



# RESILIENCE

Grant Agreement 101079792, RESILIENCE PPP

## Services Preparation and Implementation Strategy

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01.00	29/03/2024	FINAL	Final version	Version 1
01.01	22/10/2024	WORKING	2 <sup>nd</sup> version prep.	Revisions, updates and additions based on ongoing work within WP2. Alignment with outcomes of other WPs and project deliverables. More content on RESILIENCE as distributed RI with a central hub and in-kind contributions with focus on the role of national nodes.
01.02	17/11/2024	DRAFT	2 <sup>nd</sup> version draft.	Continuation of version 01.01; merge of previous chapters 2 & 4 and a rewrite of the introduction and conclusion. Addition of Executive Summary.
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## List of Abbreviations

Acronym	Full Form
BoD	Board of Directors
DMP	Data Management Plan
EOSC	European Open Science Cloud
FAIR	Findable, Accessible, Interoperable, Reusable
GenA	General Assembly
OAIS	Open Archival Information System
OS	Open Science
OSI	Open-Source Initiative
PPP	Preparatory Phase Project
RDM	Research Data Management
RS	Religious Studies
SDPT	Software Development Plan Template
SSH	Social Sciences and Humanities
SSHOC	Social Sciences and Humanities Open Cloud
TRL	Technology Readiness Level
WU	Working Unit
TNA	Trans-National Access
RI	Research Infrastructure
PID	Persistent Identifier
DOI	Digital Object Identifier
OCR	Optical Character Recognition
HTR	Handwritten Text Recognition

DH	Digital Humanities
IP	Implementation Phase
ESFRI	European Strategy Forum on Research Infrastructures
EC	European Commission
WP	Work Package
KPI	Key Performance Indicator
AI	Artificial Intelligence
ML	Machine Learning
NER	Named Entity Recognition
BnF	Bibliothèque nationale de France
HPC	High Performance Computing
SWOT	Strengths, Weaknesses, Opportunities and Threats
DP	Design Phase

## 1. Executive Summary

This document presents RESILIENCE's strategy and preparatory steps for developing a comprehensive service catalogue, focusing on integrating existing services from both the RESILIENCE headquarters and community (in-kind) contributions, other Research Infrastructures (RIs) and e-infrastructures. Key outcomes of this deliverable include the development of our guiding principles, outlining the responsibilities of national nodes, identification of service types and integration strategies with European infrastructures.

At the outset of the RESILIENCE Preparatory Phase Project (PPP), both the work packages and the General Assembly (GenA) agreed that during the development of our service catalogue we would adhere to nine **Guiding Principles (cf. chapter 3)** that include but are not limited to our services being findable and accessible, driven by expertise and excellence, serve a wide user base, adhere to the FAIR principles and be transparent, reliable and sustainable. On top of those principles, we emphasise the importance of involving the research community. By working closely together with WP3 User Requirements we ensure that our strategy is **driven by user needs**. As a result of this collaborative effort we could distinguish three priorities that guide this strategy: the discoverability of data sources, networking and mobility and research data management and data deposit according to the FAIR principles.

Since RESILIENCE is a **distributed RI**, it is to be organised around a central hub that coordinates a network of services that are delivered through **national nodes**. We identified four service types: Core Services managed by either (1) RESILIENCE headquarters or (2) a national consortium member, (3) Community (in-kind) Services contributed by national nodes, and (4) Internal Services which are essential for the operation of the RI but not part of the public service catalogue. Besides contributing to the service catalogue, the national nodes have the responsibility to establish and grow a collaborative local network, identify user needs, contribute national data and expertise, facilitate engagement and communication with the local community and align with other national research consortia.

**Mapping existing services** is a key step in our implementation strategy. This involves identifying and documenting services from partners and the wider European ecosystem to enhance visibility and integration into the RESILIENCE service catalogue. Evaluating the quality and sustainability of these services ensures long-term usability and accessibility. Providing clear and detailed service descriptions, which is one of our



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guiding principles, helps researchers find and use services effectively. Information collected includes basic details, classification, geographical availability, maturity, dependencies, and financial aspects.

