoken language in digital humanities? What is the role of local languages and what is the role of local traditions? Thus, and following the principles of diversity advocated by the European Commission, DARIAH should not think of these issues on an infrastructural level, but also epistemologically and historically. That is, DARIAH should promote a reflection that takes into account the local and differentiated histories of digital humanities.

## Recommendations – organization

The main recommendations of the Portuguese National Coordinator on the functioning of DARIAH relate to the need for a clearer, more effective and more direct contact system – one that would improve liaison with national coordinators and the dissemination of the infrastructure. According to her, it must be defined a clear work agenda and a clear set of goals to be achieved. This clarification should, on the one hand, take into account the needs of national coordinators and, on the other hand, enable them to identify more issues and improve their contribution to DARIAH.

When asked about the usefulness of conducting usability tests with DARIAH, the Portuguese National Coordinator and the university library coordinator considered it something to take into consideration. A participant in a DARIAH working group, in turn, recommends that the subgroups should have their own internal dynamics and a less hierarchical structure.

According to a national official, the recommendations should result from the analysis of other benchmark infrastructures, even if they focus in other scientific areas. There are infrastructures which have forged true “success stories”. They have gone through a lot of problems and still managed to integrate many countries and scientific areas. They were able to bring together European organizations that already existed, in various scientific areas, and, without much conflict, to bring communities together in one institution.

The integration into broad, European networks was valued by the interviewed researchers. Having contact with other *modi operandi* is very important because it helps to validate processes and to introduce different types of processes on both sides. There are partners who may have more experience and know-how in some areas, which can then be acquired by all the other partners belonging to DARIAH. The ability to share experiences is very relevant.

From a technological point of view, a number of new platforms have emerged that allow digital analysis to be made but, often, social science researchers are unfamiliar with them. It is necessary to promote workshops, to bring concrete and specific cases, to try to show researchers why they should be collecting data in one way and not another, and to make it clear to the researchers that these tools exist. There are some, somewhat, elementary difficulties. For example, if people are using a proprietary database whose data is stored in a proprietary format, later they may not be able to use open source tools. It is important for researchers to be aware that, when they are collecting information, it has to be collected within some given parameters because that is what will allow the information to be mobilized in different ways on a latter occasion. In addition, it is necessary for people in the information and technological sciences to realize that they are not dealing with computer engineers and that the tools have to be made available for case studies that are, eventually, simpler.

One of the interviewees, a member of a DARIAH working group, recommends a less vertical management structure that can operate as an access point for all researchers and is not confined exclusively around those closest to the levels of decision in DARIAH. Her



recommendations are directed towards an effective support to the working groups, which should start with the resources needed to streamline their work.

### Difficulties – national level

Concerning the national decision-making processes, and the national strategy for science, the social sciences and humanities' researchers call for a closer look at these scientific areas, including their funding.

*"What is traditionally thought is that this link to the digital needs to have a profitable aspect, it needs to give money, it needs to have an impact on the economy, and it is believed that those who do research in the humanities are not profitable to the state – the added-value is very low."*(Digital Humanities Researcher)

In order to highlight the importance of the humanities for the economy and society, this researcher mentions the example of tourism, which is expected to be worth 10% of Portuguese GDP in 2019. It is an area that benefits directly from the investment made in the humanities, art and culture.

In addition to the problem of non-prioritization of the social and human sciences, respondents also report a general and chronic shortfall in the investment in research infrastructures.

*"There is a chronic problem of funding and in the sustainability of these infrastructures."*  
(Document Service Officer)

In this scenario of scarce public investment in research infrastructures there are important exceptions, namely those that require inexpensive maintenance or the payment of a relatively low fee – which often occurs in humanities infrastructures. This is evident also in the national infrastructure's roadmap itself, which includes a reasonable number of infrastructures for the humanities and social sciences since they generally require less funding than other scientific areas.

The absence of a national infrastructure's roadmap prior to 2013 is symptomatic of the investment and strategy deficits in this matter.

*"We have only made one roadmap. There are countries that have already made several editions of their roadmap."* (Responsible for implementing scientific policy)

Another interviewee also highlights this point, arguing that the roadmap was chosen because of external European pressure. Without undertaking a process of identifying the priority infrastructures, the country would not be able to receive European funding for research infrastructures.

*"The roadmap was the first time that a predefined methodology was made. (...) It was imposed upon us by the European Union because, when the Portugal 2020 program was*

*negotiated [partnership agreement between Portugal and the European Commission that brings together five European Structural and Investment Funds], Portugal would not have had any funding for infrastructures had it not written a roadmap.” (Responsible for implementing scientific policies)*

It should also be noted that several respondents mentioned the shortage of staff in the Portuguese science funding agency (FCT) - particularly in the area of infrastructures – and that their responsibilities have increased as the human resources decreased.

*“I think we need more human resources in the national agencies. We have few people. (...) We have very few human resources for what should ideally exist in order to make a well-sustained strategy implementation.” (Responsible for implementing scientific policies)*

Another respondent argues that FCT should have its own internal department for issues concerning research infrastructures. He recognizes, however, that this area is not treated as a priority by the agency. Currently, FCT's support to the infrastructures is attained through the support to research units.

The national policy makers in charge of scientific matters also recognize that there is little reasoned strategy on research infrastructures as instruments for the scientific community.

*“I see that, in Portugal, there is little or a practically nonexistent structured thinking of a science policy for infrastructures, both digital and other.” (Responsible for the implementation of scientific policy)*

Despite the elaboration of the roadmap for infrastructures – which aims to be a strategic document on the subject – the interviewee considers that it reflects the difficulties that exist in order to establish priorities regarding research infrastructures. This happens due to the structural lack of knowledge and a small investment that has existed in this area. In his view, the national roadmap foresees investment in a number of research infrastructures that is excessive for the size of the country and its scientific community. In addition, the roadmap was the result of a process based on applications in which no priority areas, or a limit of infrastructures per area of studies, were previously defined according to some priorities judgement. As an example to take into account, the interviewee mentions the case of Sweden.

*“[In Sweden] they have an internal discussion in science policy thinking in order to discuss what is strategic, where the gaps are, and then they make a ‘call’ in order to fill these gaps, in what is wanted for the country. (...) They define [the strategic areas] and direct the ‘calls’ towards these themes.” (Responsible for the implementation of scientific policies)*

Another respondent considers that it is not easy to develop a structured thought on scientific policies and strategy while the investment in science is essentially dependent on structural funds. He notes that this approach encourages the search for short-term and project-based

funding, rather than foreseeing the development of research infrastructures that can become stable and durable.

In order that the elaboration of a national roadmap for research infrastructures becomes a starting point for a routine of investments in these instruments, from a strategic perspective, an evaluation of that roadmap is necessary. This evaluation can assess which infrastructures have actually developed in such a way that made them essential to the scientific community.

Three of the interviewees were concerned by the fact that it has not yet taken place an assessment of the infrastructures that have been funded with base on the national infrastructure roadmap. Nevertheless they recognize that their actual development started later than was expected, and that it may still be early to analyze their impact in the scientific community.

*"After six years the roadmap should already be under review, but there's no one talking about it. There is no talk about it and it is not even in the plans."* (Responsible for the implementation of scientific policies)

A revision of the document will be necessary in order to the funding agency to analyze which infrastructures does it make sense to continue supporting, and whether there will be new applications that will have an interest to the community.

*"FCT has to do an assessment of the infrastructures when this funding cycle ends. This is not planned yet, but I think it is important to know whether or not it makes sense to maintain funding for all of those that are on the roadmap."* (Responsible for implementing scientific policies)

In his view, it would make sense that the first infrastructure roadmap would encompass a large number of infrastructures, once the following roadmap, after the review, would reduce the number of supported infrastructures and would start supporting the truly strategic ones. This need to filter which infrastructures are important to fund is also relevant at the level of the international research infrastructures in which Portugal participates, and it is advantageous that public funding efforts focus on the instruments that the community most recognizes as structuring.

*"Other countries are trying to find evaluation mechanisms to understand which European infrastructures the national community derives the most from, but it is not easy to find indicators for this."* (Responsible for implementing scientific policies)

However, one of the respondents mentions that the need to revise the roadmap has already been identified, and it is only the political decision to implement it that is missing.

*"I think that there is an intention [to revise the roadmap], on the part of the services, because the need is identified, but the political authorization to carry it through is lacking."* (Responsible for the implementation of scientific policies)

The funding for infrastructures comprised in the national roadmap is managed, in part, by regional structures that assume competences that were decentralized by the central government. Despite the importance of delegating, to the regions, the application of funds that are intended to mitigate territorial inequalities, one of the interviewees believes that this involvement has increased the bureaucracy of the process, which was already high, and that these organizations are largely lacking the knowledge or experience to deal with subjects of this nature.

*"[Regional structures] often do not have the staff to do this kind of processes. Therefore, when most of the funding is put under the control of regional funds, the complexity of these systems is largely increased, and, on the other hand, the ability to manage with a fully-fledged national strategy is slightly lost."* (Responsible for the implementation of scientific policies)

The importance of ensuring a truly national look at this process is the need to ensure that a national infrastructure that is publicly funded is designed to serve the entire national scientific community, not just that of a certain region or institution. Even if it is the team of an institution that has direct responsibility for the development of such infrastructure and ensures, at times, the connection to a European infrastructure, for example from ESFRI.

*"If it is FCT controlling this, right from the start, it has the advantage of ensuring that there is a balance, an equal treatment for the entire community of the country."* (Responsible for implementing scientific policies)

This concern, that the international research infrastructures in which Portugal participates effectively serve the entire national scientific community, broadly, clashes with the need for an institution that pays the participation fee.

*"When it comes to ensuring that the entire community has access to a particular infrastructure, it makes no sense that it has to be University A, B or C to pay a fee."* (Responsible for implementing scientific policy)

However, at the moment FCT's policy is to delegate to the institutions the responsibility to pay the Portuguese participation fee in international infrastructures – later the agency may reimburse the institutions through the funding that is made to the research units. One respondent expresses what he considers the main advantage of this option:

*"One advantage is that institutions have to define, strategically, which international networks they want to participate in. (...) FCT (...) does not want to set priorities because they think it should be the scientific community that sets them. (...) By assuming the costs, the more institutions are involved, the more the institutions will share the cost. This is also an incentive to expand national infrastructures and networks."* (Responsible for implementing scientific policy)

Thus, it is clear that FCT's strategy is contrary to that proposed by another interviewee, which had recommended that the state should guide and define the priority areas for infrastructure financing.

### **Difficulties – institutional level**

One of the interviewed researchers argues that higher education institutions do not give enough investment and support to methodological aspects, which compromises the assimilation of digital methods in the research practices of students and researchers. In his view, it would be crucial for universities to have a different approach to its curricular offer and, on the other hand, that institutions could delegate to one person the dissemination of digital instruments (including infrastructures) within the academic community.

*"The faculty itself [could] have someone responsible for the dissemination of the instruments."*  
(Researcher specialized in Digital Humanities)

*"What the faculty board could do was, immediately at the Doctoral School, offer optional courses about the utilization of infrastructures."* (Researcher specialized in Digital Humanities)

A researcher from another institution also points out the need for reformulation of teaching programs as a solution to the emergence of Digital Humanities as a disciplinary area in its own right. This should necessarily involve the commitment and dialogue among researchers and teachers from various sciences.

*"There is a major effort of curricular transformation, to change the conceptualization of projects, so that this area [the Digital Humanities] can emerge as such. It's very difficult."*  
(Researcher specializing in Digital Humanities)

This researcher explains that the difficulty in making this curricular transformation lies in the difficulty of bringing together researchers from different areas to create intersection spaces.

*"The institutional boundaries that exist, in the way that departments and different services are organized, or the boundaries that research centers, on their own, establish when they define an area of research, are obstacles to some of these intersections. Often [the projects] are more successful on the account of personal interaction – when there are two or three people from different areas that have a great collaborative capacity."* (Researcher specializing in Digital Humanities)

As it was already mentioned, one of the challenges is to increase the use of digital tools within the academic community and, hence, within research support infrastructures. A head of documentation services refers to the need of improving communication in order to disseminate these tools, noting that, in his opinion, such communication will have better results if it is addressed directly to researchers and not to the directors of research units, since

there may be researchers prone to integrate digital methodologies into research units where the director does not regard it as a strategic point.

*"Communication. In this case, all it takes is communication. (...) We have already reached the conclusion that there are scientific areas more prone than others for the consumption of this type of infrastructure."* (Document Services Officer)

One respondent, with a management role at an education institution, agrees that the diversity of interlocutors within the university does not facilitate the definition of a communication strategy aimed at improving these instruments' utilization rates.

*"The organization, which has to accommodate many voices, receives and interprets a message, that is to be applied to the whole, more or less clearly."* (Manager of an Education Institution)

*"Faculty gigantism, which is very good, is also a problem when it comes to implementing a policy and a set of measures that we consider strategically important."* (Manager of an Education Institution)

There is also a great deal of difficulties in accounting for the community's use of research infrastructures. Thus, there is little information from which we can derive strategies aimed at a wider and more systematic use of these instruments. The head of documentation services says that the university only possesses data on the effective use, by students and researchers, of the infrastructures and databases that are managed by the institution itself – such as the repository – or which are subscribed by it.

*"We have been able to control access to B-on, Scopus, Web of Science, JStor and other collections that we subscribe through B-on but which are paid separately. These are tools whose administration is on our side; the others don't."* (Document Services Officer)

The same interviewee warns that there is not a page where it is possible to access all the resources, platforms and projects that, over time, were developed in the context of the institution and were aimed at providing free-access information and knowledge to the community.

*"There are many projects scattered across many platforms, in many [web] domains – institutional domains, commercial domains. (...) There is nowhere you can access them all from a single page."*(Document Services Officer)

This concern is also voiced by another interviewee, who is aware of several of these projects.

*"We started managing and producing information and there is, I would say, a lot of digital information on dead websites. I have no doubt. (...) All this information is unanalyzed and not centralized. Maybe the management needs to be a bit stronger in trying to start centralizing the information."*(Digital Humanities Researcher)

Another question, which relates the establishment of research infrastructures with the level of institutional decision, concerns the participation of institutions in national or international infrastructures, including ESFRI infrastructures. One respondent comments that some of the common difficulties are the lack of financial resources, on the part of the institution, or the lack of strategic recognition of this aspect.

*"Often research units may or may not have the resources to pay these fees, or may not have it as strategic enough (which sometimes is a mistake) to disburse that money."* (Responsible for implementing scientific policy)

Associated with the difficulty of participating, financially, in international research infrastructures are the difficulties that result from the excessive bureaucratization of certain processes that already constrain the development of national infrastructures. This happens even when they are considered as a priority (such as those comprised in the national roadmap for research infrastructures). Another difficulty is the participation in other infrastructures when funding for this purpose comes from the science funding agency. Two respondents point out that the hiring and acquisition processes effectuated by the institutions, due to the rules imposed on them by higher levels of decision, largely increase the time that goes from need to resolution.

### **Difficulties – researchers**

Content analysis of the interviews carried out under the DESIR project made it possible to highlight some of the difficulties that, at the researchers' level (individual decision-making), may constrain the widespread recognition of a research infrastructure, such as DARIAH.

The first issue relates to the insufficient training that researchers in humanities possess on the digital domain, which is further coupled with a strong resistance to integrate new research methods that have a bigger focus on digital tools. One of the interviewed researchers mentions the case of History as a paradigm of this situation:

*"In the case of history, I think there is still a very traditional look towards the idea that research has to be done in physical archives, and if the source is online, it's not the same anymore."* (Specialist Researcher in Digital Humanities)

Regardless of the investment that may be directed towards the development of digital tools that support research – such as research infrastructures – the limited receptiveness to these new approaches and methods by most of the scientific community may constrain the actual utilization of these instruments, and thus the lack of adherence by this community. Other respondents have maintained that this is a real problem.

*"[It's not easy] to change the mindset and change the habits of a community that has its own complexity, its diversity, and that is not always prepared to react, when it comes to the digital, at the speed that the new times demand."* (Manager of an institution)



*"There are few people properly trained in Digital Humanities who realize exactly how the Internet mechanisms work, or how this "digital thing" works." (Specialist Researcher in Digital Humanities)*

Some of the researchers point out that it would be absolutely strategic to reinforce the digital skills of students and new researchers, in order to increase adherence to these tools in those who are currently beginning their careers in scientific research. One of the interviewees considers that, for the initiation of a student or young researcher in digital methodologies, it is essential to have the guidance of a more experienced researcher, someone that has already fostered these working methods.

*"I can imagine that a masters student accessing [research infrastructures] will need the guidance of a senior." (Researcher from another scientific field)*

Another researcher realizes, however, that it is not easy to find teachers who use digital methods in a systematic manner, which can compromise the transmission of these methodologies to new researchers.

*"In class, it would be very interesting [to integrate these tools], no doubt about that. I think that part of these platforms are not even used by teachers." (Specialist Researcher in Digital Humanities)*

The result of this rare engagement with new methodologies that comprise the digital, by senior researchers, is the low use of these tools by new researchers. The rates of use of research infrastructures are low across the various age groups.

*"[Students] forget what they learned in the course because they never use it again. Or they use it very little." (Specialist Researcher in Digital Humanities)*

In contrast, another respondent states that, in his institution, teachers have been a determining factor in the widespread increase in the use of digital tools by the students (in this case, the institutional repository), which reveals that these actors can be key elements in the establishment of digital tools in research practices.

*"It is the issue of training and capacity building. Often people do not know, they are not aware of it. Even here, at the university, some students are unaware of the repository, but the utilization is quite high, nevertheless, because the teachers spread the word." (Document Services Officer)*

The same interviewee states that another problem that compromises a higher utilization of research infrastructures by the researchers is, in many cases, their usability. In order to effectively increase the level of use of these tools, especially within a community where a significant investment in digital skills is lacking, it would be extremely important that the new research support tools would be more intuitive and user-friendly.



*"Infrastructures need to improve their usability, in many cases: on average, the usability of these infrastructures is mediocre and unintuitive, and there are many that are bad."* (Document Services Officer)

Another interviewee, who systematically uses Digital Humanities tools in his research, reinforces this same aspect. He notes that, in some research infrastructures, there is a great difficulty, for the average researcher, to find what they are looking for.

*"In these infrastructures there is an excess of information. It does not seem to me that it is properly directed; one has to be searching and one, in general, does not want to be searching."* (Specialist Researcher in Digital Humanities)

Another researcher points out, however, as a positive sign, that he feels that there is a widespread acceptance, by the scientific community, of the principles of open science, for which the digital will have to play a key role. This open-minded attitude by the researchers can be a starting point for the future development of Digital Humanities in Portugal, if there is adequate awareness and training.

Despite the acceptance, two respondents reported their concern about the discontinuity of infrastructures that store data and documents. In their view, an important reason for many researchers to insist on more traditional methods of disseminating their scientific work (such as physical journals or books) is precisely the risk that their work will no longer be accessible due to the discontinuity of digital infrastructures.

*"With digital, they may fear that five years from now the work will not be available, whereas, by publishing a book in a traditional way, the book will be in the library for centuries."* (Specialist Researcher in Digital Humanities)

### **Digital Humanities – situation in Portugal**

The interviewees' considerations about Digital Humanities starts right from the very concept. Several interviewees express doubts about the relevance of the term, they assume that they do not know exactly what is meant by Digital Humanities, or that this concept is poorly understood by the research community in general.

One respondent who runs the documentation services of an institution notes that the concept is broad enough to include very diverse practices, and that the definition of Digital Humanities varies from researcher to researcher.

*"Digital Humanities turn out to be a concept that is too broad, ranging from research projects aimed at making the original results, or data, available to the public in a digital format, as well as those working in data repositories or publication repositories. (...) It turns out to be too big of an umbrella term."* (Document Services Officer)

A researcher in the Humanities, who identifies himself as a digital humanist, also considers that the concept of Digital Humanities allows for the incorporation of a wide range of practices. These include tools, methodologies and instruments that open new possibilities for gaining knowledge and for executing projects.

Another researcher argues that the term “Digital Humanities” worked very well as an aggregator of a set of methodological practices that were already taking place in the various disciplines of the Humanities, and which made it possible to form a community of researchers and users. Before the widespread use of the term, other buzzwords were used – such as “Digital History” or “Informatics applied to History”. In his perspective, the appropriation of the term “Digital Humanities” constituted:

*“an attempt to give visibility to work that was done by a scattered community of researchers from various areas across the Humanities, who were already using these technologies in their work but lacking its visibility in academia. (...) There were few networks, little collaborative work.”* (Specialist Researcher in Digital Humanities)

He also adds that, despite using digital methodologies since the 1990s, the act of assuming himself as a digital humanist – as an appropriation of the discourse around Digital Humanities that has been developed over the last twenty years – led him to reflect critically on the methods, on the use of digital technologies within the Humanities, and on new possibilities for research.

Another respondent considers that the actual possibilities for humanistic research opened by digital technologies go beyond what is generally acknowledged.

*“Digital Humanities are often seen just as a methodology of analysis (possibly with the possibility of presentation or reorganization of information). Above all, it is seen as a methodology of analysis that allows drawing patterns and visualizing relationships: in the end, making a series of formal operations to produce certain type of results in relation to a corpus, within the Humanities.”* (Specialist Researcher in Digital Humanities)

In his view, the most interesting thing that the Digital Humanities can bring to research in social sciences and humanities is a perspective of speculation, of “speculative creation”.

The same researcher mentions what he considers two distinct moments in the evolution of the application of digital technologies to the humanities. The first moment occurred before the generalization of the Internet and was essentially marked by the incorporation of digital technologies in a disciplinary perspective, it sought to develop computer methods that responded to the purposes of each humanistic area. The second moment has been developing in the last twenty years.

*“Afterwards, there is a moment that takes place in the 1990s and exploded in the last twenty years, which is when what has been disciplinarily developed meets an intersection, and, then,*

*comes forward the notion that there are methodologies that we can designate as computing for the Humanities or Digital Humanities.*" (Specialist Researcher in Digital Humanities)

According to another researcher, this notion of Digital Humanities as a discipline that develops at the intersection of countless humanistic disciplines and which has, as its aggregating concept, the use of digital research methods in a collaborative approach between the various areas of the Humanities, creates obstacles to the widespread use of these practices:

*"It is very difficult for the Digital Humanities to become mainstream because it implies two things: the ability to talk to your neighbor or the ability to understand both domains [the humanities and computer science]."* (Specialist Researcher in Digital Humanities)

In this researcher's opinion, research work in the social sciences and humanities remains focused on each different discipline, without many researchers recognizing this intersection space where their practices could meet. Furthermore, it is also rare that a humanist, or social scientist, has such computer skills that makes him a knowledge creator by using established digital methods and developing new ones on a daily basis. This matter will be further analysed in a later section.

The beginning of the systematic incorporation of digital tools aiming at the optimization of humanistic research in Portugal dates from the 1980s, with the use of tools for computational analysis of corpora and the creation of computer databases. One of the interviewees indicates the disciplinary area of Philology and Linguistics as a pioneer, in Portugal, in this crosscutting approach between the Humanities and digital technologies.

One respondent, with a recognized body of work that reflects on Digital Humanities, mentions another relevant motive for the emergence of the question of connecting the Humanities and the digital universe.

*"[The Digital Humanities] are born because there is a process of migration from the medial heritage of Humanity: books, records, films, recordings. There is a migration of this medial heritage into the digital medium, and once this heritage exists in digital form, it can be analyzed and made available in other ways."* (Specialist Researcher in Digital Humanities)

According to his view, in this way, the Humanities emerge as a response to a new need: the intermediation of literary, cultural and artistic heritage for the public space. This is both an opportunity and a challenge for humanists, paving the way for deepening the partnership between scientific research institutions and cultural heritage entities, archives and libraries. One respondent emphasizes the untapped potential that exists in this link between academia and entities that hold important cultural assets:

*"We, in the Social and Human Sciences, have a problem: we have no connection to businesses. The relationship with these [cultural heritage] institutions is, perhaps, our most*

*interesting alternative, but this alternative is still under-explored.*" (Specialist Researcher in Digital Humanities)

In this context, some interviewees regret that these entities have not yet adopted a widespread culture of open access to their assets:

*"There is still a lot of information that is stored very well and is very restricted. (...) The institutions are [still] very zealous about their articles, their patrimony."* (Specialist Researcher in Digital Humanities)

The same researcher refers, however, to a slow but gradual opening of these institutions towards making their information available, both for dissemination to the general public and for their analysis by researchers.

Digital Humanities in Portugal are far below the dynamics of other European countries, in which Central and Northern Europe stand out, but there is a clear evolution towards a larger number of members of the research community that link Humanities with new digital technologies. The scientific production and thoughts on this subject by researchers from other countries, published online and easy to access, helps Portuguese researchers to learn about new developments in this area.

Since 2014 to the present, the DH landscape has slightly improved in Portugal, mainly due to the greater attention that this subject has earned.

*"There are half a dozen researchers in Portugal (...) who have made an effort to put [this subject] on the agenda. The congress we hold in 2015 also helped, and ever since there has been a collection of publications from other congresses, seminars, where this speech has appeared."* (Specialist Researcher in Digital Humanities)

Many researchers, however, continue to resist the application of new technologies to their research work, and the notion that computing for the humanities is allowing new directions, new approaches and new results, without compromising pre-established methods of these sciences, has not yet come forward.

*"It's hard to show people that digital methods don't replace the existing methods, but they add to them. They come to ask other questions, to formulate the problems in another way."* (Specialist Researcher in Digital Humanities)

The discourse around the Digital Humanities, and the acceptance of this term to designate a set of tools and methodologies, has been appearing in a growing number of publications and presentations at congresses and seminars, and is gradually entering the academic world. Slowly, the number of researchers showing some openness to the Digital Humanities is increasing, although many do not necessarily identify themselves as "digital humanists". However, from the perspective of an interviewed researcher, the proper institutionalization of this area is still lacking, as it remains to be included in the curricula of higher education institutions and needs greater attention and visibility from research units.

The impetus for this growth comes mainly from abroad, from whom new experiences become known and are, at times, replicated in Portugal.

*"[The] big impact comes from abroad because, in the Anglo-Saxon world, or even in Spain, France, Germany or Italy, there are a number of initiatives, institutions, degree courses, masters, doctorates; and that has given some visibility [to this area]." (Specialist Researcher in Digital Humanities)*

The discourse on Digital Humanities in Portugal is, generally, imported from other countries where this area is more developed and established. It is difficult to specify when the term "Humanidades Digitais" began its widespread use in Portuguese, but the adoption of a direct translation of a term that was already generally used in English to refer to the new digital methods for research in the Humanities (and to the community that makes use of them), says a lot about the strong influence of the Anglo-Saxon world in the settling of this area in countries like Portugal. The great influence exerted by Anglo-Saxon discourse around Digital Humanities constrains the development, in communities of other languages such as Portuguese, of a discourse of their own.

The strong pressure that exists in order to include the digital component in European Union funding applications – which stems from a strategic European orientation towards the digital in science – also needs to be taken into account. At its own pace, this strategy has also been making its way to Portugal, with several open access initiatives, the construction of a roadmap for digital research infrastructures (replicated from the European roadmap) and a meeting focused digital skills (INCoDe 2030).

### **Institutional Initiatives**

In the landscape of Digital Humanities in Portugal, generally, it is the positions taken by individual institutions – by taking this area as important and strategic – that makes the difference. The University of Minho, in the north of the country, is a case that illustrates the need to sensitize the leaders to this subject. In 2002, the formerly existing Portuguese Knowledge Society Agency, through its Innovation and Knowledge Mission Unit (UMIC), invited universities to present projects and initiatives aimed at encouraging mobile internet access in higher education institutions, and creating and making available more online content in Portuguese. Following this, the Rector of the University of Minho took advice from the then-in-service director of documentation services, who proved it useful to design a platform for storing the theses and dissertations that, in increasing numbers, were being submitted in a digital format.

*"The dean asked me if I had any proposals to include in the set of proposals that the University of Minho was going to present, and I proposed the repository. The proposal was made, it was approved and it brought funding for human resources for a year or two, but funding took time to arrive and the university advanced right away." (Document Services Officer)*

Once the rectory considered this a strategic measure, the University of Minho would become the first higher education institution to have an open access institutional repository (called RepositóriUM).

The balance of this repository is highly positive. The university ensures that open access dissertations have more citations and more visibility, which contributes decisively to the projection and recognition of the institution's excellence. Since then, the investment in open access has been part of the strategic vision of all the deans of the University of Minho.

*"The University of Minho is known for being a pioneer of open access not only in Portugal, but internationally. And being recognized makes us even more recognized, because we are cited in various projects."* (Document Services Officer)

The RCAAP portal (Open Access Scientific Repositories of Portugal) seeks to aggregate all the scientific content available in open access in the various institutional repositories of higher education and research entities in Portugal. It constitutes a unique point for searching and retrieving articles, dissertations or communications by Portuguese researchers. The University of Minho is just one of the institutions that currently feed this network with its repository.

The NOVA School of Social Sciences and Humanities (NOVA FCSH) is also deeply committed to an open science policy, according to one interviewee. ROSSIO – a consortium that joins the FCSH with several cultural institutions with important collections for the public, and which aims to aggregate, organize, interconnect, contextualize, enrich and disseminate a unique universe of digital content on Social Sciences, Arts and Humanities from research activities, repositories, archives, libraries, art collections and databases – is a central part of the institution's strategy in this area.

*"ROSSIO is the college's way of saying and demonstrating that it is deeply involved in an open science policy."* (ROSSIO manager)

ROSSIO is still in its implementation phase, but it is one of the infrastructures from the social sciences and humanities receiving funding under the national roadmap for digital infrastructures.

However, the effective implementation of an open science policy has proved to be a demanding challenge, as it is difficult to involve in this approach all the interlocutors within the institution. Having fourteen different research units, the institution does not have the same ease with all of them in committing to an open science agenda.

Portuguese researchers are, generally, still not open to digital methodologies in the social sciences and humanities. Systematic use of the available digital resources and tools is still very limited, and often casual. There is a restricted group of researchers who seek to give visibility to the available tools, but they have encountered strong resistance. Spontaneous initiatives taken by groups of researchers are emerging in some institutions, aiming to contribute to the introduction of a discourse on Digital Humanities into their circles. Some of the initiatives,



however, have a small number of participants, namely from the institutions where they are organized. The researchers behind these initiatives argue, nevertheless, that it is an increased offer that could eventually lead to higher levels of interest and participation.

*"It is necessary to give supply so that there is demand."* (Specialist Researcher in Digital Humanities)

In this regard, initiatives such as the Digital Humanities Laboratory of the Institute of Contemporary History at NOVA FCSH – which was recently created – have organized a series of workshops on digital tools that are useful for researchers working with data processing within various human sciences. Another initiative worth mentioning was the first Digital Humanities Congress, in 2015, attended by around 160 participants.

In 2013 and 2014, NOVA FCSH hosted a Digital Humanities Day with the aim of promoting communication between researchers that use digital elements in their work on the Humanities, in an interdisciplinary and international approach.

In 2013 it was founded the Digital Humanities Association (AHDig). It is a network of researchers united by the Portuguese language and by the inclusion of a digital perspective in their research practices. The main goal is to strengthen the initiatives in Digital Humanities that already exist in the universe of Portuguese speakers, and to promote new initiatives. It aims to be a forum where these researchers can discuss and share their experiences, and create networks, within this cultural and linguistic sphere, which can lead to collaborative work and which can increase the international visibility of Digital Humanities projects conducted in Portuguese. However, there have been a small number of initiatives and it is not yet formalized.

*"The association was created in 2013 but is not yet formalized, it still has a committee for its implementation, which is not good. It brings together Portuguese and Brazilian researchers, but there have not been many initiatives."* (Specialist Researcher in Digital Humanities)

The creation of this association can be seen in parallel with the formalization of several similar organizations in other countries, which aim to constitute institutional spaces where this community - the Digital Humanities community – can share their experiences. As examples of other associations are the *European Association for Digital Humanities*, the *Association for Computers and the Humanities*, the *Asociación Argentina de Humanidades Digitales* and the *Humanidades Digitales Hispánicas*. As it can be seen, AHDig is not the only association of its kind that establishes a common language (in this case, the Portuguese language) as the fundamental link of a community of digital humanists.