Since a crucial aspect of our strategy is **future integration with the broader European landscape** of RIs and e-infrastructures, a big part of the preparatory work done in this phase involves assessing how to best integrate our services into the European Open Science Cloud (EOSC) and the Social Sciences and Humanities Open Cloud (SSHOC) to ensure global accessibility. To facilitate this integration, we have aligned our service description templates and categorization efforts with those used by the SSH Open Marketplace and the former EOSC Marketplace. Future developments, like the recent launch of the EOSC EU Node may require adjustments in our integration approach. The final version of the D2.2 User Services Catalogue will include updated templates and methodologies for categorising and integrating services.

In the future, it will be important to continuously adapt to market trends and digital innovations. Sustainability remains a crucial pillar to ensure long-term access and usability of resources. Ongoing review, refinement, and improvement of both the collection process and the service catalogue, based on user feedback and technological advancements, are essential. In conclusion, the RESILIENCE PPP is dedicated to creating a sustainable, user-driven service catalogue that integrates seamlessly with the broader European RI landscape.



## 2. Introduction

According to the Grant Agreement of the RESILIENCE PPP, the final version of 'D2.1 Services Preparation and Implementation Strategy' needs to provide a "detailed description of the strategy for implementing RESILIENCE services".<sup>1</sup> As an interim version, this document covers the work done by WP2 Services so far, including the findings and conclusions regarding the strategy, its guiding principles, initial steps towards a service catalogue, and the implementation of RESILIENCE as a distributed RI with a central hub and national nodes. It also outlines related policies and potential future steps.

The **Guiding Principles** in chapter 3 emphasise delivering high-quality, sustainable, and transparent services aligned with the FAIR principles to support research within the Social Sciences and Humanities (SSH). By combining in-house expertise with strategic collaborations, RESILIENCE aims to offer services that are clear, accessible, and driven by community needs. This approach helps keep our service catalogue adaptable and integrated within the broader European Open Science Cloud (EOSC) and other SSH research ecosystems, promoting consistent value, usability, and innovation for its users.

An integral part in offering an accessible and relevant service catalogue is collaborating and aligning with the EOSC EU Node, the SSH Open Cluster, and the SSH Open Marketplace. This positions us to fully **participate in the growing ecosystem of Research Infrastructures (RIs) in Europe**. Chapter 4 delves deeper into these collaborative efforts and how RESILIENCE addresses the needs of its end-users, keeping them central during the development of this implementation strategy and the development of the service catalogue.

Exploring the opportunities available among consortium members and the wider Religious Studies (RS) community is equally important. A distinction is made between core services and in-kind contributions by the national nodes, clearly defining their roles within **RESILIENCE as a distributed Research Infrastructure**. Chapter 5 details these roles, the different types of services provided, the responsibilities of the national nodes and which activities they will focus on based on the most important user needs within our community.

Services will also be delivered by a central hub that coordinates RESILIENCE and its national nodes.. Chapter 6 describes the foundation for the preparation and implementation of those **central hub core services**,

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<sup>1</sup> Grant Agreement, Project: 101079792 – RESILIENCE PPP – Horizon-Infra-2021-DEV-02, p. 16



identifying those already underway but needing further investment for growth. Executing the necessary developments are, however, not part of this Preparatory Phase Project (PPP) but rather the following Implementation Phase (IP). Recognizing the importance of collaborating and integrating with other European initiatives, part of the work done in preparing our services included exploring **synergy possibilities with other RIs** and e-Infrastructures. As a result, chapter 7 provides a non-exhaustive list of relevant initiatives.

Given the diverse nature of beneficial services to the RS community, policies governing their use and outcomes need to be sufficiently flexible and broadly applicable. RESILIENCE's (open) **Access Policy**, described in chapter 8, outlines guidelines for accessing its resources and services, ensuring transparent and open access while considering sustainability. The **Open Science policy** in chapter 9 expands on these principles, reflecting our community's values that access to scientific knowledge is a universal right. Implementing these policies will help foster synergies with other RIs and e-infrastructures and ensure easier cooperation and collaboration.