### **DH integration in university courses**

At NOVA FCSH there is a course in Informatics Applied to History for the students in the first year of the History degree. However, the methodologies that are taught have a sparse integration into the students' research processes and, later, into those who pursue a research

career. In the master and doctorate programs, there is not a specific subject on digital skills for the humanities.

Some of the courses that were part of the history degree at NOVA FCSH, for example, were discontinued: such as Quantitative History or Social Networks Analysis. Even at the PhD level, the use of digital tools is only taught and promoted for qualitative data analysis purposes. The existing curriculum offer for digital methodologies and approaches in research practices suggests a shortfall in the investment and focus on digital technologies.

*"I think that some of these platforms are not even used by teachers. That link between research and teaching does not yet go through these digital projects."* (Specialist Researcher in Digital Humanities)

The same interviewee regrets what he considers an institutional lack of investment in these methodologies – which should be taken as an essential topic in the students' education – as it is proven by an analysis of the curricular offer of the courses. As a way to correct this deficit, the researcher proposes that the faculty puts a focus on these contents, at least in doctoral courses.

*"What the faculty board could do would be to offer, right away at the Doctoral School, courses directed to the use of infrastructures, as optional courses."* (Specialist Researcher in Digital Humanities)

At the Faculty of Arts and Humanities of the University of Coimbra, between 2002/2003 and 2006/2007, the masters program in Anglo-American Studies had a technological component, which was intended to foster a reflection about literature in its relationship with the digital environment. This program included a Digital Culture discipline and a seminar on Archives and Electronic Publishing, for example. Although the course was discontinued a few years after its start, it still yielded some academic work.

One of the interviewees, who assumes himself as a digital humanist, mentions also that, since the beginning of the decade, there was a Master's degree in European Heritage, Multimedia and Information Society at the University of Coimbra, which was coordinated by this institution but involved four other European universities.

*"[The degree] was oriented towards thinking about heritage issues in their relation to the new digital tools. In fact, this master's degree (...) was the only course referenced in Portugal as a Digital Humanities course."* (Specialist Researcher in Digital Humanities)

Referring also to the University of Coimbra, he further points out that the Information Science degree is the only program with specific seminars dedicated to Digital Humanities. In addition to this seminar, he mentions that an introductory course to Digital Humanities will be created as an elective course available across all undergraduate programs, as well as specific training in geographic information systems in the Geography degree.



In the academic year of 2018/2019 a masters program in Digital Humanities debuted at University of Minho's ILCH (Institute of Literature and Human Sciences). It was conceived as an interdisciplinary teaching project involving the Engineering, Science and Engineering Schools.

In addition, one respondent noted that, due to the fact that the University of Minho is a pioneer in *open access* initiatives, the institutional repository is widely mentioned and recommended by the teachers (starting on the bachelor's degree programs), which results in an effective use by students.

Thus, the existence of specific courses focusing on Digital Humanities suffers from great instability in Portugal. Furthermore, regarding the process of introducing courses that deal with the application of digital technologies to the Humanities, it is not evident that there is a clear investment in this domain. What remains, in fact, are courses with disciplinary approaches to the use of digital methods (such as geographic information systems), without the general perception of Digital Humanities as a common intersection space between the various social sciences and humanities.

### **The Portuguese roadmap for research infrastructures**

Prior to the elaboration of the Portuguese roadmap for digital research infrastructures there were no infrastructures in the Humanities securing public funding. This situation has changed with the current roadmap, which comprises research infrastructures that are considered strategic and priority for all scientific domains.

*"With the roadmap (...) we went from 4 to 40 funded infrastructures, we now have infrastructures in all scientific fields."* (Responsible for implementing scientific policies)

The national roadmap was created following the European roadmap and during a relatively early stage. It defined classes and launched a request for tender (RFT) aimed at finding priority infrastructures according to criteria and instructions that were similar to those guiding the selection of infrastructures at a European level.

Naturally, the roadmap only formalized some dynamics of building and development of infrastructures that already existed within the scientific community. There were already collaborations and projects within the various disciplinary areas, some of them with national or European funding, aimed at establishing research support infrastructures.

The RFT specified criteria of scientific excellence, of the infrastructure's access plan and a SWOT analysis, and it was also necessary to submit a budget. All of this was evaluated by an international panel. The infrastructures for the humanities and social sciences received less funding than the infrastructures in other academic areas, but this was not due to the RFT's design since, by principle, it did not discriminate values to be attributed to each scientific area. There was no ceiling on the amount of funding that applications could ask for, which led FCT to allot higher funding to the infrastructures that requested the bigger amounts, given

that these infrastructures were integrated into the roadmap. The funding that was requested varied according to what each infrastructure proposed to accomplish. Percentage caps were assigned to specific items (such as human resources, for example).

By the beginning of 2019, it was not possible to make an assessment of the actual implementation of the infrastructures that were considered in the roadmap.

*"It's a bit early to make that evaluation. The RTF was in 2016, but the results only came out in 2017, between March and June. Then there was a complaint from an infrastructure which caused a revaluation of the rules setting the maximum amounts. (...) In any case, this process only finished in December 2017, so they could only start spending in 2018, basically."* (Responsible for the implementation of scientific policies)

When this interview took place, FCT had not yet received progress reports and there is still no information on an update of the roadmap. However, it will be important for this agency to make a general assessment at the end of this funding cycle in order to understand whether it makes sense to maintain funding for some of the infrastructures that were supported previously.

When compared with the European roadmap, the Portuguese document assigns more investment to the social and human sciences infrastructures. Infrastructures from these disciplinary areas that were included in the Portuguese roadmap add up to 13% of the total roadmap funding, which comprises funding from EU (namely, from the European Regional Development Fund – ERDF) and from the state budget.

An official in charge of scientific policy-making believes that a funding cycle of only three years is too short and does not guarantee stability for infrastructures that should have a long-term scope, and which require considerable efforts in their implementation. The fundamental problem is that science is heavily dependent on public funding, which hinders a longer-term view.

*"[Science] is all dependent on structural funds and thinking in a longer term is difficult. There needs to be longer cycles [and] there needs to be an assessment of what the infrastructures are doing."* (Responsible for the implementation of scientific policies)

*"Typically, in the countries where there is a greater reliance on structural funds and a greater need for this bureaucratic articulation, the process tends to drag a little further."* (Responsible for the implementation of scientific policies)

It is possible to describe in more or less detail, and in a more or less descriptive form, what was the situation before the roadmap, and it is also possible to refer to the roadmap as an important milestone in this area. Nevertheless, it is not yet possible to make a fair analysis of what has actually changed with the elaboration of the roadmap, and still less of what will be the landscape of digital infrastructures after this funding cycle, which is still to be finished

One of the interviewees sees a risk in the absence of guarantee that the infrastructures supported by the roadmap will continue.

*"The risk that I see right now is that of discontinuity, that is, the roadmap being viewed only as a 'call' for projects and not as a structuring instrument for the scientific community."* (Responsible for the implementation of scientific policies)

In the absence of a medium or long-term perspective on the development of the currently supported infrastructures there is a risk that, after the efforts made for their implementation and funding, they will be discontinued. Predictability is an important trust factor, and one that the community should be able to recognize in an infrastructure that is intended to support research.

Most of the funding provided for in the roadmap, which was destined for infrastructures, has been placed under the control of regional funds, which may have contributed to increased delays in the process as it generated more bureaucracy and hindered streamlining. Regional agencies in Portugal have a lack of experience dealing with subjects such as research infrastructures, and even at the national level there is a shortage of human resources devoted to this topic.

#### **The national participation in international research infrastructures**

The participation and funding of Portuguese institutions in international research networks and infrastructures is also a topic subject to ongoing changes. The state agency for funding science (FCT – Foundation for Science and Technology) no longer funds the Portuguese participation in these infrastructures directly, but maintains this support indirectly by funding the research units. Research units should allocate funding for infrastructure participation in the funding request that is submitted to FCT, if they consider such participation as strategic for their research work. It is not yet known what consequences this decision will have, i.e., whether Portugal will no longer have a participation in some of the infrastructures and networks it currently integrates. Under the new rules, institutions will be able to solicit FCT for certain costs of participating in networks and infrastructures which, until this change, could not be reimbursed to institutions: such as researchers traveling expenses.

It is part of the FCT policies to appoint the alternate delegate of Portugal at the ERIC General Meetings in which Portugal participates, whereas the national delegate is someone from the institutions that are directly involved. This is how the governmental entity is aware of the national participation in these networks.

*"We always try to have the alternate delegate come from FCT and go to general meetings, even if he doesn't attend the meetings. It's a way of keeping track."* (Responsible for implementing scientific policies)

## Articulation between SSH and technology

Conducting Digital Humanities projects requires the intersection of knowledge from two scientific areas with distinct ground studies: Humanities and social sciences, on the one hand, and digital skills, on the other. Several of the interviewees point out this relationship as one of the important challenges to tackle in the future.

*"There is a kind of disparity between the computer world and researchers [in the humanities]"*  
(Researcher in Digital Humanities)

*"The difficulty lies in creating intersection spaces between the disciplines within the Humanities, and, then, intersection spaces between those disciplines and technology."*  
(Researcher in Digital Humanities)

According to several respondents, the acquisition of digital skills in the training of social scientists and humanists is, indeed, not given a great deal of attention. One researcher refers to the skepticism, which resists in most researchers, about the possibilities that the new technologies have brought for their research practices.

*"For many researchers who work in these fields [humanities], and are very used to interpretive methods based simply on reading and individual interpretation of the text (...), they do not see much relevance in digital methodologies. Often the introduction of a digital methodology seems alien to them."* (Researcher in Digital Humanities)

The solution could lie, as a starting point at least, on introducing courses that address the application of digital elements in the humanities, aiming to familiarize the next generation of humanists with methodologies that use new technologies. One of the respondents in this study was responsible for designing the program for an elective course for all undergraduate degrees in the humanities and social sciences at his university, and he highlighted the need to replicate this solution in other institutions.

*"We designed the course's program so that it had modules representing the digital humanities in history, geography, literature, information science, linguistics. So that there was transversality, in order to understand how these methods are used in disciplinary terms, but at the same time how they can create a space for intersection and sharing."* (Researcher in Digital Humanities)

According to the same interviewee, it is only by creating courses that build bridges between the various traditional disciplines of the humanities that we will be able to, effectively, create a digital humanities discipline.

*"Ideally, humanistic training should include at least one computational element. (...) This would allow most new students to look at the digital in a different way."* (Digital Humanities Researcher)

However, the intersection of all the scientific areas of the humanities, and the desired technological response to their needs, requires a domain of knowledge so diverse and wide that it endows Digital Humanities with a necessarily collaborative character, one that can bring people together from diverse knowledge and training backgrounds.

In this sense, it is necessary to promote the acquisition of knowledge, and the exchange of know-how, between computer engineers and humanities and social scientists. As it has been taking place in other countries, there is a need to increase the number of researchers who are trained in both areas, and know how to create the right links. From the perspective of another interviewed researcher, with training and work in the field of biology, this necessity to train researchers in different areas simultaneously is also felt outside of the Humanities.

*"In fact, those who are the most capable to work on our projects are either computer scientists who, later, learn 'biodiversity computing', or biologists who learn computer science."*  
(Researcher from other scientific areas)

According to one respondent, hiring computer engineers for Humanities projects is, more and more, a necessity, given the difficulty in finding researchers that master all the skills required for the proper execution of projects. Once again, he insists on the urgency of creating collaborations between disciplinary areas, since it is only by exploring the methodological common spaces that new paths for research will be found.

*"Many of these digital skills take time to learn, to master, to know. Much of this knowledge needs to be collaborative."* (Digital Humanities Researcher)

The underdevelopment of this intersecting space between the humanities and computing is still so pressing, and most researchers still look at their scientific fields in such an isolated manner when it concerns the remaining disciplines, that the projects in Digital Humanities that emerge are constantly underestimated. This takes place in an academic context where evaluation is carried out by teams that are not yet sensitized to the collaborative possibilities that are rising.

There is still a long way to go in order to achieve the consecration of a new, transdisciplinary look at the social sciences and the humanities. This view still lacks the validation and recognition of the research teams in these scientific areas.

### **Dimensions of sustainability – durability**

DESIR's central goal is to develop the sustainability of the DARIAH infrastructure. Considering this purpose, we have identified the following topics as dimensions of sustainability of a digital infrastructure: credibility, continuity, accessibility, equal access, interoperability and usability. We will be closer to ensuring the sustainability of a research infrastructure if we develop all these dimensions in a parallel and integrated manner.

The issue of sustainability is mentioned, for example, by a researcher with a deep understanding of the digital humanities landscape. This respondent warns that a digital infrastructure, since it exists virtually, needs a permanent technological upgrading in order not to become obsolete. Therefore, it is essential for an infrastructure to be able to guarantee its continuity to the researchers that, for example, will place their documents and publications.

*"With digital, we may fear that five years from now the work will not be visible, while if we publish a book in a traditional way it will remain in the library for centuries."* (Researcher and user of digital humanities)

This concern is also highlighted by an interviewee with scientific management responsibilities, who points out that this focus on digital, all over Europe, needs to be accompanied by a guarantee that digitized knowledge will continue to be preserved.

*"Several research units have been investing in digital products and initiatives, but how is this data preserved and managed? And curated? Indeed, it is urgent to have a policy that sets rules about it."* (Institutional decision maker)

A computer engineer with some experience in the digital humanities refers to some platforms, where he was involved, that, at some point, stopped receiving funding for their operation, which greatly compromised the preservation of the data deposited there. Even though the repositories continue to exist, the process of updating information stops. This assertion reveals that a fundamental problem, concerning the continuity of research infrastructures, lies in the problem of funding. The same interviewee considers that this notion, that one project needs to follow another in order to ensure the continuity of the funding that is necessary for data preservation, is harmful.

*"Sometimes, this fixation with digitizing and making a lot of resources available online (when there is no real capacity to support it, either technologically or otherwise) is problematic because, in practice, we may be uploading information which will not be available in two or three years."* (Researcher in Digital Humanities)

This problem is aggravated if we recognize that, generally, it needs a big investment in order to build and implement an infrastructure, which can become entirely unused if, with the end of funding, all the information is made inaccessible.

Considering these difficulties, this interviewee argues that the processes of collecting, hosting and providing information should follow minimum standards.

*"What is the main difficulty? If you create a proprietary system, or an exclusive system, for a research project, in five or six years the IT person leaves the project and it disappears. (...) Standards need to be set in order to this preservation duty to be passed on, and in order that a department that preserves one project preserves several using the same rules."* (Researcher in Digital Humanities)

He also considers that *open access* solutions offer, in principle, greater assurance of its continuity. Although *open code* solutions may also be abandoned, or the code may not run in versions that will exist ten years from now, at least it will be possible to access the code and deploy it again.

Another researcher, who has been working on the development of international infrastructures and networks for the life sciences, shares the same thought. In her view, the difficulties in granting stable funding and guaranteeing its continuity are the main obstacle to the sustainability of an infrastructure. In the case of the infrastructures and networks she is acknowledged with, funding has been directed to successive projects, and is aimed at the implementation and expansion of the networks; however, the operation and maintenance of these networks is very rarely financed in a stable manner. The key problem concerns the lack of guarantee that the infrastructure will continue after the ongoing projects come to an end.

This ongoing necessity to secure new funding cycles constantly places this cost-benefit logic at the center: the lack of stability in infrastructure funding – infrastructures which, by nature, take time to be implemented and become actually used by researchers – puts pressure on them to show, on a regular basis, that they are useful, worthwhile and essential to the community – a fact that is not always easy to quantify or express.

This is why, according to this researcher, at the end of each project it is necessary to make a strong investment in the dissemination of networks or infrastructures, promoting them among the communities that can benefit from their services. Funding will be easier to secure once the infrastructure is effectively used by its target community. This view is shared by another researcher (in biology), who identifies the visibility of the infrastructure and the broadening of its utilization as necessary components to ensure sustainability. He further suggests the creation of several parameters – which he calls *key performance indicators* – to measure the use of these infrastructures.

One respondent, responsible for implementing scientific policies, believes that the major issue, with regard to continuity, is, in fact, the problem of research infrastructure funding, which must be continued and stable. He also criticizes an approach whereby infrastructure funding is determined by whether or not it is used by researchers. He considers that an infrastructure can be structuring for science even if researchers do not (yet) use it on a large scale and, thus, it should continue to be funded.

Another respondent, with a role in implementing national policies, mentions a “struggle for survival” of infrastructures, as they need to compete for funding that is scarce.

*“There is a particularly demanding process in building an infrastructure: applying for a roadmap, funding, service activities, setting the status of an ERIC... there is a lot that needs to be done in a context where the numbers are increasing (there are currently 20 ERICs in Europe) and all of them are trying to (...) broaden their support base and involve more*



*countries that can contribute to ERIC quotas.” (Responsible for implementing scientific policies)*

The risk of discontinuing these infrastructures is his main point of concern. He is afraid that the national roadmap for research infrastructures will be seen more as a brainstorming contest rather than a structuring tool for the scientific community.

*“If we do not guarantee that there is a medium or long term perspective for the things that are in the roadmap, (...) they will eventually be discontinued.” (Scientific Policy Implementer)*

The problem of infrastructures’ funding lies, not only in the instability of funding the projects aimed at implementing such platforms, but also in ensuring the payment of fees by member countries or participating institutions. The fact that research units, universities or some countries may discontinue the payment of quotas for certain infrastructures – either because resources are scarce or because such participation does not seem strategic enough to them – is looked upon with some concern.

Once again, the solution relies very much on maximizing the use of infrastructures, encouraging the community to regard them as key instruments for research support, and clearly conveying the message that these tools are pivotal.

A researcher and specialist in digital humanities points out that research infrastructures may see their continuity threatened due to the risk of obsolescence. In his view, tools become obsolete because they do not adapt to new devices or because their interfaces are out of date, losing some of their functionalities due to poor maintenance. The evolution of software and hardware is so rapid that, often, new tools are created that become unusable very quickly due to the lack of permanent updating.

*“We are frantically creating resources, creating files, platforms, tools, but we often don't know how long these files, tools, platforms will last. Sometimes, when they are conceived, they may be born in the context of a research project but, later, they won't have the institutional framework for long-term maintenance.” (Researcher specializing in digital humanities)*

In his opinion, institutional libraries could help answering this challenge of a continuous maintenance of the tools, since one of their fundamental duties is the maintenance, preservation and conservation of the archives, both physical and digital.

This stance is also shared by another researcher, who points out that, as far as digital tools are concerned, there are always updates to be made and, by not doing it, the continuity of what is developed and funded will be compromised. He recognizes that it is quite rare to find a research infrastructure project whose funding is continued. Concerning the preservation and maintenance of these tools, when they have been foreseen and warranted from the start, the problem may arise when the team responsible for that maintenance efforts leaves, or is changed.



A researcher who participates in one of the DARIAH working groups admits that this continuity dimension is not even guaranteed when it comes to the continuity of the working groups. An infrastructure that aims to ensure its sustainability and, therefore, its continuity, must ensure, from the start, the continuity of the services it provides to its users (such as the DARIAH working groups).

### **Dimensions of sustainability – credibility**

A researcher working on the development of research infrastructures in biology and life sciences considers that the key to securing the credibility of an infrastructure – by gaining the trust of its potential users – is to build a tool that is clearly useful for the scientific community. That is, a tool that effectively responds to the needs that exist in that community. In addition, researchers need to identify a positive cost-benefit ratio, which can, at times, be recognized on the account of the scale of these infrastructures: clustering information or tools in order to make them available to a wide range of researchers makes data collection and analysis more cost-effective. The acknowledgement of these advantages easily leads to a high receptivity of these platforms. In the same line of thought, another researcher considers that the use of a digital infrastructure allows to:

*“Use this computing power to make life easier and save time. (...) There is now a reduction in time – a compression of time – for a given result (...) This is the role of research infrastructures, from my point of view.”* (Researcher from other scientific fields)

Digital research infrastructures also need to ensure that the information they provide is itself credible, and subject to validation and certification. The mechanisms required for this guarantee have to be thought through and put into effect by those who lead the infrastructure.

### **Dimensions of sustainability – accessibility**

From the decision makers’ point of view, at a national level, the major concern is ensuring access to all territory and all the research institutions.

Funding by the national agency that supports research aims at the creation of national infrastructures which, then, will have a link with European infrastructures. In this way, the national agency ensures that the entire community has access to DARIAH. The national decision-makers consider that funding for DARIAH is only justified if the infrastructure ensures national coverage.

In addition to ensuring national coverage, European coordination infrastructures should ensure that, within each country, there is no discrimination between institutions. To this end,

the national agency is represented in the management organs of DARIAH, in order to keep pace with the management of the infrastructure.

European infrastructures' goal is to make instruments available to all researchers at a European level. According to this official, the existence of *calls* allows to determine who will have access but, ideally, access should tend to be free for all academic users. This interviewee also suggests a scientific assessment of the projects' excellence: assessors reviewers should define who is doing the most cutting-edge research and who has access to infrastructure's equipment. However, the criteria for accessing the infrastructure should avoid bottleneck mechanisms that benefit countries with more researchers. The size of the countries must be compensated in order to ensure a balanced geographical distribution around the European territory. According to the same interviewee, it is important to ensure that there are clear rules for accessing the infrastructure, (which should not be available only for the researchers of an institution that holds a given equipment and does not allow access to those who do not belong to that institution). In this way, there will be greater trust from the scientific community, which will recognize why such an infrastructure is essential for everyone and not just for those linked to a given infrastructure.

An important issue posed by the Portuguese political representative is the democratization of access to these resources: one of the key indicators for the European Commission in infrastructure implementation, especially at a European level, is the number of access units that are made available to the scientific community through these infrastructures. This has become easier to systematize, to present and, thus, to provide the tools for decision-making and funding that are aimed at certain activities, and, finally, to give researchers access to resources at European level.

From the point of view of the institutions, the emphasis is on access to cultural heritage resources and the need for dialogue with information holders and research units.

The obstacles pointed out by the Portuguese national coordinator are those of negotiating access to information and issues related to copyrights with the national libraries and archives.

At the NOVA School of Social Sciences and Humanities, access to digital libraries and digital platforms is equal for both students and researchers, whether or not there is a contractual relationship with the university. According to the head of the university library, access is more frequent to some of the social sciences, such as sociology, geography and communication sciences. He further emphasizes that the consumption of these resources increases when the syllabus of the subjects contemplates the use of digital platforms and libraries.

The representative of a cultural heritage institution considers that it is important to ensure, above all, the availability of primary sources in an almost immediate manner. These infrastructures make the information available to the user almost immediately. He highlights the importance of ensuring information availability which is accompanied by well-made indexation structures. The quantitative dimension of access to digital humanities

infrastructures is relativized: even though institutions expect thousands of daily users, this expectation is wrong. According to him, the number of users in each of the specific platforms is often quite small. In fact, most research libraries do not have thousands of users either. He believes that the problem of accessibility may be related to the difficulties in finding the information – there are people who do not have this ability. Thus, his suggestion is that, firstly, from a technological point of view, information should be made accessible and indexed by search engines: Google or other search engines, as collectors and information providers, should be used. He even recommended to lose sight of the fact that these search engines are competitive since they are a way for the information to be accessible and searchable on the internet.

Access to archives is also highlighted by a researcher with extensive experience in the digital humanities, but it depends largely on the institutions: while some have a more open policy, others are more zealous of their collections. Access also means power relations. Still, the most important thing is to have a common platform that people can access and, by using the search engines, their visibility (and, thus, their accessibility) will increase. Nevertheless, for this interviewee, this will depend a lot on people's mindset.

A biology researcher highlights the recent pressure for the publication of articles to be accompanied by the publication of the used data, in repositories. He stresses the difficulty of ensuring the four FAIR requirements and the need for data to be sufficiently well supported by metadata, and the need to have a well-documented data table (also by its metadata). One of the difficulties is the very existence of various interpretations of what metadata is. Indexation is what guarantees *findability*. To be *open access* it has to be free, costless and to not prevent the reuse of that information for other purposes – this is what defines *open access* but, normally, FAIR requirements are not met.

Also in regard to *accessibility*, an important obstacle relates to the size of the country's scientific community. In some disciplines the number of researchers is rather small, which makes it difficult to justify the national funding that ensures access to the infrastructure.

Accessibility is facilitated through training. However, training must take into account that “*today's tools are not tomorrow's tools*”. It is important to teach people how to think about tools. This interviewee recommends using free, fully *open access* tools, because all the tools for a determined purpose follow the same reasoning. The key problem lies in being able to train people to use the tools, whatever they may be. It is important to develop the ability to learn how to use them, and to think of them as a means rather than an end in itself.

This interviewee also points out that Europe defends the paradigm of multilingualism, but the language issue is still a problem and not everyone speaks English.

### **Improvements in accessibility and support from institutions**

One of the interviewees, responsible for digital humanities in a university, states that the initial strategy followed by some institutions in the United States was to create electronic text

centers, which later evolved into centers of technology applied to the humanities. The most pioneering cases were the Institute of Advanced Technology in the Humanities, at the University of Virginia, and the Maryland Institute for Technology in the Humanities. These two institutes functioned as the model that was later replicated at many other American universities. In all these cases, the centers of digital humanities worked from the library of one of the departments (which was one of the university libraries). The center was hosted in this library – which had its own permanent staff, a director, a minimum core of coordinators – but it also had a permanent staff of programmers and computer engineers. University funding was granted through a *call* for proposals, to which the researchers working in humanities would apply with the projects that required such a technical element. It would then grant them *fellowship*, in that institute, along with the financial means needed to develop their projects in such a technical environment, for a year or two. This is an example of a functional model in the sense that it comprises a group of people who are aware of technological progresses that may be applied to the humanities. There is a group of researchers who are hired to collaborate in these projects and who will, then, constitute interdisciplinary teams whose members can have backgrounds from history, computing, literature or archeology (for example). The way the center was designed was to promote, not only those who brought new ideas, but also the intersection and interaction between different disciplines. It makes sense that the library, as a space on campus aimed at intersecting different forms of knowledge, can play a role in promoting this kind of work. Also because, much of what goes on, from a computer or informational perspective, has to do with cataloging, indexing, search, metadata. The dimension of information science is the most important in this work.

### **Difficulties in accessing digital platforms**

According to a responsible for digital humanities in a university, the main obstacle is to create intersection spaces between the different disciplines within the humanities, and intersection spaces between these and technology (which holds its own set of competencies).

This respondent exemplifies some of these difficulties based on his own experience with the design of a platform aimed at supporting teaching activities by secondary school teachers. As part of this project they developed a set of workshops. One of the platform's functionalities was virtual publishing – “virtual publishing” used in a very broad sense – and they set about publishing an anthology. Some of the texts of Fernando Pessoa’s “Book of Disquiet” were chosen, organized and annotated. The teaching population was quite aged – the majority being over 50 or 55 years old – which resulted in some resistance to these activities. Although all the participants were familiar with digital social networking, it is more difficult to think of a platform which can be used in a classroom context and which can be adopted as a teaching tool. Therefore, there was a lot of resistance from the teachers in order to transpose the platform for a teaching context. In part, this resistance had to do with the difficulty in devising strategies to “convert” a platform that already exists for a teaching purpose, and at the same time think of other different strategies. The platform itself suggested modes of interaction with the text (games were introduced, for example). Resistance was not only related to age

but also to a “mental disposition”, that is, the idea that, in the school, there is an institutional framework. Changing the practices that are applied at school is very difficult, there are limited times for everything that is done. A common remark was: “if I try to use this to teach in my classes, it will require a much longer preparation time”. Furthermore, there were concerns about doing something new without the certainty that it would work – when people used the platform in the workshop there was a general feeling of “fun”, but then they would not use it in class.

This interviewee started using digital materials, platforms and resources in the 1990s and, in 2003, he already had entire courses that relied only on the internet. All of its resources were available only on the Internet and many of these electronic resources, notably the new editions of some works, were considered better than those available on paper. Therefore, from a scientific and quality standpoint, the work would be better accomplished. At the same time and regardless of this, nobody else was using those resources (a situation that remains more or less unchanged). People make little use of the valuable electronic resources that exist and, if they do use it, they will do it occasionally rather than systematically. The reasons for this are related to the mental disposition of the person: at the end they are more likely to be familiar with books, which they got used to handle. There is a resistance to using electronic resources because, for them, there is a very demanding component. While a book will have a completely familiar interface - “no one will ask how a book works” - an electronic resource will have its specificities – a certain structure, a search engine, a way of searching for something, etc. There is always a moment of exploration that is needed before the user becomes familiar with a new resource, and then become able to reproduce it in teaching or research.

*“This step is often dismissed because the teacher already has his own habits, his methods, and he will not get out of these habits and methods. This is not to say that no one pays attention, because I think there are people who give, and make the effort, but, by 2019, I would expect to see a lot more electronic resources being used as teaching and research tools than I believe they actually are.”* (Responsible for Digital Humanities)

### **Dimensions of sustainability – equal access**

Equal access is understood as a guarantee that a Digital Humanities’ infrastructure can be used regardless of the employment status, the contractual relationship with the institution, gender or age.

Age does not seem to be an important indicator in order to explain access to infrastructures. From the interviewees’ perception it is possible to assert that, although younger people are more at ease with using digital media, this “easiness” does not necessarily translate into greater utilization of research infrastructures.

Even when it comes to biology infrastructures, one of the interviewed researchers believes that the access to platforms has no such issues. The difference in access will be noticed in

people who do not have access to digital tools and the internet in general. However, another respondent in this area considers that, even if access is the same for everyone, there are differences, which are linked to the scientists' experience and to their ability to use the infrastructure. For example, some infrastructures can only be properly used by a master student if he/she is mentored towards the tool by a senior researcher – and this is part of the researcher's own growth process.

Another researcher bases his answer on the results of a survey carried in his college in which it was concluded that age had very little influence. The survey revealed that 70-year-old senior researchers had a reasonable use of digital instruments whilst some researchers belonging to younger generations would not have the same ease. In principle, access is universal, but if the researcher does not know that infrastructure exists, he can never use it.

Another researcher with extensive experience in the use of digital methods considers that the utilization of these methods has more to do with how one looks at research – as in, if one looks at it in a more collaborative way, i.e., if the issue of having to deal with other people, who bring this mentality of the digital humanities, comes up – rather than it is an age issue.

*“You can find people, who have this spirit, in their 50s and 60s – meaning that they already have a stabilized and consolidated career – as in younger people. To me, the opposite also seems to be true, that is: you can find people (...) with a more... let's say 'secluded' vision – a more individualized approach to research – either in older people, with an already established career in the academy, as well as in the younger ones, that are just starting out and have a different view.”* (Researcher with extensive experience in using digital humanities).

### **Dimensions of sustainability – usability**

Usability is another criterion that ensures the sustainability of a digital platform. The Portuguese national coordinator underlines the importance of platforms having clear, easy-to-read and user-friendly content and objectives, and being a “space” where the tools and the activities that are conducted can be easily found.

The coordinator of a university library raised the interest in conducting usability tests on DARIAH's webpage (following the example and the results obtained by similar analyzes performed on other digital humanities' platforms that are available at the college). She argues that usability tests allow: to identify problems and resolve them; to understand if the users' difficulties are related to the tool itself or if they are just communication and dissemination problems; or if researchers simply do not know that the platform exists.

### **Dimensions of sustainability – interoperability**

The ability of infrastructures to articulate their work among each other – in a logic of interoperability, rather than operating isolated from the rest – was another dimension taken into account, regarding the sustainability of the infrastructures. One of the interviewed



researchers highlights the importance of research infrastructures, including repositories and information archives, to communicate with each other in order to expand the accessibility to all the digitally available information. In the same vein, another respondent, who works in the implementation of scientific policies, recognizes that it is imperative that infrastructures work together and avoid overlaps, especially when funding for these tools is scarce.

*"There is an overlapping problem, regarding the fields of action of infrastructures, which is not being properly addressed (...). Infrastructures operating in the same areas must be coordinated with each other because there is no point in duplicating efforts."* (Responsible for implementing scientific policies)

Another respondent, also working in scientific policies, refers as well to the necessity of infrastructures interoperating with each other in order to become truly useful. According to him, it is only through dialogue and articulation between the infrastructures that:

*"the conditions, for any researcher to access much more information, and produce knowledge from it in a shorter amount of time, can be created."* (Responsible for the implementation of scientific policies)

Furthermore, he considers it inevitable that, at some point in the future, infrastructures will start to aggregate, or at least to present a common and unifying facet, in order to become more useful for researchers.

Another respondent, in charge of a library in a higher education institution, drew attention to the overlapping risks that can occur in infrastructures which provide the same service, resulting in the multiplication of (implementation and operational) costs without any real benefits being added. This interviewee refers to the existence of "vertical" and "horizontal" infrastructures: the former being those that seek to respond to the specific needs of a scientific community (DARIAH is included in this group because of its focus on the humanities and arts community); the latter being those which offer services and tools that are useful across the academic community. In his view, vertical infrastructures, such as DARIAH, should seek to match exclusively the most specific needs of their focus communities and avoid duplicating the services that can be provided by infrastructures targeting a larger audience.

*"Regarding DARIAH, what needs to be grasped is in which tools and areas there are, in fact, no horizontal alternatives and the needs are, indeed, very specific."* (Head of a university library)

A researcher in the area of biology and life sciences states that, in these disciplinary areas too, the interoperability of research infrastructures is crucial, so that it is possible to crosscheck data that is found in several archives and databases – and which require an actual cross-checking in order to become subject to analysis.

*"This is a fundamental point (...), which is to ensure interoperability between the information that this infrastructure deals with, with other information that is being analyzed by other infrastructures."* (Researcher from other scientific areas)

In the field of life sciences, the researcher exemplifies by pointing out that there are infrastructures and databases that, each, store distinct information when, in fact, it would be necessary for them all to cross these data in order for it to become readable.

### **Implementation of a research infrastructure**

The head of the national agency responsible for scientific research funding points out that the roadmap only contemplated funding for equipment, contracting and human resources. For him it is important to improve the sharing capabilities between national and European infrastructures, by bettering the participation of the national scientific community in European infrastructures.

### **Addressing current funding constraints: appropriate funding for participation in international networks**

According to the head of the national agency responsible for scientific research funding, there is a lack of funding to cover some of the infrastructures' costs held by institutions, such as the costs of attending international meetings and the costs of maintaining equipment. Research units may contemplate the payment of (infrastructure) fees whilst, currently, not covering the costs of participating in the infrastructure's meetings, management organs, or even of the human resources that are dedicated to linking the national infrastructure with the European infrastructure of the same domain.

In addition, state laboratories and directorates-general that participate in international infrastructures are not covered by funding because, technically, they are not units funded by the national agency that supports research activities. The current limitations to funding could be resolved by the creation of a specific tender, financed directly from the state budget, to cover the costs of participating in international networks (including European infrastructures).

An example can be found in infrastructures which receive funding from the national agency, but where the expenses that the infrastructure is actually required to incur are not covered (for example, social sciences needs can require the reinforcement of human resources whilst other scientific areas may consider more important to upgrade the equipments). It would also be important to create funding pockets aimed at assuring that infrastructures can fulfill their international duties. The European Social Survey is a paradigm of this situation. The Portuguese government has pledged to participate in the survey but the funding necessary to cover these costs, allocated to the institution that was put in charge of conducting it, is not enough – because the costs are related either to contracting services (e.g. the costs of the survey itself), or traveling expenses.



### Infrastructure Assessment

The same interviewee considers that the agency needs to do an assessment of the infrastructures, once this funding cycle terminates. This will make it possible to decide whether it is important to maintain funding for all of the infrastructures that are comprised in the Roadmap. Some of the elements that will need to be evaluated are: realizing if the infrastructures are actually reachable by the entire community of the country, and whether they are serving the institutional or regional community.

### Infrastructure Sustainability

This officer further argues that funding cycles should have a longer term, over three years. Short financing cycles cause greater instability when infrastructures should have a long-term scope. As science funding is dependent on structural funds, long-term thinking is difficult.

In the context of European infrastructure policies, the subject of the sustainability of infrastructures is much discussed because it is a cross-cutting problem in many countries. The need for conciliation of financial instruments is widely recognized: while European funds have certain rules and determined cycles, national funding rarely fits into the European frame.

For the head of this national agency, another problem that is not being tackled, is the overlapping of the infrastructures' focus areas. The infrastructures operating in the same areas must coordinate with each other in order to avoid duplication of effort. In the infrastructures of the social areas, the scopes of DARIAH versus ENRICH, or CESSDA versus ESS, are not defined. There has to be a clear understanding of what is the role of each infrastructure, in order to avoid overlapping their field of action and overcoming possible vested interests of the institutions that manage these infrastructures.

One of the persons in charge of implementing scientific policies considers that ESFRI has a well-defined funding process that lasts a maximum of 10 years: from entering the ESFRI Roadmap to the actual implementation. Similarly, an interviewee with extensive experience in digital infrastructures in other scientific areas describes the various phases of building an infrastructure. For him, in the first phase, it is important that the community has already some maturity, from a scientific point of view. It may be a network (a European network), but that network may come at a time when higher levels of integration are demanded and, thus, they will create integrated activities. Through these integrated activities, the willingness, and the available conditions, of the community to form the infrastructure are assessed and, then, it is proposed its entry (still in a project phase), into the ESFRI roadmap. If it is accepted – in this first step the application is evaluated essentially for its scientific and “capability” qualities – it will then enter the Roadmap and pass to a preparatory phase. The next step is building the infrastructure and, finally, it should be able to become an ERIC, or some other legal figure (ERIC is one of the possible legal procedures to build an infrastructure, but other models exist). It has, then, become an implemented infrastructure, a “landmark”. This process is needed in order to set the infrastructure. It has scientific but also organizational aspects:

definition of bylaws, form of participation, setting of quotas, financing, etc. The construction phase is also the operationalization phase: definition of services that should be provided, responsibilities and roles.

### **The example of the European Strategy Forum on Research Infrastructures (ESFRI)**

A representative of a national institution and a researcher, both with extensive knowledge of ESFRI infrastructures, point out that the process for setting up an ESFRI is very well defined: the new infrastructures, emerging or still in a proposition stage, start receiving funding for their conception, for testing and for *info concept*. Nevertheless, for one of the interviewees, the first step is to have a community that, from a scientific point of view, already shows some experience and maturity. It may be a network (a European network), but that network may reach a time when it aims for a higher level of integration and seeks to promote *Integrated Activities*. These can come at a time when they are assessing whether they have the conditions (and willingness within the community), to move towards an infrastructure. After, they can propose the entry of this infrastructure as a project for the ESFRI roadmap. This first step is an application that is evaluated essentially from the scientific point of view of its experience. Some technical aspects of implementation can also be taken into consideration, but at this stage they are not essential. If accepted, then it can enter the roadmap and go through a preparatory phase, followed by a construction phase, before it finally becomes an implemented infrastructure. From its entry into the ESFRI roadmap until the actual implementation, funding can be maintained for 10 years but it cannot exceed that period. When this period is over the infrastructure must be self-sufficient and needs to be maintained by the member states. This is the time that is considered necessary for the infrastructure to become fully prepared regarding its scientific goals – defining how they will provide services to the scientific community – but also its organizational structure – setting its bylaws, forms of participation, quotas, funding strategies, etc.

The same interviewee exemplifies with an infrastructure in the field of Chemistry which operated through a partnership of the Department of Chemistry of the University of Porto and the Department of Chemistry of Nova University of Lisbon. In this case, efforts were joined before something new was created – there was an information sharing platform that lasted for years. Researchers used it and established working habits which lead to the recognition of the platform as being very useful. Then, the research units and colleges began paying for the infrastructure on their own. The respondent believes that this should be the optimal way of implementing an infrastructure.

In summary, the respondents with experience in the implementation of research infrastructures consider that this process is a result of the experience demonstrated by the scientific community. Its lifetime will be the result of the partnerships that are established and the creation of information sharing platforms which are truly functional and which have users who recognize its usefulness. Based on their experience in this area, these infrastructures will then become funded by the research units and the faculties themselves.

## Open access and open science

### Open Access Implementation Difficulties

The head of a digital humanities infrastructure that was interviewed in this study pointed out several difficulties related to open access: the difficulty in bringing together such divergent interests as those of national libraries, national archives and universities; copyright issues (e.g. large publishers that do not allow open access to their contents); privacy of individual rights in some social sciences; quality control of the tools that are made available; and the quality assessment of databases.

On the other hand, the head of the university library focuses on the problems that result from scientific policies not being compatible with the publishers' editorial policies. If, on the one hand, researchers must publish in open access, on the other hand, they may have responsibilities towards publishers that contradict their obligations to their funding institutions. In addition, the rules are not the same in all countries of the European Union: the legislation of each country, the policies of each funding entity and of publishers can differ.

For the head of the national repository, funding for infrastructures that allow open access is also an obstacle in Portugal. In the case of the RCAAP project, funding constraints caused some jolts, particularly during the crisis when it was kept to a minimum (even though, since it is a small budget project, RCAAP was able to keep afloat). Regarding open data access, about two years ago the State Department for Science and Higher Education promoted initiatives for the management of research data in Portugal – namely for *long tail* data (which do not have infrastructures contemplated in the roadmap that aim at their management) – and also for the training purposes. According to him it was already set a clear concept and a training program but, even though the costs were not very high, these initiatives did not happen due to lack of funding.

### Difficulties related to plagiarism and copyright issues

The head of the national repository points out that during the information and dissemination sessions about open access, the problems posed by the participants were the following: plagiarism and copyright. Being a very recurrent problem in the beginning, plagiarism is a less frequent issue nowadays. There is now a more common awareness that bigger openness allows for easier detection of plagiarism. As an example, the respondent states that the university that he works at has withdrawn a doctoral degree to someone because, by being obliged to deposit the doctoral theses in the repository, it was possible to prove that that person had plagiarized his/her doctoral thesis.

The issue of copyright remains a real problem nevertheless (even though people tend to overstate its importance due to lack of knowledge). Often publishers use a tactic known in political science as FUD – fear, uncertainty and doubt – whereby conditions are changed hindering people from knowing what can or cannot be done during the embargo: if they need to use the publisher's pdf version or if they have to use their own. Publishers create obstacles

which make people afraid of acting against the standards that they have set. The responses can happen in both extremes: people who are very afraid and abide by the publishers' policies, and others who are not afraid at all.

### **The specificity of the social sciences and humanities**

For the university library manager, there are issues related to open access that do not make much sense when it comes to other European infrastructures in the field of exact sciences or technologies. While such infrastructures benefit from the fact that researchers already have experience with information sharing, social science or humanities' infrastructures, they still have to discuss these issues in the first place. In this interviewee's opinion it is necessary to distinguish between open access to publications and data. The work regarding open access to publications is already accomplished and just lacks implementation. There are enough infrastructures and know-how to conclude this process, what still remains to do is changing the attitude of researchers.

### **At the national policy level**

According to the head of the university library there is not a national policy *per se*, but there is a policy of the national agency responsible for science funding which follows the obligations imposed by the European Commission ("...and therefore, if the two main national research funding agencies demand it, then we have to do it").

### **At the level of research institutions**

The head of a university library states that the faculty where she works is a good example in the adoption of open access policies. The faculty has issued a mandate from FCT and a mandate from the European Commission urging the deposit of publications, at risk of some consequences. Despite being a top-down decision, open access requirements are being met which has resulted in high success rates for the open access to publications. In the case of the repository, the faculty did not exactly required researchers to adopt specific rules for depositing their work – some universities have very specific mandates, such as only allowing researchers or teachers to be evaluated by the scientific output that they have made available in the systems.

### **At publisher level**

In the same interviewee's opinion, currently, most of the renowned commercial publishers have already defined open access policies. The main problem for social and human sciences, in general, is that most of the structures where they publish do not have definite policies, since they are non-commercial publishers, associations, foundations, or other such entities. While major commercial publishers define embargo periods during which publications cannot be accessed without payment, small companies do not have the know-how and knowledge to define a copyright policy which, in its absence, leaves publications without permission to become available in open access.

### **Data open access**

This officer believes that open access to data hardly exists in Portugal. According to her, there is still a long way to go, and there are not yet infrastructures – or there are few – that can provide researchers with the tools to make their data openly available. Those that exist are poorly disseminated and, furthermore, researchers are still grasping open access to publications.

A user of digital humanities tools considers that the open access culture is highly dependent on the institutions: some have more open policies while others are more zealous of their information. This kind of mentality tends to be perpetuated because institutions are very zealous of their items, of their assets. For him, the main point is convincing, or making people realize that spreading information is important and, above all, to have a common platform that people can access and, thus, increase the visibility of this information. More important than writing an article and storing it, is to computerize it and make it available to other researchers. Sometimes it is difficult to convince researchers of the benefits of making information available, which will depend a lot on people's mindset.

### **Difficulties in defining open access**

This manager of the university library considers that it is necessary to define and clarify what is meant by open access. Many researchers find it difficult to understand how a commercially published book can be made available in a repository. They are unaware that most publishers have open access policies and well-defined copyright policies. Sometimes difficulties arise from issues that have much more to do with technical aspects. In order to answer these questions, the faculty has developed a procedures manual, entirely technical, explaining how the embargo period is defined, for example. The difficulties in defining best practice manuals for open access lies in the diversity of legislation and copyright regulations in each country.

### **Increased visibility to open access and information digitization issues**

The head of a digital laboratory believes that there has been a considerable number of open access initiatives and digital oriented Roadmaps, that have been promoted in recent years, as well as meetings to improve digital skills (e.g. INCoDe – an integrated policy initiative dedicated to strengthening digital skills). For him, the visibility of these issues has increased in the digital humanities and social sciences.

### **The National Repository, example of an Open Access initiative**

For the head of RCAAP (Open Access Scientific Repository of Portugal), since 2007/2008, there has been some investment in the area of open access. The very creation of RCAAP was a very relevant initiative. Another recent and most important moment was the definition of the digital infrastructure roadmap, because it represented guidance and funding.

The RCAAP was created in 2008 as a joint initiative of political agents working on scientific issues and the university that promoted it. In 2002 this university had created the first

institutional repository in Portugal before, in 2008, RCAAP managers started working on different of European infrastructure projects. In 2010, University of Minho became the coordinator and national node of the Southern Europe Region of an open access European infrastructure, and was also involved in the coordination of the project and in several of its *work packages*. In addition, they are also involved in European projects related to the development and coordination of open science policies, and open science training projects (such as the FOSTER project, which they currently manage).

According to this interviewee, the determining factors for the successful implementation of the RCAAP were, on the one hand, the great institutional support received from the university's rector, since the outset, and, on the other hand, the documentation services having a very dynamic and committed team.

For him, one of the differentiating elements of the University of Minho is the focus on open access. From the outset, the rectors realized the usefulness of the repository and included this infrastructure in their strategic vision, assuming a role as a core infrastructure inside the University. By the end of 2002, the university had to deal with an increasing number of theses and dissertations handed in a digital format. At the same time, the concept of an open access institutional repository was released. The interviewee made an application for funding for the repository but, even though it was approved, the funds took a long time to arrive and the university decided to take the steps on its own. At the time, the university had a strategic statement verbalized as "university without walls", and the repository project fitted very well in this strategy. The Rector realized that there was an advantage, in terms of visibility, for the institution in being a pioneer in this field. Dissertations that are available in open access have, on average, more citations and more visibility. It started to happen, also, an "anecdotal" coincidence of people who contacted University professors stating that they knew about their work through the repository. Thus, the Rector integrated the repository into the University's strategic plan, as did the following rectors.

The University of Minho is known for being a pioneer in open access not only in Portugal but also internationally, and this was recognized by the institution. Last year a final step was taken, which was the linking of the repository to the teachers' evaluation system. Now, the publications that are taken into account for teacher evaluation purposes have to be present in the repository. Furthermore, the departments were given a financial incentive by the Rector, according to the number of publications that each placed in the repository.

Teachers joined in different ways, depending on their scientific areas. Although there are exceptions, adherence by those in engineering and exact sciences is easier than in the humanities. In this regard, Law remains a difficult area, where there is greater resistance to adhering to digital.



### **The paradox remains: adherence to open access and methods of evaluating scientific production**

According to the head of the national repository there is a big paradox: on the one hand, universities often advocate adherence to open access practices while, on the other hand, teachers' evaluation continues to give more importance to publications where there are impact factors (which are dominated by a private and rather closed system). According to the rules of this closed system – which hinders openness – the validation and assurance of scientific quality is given by the scientific community. There are incentives and reward schemes that evaluate researchers in other types of systems. Nowadays, researchers still have incentives to use closed publishing systems, which is becoming an increasingly recognized issue at an international level: it has long been argued that people should not be evaluated for the impact factor. Even though it can be a reasonable metrics for understanding the relevance of a journal, it is not good metrics for evaluating people or research units.

The head of the national computing agency points out that this problem does not relate to all publishers, but to the major publishers that have managed to position themselves in a prestigious market and, above all, keep the researchers' copyrights. In essence, the taxpayer pays the building where the researcher develops his work, pays the researcher, pays the researcher's project and pays many other scientific expenses, whilst, in the end, the researchers' copyrights are handed over to a publicly traded company, such as Elsevier, that will sell it back to the public once again (and then will sell it to Africa, Asia and America). Ultimately, the taxpayer is paying twice: he pays for the researcher's work, then he pays the researchers so that they can pay to publish, and in the end he buys the articles from B On (pay to read). These companies can even use other devices, such as placing an article in the so-called hybrid journals, which have open access articles and restricted access articles. Despite the fact that 30% of the journal is already open access, the journal will still cost the same and will increase every year by 3-4% which, according to the interviewee, is utterly unsustainable.

### **Important initiatives aiming to tackle difficulties in joining open access**

The head of the national repository considers that the path to attain a widespread adherence to open access will have to encompass training and empowerment of people. Much still needs to be done in terms of promotion and training. There are good examples of universities and teachers who promote the use of these platforms, among the students. It is often the teachers who spread the word, encouraging students to register.

At the same time, infrastructures need to improve their usability. In many cases, its usability is mediocre and unintuitive.

The same respondent highlighted the initiatives that aimed at solving the difficulties of joining open access. For example, the European Association of Universities held a workshop about scientific assessment during the phase of transition to open science. Another example comes

from universities that have already started promoting initiatives that move away from metric-based assessments, since it was recognized that quantitative assessments need to be combined with qualitative assessments (e.g. Ghent University). However, although the discussion has already started, it should still take some time for real changes to take place.

This manager referred to the *toolkit* as a tool for promoting open access. It is a set of ten courses on various aspects of open science. They are rather generic but offer disciplinary examples from all areas of both life sciences and humanities. For example, an open access module explains what are institutional, disciplinary repositories, etc., and has examples of disciplinary repositories from all areas. In the case of RCAAP, training initiatives are limited (also because RCAAP funding is low) but they have been horizontal (that is: generic).

This manager also points out the launch of another platform in 2019 – the *Open Monograph Press* – which promotes the dissemination of the digital versions in open access. In some cases, it is maintained a paper edition for commercialization and a digital version for open access. In 2020/2021 it will be launched a support platform for distance learning, with a bigger focus on more interactive resources: it is enhancing publications, which may have links to content that is dynamic.

### **The need to innovate in scientific communication**

According to the same interviewee, scientific journals are, to a large extent, the same that have always been. They were created to facilitate communication between the research communities because, before scientific journals, communication was made through correspondence. What the first scientific journals did can be considered almost as a continuation of the letters – even though they started publishing articles some of these were almost the same as the old letters. Letters ceased to be effective when the community expanded and, instead of three people, there were a hundred studying a subject. Nevertheless, it was still a matter of gathering a series of articles, packing them in a bundle, and distributing them. Scientific journals have made it possible to share the research and promote the dialogue among the whole community. In this sense, the journals created the communities: they created knowledge areas or helped to structure them. That made sense in the physical world. Today, with the digital revolution, journals are increasingly straying from the necessity to wait to have enough articles to publish. Publishing articles in a continuous flow is becoming more frequent. It is also changing the very form of the article: it is probable that the long, narrative article, in some scientific areas, no longer makes sense. What makes sense is to have short scientific statements, with explanations of experiments, methods, tests and results, and which can fit on one or two pages.

This interviewee questions the very notion of a scientific journal since it is currently possible to have other channels of information. The proposal that was made by the head of the national repository, aiming for funds from the European Open Science Cloud, is to create a pilot for a new publishing platform. The underlying metaphor of the proposal is the following: *what has happened to music in the last thirty years?* The proposal is based on the adoption of the same



procedures that, in music, led to the replacement of the physical record by the digital formats, which can be easily shared among peers. This paradigm can be replicated in scientific information, and have different types of dissemination channels other than the journals. This requires the platform to accommodate each user's contributions, scientific articles, and research, coupled with a form of community validation. For example, there is more and more talk about using open peer review instead of closed peer review, and post-pay instead of pre-post. Currently, in 99% of cases, peer review, as well as the whole editorial process has no cost. It is the researchers who contribute their time. The main cost is the infrastructure itself. However, this proposition aims to use the institutions' infrastructures, which are rather sustainable and should be durable (such as, for example, *data centers*), and create links (or federations) between them. Funding can be done by consumption – as it is currently the case with scientific journals. That is, if one wants to read or publish, in some journals, he/she needs to pay; or else, it can be incorporated into the research model itself. The European Commission on its own, when it has a project, already assumes that there are infrastructure costs, which then become directly financed (so it does not have to be paid directly by the researchers).

The proposal is based on the idea that the repositories of these smaller infrastructures should continue to be supported by the universities. Therefore, the deposit service would be decentralized and the *peer review* service would be under the management of a higher institutional ranks, which would be also responsible for disseminating it. In practice, an article on digital humanities is deposited in the university repository, which is linked to this communication platform. The article, when deposited, creates a notification that is sent to a central platform. Reviewers are then invited to review this article and they can make comments on the central platform (which will be also visible in the source repository). This article, once validated, may be included in various dissemination channels – these may be the Portuguese journal of digital humanities, or a list of articles that the researcher has selected to read; or it may even be the University's selected list of articles, which works as a way for the institution to showcase its best works. Thus, there may be communitarian scientific channels, which are journals or journals-like media; dissemination channels that are personal; and dissemination channels that are institutional.

### **Difficulties in implementing open access policies at an institutional level**

The director of a NOVA School of Social Sciences and Humanities sciences stresses his commitment to an open science policy. Among the institution's most important actions he highlights the investment and coordination of a digital humanities platform – which brings together a number of other entities and will involve a big effort in hiring human resources – and also the acquisition of materials, including computer equipment. Another initiative is linked to the directory of digital repositories, of which the Faculty is a member, along with FCT and FCCN. According to him, in addition to the Faculty's adherence to policies of open access, it is necessary to change mindsets and habits of a complex and diverse community that, regarding the digital technologies, is not always prepared to react with the speed that

the new times require. Also the size of the institution is a further obstacle hindering the implementation of policies and measures, even when they are identified as strategically important. Thus, there is a difference, in manner and speed, of how these stages unfold: one is the mental and political stage of commitment; another is the execution, implementation and even consolidation of these policies.

### **The adherence to open access and the issue of information management and curation**

According to the same interviewee, solutions to a science-wide problem of data management and curation need to be found. The European Commission already encompasses such demands on research projects, i.e., the researcher has to state how he intends to preserve, manage and curate the data. This is a concern that is inexorably embedded in science and research policies at a European level, and is being transferred to the institutions. According to him, several research units have invested in digital initiatives and products, but rules must be set for the preservation, management and curation of these data. These changes need to be implemented gradually because they involve cultural, mind-frame, and systemic issues. People have to understand why they are being asked to follow these changes, and what advantages come with it. Sometimes they realize it is not so much by words or speech, but through examples.

The director of the NOVA School of Social Sciences and Humanities considers that one of the problems with the implementation of open access policies concerns the difficulty of uniting the existence of a European policy, which encourages open access, with the existence of publications that have commercial purposes and in which access is not open. There is a commercial system where, it seems, people are presently starting to pay to publish, and which, in any case, you already had to pay in order to read and consult. The system seems subject to some schizophrenia. On the one hand, universities are being challenged to adhere to this kind of policies (and even to compete for public funds in order to implement it), but on the other hand, articles are published in journals that do not have open access. Universities, in order to provide access to their researchers and students, need to pay for the subscription to these online databases.

### **Open Access Software**

A user of digital humanities infrastructures argues for the existence and use of open access software, but calls attention to a problem that concerns both the compatibility of differentiated digital media, and the possible absence of updates which are compatible with these digital media. For example, a new version of software may require updating the formats in which the information was stored, in order to be able to be utilized in that software. Within the area of digital repositories open software has been widespread, with some non-significant modifications in specific cases. According to the interviewee's personal experience, open access software is being used more and more, which facilitates information integration, and simplifies information migration, changes, and the integration of different resources. Without these systems (which are used by everyone) information would have to be transferred

otherwise, sometimes manually, which in many cases is an impossible task given the volume of information. This (relatively complicated) process is facilitated by open source tools.

Another user considers that, even at a computer systems level, open source is not the solution to all problems. According to him the biggest problem is the willingness to share the data. If this willingness is there, with more or less work there is always a way for systems to communicate. Naturally, using only open source software will, in principle, make it easier. However, it poses the problem of sustainability because the software itself can become outdated, and because there is also the risk of it being abandoned due to the funders having found other priorities. In commercial software these risks also exist but, in principle, there is a higher level of guarantee.

### **Open access in other scientific areas**

A biology researcher and user of the digital infrastructure PORBIOTA considers that there is a great deal of pressure from the European institutions for all that is publicly funded to have open access. However, access to information may vary within the scientific community. In her experience, a researcher may not want to provide all the information; or not provide it with all the details; or the information being available in a specific standard, rather than allowing equal access for all. The interviewee points out that there is some resistance caused by the fear of making "personal" data available which then becomes used by other researchers. Another area that is now trending at the Faculty of Sciences is *citizen science*, which can also be a valuable tool to integrate since there are some institutions that are promoting it. *Citizen science* is defined by the fact that it is the ordinary citizen that collects information, which, once validated, can integrate the platforms. It could be very useful to make the different areas of society realize that the information is stored in this platform and have them disseminating it. In order for this to happen a good outreach work needs to be done.

### **Open Access: A Top Down Decision**

Another user of digital humanities infrastructures considers open access to be a top-down reality that cannot be escaped, either through EU indications or through the national agencies. There are issues, notably *copyright*, and the researchers end up being "the ant amidst the storm." Researchers become lost because the standards vary from journal to journal, and there are contractual and legal grey zones that researchers do not always know or master.

The head of the national computing agency stresses the key role that policy makers play in the affirmation of open science. According to him, a decision maker with a well-structured and modern way of thinking in this area can make a difference. Open access, particularly for open data, requires significant change. Following his participation in various open science events, he points out the opinion of a genetics expert who considers that 5% of the science budget has to be to manage data, to cure it and maintain it. However, there are no research

units that would be willing to pay these amounts at the present day. For him it is a long process and one of the most difficult areas is the area of social sciences and humanities.

The same interviewee refers to an appeal made by the current minister for the development of open access policies. In his institution, the next step will be to grant access to open data, from the open science perspective, which will take place through the implementation of a data repository. He refers as well to a European infrastructure where Portuguese researchers can deposit their data, which is available in a FAIR mode (or at least Findable and Accessible, it does not guarantee that it will be Interoperable and Reusable).

At the international level, the European Commission will increasingly require data to be deposited in the ZENODO, or a deposit which they recognize. If possible the data should be FAIR. The European Commission's current motto is "as open as possible, as close as necessary".

### **The specificity of the social sciences and the humanities**

This manager considers that the areas of social sciences – concerning more the humanities than the social sciences in itself – often have to deal with the problem of their objects of study requiring the collection and production of very valuable data (whether paintings, maps, written works, etc). Many, such as music and artworks, are protected by copyrights. Therefore, the object of study has a value and that value is protected by law: which means much more regulation. In other scientific fields benefits often come from the accumulation and concentration of data. For example, data on earthquakes is intrinsically shared: if there is an earthquake in Japan, after two hours the Portuguese seismologists will have all the data. In other areas it happens almost the opposite.

The head of the national computing agency points out that they have long advocated open access, giving RCAAP, which has millions of downloads and has been functioning very well, as an example. In the social sciences, despite the efforts made, he recognizes that it was not possible to make much progress regarding open data. Nevertheless, he states that there is a pressing need to make changes and get people to work with shared databases. The European Open Science Cloud (EOSC) will make an important contribution. Further, in the forthcoming European Commission Framework Program, the deposit of data will be mandatory, or there will be a 5% supplement dedicated to data management which will only be attributed once the data becomes available.

### **Open Access and the evaluation of scientific production**

In this respondent's opinion, the evaluation system for scientific production needs to change transversally, that is, it needs to apply *altmetrics*. Countries like Germany already discuss the role of these companies in the world-wide scientific system, and even parted ways with Elsevier. France also broke up with Springer. In northern European countries, one pays to publish, not to read. Prices are lower in Portugal because B-On has been negotiating a national mandate for over ten years. The last renegotiation was made last year, and for a

period of two years: 2019-2021. Sweden (once again, a richer country), Germany and France are currently breaking their contracts and not making new ones. There is a big “elephant in the room” which is Sci-Hub. This illegal platform comprises all the articles that the Kazakh platform was able to gather, by making a software that uses the researchers’ accounts in order to fetch all the articles and place them online for free. Despite having numerous lawsuits, it still exists.

### **The perspective of cultural heritage entities**

The responsible for a cultural heritage institution believes that recognizing the benefits of open access platforms has allowed to overcome the resistance that was initially felt. Adherence to *flickr* had very positive impacts for the institution by increasing, exponentially, the visibility of the collections. The millions of views reached every year and, also, the exponential increase in content reuse in various contexts – such as exhibitions, catalogs, works, media, etc. - are a way to assess the benefits of joining the platform. This platform also brought in a different audience. In 2015, through a survey realized on *flickr* audiences, it was concluded that they were mainly Portuguese users – men, holding a higher education – but not necessarily art-experts (rather comprising curious folks from all professional areas). Interest groups have also been identified among the users of their gallery, but often other, more generic, interest groups emerge, which look for content that has interest to them.

For this interviewee, open source must be supported by a model in which the industry sells packages, or services, that use open source. Most cultural heritage organizations do not have the technologic teams required in order to implement open source tools. Therefore, turnkey solutions have to be used in these cases – institutions cannot afford to have a technology-qualified staff member that can manage the tools that concern the server, the compilations, JAVA, etc.

### **Good examples of open access**

A person in charge of infrastructures in the agrarian science field, recalls that a pilot study, conducted in the United Kingdom, revealed significant productivity gains if scientific data were published in open access. These gains represented several million pounds of the country's GDP. This economic study was one of the main reasons driving these ideas. The adoption of open access licenses is the result of a European directive, a European recommendation, that was implemented in Portugal in 2014.

He also mentions the example of GBIF, which is an international and intergovernmental initiative, whose goal is to make biodiversity information free and open access to all, through the internet. GBIF has been providing access to information that is stored in institutions or biodiversity projects, so that this structure can publish them. This was made possible by a truly global initiative that brought together work from various organizations. There is another organization, also global, that is developing a project / initiative called Catalogue of Life, which aims to obtain a list of all names for all organisms that exist worldwide. At the moment

they hold the names for 1.8 million species known to science which, through the combination of GBIF and Catalogue of Life can help to clarify the problem of whether a species name is a synonym for another, for example. Catalogue of Life manages the process while GBIF uses the results. In addition, GBIF has the species occurrence data that is documented in bibliography and there is also another initiative, the Biodiversity Heritage Library, which is dedicated to digitizing old (and royalty-free) bibliography where species documentation occurs. The Biodiversity Heritage Library also allows free access to the texts describing the species. Another initiative is the Encyclopedia of Life, which is an encyclopedia of species that gathers information, not only the description of the species, but also through the support of a helping community – it sets the parameters for a particular property which the community then helps to interpret and aggregate; and also joins other information from the data that is available in GBIF (just as GBIF uses the data in the Encyclopedia of Life for the description of species, and the data in the Catalog of life, for the name of the species). Therefore, these various initiatives, each of them an infrastructure, interoperate in order to obtain and aggregate, from each of the parties, the best possible information. GBIF is also associated with GenBank. In GBIF one can find information about the occurrence of species, and each entry then links to the data in GenBank (if the genetic sequence has been determined).