In conclusion, this deliverable provides a comprehensive overview of our strategy and preparatory steps and serves as a guide during both current and future development of the complementary D2.2 'User Services Catalogue'. By implementing this strategy, we ensure that RESILIENCE remains at the forefront of supporting research within the SSH community.

### 3. Guiding principles for establishing the RESILIENCE service catalogue

The following guiding principles will help to establish the priorities of the RESILIENCE service catalogue for the PPP and IP. They underscore the project's commitment to creating reliable, community-centred services within the Social Sciences and Humanities (SSH) fields. By emphasising expertise and excellence, RESILIENCE aims to ensure that each service provided meets high standards of quality and effectiveness. This commitment is achieved either through leveraging RESILIENCE's own strengths or by collaborating with key infrastructures like EUDAT and other RIs. The FAIR principles, sustainability, and transparency are additional pillars, guiding not only the structure and availability of resources but also their enduring impact and usability.

Furthermore, RESILIENCE places value on transparency, clear service descriptions, and integration with broader ecosystems like the European Open Science Cloud (EOSC). By doing so, RESILIENCE fosters a service catalogue that is accessible and findable, allowing end-users to fully understand each service's readiness, benefits, and limitations. It is important for the catalogue to constantly evolve as to remain relevant to the SSH community. These updates need to be informed by user needs, market trends, and innovative developments within the research community.

#### 1. RESILIENCE services should be driven by expertise and excellence:

RESILIENCE should offer services in which the community can boast both expertise and excellence in the study of religion. For other services in which we hold only circumstantial expertise, RESILIENCE could look towards collaborations with e-infrastructures (e.g., EUDAT) and other RI providers in the SSH cluster and beyond. The EOSC will be a valuable additional source of services for researchers in need of technology.<sup>2</sup> RESILIENCE can help researchers find the right service in the wider offering of e-infrastructures and RI providers. By stimulating and coordinating a bidirectional input flow between user and service provider, RESILIENCE will boost the quality of research and services alike.

#### 2. RESILIENCE services should safeguard that our community's research output is both FAIR and sustainable:

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<sup>2</sup> <https://open-science-cloud.ec.europa.eu/>



When RESILIENCE hosts research outputs such as research data, websites, blogs or software, we should be able to guarantee that resources are and remain Findable, Accessible, Interoperable, and Reusable (FAIR) over time (or for the minimum period indicated in a clear and transparent service description). This requires a mature service level with a stable and robust infrastructure and a strong support team in place. This is necessary to prevent the loss of digital objects and thus the trust of our community who have put the safeguarding of their intellectual work into our hands. As a result, RESILIENCE should consider working with trusted and sustainable depositing solutions when possible or adhere to the expected requirements for a trustworthy repository when no existing solutions are available.<sup>3</sup>

**3. RESILIENCE should be transparent about its service offerings:**

The service catalogue can contain innovative new services and tools that have a low Technology / Service Readiness Level (T/SRL<sup>4</sup>). It is however important to offer potential users clear information on the experimental and possibly temporary nature of the service. Users should be able to export their research data in an open and interoperable data format to prevent data loss. Transparency about the T/SRL allows RESILIENCE to offer valuable innovative and experimental tools to the community without risking critique on quality and long-term availability of the service offering.

**4. RESILIENCE services should have a clear and concrete service description:**

RESILIENCE should provide clear and concrete service descriptions, so users immediately understand what the service entails, what to expect (e.g. T/SRL), how they will benefit, what its added value is, what the modalities of access are, and more. Service information should be findable through the RESILIENCE service catalogue, accessible via the RESILIENCE website and distributed to other service discovery platforms such as the SSH Open Marketplace and the EOSC.

**5. RESILIENCE services should be stakeholder-driven and follow market and digital innovations:**

The RESILIENCE service catalogue should evolve over time by innovative input coming from researchers, developers, service providers, and projects alike. It should also follow market trends and digital innovations to remain state-of-the-art and relevant. This could be achieved, for example, by establishing a dedicated trends/innovation discovery team to actively monitor digital as well as societal evolutions (e.g. influence of fake news on data validity, switch towards video “reels” communication).

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<sup>3</sup> See for example <https://doi.org/10.5281/zenodo.7051012>

<sup>4</sup> [https://en.wikipedia.org/wiki/Technology\\_readiness\\_level](https://en.wikipedia.org/wiki/Technology_readiness_level)



## 6. RESILIENCE services should be findable and accessible for the end-users:

RESILIENCE services, once promoted to the community, should be easily findable via search engines, the RESILIENCE website, and the future RESILIENCE service catalogue. They should:

- Include a clear and standardised service description and value proposition.
- Provide transparency on their T/SRL and mode of access (e.g., short/long term, selection only, paid access).
- be accessible via a persistent link to the service/tool/database which
  - has a minimum T/ SRL of 4,
  - provides supporting documentation as well as contact information (e.g. helpdesk).

The RESILIENCE Service Catalogue should focus on services that are findable and accessible for users with a minimum TRL of 4.<sup>5</sup> This ensures that users are only given access to tools and services that are reliable and sustainable. Given that research projects typically last up to 4 years, it is crucial that researchers have access to tools available within their project timeframe. Additionally, the rapid evolution of our (digital) society means some services may change providers or become obsolete by 2025 because of changing user needs. Since the service catalogue targets end-user (researcher) audiences specifically, services in their ideation phase (TRL 0-3) should not be promoted in the catalogue at this stage, except for a brief mention of future ideas. Components essential for the functioning and interoperability of the RI but not directly relevant to our end-users, such as email, security or Authentication and Authorization Infrastructure (AAI), should also not be included.

## 7. RESILIENCE services should be integrated into the wider SSH and EOSC ecosystem:

RESILIENCE should strive early on towards interoperability and integration of services into the SSH Open Marketplace, EOSC EU Node and Federation of Nodes.<sup>6</sup> This will increase the visibility as well as demonstrate the quality and maturity of the service offering. RESILIENCE should also consider the interfacing with, and integration and adaptation of relevant services and tools developed by other communities to meet its users' needs. Most relevant to watch and collaborate with are other SSH communities such as DARIAH, CLARIN and CESSDA, with an open view towards initiatives and

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<sup>5</sup> CloudWatch, A brief refresher on Technology Readiness Levels (TRL), <https://www.cloudwatchhub.eu/exploitation/brief-refresher-technology-readiness-levels-trl>

<sup>6</sup> SSHOC Marketplace: <https://sshopencloud.eu/service-catalogue>; EOSC EU Node: <https://open-science-cloud.ec.europa.eu/>; Building the federation: <https://eosc.eu/building-the-eosc-federation/>



innovations happening in other science domains. These integrations ensure that resources can also be discovered and used outside of the communities where they originated. To facilitate future integration, RESILIENCE service descriptions will align with established metadata schemes, categorizations and standards used by established infrastructures like EOSC and SSHOC. This alignment ensures that our services remain compatible and easily integrable with evolving platforms and policies, maintaining their relevance and accessibility.

**8. RESILIENCE should offer core services that serve a wide user base:**

RESILIENCE should prioritise the development of services that are valuable to a wide user base. Those core services:

- can be developed and hosted by partners but preferably enjoy some sort of central support,
- should comply to a quality service level and include clear communication towards the Board of Directors (BoD) and the General Assembly (GenA) concerning the status, continuity, and development roadmap of the service,
- should be transferable to another hosting location/organisation,
- should be clearly branded as RESILIENCE.