### **FAIR is not a guarantee of open access**

FAIR and Open Access are two different things. It is often confused but FAIR only guarantees these four principles: findability accessibility, interoperability and reusability. The *reusable* dimension can be interpreted as a commercial product, demanding a payment in order to access the data, which then will violate the open access principles. Open access ensures that access to information is free, or at least that what may not be free concerns exclusively the logistic costs of accessing that information. In order to be open access it needs to be free and to not prevent the reuse of that information for other purposes. That defines an open access license, which is different from defining whether or not it meets FAIR requirements.

### **European Open Science Cloud**

The European Open Science Cloud (EOSC) is another initiative that, sooner or later, will become very important. Its relevance is due to two main aspects: firstly, it wants to become a reference repository for scientific data; and, secondly, to guarantee access to such scientific data according to FAIR principles.

A user of EOSC, in the area of linguistics, points out that, in the classes that she teaches only free tools are used, that being one of the conditions: it is all open access. The aim is to show students that all tools for a given purpose have the same underlying structure. They may have a different “color”, different functionalities, different algorithms, but they “think” in the same way. She argues that the students will be, at the present, learning how to work with tool X on company A while, five years from now, they can be working somewhere else where different tool is used to perform the same task.



## GERMANY

### DARIAH – Negative points

Respondents in Germany addressed a set of criticisms to the services provided by DARIAH. One of the criticisms concerns Geo-Browser. In the opinion of a researcher who is acknowledged with the service, it does not have a good collection of historical maps, which is a difficulty for him whenever he detects that are some poorly drawn borders, for example. Nevertheless, the respondent notes that the service has been gradually improving:

*"Of course it's getting better and better. It will improve so that the researcher doesn't feel alone. You need more individual support."* (Research infrastructures user and developer)

Another researcher suggests several difficulties across most of DARIAH's tools and services:

*"The tools are schematized, which means that if I want to make adjustments, then it's more difficult to use the tools in an easier way than in less accessible tools, for example, which are based on command lines."* (Specialist researcher in the digital humanities)

The same interviewee realizes that DARIAH tools, in general, are not user-friendly for researchers that do not hold much experience in digital methodologies. This is also a point made by another researcher, who expresses his opinion as such:

*"I see the disadvantage of some services, e.g. 'generic search' service and the data federation architecture, in the fact that you can only use them if you are very intensively involved with them. I would describe some DARIAH tools as expert tools; they are not something that a scientist understands after ten minutes."* (Participant in DH projects).

Another negative aspect has to do, precisely, with the search engine (through which DARIAH makes available to users a large set of collections which are integrated into several archives). The problem pointed out by one of the researchers is related to the great diversity of results that may arise in the engine, not all with the same quality. This requires the user to be able to search among the results.

*"The results are very heterogeneous in quality. That is a problem. (...) This is above all also a problem for DARIAH, because the dissatisfaction that the user may feel is then also reflected on DARIAH."* (Participant in DH and research infrastructures projects)

A final note is related to a possible limitation on the infrastructure's communication, which has mainly focused on researchers and teachers. If DARIAH aims to broaden its communities and integrate users outside the academic context, so far the dissemination of the infrastructure has failed at this point.

## DARIAH – positive points

Although there are interviewees who consider that the tools provided by DARIAH are difficult to use for researchers who have less experience with technological solutions applied to scientific research, there are also respondents who are of the opposite opinion.

*"DARIAH is designed in such a way that even researchers with little knowledge, with little experience in this field, can use these tools."* (Specialist researcher in the digital humanities)

The same interviewee highlights the word "community". In his opinion, DARIAH tools have been developed in the context of the community that needs them and that will use them. The concept of community is pointed out by another interviewee, who notes:

*"The biggest advantage of DARIAH is perhaps also the biggest disadvantage, in my eyes, namely 'community'. I see DARIAH more as a social infrastructure than as a technical infrastructure. (...) People talk to each other and things are discussed and developed together."* (Participant in DH and research infrastructures projects)

The key role that DARIAH played in the development of a, German-speaking, digital humanities' community is also underlined, as a result of a strong dissemination component.

*"I have been using DARIAH services for seven or eight years and I have had very positive experiences with them. I also believe that DARIAH had a very big influence on the design of the German-speaking DH community, though its presence at large conferences and through the Working Papers."* (Participant in DH projects)

This strong presence that DARIAH has been able to show in the German digital humanities' community also translates into the large number of workshops held.

*"I found it positive that many workshops were organized."* (Participant in DH projects)

This undeniable contribution to the consolidation of a digital humanities community was only possible due to the communication capacity of the infrastructure. This results from the fact that DARIAH is a large project of an international scale, which offers certain guarantees to its current and potential users.

*"The advantage is clear: that there is a certain awareness. Whether they are better or worse than comparable tools I can't say. (...) This infrastructure has 10 years of development behind it, it has a certain status, is also European-wide."* (Research infrastructures user and developer)

*"I trust a bigger project like DARIAH rather than something smaller. That's what I see as the advantage of a big project: it's more durable."* (Editor of a journal for the digital humanities)

A major project, such as DARIAH, has a group of developers who can help researchers find the answers they seek, as well as being vigilant for researchers, in order to give their contributions to the development of a better service. One respondent highlights the help he got from the developers.



*"I used different DARIAH services. (...) I got help very quickly, either from support or from the developers themselves. (...) I have always found DARIAH-DE developers to be exemplary."* (Participant in DH projects)

Another advantage of DARIAH, according to some respondents, is the equal access to tools and content for any researcher. Although an institutional account is required, the issue of institution link, prior knowledge of digital methodologies, age or area of research are not distinctive criteria for researchers to access what DARIAH offers.

*"No distinction is made between different actors."* (Specialist researcher in the digital humanities)

*"I would say that [digital infrastructures] are more likely to promote equal opportunities. So at DARIAH, for example, you get an account if you belong to an institution. But you can also get an account if you don't have an institutional address, if you can prove that you do scholarly research."* (Editor of a journal for the digital humanities)

One interviewee highlights the greater impact that can be achieved with researchers' scientific work, as an open access infrastructure such as DARIAH makes this work accessible to a wide user community.

*"An advantage is that infrastructures for Digital Humanities can make research results accessible across national borders, regardless of whether you are based in China or the USA. So that in Germany you can learn what happened in research in Italy, from the computer."* (Responsible for digital publication)

Another positive aspect of DARIAH is its role in promoting open access in science. The infrastructure's philosophy has successfully put open access on the humanities agenda.

*"In my opinion DARIAH has always promoted Open Access very well."* (Participant in DH and research infrastructures projects)

The same interviewee also adds the decisive role of DARIAH in promoting the use of digital technologies in the humanities and arts, for all researchers – from the most experienced to the least experienced in this type of solutions.

*"DARIAH has always given great importance, or still gives great importance, to the promotion of young scientists, especially in the teaching of technologies, methods, from easy-usable tools to tools aimed at already experienced users."* (Participant in DH and research infrastructures projects)

Finally, one researcher pointed out that DARIAH has been doing some interesting work in setting standards. This has allowed solutions, that are needed by the researchers or other science professionals, to be available for reuse – which avoids that each one has to come up with a new solution every time.

*"The advantage for us, as a library, and for my staff, is that I don't have to build something new, but that I can use something already existing. (...) So I am often just an interface between the infrastructure and scientists who want to use these infrastructures. I don't have to rely on my own project editions."* (Participant in DH projects)

In the following section, we will consider the draft recommendations that the German respondents addressed to the DARIAH infrastructure, with regard to four key aspects: communication and dissemination; contents; objectives and strategy; and organization.

### **Recommendations – communication and dissemination**

Regarding the recommendations for a better and more effective communication of the DARIAH infrastructure, one of the interviewees stated that it seems natural to her that a humanities researcher nowadays feels disoriented with all the available possibilities and resources.

*"As a scientist (...) I don't really know where to look anymore."* (Responsible for digital publication)

This researcher regrets that, due to the proliferation of technological solutions for humanistic research and repositories that store publications and resources, it is becoming increasingly difficult for a researcher to know how to select the most relevant information, and how to access all the resources that exist. In this regard, she recommends that DARIAH should be well known among the documentation services of higher education institutions and institutions of scientific research, on the assumption that the infrastructure is recognized by the community as one of the resources to be taken into account.

*"I find it better to know that, in order to look for something, I can go to a library and this library will have a powerful digital area where I can collect, by using a specific searching system, different specialized resources. I find such a solution more useful than the idea of a generic DARIAH repository."* (Responsible for digital publication)

Other respondents underline that DARIAH's national coordinating institutions could strengthen their role as one of the infrastructure's "outreachers", among their communities, by making more resources available and having a well-defined strategy.

*"We can communicate better here at the [institution]."* (Specialist researcher in the digital humanities)

*"My institution could certainly communicate better to researchers who have, perhaps, not yet worked too much with digital methods. I see that there is more to be done. I think that that's quite clear. So it's the question of how libraries can act as informants for these things."* (Editor of a journal for the digital humanities)

Widening the audience by having a particular attention to individual users was a recommendation by one researcher.

*“I think it’s important to have a stronger focus on communication by appealing more to individual users.”* (Specialist researcher in the digital humanities)

In order to follow the path towards a better communication, it will be essential to disseminate a discourse that highlights the main advantages of using DARIAH and its services. For this reason, investment in materials that facilitate the use of digital tools is often mentioned, by associating communication and training which is needed to develop a community of effective users.

*“It is important to create trust. (...) It is a matter of strengthening dissemination and communication. I achieve this by having sufficient personnel available for training, workshops, tutorials and dissemination.”* (Participant in DH and research infrastructures projects)

Another respondent considers it fundamental to communicate the idea that DARIAH is a long-term infrastructure in order to foster a sense of security in those who use their tools.

*“There are enough infrastructures that will still be available after the end of funding, but that will not be maintained any further. In other words, we should actually move on to making it clear that something is still happening here, that we are still responding to users’ demands, irrespective of the funding phases.”* (Participant in DH projects)

Finally, one of the interviewees referred to the DARIAH infrastructure as an instrument of transversal interest to the various scientific areas of the humanities and arts, encouraging a stronger articulation between them and emphasizing interdisciplinary research. Given this, the researcher considers that it is important to keep the links of each specific area to DARIAH.

*“DARIAH has this problem that it doesn’t focus on any specification, on any discipline and on any subject exactly, but actually offers cross-disciplinary services. This means that the relationship between the individual disciplines and DARIAH has to be constantly rebuilt.”* (Specialist researcher in the digital humanities)

We must underline that this researcher considers it problematic that the infrastructure has no thematic expertise. This may be one of the difficulties that hinder a correct and effective communication strategy. In fact, it is complex to communicate to such a large community in which cross-disciplinary research is not yet the dominant logic.

### **Recommendations – contents**

Regarding the infrastructure’s contents, and stressing the ambition of creating a sustainable infrastructure in its various dimensions, one of the interviewees starts by referring to the large amount of data available in open access as a condition for the aimed sustainability.

*"...data, data, data. They can contribute to increasing equal opportunities, interoperability and reusability of Open Access by focusing on the scope and quality of the data, whether it be the publication of his own research data. The more of it you have, the better."* (Participant in DH and research infrastructures projects)

In the understanding of this interviewee, however, there are some dimensions of sustainability that should be developed before it becomes a priority to make this large amount of data available.

*"In my opinion, robust, simple and trustworthy infrastructures must be available first, and only then, in a second step, can data and content really develop well. One needs to be there prior to the other."* (Participant in DH and research infrastructures projects)

Therefore, developing and consolidating an easy-to-use research infrastructure that is trusted by the users' needs to be prioritized. Once the infrastructure already allows access to a large amount of useful data for the researchers, it is then essential to invest in the quality of metadata in order to facilitate access to the desired information. This necessity is even more fundamental when we are talking about an open access infrastructure.

*"The danger with Open Access is always the quality problem. (...) It has always seemed important to me to improve the documentation and indexing of research data, so that one simply pays attention to keeping the description of metadata at a uniform quality level."* (Participant in DH and research infrastructures projects)

In the opinion of one of the interviewees, another recommendation that could be made concerns the steps that could be taken in order to enhance the credibility of the infrastructure in the eyes of its potential users, particularly those who are still inexperienced in working with digital humanities:

*"The other is the issue of credibility: you need examples of best practices, examples of how to use infrastructures in order to guide yourself. By this I mean not only demos, but also research results that are well reviewed, for example, where experts will say that this is the best practice and then you can guide yourself by it."* (Participant in DH projects)

The same interviewee later reinforces this same idea, when proposing that users could learn from practical examples of how, for instance, the resources available in DARIAH were useful in the research work of someone who faced the same difficulties and felt the same needs:

*"DARIAH can really introduce examples of how others have used a tool (...) or working papers where certain scenarios are sketched."* (Participant in DH projects)

Referring to the example of Geo-Browser and the difficulties experienced by some researchers trying to use it, another respondent argues for a better support to users, in order to both facilitate their use of services and tools, and to gather new contributions for its improvement.

*“Adapting these tools to research questions is probably not possible with a small scale institution, there is too little support. (...) so that the researcher doesn’t feel alone: you need more individual support.”* (Research infrastructures user and developer)

This suggestion, of considering users' contributions to the adjustment of tools and services, was also mentioned by another researcher, who proposes that there should be a higher level of attention to the usability aspects of the infrastructure.

*“I think that it’s important to put a lot of emphasis on the usability of these interfaces and these resources, (...) because the scientists who developed it are very much concerned about the content, but the users have a completely different stance and they want to be able to quickly use the resources.”* (Editor of a journal for the digital humanities)

The same interviewee believes that, in the cases where tools are not, in fact, intuitive, the infrastructure should also try to make available the resources and materials that could facilitate its use.

*“I think you need to take another look and try to structure it in such a way that things can be found quickly and that they are easy to use. If there are things that are more complex and that do not come intuitively, then you have to provide good instructions.”* (Editor of a journal for the digital humanities)

Besides the usability issue, an institutional representative highlights the idea of the development of DARIAH based on its user community. In his view, the exchange of knowledge and methods within the community is more important than the technological development of infrastructure, which he considers less urgent.

*“These three keywords – usability, networking with each other and standards – should be less seen through a lens of technological innovation, or large infrastructures or tools. Much more important than that is the social work, communication – which is very time-consuming, which also costs money, but which, ultimately, aims to generate this momentum and this movement, so that progress can be made together.”* (Participant in DH and research infrastructures projects)

### **Recommendations – objectives, strategy and organization**

Regarding the goals of the DARIAH infrastructure, one respondent recommended to put focus on ensuring that it becomes long-term funded – granting security and stability guarantees to those who use it. However, she recognizes that obtaining durable and stable funding is dependent on the degree of trust that the infrastructure deserves from its users, but it is also certain that this trust will only be consolidated when there is assurance that DARIAH will be continued. Recognizing DARIAH as one of the priority funding infrastructures at European level has been a major step forward.

*"[It is necessary] above all to guarantee long-term funding. (...) It doesn't help to set up such infrastructures in a project if you don't know how to finance it further. It also depends on the trust of the users."* (Editor of a journal for the digital humanities)

Another researcher believes that it is necessary to ensure the quality of the infrastructure's content and tools. He also believes that having a well-accessible contact person can help collect input from users with a better grasp of how these tools can evolve in order to become more effective in responding to the researchers' problems.

*"[It is necessary to] provide a guarantee of quality of the tools and more support. (...) I know that it's extremely difficult, but there has to be a contact person to talk to."* (Research infrastructures user and developer)

Similarly, another respondent recommends having more DARIAH-related services and contact persons in their user communities, for example in the institutions where DARIAH wants to promote itself.

*"DARIAH should concentrate on creating and supporting local resources on a long-term basis."* (Participant in DH and research infrastructures projects)

This interlocutor emphasizes the need to deepen the infrastructure's bond with its potential user community, so that DARIAH can be the infrastructure that responds to research challenges within that community.

*"If I am normally in an intensive contact with the users, then I am more likely to have the chance that the contents of these users will also be posted there, which will also give me intensive feedback on how I can improve my infrastructure. Time, time and this communicative aspect."* (Participant in DH and research infrastructures projects)

Another researcher considers it essential to focus on teaching digital methodologies and on acquiring certain digital skills, such as a filtering ability. In her opinion, it is through the teaching of these methodologies that a greater use will be achieved, and that the community making use of these new solutions for research in the arts and humanities can grow.

*"I think that we should strengthen the development of a certain attitude at school. This means that schoolchildren should already learn how to find materials for a presentation, not only in books but also on the Internet, and, above all, they should learn how to correctly assess their sources on the Internet."* (Responsible for digital publication)

Finally, the same interviewee believes that the DARIAH infrastructure could play a relevant role in promoting open access among policy makers at the national and European levels.

*"...policymakers must take action in other areas in order to facilitate open access or free access and I believe that DARIAH (...) could also inform politicians and do some lobbying work."* (Responsible for digital publication)

In the next section we will analyse the difficulties pointed out by the interlocutors that hamper the development and affirmation of digital research infrastructures in the arts, humanities and social sciences. These difficulties were identified in three levels: national decision-making, institutional decision processes and individuals (including researchers).

### **Difficulties – national level**

The first difficulty that stands out, regarding national decision-making processes (through ministries or funding agencies for scientific research, for example), is that of infrastructures' funding. According to two respondents, national states have a responsibility to fund and ensure the continuity and maintenance of research infrastructures that are critical to scientific research work. They see no guarantee of sustainability of these infrastructures if there is no guarantee of stable financing.

*"I think it's still important to have stable funding. I believe that science policies must guarantee this, because only good funding can guarantee that the infrastructure is functional."* (Specialist researcher in the digital humanities)

Another researcher considers that it is important, from a national point of view, to decide which projects are to be funded and which are not a priority, in order to optimize the investment that is made and the benefits to the community. Recent projects where the funding was discontinued, because they were not particularly important to the community, generate "digital corpses" that alert us to the necessity of deciding and prioritizing with more rigour.

*"...a lot of people are building [infrastructures] wildly and then, at some point, you start having, so to speak, digital corpses."* (Responsible for digital publication)

Therefore, this interviewee argues that it is necessary to think longer term, and that, by financing one single infrastructure that has a clear connection to institutions such as universities, libraries or other knowledge organizations, decision makers would offer better guarantees of continuity and preservation.

*"I think it is perhaps necessary to plan more long-term. It would be better if projects and infrastructures were more closely tied to libraries or research institutions, where they would also find clear criteria with regard to objectives and tasks – e.g. preservation, research, mediation, etc."* (Responsible for digital publication)

The establishment of research infrastructures on a European scale is hampered by the fact that there are relevant differences, from country to country, in laws, practices or even scientific areas. One researcher believes that European integration, when it comes to science policies, should also facilitate the sharing of best practices and the creation of more uniform rules.

*"At the moment, we can of course work closely together at European Union level, at least on a technical level, but it is usually the case (...) that, after all, the national states do their own*



*thing, because they have different rules or different languages, cultural areas, etc. (...) I think exchange is essential.*" (Responsible for digital publication)

### **Difficulties – institutional level**

One respondent refers to the difficulty of retaining, on a permanent basis, digital humanities specialists in institutions (such as universities and research centres). The permanent presence of these experts could help the development of the digital humanities field. Most of these experts come to institutions on temporary, project-related, context, which hinders thinking of a long-term strategy.

*"We have permanent IT managers everywhere but we don't have permanent DH employees at any institute. Some of these are only project positions."* (Responsible for library services)

Later, the same institutional representative reiterates the same problem.

*"...we now have a personnel problem here: we simply don't have capacities. And some of these capacities are only on a project basis. These are not budgeted posts."* (Responsible for library services)

The temporary, rather than permanent, nature of these posts is directly related to the type of funding that is directed to the development of research infrastructures, which also follows the logic of temporary projects. Institutions find it very difficult to promote the development of digital infrastructures (and even other tasks such as their effective dissemination to the community) due to budget constraints.

*"What we don't have is a fixed budget for research infrastructures. (...) We have project funds and if these projects are to be made permanent, they must be supported by the basic budget. But there is no specific denomination, no specific budget, no "pot" that is only managed for that purpose. We don't own means specifically for this."* (Responsible for library services)

Another interviewee with institutional responsibilities also mentions the scarcity of human resources, which could develop permanent tasks promoting the use of digital resources in their organizations. In his view, the tasks related to training users, disseminating methods and infrastructures, and organizing promotional activities, require the availability of human resources which are permanently dedicated to these functions.

*"It is important to create trust. (...) I achieve this by having sufficient personnel available for training, workshops, tutorials and dissemination. These are not some kind of highly complicated tasks, but they have a lot to do with manpower and time. In my opinion, it would be a very important impulse to support infrastructures, particularly in the digital humanities."* (Participant in DH and research infrastructures projects)

One researcher agrees that libraries can contribute more to the increase of use of digital infrastructures, by assisting community training and fostering the acquisition of new research habits and methods.



*"...libraries should know these resources well so that they can continue making it available to their users, either in small workshops or on request."* (Editor of a journal for the digital humanities)

Similarly, it is mentioned that higher education institutions still resist to include new digital methodologies as a priority content in the curricula that is offered in their humanistic and artistic courses. Such integration would be essential to consolidate a new attitude in research, which should be passed on to younger researchers.

*"...universities could already incorporate these things into teaching. That's important, because that's where these future scientists come from, and it would be important to say during their studies: 'There are these resources, you can do these things with it, or maybe even use it in a seminar', so that they would simply integrate it into their personal workflow"* (Editor of a journal for the digital humanities)

At another point the same researcher reiterates that, in her case, digital methodologies for the humanities were not seriously approached in class.

*"During our studies the digital was rather pushed to the side, so it had no influence."* (Editor of a journal for the digital humanities)

On the other hand, one interviewee considers that, if there are problems and difficulties with the establishment of digital infrastructures in the humanities area, these difficulties should not be attributed to the institutions, since, in the case of the institution to which she is linked, much is already done with the resources that are available.

*"I think my institution already does a lot. I always use all these DARIAH dissemination materials."* (Responsible for digital publication)

### **Difficulties – researchers**

One of the difficulties that researchers mention often, regarding the use of digital infrastructures in their research work, is the fear that the infrastructures will not be continued and, thus, the resources which they find there, or the information they seek or store there, will not remain available in a short, medium or long term time horizon.

*"If I worked as a historical researcher on an edition of a journal for seven years while having the guarantee for five years bit-preservation (or now ten), it's not enough. I will never trust my data to an infrastructure that offers 10 years of bit-preservation."* (Research infrastructures user and developer)

This researcher, as we have seen, refers to the idea of trust. An obstacle that, if it is not overcome, compromises the future sustainability of a research infrastructure. The most frequently mentioned difficulty, however, concerns the excess of information that users find in research infrastructures, notably repositories; and the difficulty of correctly filtering out all the results that are shown.

*"...the results displayed to others are very heterogeneous in quality. That is a problem. This is a problem for the users, because then they have to assess and select more what is in front of them, what is useful for them."* (Participant in DH and research infrastructures projects)

The ability to filter information with, as stated, varying levels of quality, is a digital skill that is not yet sufficiently developed in humanities' courses, or even before, which adds obstacles to the problem of information overload.

*"...schoolchildren should already learn how to find materials for a presentation, not only in books but also on the internet, and, above all, they should learn how to correctly assess their sources on the internet."* (Responsible for digital publication)

There are also, in the opinion of two respondents, too many infrastructures that provide resources for researchers, without all of them being properly known and disseminated to the community and without being clear which services each provides. The difficulty for researchers is to be aware of all the infrastructures in which they can meet their needs.

*"We have a lot of distributed digital infrastructures, and many users have the problem that they don't even know which services they have."* (Participant in DH projects)

One respondent believes that libraries and other community associations could help overcome this difficulty that results from the widespread proliferation of infrastructures and low knowledge about them.

*"I think it is important that the projects are very well positioned and well propagated by the professional associations and libraries."* (Editor of a journal for the digital humanities)

Mastery of the digital skills which are required for the correct and productive use of research infrastructures and their services is a major difficulty for most researchers, as academic and school curricula still do not sufficiently address the need to capacitate researchers with this knowledge. For one of the respondents, however, this difficulty is particularly felt by older researchers.

*"Older scientists find it very difficult to use digital infrastructures: even if there are resources that can help, this is a much higher hurdle for them than for the younger generation, who have enjoyed a different education and still deal with digital content in a completely different way."* (Participant in DH projects)

Among older researchers, as well as younger, there is some consensus about the need for support, so that everyone can effectively use the digital tools which are available.

*"It must be assured that I, the humanist, can simply use the tools. (...) You need support."* (Research infrastructures user and developer)

*"I think it's not that clear how to use the tools if you'd find them as a new user."* (Specialist researcher in the digital humanities)

Another researcher mentions the difficulties one may experience if, for example, the user is blind or does not speak English. There is also the problem that many infrastructures (although not the case of DARIAH) have services and content with paid access. In such cases, researchers face difficulties in accessing the information they need, which compromises effective solutions to their difficulties. This access is sometimes made possible through the organizations' documentation centres, which ensure the community's access to infrastructures at a corresponding cost.

*"If we now consider, for example, OpenEdition Books (...) we find that 80% of the content is not exactly free. That means I have to go over a VPN or over a library into the net, so that I can read the things. Or I'll have to buy it. Digital does not always mean free access."* (Responsible for digital publication)

The issue of open access leads us to another obstacle that concerns researchers in general: the scientific evaluation paradigm, which relies heavily on the publication and dissemination of scientific work in paid access forms. For the curriculum of a researcher, making his/her academic production available in open access does not guarantee the same reputation as publishing a book or article in a reputable scientific journal.

*"If I don't go down this road and go down the green road, because I made two publications and published them free of charge, then it's another problem: then I don't necessarily have the reputation that the publisher confers it."* (Specialist researcher in the digital humanities)

*"I publish in Open Access, and I think it's a pity that the professors and people who are currently hiring staff and promoting young researchers say "Yes, that's not worth anything". It's such a mentality problem. I and many people my age and at my level of experience publish Open Access."* (Editor of a journal for the digital humanities)

Another researcher notes that this issue of the poor reputation of open access publications is a problem particularly associated with the humanities.

*"The disadvantage is that, for example, for my doctorate, my supervisor strongly advised me against Open Access and online publishing, because only the classical book counts in the humanities."* (Participant in DH projects)

In the following pages, we will refer to the inputs from the various interviews conducted to the situation of the digital humanities in Germany.

### **Digital Humanities – situation in Germany**

Germany, through its Ministry of Education, following the European Commission such as other European countries, has developed its roadmap for national data infrastructures considered as priorities. This was mentioned by a respondent that recalled that the government initially intended to fund infrastructures that were providing services on a transdisciplinary basis, but the logic of individualization of the various disciplines has since marked the development of most of the research infrastructures that were supported.

*"At first, the approach was that these infrastructures should actually be set up across disciplines. The current development shows, however, that disciplinary thinking is even more influential, and consortia that are currently being formed are also very strongly discipline-oriented."* (Responsible for library services)

This interviewee refers, however, that the approach of the institution he represents is diverse, favouring digital humanities projects that respond to transdisciplinary needs, and arguing that this favours the institution itself.

*"We have many transdisciplinary projects and the techniques used here are therefore really not defined as disciplinary – [and that] is exactly what makes the strength of the Foundation. I can't understand the logic, or the argumentation, of defining DH-tools as disciplinary."* (Responsible for library services)

One of the infrastructures that respondents refer to as relevant, in the national panorama of the digital humanities, is precisely DARIAH. One of the researchers has become a DARIAH user for a number of years, considering that the services provided by the infrastructure have been very useful to him. He also considers that DARIAH has played an important role in consolidating a digital humanities community in the country.

*"...the DH-community in Germany would otherwise also be considerably weaker if DARIAH had not existed."* (Participant in DH projects)

The same researcher also mentions, among the infrastructures that have been relevant to his scientific work, a digital library that stores editions and digitized texts: the Wolfenbüttler Digital Library.

Another interviewee, doing research in poetry, tells us that he has found useful infrastructure solutions such as DARIAH, CLARIN and Zenodo, and has become a frequent user of all three.

*"I checked the three as solutions for archiving research data: checked how you can archive there, how is your own access; and then, in the second step, examined the further usage possibilities; and then looked at what could I do with the data when I archived it there."* (Specialist researcher in the digital humanities)

Another researcher, developing work in archaeology, highlighted the geo-information services of a project whose name she did not disclose, as well as the services of the Zotero-bibliography for archaeology.

*"What I (...) use are the instruments for research in literature, for example Zotero-groups. The German Society for Early History has its own Zotero-bibliography for archaeology."* (Editor of a journal for the digital humanities)

*"There is a project, (...) [with] a geo-information system, that is currently more focused on the French-South German region. But they pack all public or freely accessible archaeological data*

*together, and even beyond this country's borders.*" (Editor of a journal for the digital humanities)

Institutional concern with the transmission and teaching of digital skills to new and future researchers is something that is felt by several interviewees. This same archaeological researcher regrets that the teaching of digital methodologies, which can be useful to her field of interest, was not guaranteed in her degree studies. In her view, this leap is necessary because digital technologies are increasingly present, and it is urgent to promote the acquisition of greater digital literacy.

*"It plays an increasing role in archaeology. That's why it was important for my studies to deal with it."* (Editor of a journal for the digital humanities)

This opinion is shared by another researcher who reinforces the necessity to focus on teaching research methodologies that use digital technologies, without mentioning any particular discipline but, rather, intending it to reach across the humanities.

*"It would be, rather, a requirement to involve libraries and universities in teaching digital content, especially in this area of data literacy. That doesn't mean that students have to learn XML, but they should know, for example, how to use search engines and scientific content beyond Google, or what are licenses, or what else can I use in presentations and what not."* (Participant in DH projects)

Next, we will look at the respondents' contributions about the various sustainability dimensions of a research infrastructure that were previously defined: durability, credibility, accessibility, equal access, usability, and interoperability.

### **Dimensions of sustainability – durability**

All the respondents, at some point, mentioned that it is essential that research infrastructures can guarantee their continuity, which is always seen as a funding problem. Without stable funding for an infrastructure, potential users will never see it as a reliable resource, where they can access technologic solutions and store the products of their research work. Their continuity over time is a fundamental requirement for infrastructures to build confidence in researchers.

*"I think it's still important to have stable funding. I believe that science policies must guarantee this, because only good funding can guarantee that the infrastructure is functional."* (Specialist researcher in the digital humanities)

*"One point, of course, is the longevity of such projects or infrastructures. This has to do with financing."* (Editor of a journal for the digital humanities)

*"[It is necessary], above all to guarantee long-term funding. (...) It doesn't help to set up such infrastructures in a project if you don't know how to finance it further."* (Editor of a journal for the digital humanities)

*"I sometimes use the Geo-Browser for projects. Of course I'm counting on this service to be continued because I use this link and this mapping."* (Editor of a journal for the digital humanities)

*"It is important to create trust. I can do that by making things available in the long term."* (Participant in DH and research infrastructures projects)

*"[it is] often feared that many infrastructures will only be funded by third parties. And then many users are afraid, not without good reason, that when third-party funding comes to an end it will no longer be maintained."* (Participant in DH projects)

The latter respondent underlines the question that, in his opinion, any researcher would ask when faced with the possibility of relying on a digital infrastructure:

*"Will this service still exist in ten years' time? Will my data still be available in ten years?"* (Participant in DH projects)

In this context, one of the interlocutors makes a critique of the logic of project-oriented funding, which is generally the norm in funding infrastructures and other digital resources. If a research infrastructure is to be continued over time, it must permanently apply for projects that provide only temporary funding, rather than prolonged funding for its own maintenance and development. Thus, its continuity is never a certainty. This obstacle, of permanently hiring human resources that are closely related to the maintenance of an infrastructure, is also present in the institutions to which the infrastructures are linked.

*"We have project funds and if these projects are to be made permanent, they must be supported by the basic budget. But there is no specific denomination, no specific budget, no 'pot' that is only managed for that purpose."* (Responsible for library services)

One respondent suggests, for example, that the German roadmap for data infrastructures should take into account the continued funding of infrastructures, focusing on the sustainability of these platforms.

*"I think we should make clearer – which is now, perhaps, also the case with the national research data infrastructure in Germany (NFDI) – that the institution and the funding agencies put more emphasis on sustainability, on the long-term financing of the infrastructure. This is the only way to create trust and sustainable benefits."* (Participant in DH projects)

While continued funding for a particular infrastructure is not a priority over investment in new ones – leading to the abandonment of some already developed infrastructures – there is a risk of irreversible loss of information. One interviewee regrets that it is sometimes easier to get funding for a new project than to continue another.

*"The problem is that you usually only get money for something new, and then, older things become corpses on the internet. (...) I think it is perhaps necessary to plan more long-term."* (Responsible for digital publication)



Another respondent argues that large infrastructures may focus on the creation of standards. This may play an important role in the future maintenance of tools, in case changes in the teams that develop them occur.

*“What is important is that this large infrastructure [DARIAH] develops some standards and enforces these standards. This is very useful. We need standardized tools.”* (Research infrastructures user and developer)

The same researcher synthesizes the main problem that will persist as long as the continuity of digital infrastructures is not ensured: the paradigm of scientific communication, and consequently of scientific evaluation of researchers, will not change. As long as this paradigm is maintained, print publications will offer greater guarantees of preservation and will be more valued in the researchers' curriculum. It is assumed that these are more reliable than the content available online.

*“Since it is not possible to guarantee a few hundred years of sustainability, volumes for this edition will continue to be printed on paper. That hurts those who think digitally, but as long as there is no sustainability, no one else will. The safety of a given scientific product is essential.”* (Research infrastructures user and developer)

#### **Dimensions of sustainability – credibility**

Credibility – also referred to as “reliability” by one of the respondents – is an emerging factor in a number of issues that, together, contribute to the users' trust in a research infrastructure.

Firstly, there is a general assumption that one can only trust something that is known and presented in a transparent way. For one of the interviewees, the infrastructure should clearly disclose its processes (such as the process of certification of the information that is provided, or the administrative processes of the infrastructure itself) and also identify the actors associated with the project.

*“Credibility is created through certification processes. (...) The infrastructure must present the resources' administrative processes, it must also present the actors involved and openly present what has happened to date, at any time.”* (Specialist researcher in the digital humanities)

This idea is shared by another researcher, who points out the importance of users relying on the technology that forms the infrastructure by it having transparent information about what happens to the data that is stored there.

*“You just have to trust the technology, and that's a very important point with digital infrastructures: you should make clearer what happens with the ingested data in order to create trust.”* (Participant in DH projects)

This interlocutor establishes a relationship between this *sustainability* dimension and the ones that were analysed previously: *credibility* and *durability*. In his view, ensuring continuity of the

infrastructure is inseparable from the trust it will inspire in the community it addresses. In order to achieve credibility, the infrastructure should be able to pass on a guarantee that the services will continue to be provided and that solutions for data preservation are in place.

*"I also believe that more credibility and continuity can be achieved if infrastructures are better documented. (...) What back-up systems and archiving systems are behind them? That is often not found yet, even if it also creates trust and credibility."* (Participant in DH projects)

On the other hand, it is mentioned that the longevity of an infrastructure is, in itself, a factor of trust for users. Referring to the case of DARIAH, one of the respondents considers that this project, also as a result of its European scale, inspires greater credibility to the community than newer and smaller projects.

*"[DARIAH] is an infrastructure that has 10 years of development behind it, it has a certain status, is also Europe-wide. This means that it can give you a certain edge of trust if compared to any of the tools that someone has developed somewhere else, as part of a master's thesis."* (Research infrastructures user and developer)

However, according to this interviewee, it is essential to ensure resources and support mechanisms for the researchers who, for some reason, are not yet familiar with the tools and services that the infrastructure offers; or simply have difficulties in using technological solutions of this kind. An infrastructure that presents ways to overcome the difficulties of using its tools deserves a special kind of trust from researchers.

*"[It is necessary to] provide quality assurance of the tools and more support. (...) I know it's extremely difficult."* (Research infrastructures user and developer)

Similarly, the dissemination of concrete cases of use of the infrastructure which led to the resolution of the researchers' difficulties and needs can be helpful in order to understanding it better, and to inspire a greater sense of credibility. One of the speakers recommends the dissemination of best practices that can highlight the usefulness of the services and tools offered by the infrastructure.

*"The other is the issue of credibility: you need more examples of best practices, examples of how to use infrastructure to orientate yourself."* (Participant in DH projects)

It is also noted that the ease, with which the desired information or service is present in an infrastructure, counts for the assessment of the credibility of that infrastructure, as an infrastructure in which what is sought is found the easiest, is an infrastructure in which the community will, most likely, trust to resolve their problems.

*"I believe the information base (...) is not always optimally communicated and perhaps cannot always be found optimally. And if that is the case, credibility may be called into question. Information that can be found clearly is usually catchier and is therefore believed."* (Specialist researcher in the digital humanities)



### Dimensions of sustainability – accessibility

Most respondents consider accessibility one of the key advantages of digital research infrastructures. Only one of them, however, recalls that, while most infrastructures allow access to anyone who wants it, only some do so at no cost to the user. In these cases, accessibility to information exists upon payment of a license.

*"Digital does not always mean free access."* (Responsible for digital publication)

The same interviewee points out that digital access to information is easier when compared to accessing information via libraries or files.

*"In the past, people searched mainly in library catalogues; then, with the retro-digitized materials, they started to look for digitized books online and now we are so far that we have a broader area of digital publishing."* (Responsible for digital publication)

By "broader area of digital publishing" the respondent refers not only to books or articles in a digital format, but also to the content available on blogs or Youtube videos, which are now considered as possible sources of useful information for academic research. From the transformations that she mentioned the interviewee concluded by stating the point which, in her opinion, is the most beneficial regarding this paradigm shift:

*"I don't have to go to the library to read things, I can read things digitally. The advantage is accessibility."* (Responsible for digital publication)

Considering that accessibility is pointed as a fundamental advantage of digital infrastructures, another respondent argues that it is a priority to store all possible information in these platforms. In his opinion, this is the best manner to optimize the benefits that digital technologies have brought to the way research is possible today. It is only then that one can make the most of these infrastructures' accessibility.

*"DARIAH (...) should concentrate on improving the scope and quality of the data that it offers, or the accessible data. For example, to be careful that a research data repository really contains something – a repository without data is not useful. So, simply fill these structures with content. Everything else comes after that."* (Participant in DH and research infrastructures projects)

However, even though accessibility to these infrastructures, to their services and to the information they store is guaranteed to the researchers that use it, then the problem of visibility arises. If an infrastructure does not communicate intelligently with the community it is targeting, and does not become visible to its public, it will, in practical terms, be poorly accessible. In addition to ensuring an easy access to services and information, infrastructures must also ensure that a researcher can easily find the infrastructure itself.

*"Difficulties: so, on the one hand, it is the findability of such platforms. As I said, I stumbled across this project just by chance. I think it's important that these projects are very well*

*positioned, and well propagated by the professional associations and libraries.” (Editor of a journal for the digital humanities)*

### **Dimensions of sustainability – Equal access**

In regard to equal access to research infrastructures, one of the interviewees sees these infrastructures as capable, in principle, of promoting equal access to information for all researchers, without discriminating factors.

*“I would say that they [these infrastructures] are more likely to promote equal opportunities.” (Editor of a journal for the digital humanities)*

However, referring to the specific case of DARIAH, another interviewee has mentioned:

*“Access is possible for everyone and, because no distinction is made between different actors, everyone gets a DARIAH account which is somehow affiliated with academic organizations.” (Specialist Researcher in the Digital Humanities)*

In his view, DARIAH makes no distinction – in terms of gender, age, scientific field or the kind of link held to the research or higher education institution – but only if there is, indeed, an affiliation between the user and one of those institutions. Further ahead, he revisits this idea:

*“If you’re not an academic I think access is really more difficult (...) and also more difficult to get access to services because I am not based in academic institutions.” (Specialist researcher in the digital humanities)*

However, the same interviewee who argued that research infrastructures tend to promote equal opportunities, contradicts this view by stating that, in DARIAH, there is the possibility of obtaining an account even when one is not currently linked to any institution:

*“So, at DARIAH, for example, you get an account if you belong to an institution. Nevertheless, you can also get an account if you don't have an institutional address but you can prove that you do a scholarly research. This is an important point for researchers who are not connected to an institution at the moment.” (Editor of a journal for the digital humanities)*

Another interlocutor, with an academic research background, does not detect gender-based inequalities of access to digital infrastructures:

*“On the one hand, I now see equal opportunities in terms of gender.” (Participant in DH projects)*

However, he argues that there is inequality in the access conditions when it comes to the age of researchers, or at least to the experience or ease with which they work with technological and digital solutions.

*“...but I see a discrepancy between older scientists and younger scientists. Older scientists find it very difficult to use digital infrastructures, even if there are tools to help. This is a much*

*higher hurdle for them than for the younger generation, who have enjoyed a different education and deals with digital content in a completely different way, even privately.”* (Participant in DH projects)

Other possible barriers to access and use of the information and the services that are available are also mentioned by a different interviewee, who raises a few questions:

*“How difficult is access, for example, when you are blind? Are all contents barrier-free? (...) Language can also be a barrier.”* (Responsible for digital publication)

This researcher believes that research infrastructures should be developed in such a way that their content is in fact accessible to all people with a potential interest, and in a multilingual sense.

Another interlocutor, referring to a digital humanities project in which he works, admits that access to the information deposited there is not equal to all researchers, but only to those who are professionally associated with the project.

*“When research takes place in the framework of a project, these people have access to all our tools and all our infrastructure. This is not a problem. But we don't offer anything for outsiders. (...) This also means that when their contract ends, scientists can no longer use certain tools and applications in our institutes.”* (Responsible for library services)

In regard to the infrastructures that are fundamental to the scientific community this issue is important, both at a European and at a national level. If the ministries in each country, or the European Commission, support the development of infrastructures that are associated, or will be developed by a particular institution, it is necessary to ensure that the whole community can benefit, and not just that organization.

### **Dimensions of sustainability – Usability**

As far as usability is concerned, one of the respondents criticizes most research infrastructures for the humanities, which, in his opinion, are unintuitive and have content which is unfriendly to users.

*“Many of the infrastructures for the humanities (...) do not have good usability or good user-friendliness.”* (Participant in DH projects)

Later in the interview, the same researcher reinforces this idea, by stating that it is sometimes difficult for users to understand what are the solutions that the various humanities' infrastructures, in fact, offer.

*“[Improving the usability of infrastructures is something] that the humanities are still lagging behind. That's also very expensive and very complex. We have a lot of distributed digital infrastructures and many users have the problem that they don't even know what services they have.”* (Participant in DH projects)

Another interviewee agrees that there is a long way to go in improving the usability of these infrastructures.

*"I think it's important to put a lot of emphasis on the usability of such interfaces and such offers." (Editor of a journal for the digital humanities)*

The same researcher suggests something that is shared by a considerable part of the remaining interviewees, which is that the systematic interaction and dialogue with users may give hints as to how tools should be improved in order to better meet the needs of the researchers.

*"The users have a completely different view of it and they want to be able to use the resources quickly. I think that you have to take another look and structure it in such a way that things can be found quickly, and that they are easy to use, and, if there are more complex things that do not come intuitively, then you have to provide good instructions." (Editor of a journal for the digital humanities)*

In fact, several parties agree that it is important to listen more regularly to the users, if the intention is to build the infrastructure that everyone aims.

*"A specific aspect of communication: user interaction. This means that the infrastructure must always deal with the users, must permanently ask questions: is what we have to offer the right thing for your needs? Is something missing? Does that have to evolve?" (Specialist researcher in the digital humanities)*

*"The one who wants to use the tools should really be the center of attention." (Research infrastructures user and developer)*

*"If I am simply in intensive contact with the users, then I am more likely to have the chance that the contents of these users will also be posted there, which will also give me intensive feedback on how I can improve my infrastructure." (Participant in DH and research infrastructures projects)*

In the same vein, it is necessary to ensure that users who have difficulty using the tools have someone to turn to and who can support them. Usability is not only about building tools that are easy to use and intuitive, but also about providing support to those who use them, since, a lot of times, the tools can, in fact, have some complexities, and the level of digital skills of the researchers can vary greatly.

*"So the researcher doesn't feel alone, you need more individual support." (Research infrastructures user and developer)*

*"It must be assured that I, the humanist, can simply use the tools. Not everyone will have a developer at their side." (Research infrastructures user and developer)*

*"I think that it's not clear how to use the tools if you'd find them as a new user." (Specialist researcher in the digital humanities)*

### Dimensions of sustainability – interoperability

The issue of interoperability between different research infrastructures for the humanities and the arts was mentioned by only two respondents. One of them mentioned the specific, well-known case of DARIAH. Since there is a wide variety of infrastructures that store data and publications in the humanities, DARIAH's intention was never to compete with them and become, itself, a repository: the idea is to make existing collections visible and allowing joint and simultaneous search tools across all of them, which could greatly facilitate the work of researchers.

*"DARIAH is a distributed research infrastructure and, unlike an archive's library, it does not have direct and complete access to the data. However, DARIAH itself does not have any data, but DARIAH makes data accessible that are made available in (...) the multitude of archives via the Collection Registry. These are different collections that come together."* (Participant in DH and research infrastructures projects)

However, another researcher considers that, rather than creating repositories of collections, and of other repositories, it is essential not to overlook the role of documentation centers (such as libraries) in assisting researchers. In his opinion, those who work in libraries should be able to guide researchers and help them do their research using digital platforms as well.

*"I find it better to know that, in order to look for something, I can go to a library and this library then has a powerful digital area, where I can gather, by using a specific searching system, different specialized resources. I find such a solution more useful than the idea of a generic DARIAH repository."* (Responsible for digital publication)

The considerations that will follow deal with the subject of cross-disciplinarity, according to the statements and inputs of the interviewees, especially in the relationship of this subject with digital research infrastructures.

### Cross-disciplinarity

All respondents who expressed their ideas on cross-disciplinarity believe that there is a growing adherence to collaborative work between different disciplines, by using digital infrastructures as well as digital humanities' tools that can serve researchers with different backgrounds. Infrastructures aiming to support research foster the sharing of information and methods between researchers coming from different research areas and interests.

*"These infrastructures have a very strong tendency towards interdisciplinary or multidisciplinary approaches. (...) It is possible to use data from a project that comes from a completely different discipline."* (Specialist researcher in the digital humanities)

*"Interdisciplinary approach, I must say, plays a big role because, according to my understanding, Digital Humanities are not bound to a discipline. (...) For quite some time there has been a very strong trans-interdisciplinary approach. This means that everyone also works with representatives of other disciplines."* (Responsible for library services)

The same institutional representative states that he does not understand the principle by which digital humanities' tools are developed in view of the specific needs of a single disciplinary area, as it sometimes happens. This interviewee can see clear advantages in the development of tools across the humanities.

*"I can't understand the logic or the argumentation of defining DH-tools as disciplinary."* (Responsible for library services)

*"The disciplines simply have to learn that, although they have their own scientific questions, of course, the technology is often similar in many respects. (...) I think we could not only save money with a standardized DH technology in many cases, but also ensure equal opportunities – as far as education and suchlike are concerned."* (Responsible for library services)

In his view, the potential for sustainability, in particular through greater use of the infrastructure, is bigger if it addresses a larger community with an interest in common tools. This is precisely the logic of DARIAH in the area of the humanities and the arts.

According to another researcher that was interviewed, the existing research infrastructures help to make research work more interdisciplinary. This happens because these tools make research results from other disciplines, with similar themes, visible and easily accessible.

*"My impression is that researchers are more willing to perceive impressions from other disciplines because it is easier to access information. Interdisciplinary is also increasing significantly via the DH in the humanities. (...) The boundaries that existed before are simply crumbling."* (Participant in DH projects)

This opinion is shared by another interviewee, who associates this greater tendency towards cross-disciplinarity with the visibility that other disciplines in the humanities have gained through the utilization of common tools, or with infrastructures that bring together the tools of the various disciplines.

*"I think that's also related to visibility. The things that happen somewhere in your discipline are something you get to know and that you know about them, but then, beyond the boundaries of the discipline, it becomes more difficult. If these platforms are clearly visible, then you also discover platforms that don't belong to your own discipline, so that you get to know other data or other methods, which you can also transfer [to your research]."* (Editor of a journal for the digital humanities)

Another researcher refers to his personal case, stating that, for his study, it was relevant the discovery of works that were developed on the same subject by researchers from other disciplines, since the subject he studies lies, in his words, in a "niche".

*"If you are in a niche subject, then is only through this interdisciplinary exchange that you can have the chance to make your own research better and better known."* (Research infrastructures user and developer)

It is also noted that the German roadmap for data infrastructures, prepared by the Ministry of Education, primarily focused on (infrastructures) projects with an interdisciplinary approach. However, one of the interviewees considers that this principle was abandoned and that the disciplinary logic prevailed.

*"At first, the approach was that these infrastructures should actually be set up across disciplines. The current development shows, however, that disciplinary thinking is even more influential, and consortia that are currently being formed are also very strongly discipline-oriented."* (Responsible for library services)

This officer ends by saying that, in his opinion, this inversion does not follow the right direction:

*"In my eyes, this is a false path."* (Responsible for library services)

Finally, the next section comprises the interviewees' considerations about the theme of open access and open science.

### **Open access and open science**

One of the interviewees, when asked to give her opinion about open access and the role of research infrastructures in establishing this principle, began by a brief recall of the concept of open access, since she considers that there is often a wrong idea about it.

*"Open Access means that a text, an object, has a free license. This means that I can use it, continue to use it, change it, etc. Most people don't even know that, many are only interested in free access."* (Responsible for digital publication)

Most respondents can easily list a wide group of advantages of the open access philosophy. One of the stated advantages is the immediacy of publishing, as well as the speed with which the researcher gets feedback on his results:

*"I publish in open access and I have immediate feedback, it also accelerates my projects, because I publish faster. (...) It used to be normal to publish five years later after a conference or a research project."* (Research infrastructures user and developer)

*"Because open access is always published online, it is much faster than in the conventional print sector. (...) When I publish in an open access journal, contributions from several authors are more easily accepted, as well as the integration of research data or new media formats such as videos, which is easier."* (Participant in DH projects)

Another widely cited advantage is related with the greater reach and visibility that open access works can have, reaching more readers and, consequently, more citations and faster contributions to research on the various subjects.



*"I see a great advantage for the future in the fact that Open Access publishing platforms also provide more evidence of the reach of the publication, who quoted what, where was this contribution mentioned, etc."* (Participant in DH projects)

*"With Open Access, the reach of my publications is wider because, digitally, it is more quickly accessed, it is accessed more frequently."* (Participant in DH projects)

*"The advantages [of open access] are clear: you have greater reach. (...) If I come across an article as a reference and it is behind a paywall, then I think to myself 'well, well, it can't be that important' and I don't read it immediately. If it's Open Access, I'll read it right away."* (Editor of a journal for the digital humanities)

*"If, for example, we publish new research papers in the library, we will find out that the proportion of Open Access publications that are cited or documented is constantly increasing."* (Participant in DH projects)

The same researcher concludes that this advantage is so relevant to an academic that, according to his perception, more and more researchers are joining open access.

*"I also notice that researchers are more and more willing to publish in Open Access."* (Participant in DH projects)

Another researcher sees as an advantage the fact that, with the new open access tools, authors have greater autonomy to publish their work by avoiding the stages and the criteria of conventional publishing methods.

*"We also have the opportunity to create our own texts. We are not dependent on a typesetter, someone who makes this text from our notes in the publishing house. We do not only have technical possibilities such as platforms, but we also have the possibility to design our texts ourselves in such a way that they are published quickly."* (Research infrastructures user and developer)

Finally, the same interviewee recalls that when the research theme is very specific and there are few researchers working on it, the open access philosophy becomes even more accepted because it makes all the information that is available faster and easier to find. It also makes it easier to find other researchers that are looking into the same topics.

*"Because small subjects are so dependent on seeking and finding interlocutors, publishing open access is very popular in these subjects."* (Research infrastructures user and developer)

However, all these advantages coexist with a strong resistance from the scientific community of the arts and humanities. To explain this fact, several interviewees recall the existing paradigm for the scientific work to be valued and be taken into account in research careers, which excludes many of the principles of open access.



*"I have been told several times by older researchers that all this is worth nothing, what I have published in Open Access, and if I continue like this, then I don't need to expect anything at all about my future career."* (Editor of a journal for the digital humanities)

*"The disadvantage is that in certain areas, for example for my doctorate, my supervisor strongly advised me against Open Access and online publishing, because only the classical book counts in the humanities."* (Participant in DH projects)

*"In certain disciplines you have all this pressure: without a list of publications in prestigious journals you have no chance of getting ahead."* (Research infrastructures user and developer)

*"If I don't go down this road and go down the green road, because I made two publications and published them free of charge, then it's another problem: then I don't necessarily have the reputation that the publisher confers it."* (Specialist researcher in the digital humanities)

In short, in the current paradigm publishers have great power, and as long as a researcher's reputation and positive evaluations are dependent on the publication of their work in certain scientific journals, the scientific communication system that will prevail will continue to be paid access, where researchers and libraries have to pay in order to have access to work that is already published.

*"Publishers determine the financing models or prices, taking into account that, then, university libraries will buy their products."* (Responsible for digital publication)

Given this paradigm which, according to all respondents, is not desirable for science, a different system is proposed that can guarantee the credibility and quality of publications that are available in open access.

*"I actually think it's important for the reputation system to change. Reputation does not have to be tied to a publisher. Quality features such as peer review procedures can also be organized outside publishers."* (Specialist Researcher in the Digital Humanities)

*"You also have to adhere to a standard quality for Open Access publications, which also exists for print publications, for example in terms of editing, or the review process."* (Participant in DH projects)

Another suggestion is to ensure that what is published in open access will remain accessible over time, ensuring credibility to open science publishing for both authors and readers.

*"I think that there are several factors that need to be taken into account in order to minimize the reluctance towards Open Access. (...) One is simply the time factor. It is often said that Open Access publications that appear online have a shorter duration. (...) This is bad: if you make an open access journal, it simply has to exist for a longer period of time in order to create credibility for authors and readers."* (Participant in DH projects)

One respondent considered that DARIAH has been playing an important role in promoting a logic of open access.

*"In my opinion DARIAH has always promoted very well Open Access."* (Participant in DH and research infrastructures projects)

Another researcher, also referring to Hypotheses blogs (one of the services offered by the DARIAH infrastructure), notes that this type of infrastructure has contributed to a change of mindset, encouraging the replacement of the previous paradigm with a new one in which open access publishing does not harm the authors. In the opinion of this researcher, this process of crediting scientists who publish in open access is only possible with the development of credible and solid infrastructures, that have established themselves in the research landscape.

*"They [the research infrastructures] make an important contribution to this change in mentality. They show that it can be scientifically valuable to publish on blogs, which are a different form but are, therefore, no less valuable than an article in a journal. And for that you need this platform."* (Editor of a journal for the digital humanities)

This is also the opinion of another respondent, who points out that digital infrastructures have greatly contributed to increase researchers' adherence to open access.

*"In the area of Open Access I notice that they [the research infrastructures] have a very positive effect, because more and more publications and also research data are published in Open Access via these infrastructures."* (Participant in DH projects)

## CROATIA

### DARIAH – Negative and positive points

Among the Croatian interlocutors we interviewed, few have actually any experience using DARIAH infrastructure. For this reason, few considerations have been made about the infrastructure and its services. Nevertheless, it has been possible to gather more recommendations to DARIAH, which we will review later.

One interviewee began by directing certain criticisms to DARIAH regarding its communication, its contents and the lack of continuity of the infrastructure's initiatives. In her opinion, information on how DARIAH can be useful to researchers is scarce, the infrastructure maintains references to services or projects that no longer exist, and its initiatives, working groups or projects tend to be short-lived, failing its continuity.

*"My impression is that the biggest issues with DARIAH services, that could be improved, all relate to, on the one hand, lack of information about what DARIAH can do for us as researchers, and, on the other hand, a seemingly short-term nature of projects/working groups/initiatives: lack of continuity."* (Digital infrastructures user and participant in DH projects)

*"A number of the interesting things that I found on DARIAH website seem to have expired in the meantime, or haven't been updated."* (Digital infrastructures user and participant in DH projects)

Another researcher reports that she uses DARIAH very rarely because she realized that, in her research area (music and dance), useful content is practically non-existent.

*"I have to admit that I rarely use [DARIAH services]. Almost never. Because nothing is related to music, dance, which would be my area of interest."* (Experienced researcher using digital humanities tools)

The two remaining criticisms concern especially the insufficient dissemination of the infrastructure, which has still not been able to reach the whole community. One respondent answered a question – about whether he or she knew the DARIAH consortium – by saying that everything they know about this topic has been heard directly from the national coordinator herself.

*"Not really. What we know [about DARIAH], we know it from you [the national coordinator for Croatia]. We have heard of it, but we have already forgotten it."* (GLAM institution employee and participant in DH projects)

Finally, one researcher believes that efforts to disseminate the infrastructure, its principles and services, are still limited and unable to reach the entire community.

*"The digital infrastructure is (...) still not available to all researchers. Despite all the efforts in promoting valuable goals, including cooperation and integration of researchers and*

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## DESIR

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*practitioners, and other ideas, there is still a wide range of humanities' scholars left out. Not because they do not want to be included, but the ideas are not reaching out to them.*" (Professor and experienced DI user)

Despite of her statement, this researcher's opinion is very supportive of the usefulness and relevance of an infrastructure such as DARIAH. If she regrets the insufficient dissemination of the infrastructure, it is because she considers that DARIAH is a high quality tool for establishing the digital humanities in the scientific landscape, on the one hand, and open access in science, on the other.

*"DARIAH is the most important project, the only one that is taking care of digital humanities and digital infrastructures, while taking important, serious and crucial steps towards promotion of digital humanities, digital infrastructures and open access."* (Professor and experienced DI user)

In the following section, we will analyse the recommendations made by the interviewees and which are directed to DARIAH regarding its sustainable development as a research infrastructure for the arts and humanities.

### **Recommendations – communication and dissemination**

Most of the recommendations aimed at disseminating the infrastructure include a more intense and more frequent focus on events that reinforce the presence of DARIAH in the institutions, and to convey pertinent information about the infrastructure.

*"Institutional DARIAH representatives should, in consultation with the national coordinator, organize more events at university/institute level in order to raise the visibility to DARIAH, and to explain and highlight what it does and how it could enhance their own research."* (Digital infrastructures user and participant in DH projects)

However, this interviewee recalls that DARIAH representatives, both in the institutions and at a national level, perform these functions on a "voluntary" basis, and cumulatively with all their other professional tasks. Therefore, she considers that it would be useful that, at least the national representatives, became paid to work exclusively for the dissemination of DARIAH in the countries where the infrastructure aims to be established.

Another researcher also recommends a greater focus on the dissemination of the infrastructure, not only in higher education institutions, but also in cultural heritage institutions.

*"DARIAH needs more promotion within academy, as much as within GLAM [galleries, libraries, archives and museums] institutions. It must step out from its circle and promote – loudly – ideas of open access, cooperation, interdisciplinarity, cross-disciplinarity, strength of integration and power of integration of academic, non-academic institutions and community."* (Professor and experienced DI user)

She believes that DARIAH could enter the universities by engaging in digital humanities projects and courses.

*“At my University, DARIAH can be more involving as a support to DH courses, projects in DH and integration of scholars, students and library in common projects.”* (Professor and experienced DI user)

The same interviewee believes that only through greater investment in the infrastructure’s visibility will it be possible to increase its use by researchers from more and more diverse disciplines – including researchers who, with their influence, can increasingly persuade other scientists to use DARIAH.

*“The next step would be to include more students from different fields of study, as well as more scholars, particularly credible scholars from humanities.”* (Professor and experienced DI user)

Another speaker considers that it is important for DARIAH, through its national and institutional representatives, to insist on the dissemination of the infrastructure to organizations and researchers who have, on previous occasions, been in contact with the infrastructure. Using his personal case, this interviewee understands that a single session to promote the infrastructure may not be sufficient to create daily practices with their tools and services, thus continuous dissemination must be reinforced.

*“Probably we would have to refresh our minds, to see what is its definition and scope of activity, and what does the Consortium itself do. Then, when one repeats it a sufficient number of times, like in school, then one knows and can probably share it with others.”* (GLAM institution employee and participant in DH projects)

### **Recommendations – contents**

Some of the recommendations about DARIAH contents were mentioned by an interviewee who studies music sciences. This researcher refers to the recent creation of a DARIAH working group on the subject of artificial intelligence and music, but suggests an additional effort to clarify what the group's goals are and what is the direction of their work. This recommendation may apply to other DARIAH working groups where participants experience the same difficulties.

*“...we have not yet figured out the direction in which the group will go and its objectives, so it’s unclear... is it creating new programs for some specific needs of music scholars?”* (Experienced researcher using digital humanities tools)

Asked to clarify this undefined objectives of the working group she had mentioned, the researcher lists some of the services, to be carried out by the working group or already existing, that could meet the needs of the scientists in her disciplinary area, reinforcing the idea that these contents should be free for the user:

*"...but an idea emerged to create a database, or at least a list of the results achieved so far: available transcription programs, audio processing, listening... Something that's free."* (Experienced researcher using digital humanities tools)

In addition to this database, the interviewee considers that the great advantage that can be gained from participating in an infrastructure such as DARIAH is collaboration and the sharing of experiences, information and tools with other researchers in her area of interest.

*"Good collaboration between people and different ideas about 'exploiting' or using the digital sphere for scientific research in music would be great."* (Experienced researcher using digital humanities tools)

Another interviewee argues that DARIAH could increase its overall audience by reinforcing the diversity of its content, thus serving a community with an equally wide range of interests and needs.

*"[DARIAH could be improved] by focusing on a larger, global, culturally and more economically varied audience for its content."* (Digital infrastructures user and participant in DH projects)

### **Recommendations – objectives and strategy**

Several interlocutors consider that DARIAH should play a key role in establishing certain principles and concepts that matter in today's science, helping to put them on the agenda both internationally and at the level of smaller communities.

Open access is one such concept; in order to promote a more favourable attitude about open access, one interviewee considers that DARIAH could work on this issue with researchers and organizations.

*"[DARIAH could support a positive attitude towards open access] through workshops and presentations for scientific communities, especially in countries where digital humanities are in early stages."* (PhD student and DI user)

Digital humanities is another concept that could benefit from greater visibility and credibility within the community, through initiatives of infrastructures such as DARIAH. In the opinion of one interlocutor, many doubts remain about what the digital humanities are and what they can bring for scientific research. This lack of knowledge creates resistance to the acquisition of new research practices.

*"On all levels there should be more explaining and de-mystifying of what DH means and what it is. This may sound banal but it seems to me that a lot of people have an incorrect or distorted idea of what DH research is by imagining that it is just all about computer science and very little to do with humanities."* (Digital infrastructures user and participant in DH projects)

Another respondent understands that international-scale infrastructures, including DARIAH, could be crucial for communities to share best practices and set standards at an international level. Practices which each country can follow in order to create common and uniform languages. The case he mentions is that of museums which, unlike libraries, do not yet have an international standard.

*“Unfortunately, the museum community could not take over the museum standard because there is no internationally accepted museum standard. Different states have their own internal, national museum standards that are generally applicable to the state and not applicable to everyone.”* (GLAM institution employee and participant in DH projects)

For its own thriving in the research communities from all disciplines of the arts and humanities, DARIAH should, according to an ethnomusicology researcher, be present at the major international seminars and conferences of the various scientific areas.

Next, we will make an analysis of what was mentioned, in the various interviews, about the difficulties for the real establishment of research infrastructures.

### **Difficulties – national level**

Regarding the role that the different countries, through the action of their ministries, can play in establishing digital research infrastructures, one interviewee put four recommendations forward. He recognizes that the fundamental difficulties that persist are the lack of a consistent national strategy for investment in research infrastructures, the reduced funding for digital humanities projects, and the lack of a tool that brings together all digital repositories and archives that have already been created by the various institutions in the country.

*“At the political/national level there should be: 1) a national strategy for developing DH, written by experts in the field; 2) a roadmap with clear goals set out; 3) funding allocated for digitisation projects and related or independent DH projects; 4) (creation of) one unified platform to connect all the diverse institutional repositories and organise them by field and make them accessible to all.”* (Digital infrastructures user and participant in DH projects)

It is also pointed out by another interviewee that the instability of funding for research infrastructures is an ever present difficulty, and that without such guaranteed funding it is not possible to ensure the necessary maintenance of existing infrastructures already holding important information for scientific work.

*“If there is no adequate financial support, then system maintenance cannot be paid, as these are not self-maintaining systems. In addition to not being self-maintaining, they break down and become obsolete. So if you want to have something durable, you need to secure the finances.”* (GLAM institution employee and participant in DH projects)

Another researcher widens the scope, noting that more funding is needed for all kinds of projects – in addition to research infrastructures, linking academic and non-academic communities, and shortening the gap between cultural heritage institutions and the digital



environment. He also argues that, in addition to reinforced or more stable financial support, it is essential to adapt the rules and laws that have so far created constraints to the development of this area.

*“Projects involving academic and non-academic, especially cultural heritage institutions in digital environment, should be more supported. In financing as much as in legal support.”* (Professor and experienced DI user)

Developing the same line of thought, the speaker clarifies that the laws are vague and do not particularly favour the support of projects in the humanities area, and may leave them in the background if they are not considered a priority for investment.

*“Digital infrastructures are an issue that needs to be solved at a higher, national level, in order to be effective and sustainable. Laws are in that sense vague, incomplete and they support digitisation as such, with no straightforward intention to support digital humanities and digital infrastructures.”* (Professor and experienced DI user)

Still at the level of current laws, the same interviewee realizes that a national policy for data copyright is lacking, as well as concrete policies for the promotion of open access in science, especially regarding the areas of the humanities.

*“The main difficulties are lack of data copyright policies and lack of promotion of open access policies, especially in humanities’ circles.”* (Professor and experienced DI user)

In addition, it is mentioned that, at the supranational level (e.g. European), efforts and initiatives are still limited both for the creation of transnational infrastructures and for homogenization and standardization of terminology and good practices.

*“There are not enough international efforts for the union of digital infrastructures, or for promotion of usage of controlled vocabularies”* (Professor and experienced DI user)

### **Difficulties – institutional level**

The institutional representatives we have interviewed report that the lack of funding and human resources are permanent obstacles that limit the possibilities of developing projects which are related to the use of technologies, in order to make content available to the community or to build tools and infrastructures that support the work of the institutions themselves. One respondent stated that his institution's funding comes directly from central government and is intended to meet current expenses, without giving the institution the opportunity to invest in hiring new human resources.

*“The main difficulty that the institute encounters is a constant shortage of ICT experts. The institute is a government-funded institution; however, the budget from the state covers only staffing costs, and the possibility of employing new personnel is based upon government’s decision”* (Representative of a scientific research institution)

One of the solutions that the interviewee advocates is looking for new funding possibilities that clear the way to hiring more people and developing more projects, such as an online repository that her institution has long wanted to build.

*"We should find other alternatives to cover our insufficient financial resources in order to perform a demanding task such as building the online repository of encyclopaedic knowledge."* (Representative of a scientific research institution)

Another possibility for the institution, in the opinion of the representative with whom we spoke, is the use of international funding to which they may apply for the projects they intend to carry out.

Another interviewee spelled out the problem of funding, distinguishing between what she considers to be areas for which funding is relatively easy to find and areas for which she has not recurrently found funding. If, on the one hand, she states that institutions can find funding for the digitization of content, on the other hand, they will find it very difficult to find funds for the development of their own tools, which leads institutions to purchase existing software and try to adapt it to their real needs, sometimes at great cost.

*"It is a big problem for the digitalization of new content, for new resources, but we can still find resources for that. But these state institutions do not fund the development, and it's a total mess in Croatia, no one funds it. Or ready-made software is bought, extremely expensive software that cannot be influenced, adapted to our language, to our diacritics. Every adaptation is very expensive, connecting new units to that system. So that's the development problem."* (Representative of a scientific library)

On the other hand, the difficulties that digital humanities and digital infrastructures projects have in achieving stable funding are also mentioned. Since the existing funding is short-lived and there are many applications for these limited funds, projects are under constant pressure to show progress, to show the work done and how many users make their project viable. This is a difficulty because sometimes a project in this area takes a long time to become useful for the community.

*"To prove, constantly, what we are doing for the community is important. And in order to prove it, you must show development."* (Representative of a scientific library)

A museology interviewee lists the main difficulties that museums have been experiencing, particularly with regard to digital transition. In his opinion, there is a lack of funding, human resources and equipment.

*"In my opinion, what the museum community lacks, other than funds and staff, is actually equipment. (...) They lack funds, people to work and equipment. These are the three things they lack."* (GLAM institution employee and participant in DH projects)

The same interlocutor develops this idea, demonstrating how hiring more human resources would allow more innovation, the diversification of audiences and activities for the community, as well as the use of greater funding possibilities.

*"If they [the museums] had people, these people might have come ideas, those ideas might result in some new, let's call them products, these products could produce added value either in the form of a new audience, or in the form of new finances, from sponsors or from sale of products, let's call it that. This is actually a vicious circle."* (GLAM institution employee and participant in DH projects)

There is also a strong difficulty, on the part of both the institutions and their own research infrastructures and digital humanities projects, in delegating to someone the responsibility of disseminating contents of this area to the community. Referring to the case of DARIAH in countries such as Croatia, one respondent recalls that the infrastructure outreach work is carried out by a national coordinator who does not hold only this function, as he is a researcher, teacher or has other professional commitments that overlap, leaving a small portion of time available to help disseminate these tools. The problem here too, is the lack of human resources to accelerate the development of this area and to ensure its connection with the scientific community.

*"The real problem is: all the work currently done by all DARIAH representatives – both institutional and national – is voluntary and on top of everything else that they have to do. It would be good if some of this got professionalized."* (Digital infrastructures user and participant in DH projects)

Two interviewees mention that the digital humanities have not yet been recognized as an important scientific area by research and higher education institutions. One of them suggests that institutional decision makers should recognize this importance so that the area can effectively become established and develop itself.

*"Digital humanities should be recognised as an important scientific field. Decision-makers should be acquainted of how the use of digital resources could contribute to the research in the humanities. (...) Decision-makers could introduce new policies to support the digital humanities."*

The other interviewee, referring to the specific case of one institution, states that the importance of developing a digital repository and digitizing information has not yet been recognized by those in management positions.

*"I would say that the institution has not yet taken a fully satisfactory position. This would mean that funding the digitalization and development of a digital repository, that is valid for the entire academy, must be included in that financial part of the strategic plan, and must be found in the annual budget. And it is not there."* (Representative of a scientific library)

Finally, an obstacle for the establishment of the digital humanities pointed out by various interlocutors, and which concerns the institutions, is the lack of training and awareness of the use of new technological tools and solutions for research in the humanities.

*"I think that first there is a lack of education. (...) it also seems to me that at university everything is still very much based on books."* (Experienced researcher using digital humanities tools)

### **Difficulties – researchers**

One of the interviewees recalls that, for many researchers (including herself), especially in the humanities and social sciences, there is a strong resistance to the adoption of methods which are based on new technologies, or to the acceptance of information sources that have a digital support. This researcher feels that a book or article published in a scientific journal still inspires greater confidence than a digitized resource.

*"I'm still more committed to the written form than to any portal. (...) I love the availability of texts on the internet and all that, but again I somehow trust the text more."* (Experienced researcher using digital humanities tools)

As long as the research community does not recognize digitized sources as credible as print sources, or while online publication of scientific work counts less for scientific evaluation, researchers themselves will find it difficult to support the further development of digital infrastructures, or the thriving of technological approaches to the processing and publication of information. It is in this sense that an interlocutor considers it a priority to invest in training, education and dissemination, that makes researchers aware of these new possibilities brought by the digital humanities, thus helping to overcome resistances and difficulties.

*"What can be significantly improved and achieved is education, informing scientists to use these resources."* (Representative of a scientific library)

Another interviewee shares this view, adding that the digital humanities' role is not to replace the existing methodologies, and that what is important to promote is the combination of different methods.

*"There is a strong need to combine digital infrastructures and digital humanities methods with traditional methods in humanities. (...) The main difficulty is to find and learn how to use digital tools and software which appropriate to research questions and methods."* (Professor and experienced DI user)

Community support to emerging research infrastructures, however, is not facilitated when many of the existing tools are costly to use. One of the interviewed researchers regrets that open access to digitized information and research tools is not more consensual, which creates barriers that prevent researchers from fully enjoying new research opportunities.

*"The problems occur when one hits a paywall – then accessing the needed article or e-book becomes an issue. (...) A lot of prestigious journals are behind a paywall, or are offered through databases that institutions don't have access to"* (Digital infrastructures user and participant in DH projects)

In addition to paid access to some of the tools and content, two other obstacles were identified by the researchers, when using some of the research infrastructures for the humanities. One of the interviewees mentions that, as there are major differences in the digital humanities and research infrastructures landscape across countries, researchers in some countries have access to a much smaller amount of content: a difficulty that will be added when researchers do not speak English. Similarly, this difference also creates obstacles to the distance-study of subjects which are associated with countries that have less information available on digital infrastructures.

*"There is a clear difference between countries on the digital material that is available online, and that creates a big void in research of international and interdisciplinary themes."* (PhD student and DI user)

Another difficulty mentioned is a usability problem, which results from infrastructures and tools that are not easy to grasp for the newcomers who have not been trained to use it, or who have less experience with these technological solutions. Giving the Europeana infrastructure as an example, the respondent warns that some infrastructures do not help to promote the use of such tools.

*"These Europeana-type platforms are pretty bad, I would say, [they are] hard to search and not user friendly. It's a lot easier to find and use these platforms through Google... I don't know, Encyclopaedia Britannica, relevant pages that may not be found on Europeana. I mean, it's really a problem to find the records that you need there."* (GLAM institution employee and participant in DH projects)

The following section gathers information regarding the digital humanities landscape in Croatia.

### **Digital Humanities – situation in Croatia**

One of the interviews was made to a representative of a relevant lexicography institute that has been working on a vast list of projects and activities related to the digital humanities, in which this institute participates. This institutional representative argues that the institute's objective, in this area, is to make as many lexicography-related content available on the internet as possible.

*"Our goal is to increase the digitized and digital lexicography and scientific contents on the web."* (Representative of a scientific research institution)

The institute's first project in the field of the digital humanities began in 2009, when the Portal of Knowledge was made available online.

*"The first step towards making available online editions was made in 2009, when the digitisation of the Institute's published archival editions was initiated and the development of the repository of the digitised encyclopaedic content, the Portal of Knowledge, was made available online."* (Representative of a scientific research institution)

From 2016 on, the institute has been participating in a project to develop a portal that brings together diverse material about Croatian science, culture and arts.

*"Since 2016 the Institute participates in the project Znameniti.hr which aims at building a thematic portal containing digital material on the leaders of Croatian culture, science, arts and public life, from different collection/repositories."* (Representative of a scientific research institution)

This interviewee also highlights the institute's contribution, since 2018, to the Portal of the Croatian Technology Heritage, which aims to provide and foster the sharing of information about the history of technology.

The institute is currently a partner in the DARIAH-HR and ICARUS-HR networks, as well as it is helping to analyse the landscape of cultural heritage digitization in Croatia and the digital documentation and information that concerns digital archives – both of which are government funded initiatives.

*"The Institute was involved in the analysis of the current situation of the digitisation of cultural heritage in Croatia, organised by the Ministry of Culture of the Republic of Croatia, as well as in the analysis of the digital documentation and information within the initiative for the establishment of digital archives, led by the Central State Office for the Development of Digital Societies"* (Representative of a scientific research institution)

The institute also publishes its open access journal: *Studia Lexicographica*. This interviewee also mentioned two online editions that are constantly updated and expanded by the institute team.

*"The ongoing online editions, Croatian Encyclopaedia and Proleksis Encyclopaedia (general encyclopedias that emphasise contents regarding Croatian national heritage) are continuously updated and expanded. They have approximately 130.000 articles and 500.000 monthly users worldwide."* (Representative of a scientific research institution)

Finally, the institute's web page offers its potential interested parties a vast catalogue of newspaper articles written between the 18th and mid-20th centuries, the digitization of which was also supported by the Croatian government.

*"The web pages of the Institute offer access to the digitised Author Catalogue of the Catalogue of Retrospective Bibliography of the Articles, which in total is comprised of 10 million leaflets containing lists of articles from periodicals published in the South-Slavic area in the period from the end of the 18<sup>th</sup> century until the year of 1945. The Ministry of Culture*



*of the Republic of Croatia financially supported the digitisation of the catalogue in 2018.”*  
(Representative of a scientific research institution)

Regarding the undertaking and participation in all of the aforementioned initiatives, the representative of the institute refers the main difficulties that the institution is now facing: lack of human resources and lack of financial resources, namely for hiring more staff. In order to overcome some of the obstacles and be able to invest, the institute had to generate its own revenues.

*“The main difficulty that the Institute encounters is a constant shortage of various experts (especially ICT experts), and the lack of sufficient financial means to cover all costs other than staff costs. (...) Apart from the staff costs covered by the state, the institute invested its own financial means (earned from book sales and office space rentals) for performing those activities, especially when it comes to the acquisition of equipment.”* (Representative of a scientific research institution)

As a conclusion, the same interviewee recalls the long way that is left to go for the digital humanities to fully explore their potential. She believes that the community needs to act consistently to make decision-makers (institutional, national and international) aware of the importance of the digital humanities.

*“Digital humanities should be recognised as an important scientific field. (...) Awareness of the importance of digital humanities is the first step in changing this attitude, and in adjusting the policies accordingly.”* (Representative of a scientific research institution)

*“The research community should also be active in demonstrating the importance of the digital humanities to decision-makers, in order to gain their support.”* (Representative of a scientific research institution)

On the other hand, a representative of the institute that had the responsibility of being DARIAH’s National Coordinating Institution since 2014 considers that the Croatian Ministry for Science and Education recognizes great importance in the country's participation in infrastructures such as DARIAH and CLARIN.

*“Even the Croatian Ministry of Science and Education has recognised DARIAH and CLARIN research infrastructures as important and with great potential, and were involved in its development from the mere beginning.”* (Representative of a scientific research institution)

This representative believes that his institution's direct participation in the DARIAH infrastructure will result in enhanced networking possibilities for its community at various scales.

*“The coordinating role of the Institute via DARIAH-HR will help to develop new possibilities for quality networking with scholarly communities in humanities and arts at the national, regional and European levels.”* (Representative of a scientific research institution)



In 2011 this institute began to develop its digital repository and has been a regular participant in several scientific projects dealing directly with research infrastructures.

Another institution that has frequently participated in projects related to digital humanities in Croatia is the Croatian Academy of Sciences and Arts (HAZU). A representative of this institution outlines, firstly, the Academy's main objectives and how they benefit from the development of digital humanities projects.

*"The strategic goals of the Academy in science, in culture, are to follow Croatian identity, to preserve Croatian identity in such a way as to preserve Croatian history, truth about Croatian history, Croatian language and culture. (...) It plays an important role in the strategic plan and promotion, which the library [of the Academy] performs through standard web resources and especially through its digital repository and the digital collection it manages."* (Representative of a scientific library)

The interviewee mentions the participation of the Croatian Academy of Sciences and Arts in projects such as Znameniti.hr or its links to European research infrastructures such as DARIAH or Europeana. However, he states that the project with the longest duration is that of the institutional repository itself.

*"The longest project has been implemented for ten years (...), that is, the organization and operation of the HAZU digital collection, the central repository for all the Academy's research museum and gallery and administrative units"* (Representative of a scientific library)

A list of the Academy's challenges in consolidating the digital humanities, such as integrating the digital repository into the daily work of the Academy or establishing its collection as a corpus of scientific work, was also made.

*"Besides funding, we must work on popularizing it [the digital repository], introducing the functionalities of the collection into the daily work of the Academy's units. We primarily think of the HAZU Archive, whose entire content needs to be connected. (...) Secondly, [it is necessary] to make the digitized content in the repository a research, scientific corpus for future research. And that's exactly what it is becoming."* (Representative of a scientific library)

One of the interviewees is optimistic about the situation of the digital humanities in Croatia compared to the reality of other countries. He believes that the Croatian research community has a rich variety of digital tools that can assist them in their work.

*"Here in Croatia I think we are quite well equipped with all the available tools."* (Experienced researcher using digital humanities tools)

However, the same speaker warns that the investment in education, that is, in training for the effective use of digital tools that are offered to the community is still insufficient. Without the learning of digital skills by much of the community, the good solutions that are beginning to emerge, and whose development or maintenance have been funded, will never be effectively used.

Next, we will look at what respondents said about the various dimensions of sustainability of digital research infrastructures.

### **Dimensions of sustainability – durability**

All respondents agree that the issue of the durability, or continuity, of a research infrastructure – or any digital humanities tool – is simultaneously the issue of funding. Without stable funding, users cannot be assured of continuity of the service, which is a problem for the very credibility of the infrastructure.

*“I think that, first of all, everything revolves around the classic problem that is called financing.”* (GLAM institution employee and participant in DH projects)

As digital infrastructures are neither self-sustaining nor self-financing, the maintenance required for the infrastructure’s continuity is only possible through external financing.

*“The problem is always the same: if there is no adequate financial support, then the system’s maintenance cannot be paid, as these are not self-maintaining systems. In addition to not being self-maintaining, they break down and become obsolete. So, if you want to have something durable, you need to secure the finances.”* (GLAM institution employee and participant in DH projects)

The same interviewee clarifies, then, that the maintenance of these tools depends on human resources that constantly update the software, and that these human resources require continuous funding. If funding is not secured for a digital humanities project, the human resources required for its operation are not secured either.

*“If there are no people to maintain this component, or employees in institutions, then the money alone will not be the solution, because money, apart from paying for costs, does nothing else. We also need people who will then be paid with that money”* (GLAM institution employee and participant in DH projects)

This lack of assurance that the information available in research infrastructures and repositories will remain accessible in the medium to long term favours researchers' greater resistance to the logic of digital. One respondent noted that, despite all, physical publications continue to offer better guarantees of survival.

*“A book is a book, however you look at it, a book is published and has its number and will always be there.”* (Experienced researcher using digital humanities tools)

The logic of project financing does not favour the durability of the tools produced by these projects, as financing lasts only as long as the project lasts and is not guaranteed after its completion.

*“These project sites are funded while the projects last, and then what? (...) if your research is published on a project website, when the project shuts down, you can maintain the site for a while, but then [you find that] it is not financially viable, and then it shuts down and is no*

*longer available. It's great that you can physically store a lot of stuff in a repository or archive and something will physically survive.*" (Experienced researcher using digital humanities tools)

This difficulty leads one interviewee to argue that funding for long term maintenance should be a condition for financing the development of any digital project or tool.

*"[I recommend] funding for maintenance, and/or archiving of digitised content, as a requirement of all digitisation projects and initiatives. It is pointless to create so much digitised content only not to be able to keep it online or available."* (Digital infrastructures user and participant in DH projects)

Finally, one interviewee believes that research infrastructures directly linked to an institution – such as institutional repositories – can more easily guarantee durability, as these institutions have different types of research and permanent human resources linked to the digital and to information and communication technology.

*"I think it is more likely that they [the institutional infrastructures] will get some kind of financial support to maintain this whole system."* (Experienced researcher using digital humanities tools)

#### **Dimensions of sustainability – credibility**

One respondent finds it "terribly difficult" to guarantee the credibility of an open access infrastructure, since the information available on it lacks a rigorous and recognized validation process. He mentions the case of Wikipedia, which works on the logic that any individual can contribute to the exposed information, as an example that this attempt at a new paradigm for science continues without offering sufficient credibility guarantees for most researchers.

*"I love the availability of texts on the internet and all that, but again, I somehow trust the text more. I also trust the encyclopaedia article of the Institute of Lexicography more than Wikipedia. Especially since Wikipedia can be edited by anyone. Although there is a lot of cool stuff, but there are some that I am not an expert on, so I don't know if they are true."* (Experienced researcher using digital humanities tools)

This concern is shared by two respondents who warn of the necessity to enable researchers to distinguish between valid and invalid information.

*"It depends on us, whether we know how to recognize the right thing in the pile of things thrown at us."* (GLAM institution employee and participant in DH projects)

*"You just need to have sufficient knowledge to know what is reliable and what is not."* (GLAM institution employee and participant in DH projects)

Referring to the Europeana infrastructure, the same interviewee reinforces this idea, suggesting that the problem of insufficient credibility of some information available on this infrastructure may be due to data mapping issues.

*"it is difficult to actually determine where to find accurate information. This is actually impossible. (...) I would expect such a platform [Europeana] to be reliable, the data there to be relatively accurate. However, I have discovered it is not, far from it. Maybe the problem is data mapping."* (GLAM institution employee and participant in DH projects)

Based on the idea that a research infrastructure seems the more credible the more users it has, one respondent states that it is crucial that these infrastructures can be intelligently disseminated to certain recognized and influential researchers, thus making the tool credible. In addition, she considers necessary to develop information certification mechanisms.

*"To achieve credibility [an infrastructure] must be used by credible researchers, and it must ensure the mechanisms for achieving and guaranteeing truthfulness of data, as well as fair use of data."* (Professor and experienced DI user)

In order to reach out to these researchers, as well as others, and to become more visible to the community for which they are targeting and providing services, it is stated that DARIAH (and other similar infrastructures) should be present in important events of the various disciplines of the humanities. In addition, and finally, one respondent considers that the "formation of qualitative metadata policy" (PhD student and DI user) would help to build a digital research infrastructure.

#### **Dimensions of sustainability – accessibility**

The issue of accessibility to research infrastructures was not explored by the respondents, who referred rather to the extent of accessibility in relation to the information and other content that these research infrastructures make available to their public. One of the interviewees puts accessibility of information as the main advantage of digital infrastructures.

*"The main advantage of digital infrastructures is [its] structured, stored information, which one can reach from anywhere, browse and search."* (Professor and experienced DI user)

According to the same interviewee, in contrast, the main disadvantage regarding accessibility of information through digital infrastructures is the large dispersion of information across a wide range of different infrastructures, which require greater efforts in order to pool existing information or make it accessible from one search.

*"The main disadvantage is that there are not enough international efforts for the union of digital infrastructures."* (Professor and experienced DI user)

Another interviewee also refers to accessibility as an advantage, especially of open access infrastructures, but this time from the perspective of the author who wants the research product to be accessible to the community and get more views and citations.

*"I see only advantages [concerning open access]: global reach, accessibility, the possibility of having a concurrent dialogue with everyone in the field"* (Digital infrastructures user and participant in DH projects)

Also looking at the issue of accessibility from the point of view of those who want to make information available, a representative of a cultural heritage institution recognizes that online access to information and collections helps the dissemination of their assets, and its appreciation and recognition by the most varied audiences. It also allows interconnection with other collections when the different repositories know how to operate in a network.

*“Online encyclopedic content will help popularize the results of scientific research and develop recognisability of the Croatian national heritage. The strategy also foresees the possibility of linking [it] to the digital repositories of other scientific and cultural institutions in Croatia and abroad.”* (Representative of a scientific research institution)

A researcher working on ethnomusicology sees no reason why research work should not be made accessible on the Internet, unless there is information that should for some reason be protected.

*“There are situations where you have to protect something and you can’t publish it due to political or other [kinds of] protection, but most data can be public.”* (Experienced researcher using digital humanities tools)

From the point of view of respondents who access research infrastructures for information seeking, the possibility to access articles from a wide range of scientific journals in a short time is also valued. However, one of the interviewees admits difficulties in finding work on the subject he is studying, often needing to use search engines like Google and having to apply criteria for selecting the information that comes to him.

*“When it comes to, for example, the material that I work on, which are clocks and watches, it’s hard to find material on these portals, some relevant data. Then, really, only Google is useful for me, because I never know where to find some reliable data, but given my experience and knowledge, I know what I can rely on more or less and then select the data.”* (GLAM institution employee and participant in DH projects)

When the object of research is, as in this case, very specific, the accessibility to the information that one seeks is limited, not least because it is not certain that such information exists or that many researchers are studying the same subject. Another respondent refers to these cases, stating that open access is particularly important in these situations where, with little research on a given subject, it is crucial for researchers that these few contributions are made accessible, making contact and dialogue possible among the few researchers working on these topics.

*“No one can guarantee that the data we are looking for exists on the internet, maybe no one has ever written it. If it exists, it may be behind closed doors, so no one knows that it is there. So, if we knew that that particular data were on a portal that we cannot access, then we couldn’t get that information.”* (GLAM institution employee and participant in DH projects)

### Dimensions of sustainability – equal access

Some interviewees establish a relationship between the principle of open access and the elimination of any discrimination in access to scientific knowledge. The development of open access research infrastructures and digital tools has made it possible for all researchers – and even other audiences – to access information without being restricted by constraints linked to gender, age, academic background, link to the institution or academic career time.

*“There is no difference (...), all this technology and all these resources have made it possible to maximize the democratization of science and art.”* (Representative of a scientific library)

Open access is said to help create a “more inclusive” research communities and to promote bridges between different scientific areas, opening up new possibilities for cross-disciplinarity.

The reality that is opposite to open access is still that of some scientific journals (in addition to digital infrastructures) that charge access to their contents, making effective access to information dependent on certain conditions and, thus, not guaranteeing equal access opportunities.

*“A lot of prestigious journals are behind a paywall or are offered through databases that institutions don’t have access to. (...) Access then depends on professional, collegiate networks (i.e. contact with experts working at better-stocked universities)”* (Digital infrastructures user and participant in DH projects)

One interviewee also states that equal access is guaranteed in all the tools that her institution has already created or developed, and this is actually a prerequisite.

*“Equal access to the digital content and services is enabled to all mentioned groups.”* (Representative of a scientific research institution)

### Dimensions of sustainability – usability

Regarding usability, two of the interviewees relate this dimension on equal terms with equal access opportunities. In the understanding of these interlocutors, the main way forward to improve the usability of research infrastructures by removing obstacles to the researchers’ effective access. One of these respondents advocates the principle of open access as a recommendation for better usability of digital infrastructures.

Another respondent puts usability as a condition for infrastructure durability. In his opinion, a digital tool will make it easier to ensure its continuity by making it also easier for the researchers to use it, as this will promote higher rates of utilization. The lack of effective use of some infrastructures makes it difficult to obtain funding for their maintenance and continuity.

In this sense, in order for infrastructures to be really used – and easily used – by researchers, the interviewee advises that their development should always take into account the needs of researchers, as well as the fact that these needs vary over time.



*"To achieve usability, [an infrastructure] must be built in accordance to researchers' needs as much as must be sensitive to the change of those needs."* (Professor and experienced DI user)

Moreover, it is noted that research infrastructures should be standardized in order to become easier to use and more intuitive, and must invest in its dissemination among the community, thus increasing the level of use.

*"It must be easy to use and standardized, and it must be promoted among researchers."* (Professor and experienced DI user)

Another respondent also mentions the example of Europeana to point out that there is a general problem with the difficulty of using these pages, which are not easy to use and to search for the intended content.

*"These Europeana-type platforms are pretty bad, I would say, hard to search and not user friendly."* (GLAM institution employee and participant in DH projects)

Next, we will look at the comments that respondents made to cross-disciplinary research, particularly in regard to the contribution of research infrastructures to this kind of thinking of research in the humanities and the arts with a more cross-cutting scope.

### **Cross-disciplinarity**

One of the interviewees believes that the dissemination of the DARIAH infrastructure should strongly contribute to establish it as an instrument of cross-disciplinarity, open access and integration of new communities, by promoting these principles in the science landscape.

*"DARIAH needs more promotion within the academy, as much as within GLAM institutions. It must step out from its circle and promote, loudly, [its] ideas of open access, cooperation, interdisciplinarity, cross-disciplinarity, strength of integration and power of integration of academic, non-academic institutions and community."* (Professor and experienced DI user)

All the respondents who referred to cross-disciplinarity identified these different concepts as being all related with each other. The ability of an open access research infrastructure to favour this logic of cross-disciplinarity was highlighted by all.

*"I support the publication of research results in open access, as much as the publication of raw data in open access. (...) That is the main prerequisite, as I see it, for enabling cross-disciplinarity and interdisciplinarity research in humanities, which is so much needed. [It is] discussed but not enough promoted or enabled."* (Professor and experienced DI user)

As it can be seen, this interviewee believes, not only, that open access, as a basic principle of research infrastructures, promotes a research logic that crosses disciplinary areas, but also that the promotion of this interdisciplinary vision should go further, as it is becoming more and more pressing.



*“Digital infrastructures can offer tremendous possibilities in a sense of data storage, (re)use, cooperative and interdisciplinary work, data visualization and data mining.”* (Professor and experienced DI user)

Another interlocutor points out that, for him, the interdisciplinarity that these research infrastructures promote results in a higher probability that he, being a frequent user of these tools, will be able to find and read an article from a different disciplinary area than he would be had these infrastructures not existed. The fact that humanities researchers, in general, use the same infrastructures, makes it easier for research results from all of them, regardless of their background, to be accessible to the others.

*“Well, I would say that my interdisciplinarity is mostly a result of reading an article from someone who I might not otherwise read.”* (Experienced researcher using digital humanities tools)

Finally, another interviewee considers that the open access logic underpinning the design and operation of these research infrastructures solves all the questions that would otherwise be obstacles to cross-disciplinary research or equal access regardless of age, gender, academic degree, institutional affiliations or scientific area of origin.

These considerations lead us to the next topic, which focuses on the respondents' thoughts about open access in science.

### **Open access and open science**

Several of the interlocutors interviewed under this project have assumed to be users of open access tools for their scientific work, especially repositories. Among the various infrastructures and tools they mention, DARIAH and some of its services were referred. One of the interlocutors even stated that, for the search and reading of bibliography, the payment for access to information constitutes a major limitation to his work.

*“The problems occur when one hits a paywall – then accessing the needed article or e-book becomes an issue.”* (Digital infrastructures user and participant in DH projects)

One of the interviewees defends the principle of open access as essential, claiming a policy for science that further promotes this philosophy.

*“I doughtily support all activities and efforts in promoting and enabling open access policies in every sense. Namely, I support the publication of research results in open access, as much as the publication of raw data in open access.”* (Professor and experienced DI user)

Despite openly supporting the principle of open access, one interviewee strongly insists on the issue of credibility. In her view, open access easily meets the obstacle that there is not a consistent validation process for the information that is being made available.

The same interviewee sees no solution in sight to this problem of credibility of the information that is available in open access, due to the freedom of any individual to post any information on the Internet without a guarantee of its reliability.

*“Well, I don’t [think we can ensure credibility through open access]. I think it’s actually impossible to solve it nowadays because so many people have access”* (Experienced researcher using digital humanities tools)

In her opinion, a researcher (unlike other individuals) highly values the validity of the information he finds, not accepting data and information that is not properly certified. This attitude – necessary in research – results in resistance to open access for the reasons already given.

*“We scientists are very cautious about information, so you think a lot about whether this is good, verified, reliable... whereas other people will take for granted the first search on Google. And Facebook and so on.”* (Experienced researcher using digital humanities tools)

If these can cause resistance to open access by those who seek and use available information, there are also factors that constrain researchers who want to disclose their work. The same interviewee believes that it might be useful for many researchers to define the uses that can be made of the results of their research, *i.e.*, to set a number of preconditions for the use of their data and citations.

*“I think it’s great that you have access to everything, but on the other hand, as far as a scientific paper is concerned, you should define how to use it. And the use, what you can use and how will you use it, how will you quote it.”* (Experienced researcher using digital humanities tools)

In her opinion, there is also the durability problem associated with open access. Some researchers fear that making their work available on an open access infrastructure will not guarantee access to such work in the medium or long term, while a book continues to offer greater guarantees of continuity.

*“A book is a book, however you look at it, a book is published and has its number and will always be there. And a website may or may not be there.”* (Experienced researcher using digital humanities tools)

On the other hand, among a group of these researchers there is a concern related to the disclosure of their research product in open access because they fear some of the uses that the community might make of it, or even fear that other researchers may take ownership of their work. However, this interviewee does not consider that these fears are justified.

*“I don’t think sharing sources is dangerous to someone’s work. On the contrary, I think they would profit because if we write about the same topic on the same source, I think we can get completely different results. Or the same, and then they are confirmed.”* (Experienced researcher using digital humanities tools)

Copyright issues are effectively mentioned by two other respondents who point them out as obstacles regarding open access. Policies that focus on copyright issues and, at the same time, promote open access are needed, especially in the humanities, where the interlocutors consider that this subject is still underdeveloped compared to other areas of knowledge.

*"In my opinion, the main difficulties are lack of data copyright and lack of policies for the promotion of open access, especially in humanities' circles."* (Professor and experienced DI user)

Agreeing that much remains to be done in order to promote open access in the humanities, it is recommended to hold community events and training, particularly in countries where the issue is least developed.

*"[A positive attitude towards open access can be achieved] through workshops and presentations for scientific communities, especially in countries where digital humanities are in early stages."* (PhD student and DI user)

Where respondents agree most, however, is on recognizing the advantages of open access to research. One of them refers to the democratization of access as a fundamental advantage to science and art, that is, to knowledge.

*"All this technology and all these resources have made it possible to maximize the democratization of science and art."* (Representative of a scientific library)

Another respondent notes that open access gives researchers the ability to effectively follow the work of other researchers that study the same issues and with whom they share interests, wherever they may be, as well as to provide global outreach to their work. The issue of democratization of access to knowledge is also mentioned.

*"I see only advantages [in open access]: global reach, accessibility, the possibility of having a concurrent dialogue with everyone working in the field (and not only with those who can afford to access the latest research). It creates a levelled playground and contributes to a better, and more inclusive, research community on a global scale."* (Digital infrastructures user and participant in DH projects)

In addition to these advantages, it is noted that the principle of open access, by democratizing access to science and research results, solves the problems of unequal access opportunities and opens the way for more cross-disciplinary research, as we have already seen in this analysis.

Answering the question of how can research infrastructures support a positive attitude towards open access, one respondent states that these infrastructures offer the possibility to open up all kinds of information that results from research work.

*“The main support is in offering easy to use tools to publish in open access, whether raw data, research data, project protocols and documentation, articles, or any other type of data.”*  
(Professor and experienced DI user)

The representative of a lexicography institute lists many of the open access projects in which her institution has actively participated, and states that it intends to continue to do so. One of these projects, already under development for some years, is that of an institutional repository, which may open possibilities for a greater connection between the institution and other scientific and cultural institutions inside Croatia, as well as with foreign communities and institutions.

*“The establishment of such a repository would enable the possibilities of linking to digital repositories of other scientific and cultural institutions in Croatia, as well as abroad, and thus the national and international collaboration.”* (Representative of a scientific research institution)

These possibilities which result from the existence of a digital institutional repository, available to the community through open access, epitomize the advantages of the open science principle for the humanities and arts with regard to democratic access to knowledge and the establishment of broader collaborative partnerships.

## ANNEX 4: Script for the DESIR partners contributions

### WP 2 Dissemination

1. Regarding dissemination, how should the recommendations and strategies be oriented? To whom?
2. What do you feel are the main difficulties concerning the dissemination of DARIAH?
3. How to better sell DARIAH to whom will have to pay the next national fee to DARIAH?

### WP 3 Enlarging

In order to build recommendations and strategies on DARIAH enlargement activities, it would be very important to have some inputs from you, as a National Accession Coordinator.

1. The enlargement of DARIAH to other countries can bring new groups and communities. Considering the DESIR goal to support the enlargement and growth of DARIAH and the integration of new communities, what are the results developed by you until now?
  - 1.1 What do you think succeeded?
  - 1.2 What did not succeed?
  - 1.3 How can DARIAH support you in identifying new communities and new core groups?
  - 1.4 How can DARIAH support you in involving these new communities and core groups?
2. From your experience in representing your country as a candidate member to DARIAH:
  - 2.1 What are the main difficulties found at the national and political level?
  - 2.2 What are the main difficulties found at the institutional level (university, library, academy, other type of institutions)?
3. One of the DESIR project goals is to support enlargement and to promote activities that increase awareness of DARIAH advantages.
  - 3.1 What can be done by the DESIR project at national level?
  - 3.2 What can be done by the DESIR project at institutional level?

### WP 4 Technological enhancement

1. What are the problems and difficulties that WP4 found relevant to:
  - “ensure DARIAH’s long-term sustainability by technologically enhancing DARIAH’s research infrastructure and services” and to

- “develop DARIAH’s profile in four new and innovative technology areas” (WP4 objectives 1 and 2)?
2. As described in task 4.2, “the technology partners will each carry out a study to define the expectations and requirements, together with an overview on their importance and their applicability”.
    - Which were the main expectations and requirements defined?
    - Which results do you think are particularly important for us to take into account when defining recommendations? (We have read the Gap Analysis report, but we believe it would be more interesting if we have your main ideas).
    - What can DARIAH add to academic research in comparison with other existing platforms?
  3. How could DARIAH measure its users’ trust on the already existing services?
    - Do you agree it would be interesting to develop a permanent methodology in order to monitor, to measure and validate users’ opinions and reactions about DARIAH’s services?
    - Could we suggest, as a recommendation, a monitoring methodology to analyse the satisfaction and trust of DARIAH’s services and platform usability?
    - It could be interesting to create some indicator(s) so as to allow an analysis over time and to determine the “trust trajectory”.

### **WP 7 Training and teaching**

1. Based on the WP7 results so far, in which areas or domains do you think we can define recommendations for the future development of DARIAH as sustainable infrastructure?
2. One of the possible recommendations is to build a monitoring tool to collect useful information during training activities, in order to take into consideration new contributions, suggestions and evaluations. What is your opinion about this?

Some of our interviewees have commented that, when accessing DARIAH website, the volume of information may seem excessive and one may not understand clearly how to use DARIAH in the benefit of his/her research work, how to use each instrument, how to access the available information, etc. A recommendation that could come up would be to build some tutorial videos in order to explain visually how to better use DARIAH website and its multiple services, providing an easy answer to the question “how can I improve my research work using DARIAH?”. What is your opinion on this?

## ANNEX 5: DESIR partners' contributions

### Enlargement, Technology and Training/Education: recommendations for DARIAH sustainability

In order to build recommendations and strategies related to each of the subjects addressed by the other DESIR work packages, the partners were asked to answer a set of questions and to propose new themes and proposals. The inputs from the partners are presented below, organized by work package.

#### 1. Enlargement: inputs from WP3

WP 3 aims to support the enlargement and growth of DARIAH and the integration of new groups and communities to establish DARIAH membership in six new countries: the UK, Finland, Spain, Switzerland, Czech Republic and Israel.

#### Israel

##### Positive and negative points: the recognition from the scientific community and the lack of governmental actions

In the frame of DESIR project, the partners from Israel focus that, at the universities level, there are interest to promote cooperation and events on a variety of subjects in the fields of digital humanities. At the institutional level – as universities, libraries and academies – they didn't identify any difficulty. On the contrary, universities and libraries are the one that try to promote and willing to take part. At this level, the main point of success was the awareness and the progress in understanding the issues of DARIAH. Additionally, the recognition of the need of cooperation leads to the development of tools to promote digital humanities activities, learning opportunities and building infrastructures.

At the level of the government ministries responsible for the issue, the unsuccessful point was the absence of governmental budget transfer to DARIAH. Taking into account the partner's experience in representing the country as a candidate member to DARIAH, the main difficulties were to reach someone who will succeed in advancing the subject at the Ministry of Science and the Council for Higher Education. In their opinion, there are too much political involvement in these offices. Government authorities don't assume the responsibility for transferring the budget to DARIAH. Besides the lack of cooperation from the government, difficulties raised from the problem of a partial halt in decision-making due to governmental instability and the establishment of a new government in Israel.



### **Improvement of DARIAH's support to add new groups and communities: dissemination of research opportunities and the infrastructure advantages**

The partners from Israel highlighted that DARIAH could support them in identifying new communities and core groups by publishing and disseminating research opportunities. Another suggestion was that DARIAH could transfer information to wider bodies in academia, government ministries, and promotion of the possibility of holding meetings with these entities.

Considering DESIR project goal to support enlargement and to promote activities that increase awareness of DARIAH advantages, they considered the importance to promote DARIAH through the representatives and improve relations between countries at a higher level; publishing research collaborations, and the possible advantages of connecting to DARIAH; and recruiting named figures.

### **Spain**

#### **Positive and negative points: the growing interest in the digital humanities and the lack of governmental interest in investing in large digital humanities infrastructures**

The Spanish partners responsible for the enlargement of DARIAH to new groups and communities considered two periods of analysis: the situation before DESIR project and the work done in the frame of DESIR.

Before the DESIR project, in 2014, took place the first contact with the Ministry of Economy, Industry and Competitiveness (MINECO) in charge of the infrastructures roadmap through the Research and Development unit. In 2015/2016, two exploration surveys were launched to explore and evaluate the possibilities of getting Spain into DARIAH, taking into account the volume of groups working in research groups and projects that could become the providers of in-kind contributions. The survey was answered by 26 institutions.

After the beginning of DESIR project, between February and September 2018, Spanish partners pointed out a National Survey conducted to map national infrastructures among different institutions. In 2016 and 2018, LINHD—UNED organized two national events to promote DARIAH. In October 2018, a Workshop was held at UNED towards DARIAH infrastructures for digital humanities in Spain with 130 participants. Cooperation strategies were discussed between the Ministry of Science, Innovation and Universities and the research Spanish groups on digital humanities. The main results are: the scientific community is interested in participating in DARIAH and an action plan was defined to present a formal document to the Ministry. In February 2019, a virtual meeting was held with the main digital humanities groups in Spain to create a strong digital humanities network and apply to national calls to join efforts towards the inclusion of Spain in DARIAH. In March 2019 was presented the proposal INTELE "Strategic network to promote language technology infrastructures in eHumanities and social sciences" to the Research Networks call of the State Programme for

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### **DESIR**

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Knowledge Generation and Scientific and Technological Strengthening of the R&D&i System of the Ministry of Science, Innovation and Universities in Spain. The proposal aims to create a strategic network of Spanish researchers who are collaborating, due to their previous participation and their current and common interest in the European Research Infrastructure Consortium CLARIN and DARIAH in order to achieve the participation of Spain in both ERICs. In April 2019 was scheduled a meeting with the Deputy Vice-Director General for Internationalization of Science and Innovation of the Ministry. The Ministry in charge of a potential agreement has already been contacted and is aware of the situation.

The Spanish DESIR partners highlighted, as successful points, the identification of organizations that want to join DARIAH and the growing interest in the digital humanities field, in general.

The unsuccessful points were that the government is not interested in large investments for digital humanities field. Additionally, there is a lack of funding, especially for the humanities and social sciences. From the experience of Spanish partners in representing their country as a candidate member to DARIAH, the main difficulty found at the national and political level is the fact that digital humanities is a research area in which Spain has arrived much later than many other European countries. Most important initiatives are coming from individual and in isolated groups and most of them were the result of autonomous work, without a collective consciousness about digital humanities as a line of work in itself or as a new discipline. Another issue is that the results of research in digital humanities has a very limited diffusion in Spain.

At national level, they also pointed out the political instability, the inexistence of a policy of promoting participation in digital humanities infrastructures and the lack of specific national funding calls for digital humanities projects.

The main difficulties found at the institutional level – universities, libraries, academies – were the structure and the size of research groups that predominates in the field of the humanities. Spanish partners highlighted that they are small and fragmented. Difficulties of the academic structure of Spanish universities causes a great ignorance of the foreign field. Additionally, there is a lack of multidisciplinary training and a lack of communication between researchers of different fields (computer science and humanistic). Just a few researchers have competences in both fields and only some of them are able to develop a research project in a truly interdisciplinary scenario. They also pointed out the rarity of communication between projects using technologies for their research, as teams do not often share the solutions adopted with other members of the scientific community. There is not a digital humanities academic specific area and the university structure is still very hierarchical. In their opinion, Spanish academic system lacks the means to guide new generations of digital literate people, and to build and open new lines of research in digital humanities.

### **Improvement of DARIAH's support to add new groups and communities: dissemination events, an adhesion report and guidelines for in-kind national contributions**

The recommendations towards DARIAH's support in identifying new communities and core groups are the organization of dissemination events and the need to make an adhesion report where all the information is summarized. They highlighted that DARIAH could help partners in disseminating Spanish research, results and best practices in order to increase the visibility of national research at European level and facilitate more manpower to organize events. Other recommendations to DARIAH was the promotion of actions with multinational and interdisciplinary groups to develop new projects and activities. For example, the creation of a Spanish corner in specific DARIAH events, where Spanish research community could establish new collaboration with other researchers and join future projects.

In order to support enlargement and to promote activities that increase awareness of DARIAH advantages, DESIR project could provide best practices to organize in-kind contributions to join DARIAH, since universities and research institutions don't know how to calculate the in-kind contribution, and they don't have a clear view about DARIAH benefits. DESIR could provide a document summarizing the tools and services that DARIAH provides to the partners (portfolio).

Spanish partners suggested also the organization of workshops, events and training activities on DARIAH tools with the aim of raising awareness about the use and disseminating of DARIAH.

## **Czech Republic**

### **Positive points: the approval of funding and new opportunities of cooperation**

Czech Republic Ministry of Education, Youth and Sports (MEYS) organizes and publishes regular updates on the national roadmap of large research infrastructures ("RI Roadmap") in the Czech Republic and provides support for included projects. RI Roadmap update was planned in 2017-2018. The group of major Czech universities and memory institutions was formed to establish DARIAH-CZ consortium (Charles University, Masaryk University, University of West Bohemia, National Library of the Czech Republic, Moravian Library in Brno, National Gallery, National Film Archive, Library of the Czech Academy of Sciences, Institute of Philosophy of the Czech Academy of Sciences, Institute of History of the Czech Academy of Sciences) and put together an initial proposal for addition of DARIAH-CZ research infrastructure to the National RI Roadmap. The proposal was successfully evaluated and at the end of 2018 the Czech government agrees with RI Roadmap update with DARIAH-CZ infrastructure.

Participation in DESIR project was very helpful during establishment of DARIAH-CZ consortium, defining its goals, activities and for preparation of application for full membership in DARIAH ERIC. The DARIAH-CZ consortium has been asked by MEYS to design a path to a

gradual merger with the LINDAT/CLARIN infrastructure, therefore since 2020 will be DARIAH-CZ merged with LINDAT/CLARIN under LINDAT/CLARIAH-CZ.

The great success was the establishment of DARIAH-CZ consortium, which brought together important Czech research and memory institutions for a new form of cooperation and another success was approval of adding the DARIAH-CZ to the National RI Roadmap by the Czech government, which ensures funding for further development. Czech partners pointed out that though the forming of DARIAH-CZ consortium (and to get DARIAH-CZ to RI Roadmap) was quite long process nevertheless until the current situation they cannot find negative moments. The challenge is to become a full member of DARIAH ERIC in 2019.

From the experience of Czech partners there was quite positive situation on the national and political level in the past two years in representing Czech Republic as a candidate member to DARIAH. In 2017-2018, the evaluation of new infrastructures for the National RI Roadmap helped with forming DARIAH-CZ consortium, because it was connected to possible funding. And concurrently MEYS, which is responsible for the participation of the Czech Republic in ERIC is positively inclining to membership of the Czech Republic in DARIAH ERIC.

#### **Improvement of DARIAH's support to add new groups and communities: the role of the working groups and a roadshow on DARIAH activities**

DARIAH can support the partners in identifying new communities and core groups, and help in considering new partners and fields that might be asked for joining DARIAH-CZ, and by enabling them to join working groups and perhaps also by establishing new working groups when needed and required.

At institutional level (universities, libraries, academies), the main difficulty faced was the low awareness of what DARIAH is, what offers and what is an advantage of being a member. DESIR project can support enlargement and promote activities that increase awareness of DARIAH advantages by creating some type of "Roadshow" on DARIAH activities and services and some use cases might increase visibility, promotion and better understanding and also attract more users/researchers and institutions.

#### **Finland**

##### **Positive and negative points: general agreement on the importance of building a digital SSH infrastructure and the difficulties to show the benefits of joining DARIAH**

Considering the goal to support the enlargement and growth of DARIAH and the integration of new communities, the main results developed by Finland partner were the promotion of workshops with invited keynote speakers from DARIAH, complemented by personal communication with interested parties. They have increased awareness of DARIAH among Finnish universities (particularly faculties of humanities and social sciences), memory organisations, and organisations that govern academic funding. This work has been geared towards forming a national consortium that can, by applying for and gaining financial support

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#### **DESIR**

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from the Academy of Finland, formalise DARIAH activities at the national level and eventually enable country membership. The annual Helsinki Digital Humanities Hackathon (DHH), now in its fifth year, offers researchers and students from the humanities, social sciences, computer science and data science the opportunity to work on complex real-life problems as part of an interdisciplinary team. By creating an environment where participants can experience the benefits of digital humanities collaborations, the Hackathon helps to engage potential new DARIAH users and creators.

Collaboration with other Nordic countries via *Digital Humanities in the Nordic Countries (DHN)*, and EADH organisation with an annual conference, has strengthened digital humanities in Finland. The DHN 2018 conference in Helsinki attracted substantial local participation and provided valuable networking opportunities.

The work towards building a DARIAH-FI consortium has been successful in raising awareness of DARIAH in Finland. They have managed to bring together researchers at seven Finnish universities to discuss common interests in digital humanities and needs for infrastructural development at the national and international level. The Hackathons and DHN conferences have generated interest internationally and have attracted large numbers of participants.

The main difficulties found by the Finish partner at the national and political level is that DARIAH country membership is contingent on a national DARIAH-related infrastructure being selected for Finland's research infrastructure roadmap. The selection process is highly competitive, and the roadmap is only updated every six years.

The main difficulty found at the institutional level (universities, libraries, academies) is to apply for a place on the national infrastructure roadmap (or for any Academy of Finland infrastructure funding), applicants must first gain prioritisation from their host universities. At the institutional level, DARIAH is compared to infrastructures of all kinds and must prove its usefulness in a way that is understandable to reviewers from all disciplines.

While there is general agreement on the importance of building a researcher-driven digital social sciences and humanities infrastructure, the benefits of joining DARIAH have not been obvious to all. To a newcomer not familiar with the organisation or the working groups, DARIAH activities and services may appear somewhat disparate.

#### **Improvement of DARIAH's support to add new groups and communities: dissemination activities**

Regarding DARIAH support in identifying new communities and core groups, Finish partners pointed out the lack of awareness of how DARIAH operates in this area. At the national level, on behalf of the DESIR project, DARIAH could think of a strategy for how to disseminate information about its activities to a new country in a way that would be easy to implement. At institutional level, it was important to have the support from the BoD, and participation in an annual event. Also, DARIAH has supported the DHH19 Hackathon, which also raises awareness.

## Switzerland

### Positive and negative points: encouraging progress and doubts about the Switzerland status in the ERICs

Considering the DESIR goal to support the enlargement and growth of DARIAH and the integration of new communities, the Swiss partners pointed out that, from a political point of view, the process has made encouraging progress. The Swiss National Science Foundation (SNSF) has evaluated the project of the Swiss membership in DARIAH with the highest mark to support the full membership of Switzerland in DARIAH. However, it should be noted that the accession procedure remains dependent on the discussions between Switzerland and Europe about the status of Switzerland in the ERICs. In fact, the main difficulties found at the national and political level were the only uncertain point for us is the discussion between Switzerland and the European Union about the institutional agreement.

A DARIAH-CH consortium was founded on the 30th of October by eight partners (SAHSS, EPFL and the Universities of Geneva, Lausanne, Basel, Bern, Neuchâtel and Zurich). This is a major step towards full membership. In addition, the SIB has become the ninth Swiss cooperating partner of DARIAH in November 2018. The DARIAH-CH workshop was organized on the 29-30 of November 2018 in Neuchâtel. The event had both a scientific and a political purpose. Members of the major Swiss institutions were invited. The workshop represented a great opportunity to showcase DARIAH activities in Switzerland.

The DARIAH-CH consortium will continue to work towards Swiss membership in DARIAH. It has proposed that the Swiss Academies support the full DARIAH membership in the next roadmap of the State Secretariat for Education, Research and Innovation (SERI), from the 1st of January 2021. A formal request to SERI has been made by the Swiss Academies of Arts and Sciences. Since the end of 2018, DESIR partner has also taken charge of the Swiss chapter in the DARIAH WG DIMPO, in order to lead a test-case in Switzerland about digital practices in specific fields (SIB and the University of Zurich). Moreover, a second workshop is under preparation at the University of Neuchâtel (autumn 2019). From the DESIR Accession Team and from the DARIAH-CH point of view, the results have so far been fully successful. The present step, the political acceptance of the Swiss candidature for full membership, depends on the SERI. So far nothing was not unsuccessful; the team is following the rhythm of the institutional and political institutions, based a road map established regularly every four years. The next deadline to become a DARIAH member is the 1st January 2021 and if they don't succeed, the next opportunity will be on the 1st January 2025, within the next SERI roadmap. This agenda depends on the discussion between the European Union and Switzerland on the institutional agreement.

The DESIR Accession Team is continuously identifying potential new cooperating partners, and transmit interests to the DARIAH-CH consortium.



### **Improvement of DARIAH's support to add new groups and communities: developing projects and networks**

DARIAH can support the DESIR partner in involving these new communities and core groups developing projects and links between DARIAH and Switzerland. These activities should continue beyond the DESIR project, whatever happens regarding the membership application. The involvement of Swiss researchers in Working Groups and DARIAH networks is particularly important. The SIB has recently applied to a new H2020 project, as DARIAH LTP, which is a good way to explore the potential of the status of cooperating partner. Following a DESIR partner suggestion, the DARIAH board member has accepted to consult the DARIAH GA about the possibility for a non-member country to welcome a DARIAH annual meeting. In case of acceptance, the DARIAH-CH consortium could be interested in welcoming such an event in Switzerland. These two examples show how our mutual work will continue in the coming years.

DESIR and the WP3 are a crucial place to develop the Swiss accession to DARIAH membership, in relation to the SAHSS and the cooperating partners. The main result has been to establish the DARIAH-CH consortium and to apply to the SERI for full Swiss membership in DARIAH.

At the institutional level, DESIR project can help the CH nine cooperating partners to discuss with DARIAH the potential of this status, particularly since it could be prolonged until the end of 2024. CH have been the first country to get several cooperating partners, and contributes to discuss ideas about this status in DARIAH that could be also then proposed to institutions outside of Europe.

### **United Kingdom**

#### **Positive and negative points: engagement with policy makers and institutional and relations with co-operating partners**

Considering the DESIR goal to support the growth of DARIAH and the integration of new communities, the DESIR UK partners pointed out four types of activities. First, the engagement with policy makers (in primis UKRI and AHRC) initially via DESIR workshop in 2018 (Glasgow) and more recently on definition of UK national roadmap for research infrastructures.

Second, supporting the establishment of UK DH (or alternative label) association acting as the basis for a potential DARIAH UK consortium (note that this is coordinated by a DARIAH cooperating partner currently outside DESIR project i.e. School of Advanced Study, University of London but DESIR contributed to steer the initiative).

Third, the identification of modes of engagement with DARIAH as examples of DARIAH in kind contributions (in particular: planned work on KDL Software Development Life Cycle as a reusable toolset; engagement with DARIAH strategy development; KDL DESIR Digital



Methods Lead to liaise with DARIAH training officer and adopt/extend DARIAH and associated projects teaching methods and materials).

Fourth, the participation in DARIAH-DESIR events (in particular DESIR WP4 and DARIAH global agenda).

The most successful activities were the liaison with UK national coordinator of DH landscaping exercise (School of Advanced Study, University of London) and organisation of workshop in London in 2017 with the participation of 30 institutions (of which 28 UK-based) including research funding and policy institutions, GLAM sector, Higher Education and research & development institutions; the engagement with UKRI agenda on RI roadmapping and investment in early 2019; and the engagement with DARIAH strategy (including global agenda) and communication with WP3 chair and partners (which led to e.g. other UK institutions becoming co-operating partners during the life of DESIR, DARIAH submission to UKRI survey on RIs)

The unsucceeded activities were the systematic implementation of modes of engagement with DARIAH beyond accession (this work is ongoing and stalled partially for procedural reasons related to budget approval, but we hope to resume it shortly); the definition and expansion of the role of DARIAH co-operating partners (but note this is now part of DARIAH strategy plan) and communication channel between DARIAH and co-operating partners.

At the national and political level, the main difficulties found in representing their country as a candidate member to DARIAH are: the misalignment between UK DARIAH partners with institutional rather than national remit and DARIAH country model with designated national coordinator (e.g. usually located in national academies); the challenge in translating DARIAH benefits for the UK context especially with respect to access to consortia-based European funding schemes while BREXIT unfolded in the foreground; and the initial lack of direct willing policy interlocutor prior to UKRI owing the scene of RIs roadmapping and investment.

There are no particular difficulties found at the institutional level (universities, libraries, academies).

#### **Improvement of DARIAH's support to add new groups and communities: improving the level of communication with co-operating partners to promote opportunities**

UK partners don't need DARIAH support in identifying new communities and new core group as they have a good picture of relevant actors and stakeholders. Nevertheless, DARIAH could support in involving these new communities and core groups by maintaining a minimal level of communication with DARIAH co-operating partners to showcase DARIAH activities and provide opportunities for engagement; and by continuing involving UK partners in existing and new DARIAH projects.

DESIR project can support enlargement and promote activities that increase awareness of DARIAH advantages promoting regular communication and digest of examples of activities for all DARIAH co-operating partners (and potential ones); creating opportunities for

exchange on issues and practices beyond DH more in general and connected more specifically to RIs.

At the institutional level, DESIR project can identify relevant levers to align the DESIR agenda with institutional priorities (in KCL case: share RSE models in the development of digital projects, enhance capability in digital methods training/teaching).

## **2. Technology: inputs from WP4**

WP 4 aims to improve DARIAH and ensure its long-term sustainability by technologically enhancing research infrastructure and services, and the development of DARIAH's profile in new and innovative technology areas.

### **Limited use of DARIAH linked to the lack of overview and the marketplace**

The use of DARIAH is limited because potential users are usually not aware of DARIAH and its offerings. The lack of overview of the DARIAH RI and its services also limits the potential feedback and input for the improvement of the RI. It is also difficult for the users to connect with each other through the DARIAH RI.

Even if this is not a technical problem, the recommendation proposed by the partners demands a technical solution: at least partly these aspects can be addressed through a marketplace as central information hub on the DARIAH RI and its offerings. The marketplace won't be addressed by DESIR but by SSHOC, a European Open Science Cloud project.

### **Lack of common quality standards and development of tools or resources to promote reusability and sustainability**

The lack of common quality standards regarding documentation and development was one of the main results of the technological analysis of the DARIAH research infrastructure. For example, an undocumented although functional service may become quickly outdated as soon as its creators are not active anymore in DARIAH, a common scenario within projects.

The aim is to promote common standards and best practices and, by this, enable the principal long-term sustainability. The solution could be the development of simple standards for documentation and tools or resources which would enable and promote the re-usability and sustainability of these tools and resources.

Currently, the EURISE Network, an offspring of DESIR WP4, is addressing this matter (<https://eurise-network.github.io/>). The discussion can quite fruitfully be addressed jointly with other research infrastructures, so a workshop will be promoted in Utrecht in this regard (<https://euriseworkshop.sciencesconf.org/>).

### **Need to know user's expectations and requirements and the development of a top down approach**

Other objective addressed by WP 4 was the development of DARIAH's profile in new and innovative technology areas. In order to achieve this goal, WP 4 carried out a gap analysis to define the expectations and requirements, together with an overview on their importance and their applicability.

The main difficulty faced was that the theoretical plan to identify gaps in the DARIAH research infrastructure didn't worked out. DARIAH is a research driven research infrastructure and this reflects on its user base. Therefore, a demand by the scientific community is not identifiable in a conventional sense.

A different approach was developed, a top down approach to develop demonstrators without a specific requirement engineering for this task. With this approach, the technological expertise of the partners was considered, and discussed various ideas for demonstrators. Three concepts have been chosen revolving around bibliographical metadata which may be of interest for the DARIAH community.

### **Development of a permanent methodology to measure, monitor and manage DARIAH's sustainability**

WP 6 asked partners from WP 4 about the need to development a permanent methodology in order to monitor, to measure and validate users' opinions and reactions about DARIAH's services, in order to assess DARIAH users' trust on the already existing services.

Partners from WP 4 confirm the need and suggested the interest to link this methodology to the marketplace. Depending on the criteria, the marketplace could consider them by technical means. This could also be a question for university data centers with a longstanding experience on providing user services and with means to monitor the user satisfaction.

It could be interesting to create some indicator(s) so as to allow an analysis over time and to determine the "trust trajectory".

### **3. Training and Education: inputs from WP7**

WP 7 aims to develop the skills base across the DARIAH community, assess the current modalities of the training materials in the DARIAH ecosystem and conduct training workshops.

Based on the results achieved in the frame of WP 7, the recommendations for the future development of DARIAH as sustainable infrastructure, can be defined as orientations to the social sustainability of the infrastructure.

DARIAH is, among other things, a social infrastructure. But training and education is also a way of community building. Training and education is not only about sharing knowledge but building communities.

### **Improvement of training and education activities**

DARIAH users need instruction on how to use DARIAH services. Training and education is already anchored in DARIAH's strategy as one of the four main pillars. But there is still a lot of work to be done. So, it is important to invest time and effort into training and educating users as a way of securing the social sustainability of a research infrastructure.

DARIAH should be seen as complementing, not replacing, the existing university-based educational offerings, especially in terms of providing alternative educational measures such as hackathons, summer schools, master classes.

#### **Open Access covering Training Materials**

In many countries, training materials are usually made available only to students officially registered in a given course. Open Access policies cover research outputs but not necessarily training materials.

This is something that DARIAH may want to consider as its policy goal: to advocate Open Access more broadly, not only in research, but also in education. National research infrastructures could consider negotiating terms under which existing resources could be pooled to form a consolidated offering across institutions and open them to the general public.

#### **Maintain a continuous program of training and education**

DARIAH's efforts in training and education were sporadic and fragmentary for a long time. Many people attended various DARIAH training measures in the past, but they didn't keep in touch with DARIAH.

People that attended DARIAH training activities must be informed of new training initiatives. Its is important to make them feel that they, too, are an essential part of DARIAH.

#### **Improve communication and define guidelines**

Considering the scarcity of financial and human resources that are available to DARIAH-EU, a huge challenge is to define who is in charge of what, and how these different organizational levels should interact in a way that prevents the duplication of efforts. DARIAH should communicate better about its infrastructural offerings, the organizational structure, as well as its members, their roles and contributions. A taxonomy-based approach on what can be offered locally, nationally or, indeed, internationally has been suggested as a useful way to proceed. For DARIAH to grow and sustain itself, it would be very important for the organization to think about different levels of activities: local, national, European, and to establish clearer guidelines/procedures about what activities take place at what level.

#### **Understand and integrate the differences between National Institutions**

National DARIAHs are, structurally and in terms of funding, often miles apart from one another. A more detailed understanding of how we coexist on a vertical axis (individual researcher → institution → national DARIAH → DARIAH-EU) would be helpful.

### Provide unified access to learning resources

Learning resources are produced by scholars and institutions affiliated with DARIAH, both nationally and at the European level, yet DARIAH currently does not provide unified access to those resources. DARIAH should develop a policy to this end. Among the in-kind contributions submitted by DARIAH member countries in 2017, 12% of the total (35) were clearly identifiable as training materials or training events. The majority (approximately 80%) of those contributions were reported as events (face-to-face workshops, lectures, university courses or summer schools). The value of such non-virtual initiatives can be enhanced if they are captured in a systematic, meaningful way for learners and trainers to consult and re-use at their convenience. Those resources can be associated with DARIAH and hosted on a single platform, repository and institutional website. A single resource provides a clear overview of the available materials. DARIAH should provide a way to establish links between the training materials hosted on different channels, so that users can find what they need more easily. Resources should be described in as much detail as possible in order to increase their usability, findability and accessibility whilst also allowing for clear design on the front end.

One of the main results of DESIR (WP 7) was the implementation of a pilot version of a meta-resource called DARIAH-CAMPUS which can both host new learning resources and provide consolidated access to existing training materials, including captured training measures.

The WP 7 coordinator consider the consolidation of DARIAH's training materials and further development of the approach adopted by the DARIAH-CAMPUS pilot as of strategic guide line for the organization as a whole, especially in terms of: ensuring the visibility of DARIAH-affiliated learning resources and DARIAH's own brand; developing cohesion and trust across the organization and between different communities; fostering the integration of tools, services and activities, including with and through the DARIAH Marketplace; overcoming the dichotomy between 'creators' and 'collectors'; and preserving the identity of and past investment into the existing platforms.

DARIAH-CAMPUS aims to be a public-facing platform that consolidates everything that is done in terms of training and education by DARIAH. DARIAH-CAMPUS will remain open to new types of content: for instance, if we develop an internship program, we should find a way to integrate its outputs, lessons learned etc. into DC as well, whether it's by interviewing people who participated in such internships, highlighting the work of the organizations who offered such internships etc.

For this coordinator, DARIAH-CAMPUS is the answer to the question of sustainability in training and education. But it is not enough for DARIAH to build an online platform or a website or a whole marketplace, this is relatively easy. To make these sustainable, it is important to fit these resources into the existing and emerging organizational workflows, in order to make informed decisions about how to best coordinate new contributions and new initiatives – both horizontally across DARIAH-EU and vertically. The biggest challenge for both DARIAH-CAMPUS and the Marketplace is to sustain it in terms of content, curation and community-support.

### **Monitoring tool to collect useful information during training and education activities**

Following from this discussion it is possible to highlight the need to have a standard feedback form or questionnaire to be given to all the participants in DARIAH training measures to respond to. It is crucial to have this kind of feedback if we want to improve the quality of the events organized by DARIAH.

### **DARIAH's website improvement**

A suggestion from WP 7 is to improve DARIAH website with a significant effort in documenting, illustrating and explaining, adding series of video tutorials. The DARIAH website should be informational and helpful, pointing to resources and keeping the community in the loop of what's going on. It is essential for the Marketplace to be led not by technical concerns and system requirements, but actual user needs, trying to answer the question: how can I improve my research using the Marketplace?

## ANNEX 6: Slides for the WP6 participation in the NCC



### **Increasing visibility and promoting sustainability of DARIAH**

NCC MEETING, 15 MAY 2019, WARSAW

Maria do Rosário Jorge, João Fernandes, Filipe Guimarães da Silva, Maria Fernanda Rollo, Inês Castaño



DESIR has received funding from the EU Horizon 2020 Research and Innovation Programme under Grant Agreement No. 731081

### **Increasing visibility and promoting sustainability of DARIAH**



#### **DESIR WP6 TRUST**

##### **Objectives:**

- Measure trust in cross-disciplinary DARIAH communities and new core groups;
- Develop strategies to increase confidence in DARIAH services and infrastructure;
- Enlarge DARIAH by engaging new cross-disciplinary communities.



NCC MEETING, 15 MAY 2019, WARSAW

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## Increasing visibility and promoting sustainability of DARIAH



### Methodology:

#### 1) An academically-driven multi-country survey

- ❖ Implemented in DARIAH member countries and other countries where membership is being prepared.
- ❖ Addressed to users and potential users of DARIAH (506 respondents).

#### This survey aimed:

- To explore if DARIAH is reaching these research communities in terms of use and access;
- To analyse if these communities perceive DARIAH as a reliable, trustworthy and sustained infrastructure.



NCC MEETING, 15 MAY 2019, WARSAW

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## Increasing visibility and promoting sustainability of DARIAH



### Methodology:

#### 2) Individual interviews with key informants in three levels of decision-making:

- ❖ Regular users of digital humanities;
- ❖ Institutional decision-makers (universities, research units, heritage organizations);
- ❖ National decision-makers (funding agencies, national infrastructures managers).

#### These interviews aim:

- To define proposals and recommendations for each level of decision in view to a sustained growth of DARIAH.



NCC MEETING, 15 MAY 2019, WARSAW

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## Increasing visibility and promoting sustainability of DARIAH



### Survey main results:

95% of the respondents use any type of digital tools to disseminate their work.

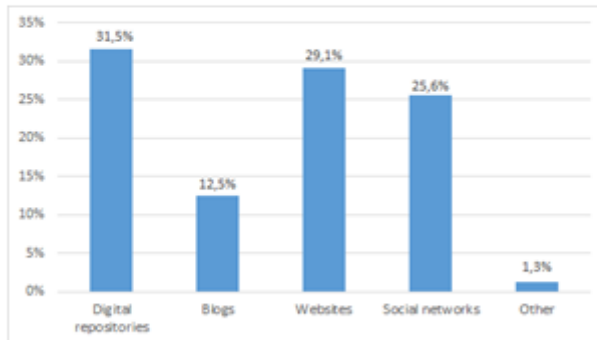


Figure 1. Digital tools used to disseminate the work



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## Increasing visibility and promoting sustainability of DARIAH



Figure 2. Purpose using DH infrastructures

Digital infrastructures are particularly used in the first phase of the research.

- Around 60% are users of digital humanities;
- Most of them (44%) use more than one DH infrastructure.



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## Increasing visibility and promoting sustainability of DARIAH



What distinguishes Digital Humanities *users* from *non users*?

	USERS	NON-USERS
Age	Older researchers	Younger researchers
Academic degree	PhD degrees are more frequent	PhD degrees are less frequent
Professional activity	Higher % of teachers	Higher % of students
Cross-disciplinarity	More frequent	Less frequent
Provision of research under open access	More frequent	Less frequent



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## Increasing visibility and promoting sustainability of DARIAH



DARIAH services and tools

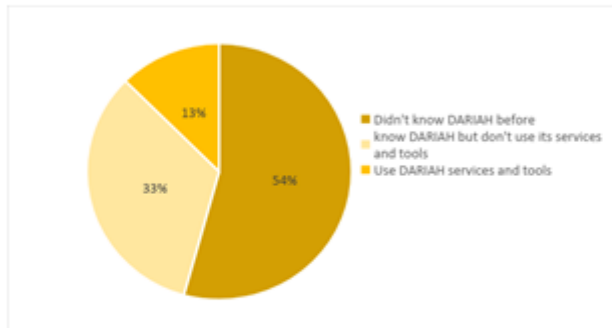


Figure 3. DARIAH knowledge and use

- In regard to gender, age, academic degree, professional activity and provision of work under open access differences between DARIAH users and non-users are not significant.
- Nevertheless, DARIAH users are slightly older than non-users and more often develop their work in a cross-disciplinary approach.



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## Increasing visibility and promoting sustainability of DARIAH



Users' evaluation of DARIAH services and tools

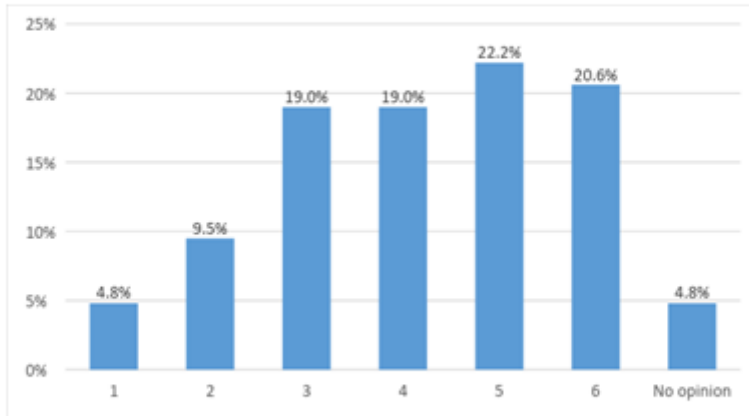


Figure 4. DARIAH services and tools usefulness (overall evaluation)



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## Increasing visibility and promoting sustainability of DARIAH



Users' evaluation of DARIAH services and tools

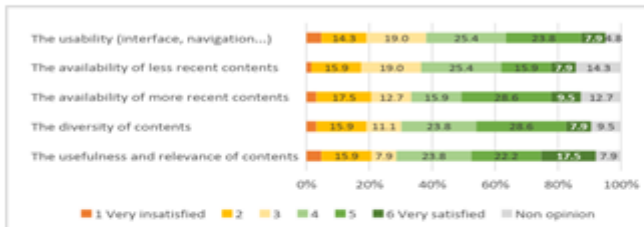


Figure 5. Satisfaction about DARIAH

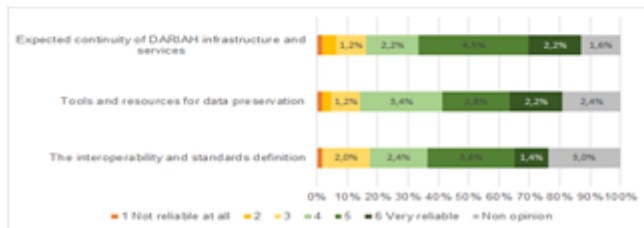


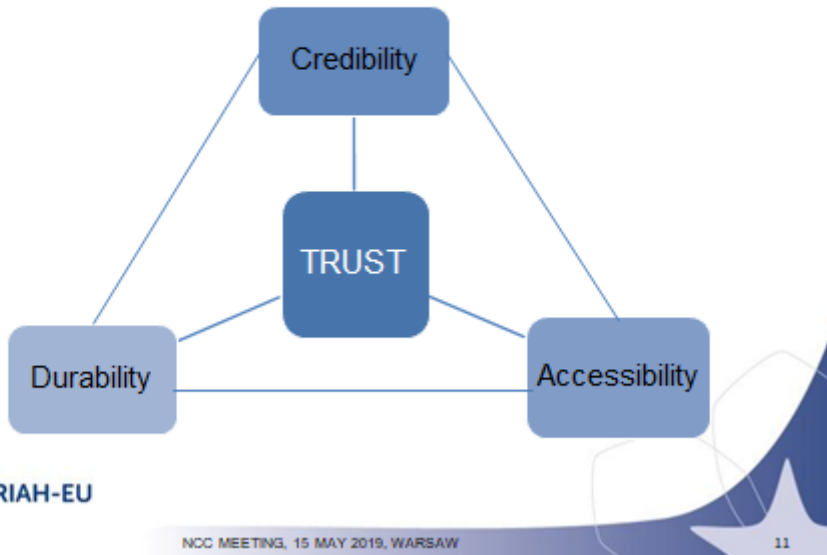
Figure 6. Opinion on the reliability of DARIAH



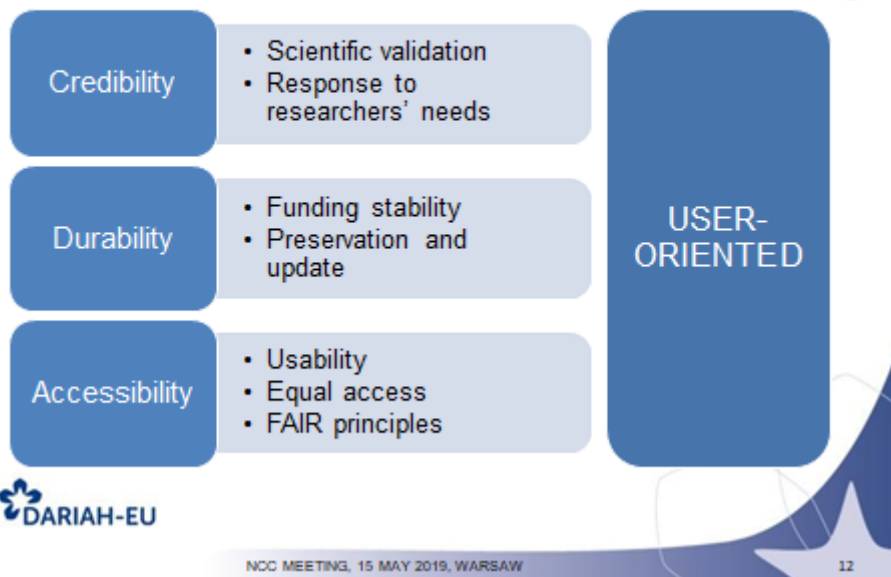
NCC MEETING, 15 MAY 2019, WARSAW

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## Increasing visibility and promoting sustainability of DARIAH



## Increasing visibility and promoting sustainability of DARIAH



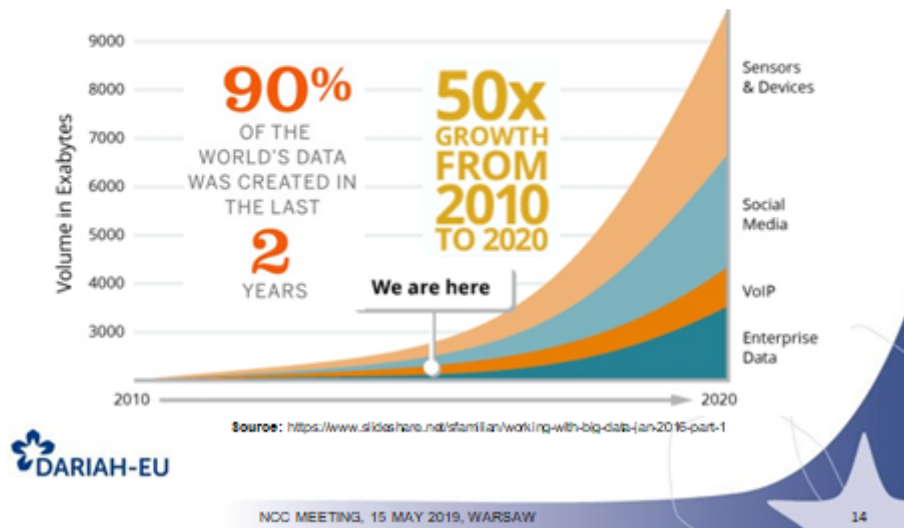
## Increasing visibility and promoting sustainability of DARIAH



## Increasing visibility and promoting sustainability of DARIAH



### Framework 1 | From data to big data



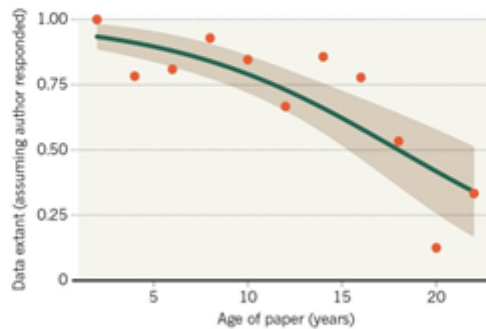
## Increasing visibility and promoting sustainability of DARIAH



### Framework 2 | Digital heritage loss & curation

#### MISSING DATA

As research articles age, the odds of their raw data being extant drop dramatically.



Source: "Scientists losing data at a rapid rate", in Nature News, 19/12/2013  
<https://www.nature.com/news/scientists-losing-data-at-a-rapid-rate-1.14415>



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## Increasing visibility and promoting sustainability of DARIAH



### Framework 3 | Challenging digital era



"After careful consideration of all 437 charts, graphs, and metrics, I've decided to throw up my hands, hit the liquor store, and get snookered. Who's with me?!"

Source: <http://www.aquest.com/cartoons/cartoons-2013/big-data-dashboard-doesnt-a-tandy-tool-with-little-utilization/>



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## Increasing visibility and promoting sustainability of DARIAH



### Framework 4 | Open Science *modus operandi*



## Increasing visibility and promoting sustainability of DARIAH



### Questions to be answered by NCC groups:

1. How can we increase DARIAH visibility considering the different target audiences?
2. What is the role of National Coordinators in increasing visibility of DARIAH?
3. How should DARIAH support NCC to overcome these challenges?
4. How could the visibility of DARIAH by research communities be monitored?



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## THANK YOU FOR YOUR ATTENTION!

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## ANNEX 7: NCC contributions and recommendations on visibility

### Increasing DARIAH visibility considering the different target audiences:

1. The role of NC in increasing visibility of DARIAH
  - a. Activities to be developed by the NC:
    - Importance of labelling and branding all the national resources, activities and services as DARIAH.

Difficulties: all the consortium partners develop a large number of activities at the country level, making it difficult to ensure that every activity is labelled as DARIAH.

    - Enlarging NC's networks to reach other institutions besides their own.
    - Articulating with the Ministries to increase visibility in order to reach a national coverage.
    - Adapting DARIAH orientations, at the European level, to each national context.
    - Ensuring that all the national in-kind contributions are useful for DARIAH and labelled as DARIAH at the institutional and national level.
2. Activities to be developed by the DARIAH executive bodies:
  - a. Having a brief and clear definition of DARIAH, so that every NC can explain it in the same way to his/her community.
  - b. Having a brief and clear list of benefits, explaining how useful can DARIAH be to the community and what services can DARIAH provide. This list should be helpful in approaching decision-makers and new potential users.
  - c. Providing a list of selected good cases of using DARIAH or success stories, to demonstrate the benefits of the infrastructure.
  - d. Providing a method of approaching each scientific community according to their discipline and specific needs and considering the different audiences.
    - i. For this purpose, it would be necessary to have an organized list of services and tools according to each scientific area, providing valuable support to every researcher's profile.
  - e. Having some kind of "implementation kit" addressed to the new members (e.g. a template for how the national DARIAH website should look like).
  - f. Ensuring that every DARIAH tool and service is available in the common infrastructure (DARIAH-EU), gathering them in a platform such as the marketplace.

- g. Providing the NC regular information about projects and networks, so they can easily find new research opportunities, data sources and tools.
- 3. Strategic orientations and goals:
  - a. Maintaining and exploiting the potential of open science to increase visibility of DARIAH outputs.
  - b. Promoting DARIAH at the local/regional level in a trans-national/ European perspective, having researchers from other partner countries explaining the infrastructure to the local researchers.
  - c. Participating in the main national and European conferences of each scientific discipline, looking for an opportunity to disseminate DARIAH in those fora.
  - d. Approaching research institutions by getting in touch with key persons (researchers or science managers) who can support dissemination within the community and promote new cooperation opportunities.
- 4. Monitoring the visibility of DARIAH by the research communities:
  - a. Monitoring the use of each DARIAH tool and service.
  - b. Surveying periodically the use of DARIAH, to get a sense of how visibility changes in time.

## ANNEX 8: DESIR Winter School "Shaping new approaches to data management in arts and humanities" - full programme

### Venue:

FCSH NOVA UNIVERSITY  
Campus de Campolide, 1099-085 Lisboa  
Almada Negreiros College, room 219, 2nd floor

Map: <https://goo.gl/maps/RXRhsPSmh6NAXJwT9>

### Tuesday 10 December 2019

10:00 - 12:30 *Welcome session and keynote "Caring for data to shape the":* Fernanda Rollo

13:30 - 16:00 *What is data in the humanities?:* Erzsébet Tóth-Czifra

Abstract: In this workshop, participants will be encouraged to examine their own scholarly practices and those of others, refining our responses to the fundamental question: "what are Humanities research data?" The ways in which Humanities methods and practices have changed to respond to digital research data will be explored in more detail. The session will combine lecture and discussion with a hands-on exercise in evaluating diverse Humanities sources, testing our ability to identify and to extract Humanities research data, and to respond to such objects in a way that reflects their digital nature.

After a warm-up session dedicated to theoretical reflections on the role of data within humanities research and cultural heritage studies, the session gently introduce the participants to the basics in research data management, data services and the FAIR principles in a humanities context, just to see how all these at first possibly fairly abstract new concepts help do more effective research if they are well-translated into community practices. Participants will travel through the research data lifecycle from planning, organising, documenting, processing, storing and protecting your data to sharing and publishing them. Participants are encouraged to discuss data management issues related to their own projects (or project ideas) ideas and to contact the trainers beforehand.

#### Learning objectives:

- Participants can define Open Access to Data
- Participants will be able to explain the advantages of Open Access to Data for their research and research in general
- Participants can summarize the FAIR principles in a Humanities context
- Participants can describe challenges involved in the concepts discussed in the session
- Participants will be able to find key resources and support for publishing data

Hands-on exercises will include: repository finding exercises and preparing a readme file for data deposits as well as modelling arts and humanities workflows that are well-aligned with research data management best practices.

16:00 - 18:00 Visit to the Foundation for Science and Technology (Portuguese Web Archive and PTCRIS - Portuguese Current Research Information System)

### Wednesday 11 December 2019

10:00 - 12:30 *Data and Software citation practices, PIDs*: Frances Madden

**Abstract: Data, Software Citation and PIDs**

This session will provide an overview of persistent identifiers, outline their importance and also provide an overview of how to cite data and software. During this highly interactive session we will both the why and how of data and software citation and discuss issues which can be encountered specifically in a humanities context.

13:30 - 16:00 *Open Research Notebooks*: Javier de la Rosa

**Abstract: Open Research Notebooks**

This session provides an introduction to Jupiter notebooks and their potentials for well documented, reproducible and reusable Digital Humanities outputs and workflows.

More specifically, it covers the following topics:

- The history of research notebooks
- Environments
- Hosted vs Local
- The Python ecosystem
- Data analysis with Pandas
- Text analysis with SpaCy
- Visualization with Seaborn and Matplotlib
- Examples for the application of Jupiter notebooks in Digital Humanities research projects.

16:00 - 18:00 Visit to the National Library (digital strategy) and National Archives (digital preservation)

**Thursday 12 December 2019**

10:00 - 12:30 *IPR and licensing*: Walter Scholger

Abstract: Copyright and (Open) Licenses

As researchers, we are both creators of intellectual works and users of others' works. Copyright addresses the proper balance between the interests of creators and the possibility of reuse by the public. We will therefore look at principles of copyright and statutory license for research and education and investigate the provisions of the recent EU Directive on Copyright in the Digital Single Market.

In addition, we will discuss how Open licenses like Creative Commons work in theory and practice and how we can employ them to ensure both widespread re-use of our intellectual outputs and proper attribution.

13:30 - 16:00 *Data Management Plans*: Antónia Correia

Abstract: Data Management Plans

1. Research data management and data management plans
2. H2020 funding requirements
3. Planning for data management
4. Data management planning tools

The first part of the workshop will be a theoretical introduction, and the second a hands-on approach to DMPs.

16:00 - 18:00 Round table discussion with portuguese Social Sciences, Arts and Humanities Research Infrastructures

19:00 Social Dinner "Pano de Boca Restaurant" (*free of charge*)

**Friday 13 December 2019**

10:00 - 12:30 *Innovative Publishing Practices in the Arts and Humanities*: Delfim Leão

Abstract: The workshop intends to approach challenges and innovative models related to multilingualism within bibliodiversity in Social Sciences and Humanities (SSH). The role of language in research practices tends to be considered secondary in STEM disciplines (Science, Technology, Engineering and Mathematics), since there seems to be a tacit assumption that English is widely accepted as the language of communication. Besides, it



tends to be promoted in (inter)national and European research and innovation policies – mainly written in English and with no or scarce reference to language use or multilingualism. In this context, SSH specific needs regarding scholarly communication in native languages has to be addressed: in those disciplines where language and concepts are very often not only means of communication but objects of research themselves, the use of mother tongue is indispensable for in-depth understanding, and knowledge co-creation and sharing. In this setting, the challenge of multilingualism should lay on the concept of ‘bibliodiversity’, coined by the International Alliance of Independent Publishers, which refers to “cultural diversity applied to the world of books” – thereof, underlining the need to encompass a diversity of languages, scientific areas, publication formats, and actors. There are firm grounds to state that bibliodiversity, through multilingual publishing, is an efficient way of protecting national languages and enhancing different academic rhetorical traditions, by reaching specialists and wider audiences in a complementary way. Therefore, it is of the utmost relevance to understand how bibliodiversity, in its manifold formats and multilingual forms, is promoted through innovative practices and high-level programmatic involvement. In order to illustrate this, a presentation will be made of the OPERAS consortium at large, as well as of the more particular scope of the recently EU funded project TRIPLE. Finally, a practical approach will be made taking as reference the UC Digitalis ecosystem, based on the experience of Coimbra University Press.

13:30 - 16:00 *Reflections from attendees*

## ANNEX 9: DESIR Winter School Satisfaction Survey

### DESIR Winter School Satisfaction Survey

Dear DESIR Winter School participants

This satisfaction survey is an opportunity for us to know your opinion on the organization and contents of this DESIR Winter School. Your answers will be anonymous and will only be used and known within DESIR and DARIAH team.

It will take you approximately ten minutes to fill this survey.

Thank you very much in advance for your collaboration!

The DESIR Winter School Organization Team

\* Required



#### Personal data

##### 1. Age \*

Mark only one oval.

- < 24 years old
- 25 - 34 years old
- 35 - 44 years old
- 45 - 54 years old
- > 55 years old

##### 2. Gender \*

Mark only one oval.

- Male
- Female
- Other

**3. Which is/are your professional activity(ies)? \***

*Check all that apply.*

- Teacher
- Researcher
- PhD student
- Master student
- Artist
- Librarian
- Research manager
- Other: \_\_\_\_\_

## Academic background

**4. Academic degree \***

*Mark only one oval.*

- Undergraduate
- Master
- PhD
- Other: \_\_\_\_\_

**5. After your undergraduate, for how years have you been engaged in academic research/education? \***

*Mark only one oval.*

- Less than 5 years
- Between 5 and 15 years
- Over 15 years

**6. Which of the following disciplinary areas are covered by your study/research/work? \***

*Check all that apply.*

- Language Sciences
- Art Studies
- History
- Communication and Information Sciences
- Literature Studies
- Sociology
- Other: \_\_\_\_\_

**7. Is your professional activity/area of study directly related to digital research infrastructures? \***

*Mark only one oval.*

- Yes
- No

8. Is your professional activity/area of study directly related to data management in arts and humanities? \*

Mark only one oval.

- Yes  
 No

9. Which of the following options would best describe your current academic activity? \*

Mark only one oval.

- It is strictly related to my main disciplinary area.  
 I occasionally collaborate with other disciplinary areas.  
 It is mainly developed in a cross-disciplinary approach.

10. Do you work in collaborative projects involving non-academic communities and institutions? \*

Mark only one oval.

- Yes  
 No

11. How would you classify the institution where you currently work/research/study? \*

Mark only one oval.

- Public university  
 Private university  
 Public research institution  
 Private research institution  
 National Government institution  
 European Union institution  
 Non Governmental Organization  
 Other: \_\_\_\_\_

12. Do you have a formal affiliation with that institution? \*

By "formal affiliation" we mean an employment contract.

Mark only one oval.

- Yes, a permanent institutional affiliation.  
 Yes, a temporary institutional affiliation.  
 No, I don't have institutional affiliation.

## Use of digital research tools - I

THIS SECTION IS ONLY TO BE ANSWERED BY RESEARCHERS

Considering your previous and current research projects, please specify which digital tools do you use in the different phases of research.

**13. Initial phase (state of art, data collection)**

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**14. Research development (data treatment)**

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**15. Dissemination phase (publications, communication of the results)**

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**Use of digital research tools - II**

**16. If you are you a user of Research Infrastructures for the arts and humanities, please specify which one(s)**

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**DESIR Winter School - Organization**

How do you classify the following aspects regarding DESIR Winter School?

**17. Organization \***

*Mark only one oval.*

	1	2	3	4	5	6	
Not satisfactory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very satisfactory

**18. Application process \****Mark only one oval per row.*

	1	2	3	4	5	6
Application platform	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information provided in the website (usefulness, clarity, details)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**19. Venue and logistic support \****Mark only one oval.*

	1	2	3	4	5	6	
Not satisfactory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very satisfactory

**20. Equipments and facilities \****Mark only one oval.*

	1	2	3	4	5	6	
Not satisfactory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very satisfactory

**21. Catering and coffee break \****Mark only one oval.*

	1	2	3	4	5	6	
Not satisfactory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very satisfactory

**22. Social dinner***Mark only one oval.*

	1	2	3	4	5	6	
Not satisfactory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very satisfactory

**23. How did you first hear about DESIR Winter School? \****Mark only one oval.*

- From a colleague  
 I got an invitation  
 On social media  
 Internet search  
 From a mailing list  
 Other: \_\_\_\_\_

**24. Did you first hear about Desir Winter School via any DARIAH communication channels/DARIAH community? \****Mark only one oval.*

- Yes  
 No

## 29. "Data management plans" by Antónia Correia \*

Mark only one oval per row.

	1 - Not satisfactory	2	3	4	5	6 - Very satisfactory	Not applicable
Objectives and contents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of the training methods and tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Speaker performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness / Interest for your activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 30. "Innovative Publishing Practices in the Arts and Humanities" by Delfim Leão \*

Mark only one oval per row.

	1 - Not satisfactory	2	3	4	5	6 - Very satisfactory	Not applicable
Objectives and contents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of the training methods and tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Speaker performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness / Interest for your activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## DESIR Winter School - Visits

Concerning each visit of this DESIR Winter School, please classify them according to your satisfaction in the different aspects.

## 31. Visit to the Foundation for Science and Technology \*

Mark only one oval per row.

	1 - Not satisfactory	2	3	4	5	6 - Very satisfactory	Not applicable
Interest of the visit within the Winter School objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness / Interest for your activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 32. Visit to the National Library \*

Mark only one oval per row.

	1 - Not satisfactory	2	3	4	5	6 - Very satisfactory	Not applicable
Interest of the visit within the Winter School objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness / Interest for your activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



### DESIR Winter School - Sessions

Concerning each session of this DESIR Winter School, please classify them according to your satisfaction in the different aspects.

**25. "What is data in the humanities?" by Erzsébet Tóth-Czifra \***

Mark only one oval per row.

	1 - Not satisfactory	2	3	4	5	6 - Very satisfactory	Not applicable
Objectives and contents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of the training methods and tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Speaker performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness / Interest for your activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**26. "Data and Software citation and practices, PIDs" by Frances Madden \***

Mark only one oval per row.

	1 - Not satisfactory	2	3	4	5	6 - Very satisfactory	Not applicable
Objectives and contents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of the training methods and tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Speaker performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness / Interest for your activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**27. "Open Research Notebooks" by Javier de la Rosa \***

Mark only one oval per row.

	1 - Not satisfactory	2	3	4	5	6 - Very satisfactory	Not applicable
Objectives and contents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of the training methods and tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Speaker performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness / Interest for your activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**28. "IPR and licensing" by Walter Scholger \***

Mark only one oval per row.

	1 - Not satisfactory	2	3	4	5	6 - Very satisfactory	Not applicable
Objectives and contents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of the training methods and tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Speaker performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness / Interest for your activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**33. Visit to the National Archives \***

*Mark only one oval per row.*

	1 - Not satisfactory	2	3	4	5	6 - Very satisfactory	Not applicable
Interest of the visit within the Winter School objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness / Interest for your activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**DESIR Winter School - Event overall**

**34. How do you classify the program and the structure of the DESIR Winter School? \***

*Mark only one oval.*

	1	2	3	4	5	6	
Not satisfactory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very satisfactory

**35. Does DESIR Winter School meet your initial expectation? \***

*Mark only one oval.*

	1	2	3	4	5	6	
Not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totally

**36. How interesting and useful was this Winter School for your activity? \***

*Mark only one oval.*

	1	2	3	4	5	6	
Not interesting / useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very interesting / useful

**37. Which aspects of the Winter School did you like the most?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**38. Which aspects of the Winter School do you think could be improved?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## ANNEX 10: DESIR Winter School: Participants Contributions

### Group 1

From our perspective, I guess, we guess, the most important thing here are the data management plan and support, because this is something handy which we can all use. Because for now there are some generic rules for how to plan data management things and I guess it would be really nice and profitable for all if we could establish something more domain specific because we represent humanities but among humanities there are many domains which have, let's say, distinct characteristics, so it would be helpful for other researchers not to take as much time as we take now to plan the data management but to use something which could be elaborated by DARIAH, or any other group. So data management support would be our guess for that.

### Group 2

It will be super easy because we will say almost the same. Is like this: Soft skills, like data management support advanced suitable for different disciplines, or projects or data sets would be essential because it leads us to the infrastructures part which is ... support with repositories and the most important is harmonizing data in the international level. So, if we would be able to combine, on the one side, these plans, how to manage data, and then how to prepare them properly to be exchangeable and how to prepare them so that they can be use by people from the other projects, from different disciplines, different countries it would be extremely good. Because it's... I think the perspective which is... so networking, like horizontal... the perspective for this is horizontal so it would be much easier and better to have the DARIAH or some international group to elaborate it and to make a proposition for small projects, small groups.

### Group 3

We were talking about that is very important to have easy access to all the services, so we were not talking about services and which kind of services are very important but that infrastructures need to make an easy access for everybody so that there are no barriers or something on that for researchers. We were discussing about how this is possible. One thing is the teaching aspect, something like winter schools or teaching and supporting in using tools and resources. The access thing.