The RESILIENCE service strategy should be driven by user demand, fed by regular user consultations in combination with trend monitoring in the research- and wider digital market space. This continuous input means that core services will evolve over time. To meet the ever-changing needs of our community, RESILIENCE can decide to integrate other decentralised (in-kind) services into their core facility in consultation with the original service owner and the community. This can for example happen when a large user base and high value for the community have been clearly demonstrated. RESILIENCE might also decide to start new development trajectories when certain gaps in the service catalogue must be addressed to serve the specific needs of our user community.

**9. RESILIENCE node services can be locally driven:**

Services developed by partners using (partial) RESILIENCE EU funding should be clearly branded as RESILIENCE and comply with the criteria of core services (cf. guiding principle 8). As several in-kind services will (have) be(en) developed outside the context of RESILIENCE (e.g. digitization lab of a university library), they can have their own branding and decision structure. However, for their inclusion in the RESILIENCE service catalogue, they need to comply to a certain quality level if we



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want the in-kinds to be of true value to our users. Preferably their TRL is minimum a 7, though pilot demonstrators can be included as long as the TRL is clearly indicated to the end users.

## 4. Steps towards a RESILIENCE service catalogue

During the Preparatory Phase, our focus remains on mapping existing services, including those offered by community contributions, other research infrastructures (RIs), and e-infrastructures. An important step in this work is setting up procedures for incorporating services into the catalogue, thereby enhancing the visibility of high-quality tools and resources already available at partner institutions and within the wider research ecosystem.

Additionally, we are working towards integrating services and research products into the EOSC and thus ensuring that our resources are accessible to the global community as part of the EOSC Federation.<sup>7</sup> This effort not only strengthens collaboration but also ensures that our service catalogue aligns with the evolving landscape of Open Science. The methodology of collecting information for the catalogue, its results and the procedures for onboarding will be discussed in more detail in 'D2.2 – User Services Catalogue'.<sup>8</sup> Our services preparation and implementation strategy only contains a brief summary of the activities involved and their results.

### 4.1 A Strategy driven by User Needs

The RESILIENCE service strategy is driven by the needs of its research community. To ensure our services and data outputs are what is most valuable to researchers, we actively gather feedback from the RS community. This commitment is demonstrated by the establishment of Work Package Users (WP3), which focuses on understanding and addressing user needs. Its primary mission is to engage with our community through workshops and focus groups, ensuring their voices are heard and their requirements are integrated as much as possible into our future service catalogue. These activities have provided detailed insights into user needs and the consequent priorities, allowing us to align the mapping and development of the service catalogue with these priorities. WP3 is also using those experiences to develop methods for collecting user needs in interviews outside the context of these workshops.

The analysis of the data and feedback gathered by the WU User requirements<sup>9</sup> has shown that three key needs stand out for our community's researchers:

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<sup>7</sup> <https://eosc.eu/building-the-eosc-federation/>

<sup>8</sup> D2.2 User Services Catalogue

<sup>9</sup> D3.1 Workshop Proceedings – 1st batch – [https://www.resilience-ri.eu/wp-content/uploads/2024/03/RESILIENCE\\_WP3\\_D3.1\\_WorkshopProceedings1\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/03/RESILIENCE_WP3_D3.1_WorkshopProceedings1_01.00_FINAL.pdf), D3.3 Use cases – 1<sup>st</sup> batch – [https://www.resilience-ri.eu/wp-content/uploads/2024/04/RESILIENCE\\_WP3\\_D3.3\\_Documented-Use-Cases-1st-Batch\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/04/RESILIENCE_WP3_D3.3_Documented-Use-Cases-1st-Batch_FINAL.pdf),





1. Discoverability of data sources and data access
2. Networking, mobility and transnational access
3. Research data management and data deposit according to the FAIR principles

These needs are relevant to both the central hub and the national nodes and can be used as a guideline to prioritise activities in proposals and plan the service development for the IP. It's important to stress again the need to reuse existing services, both 'as is' or to build and expand upon. The key needs confirm that FAIR data management practices are still not widely recognized and implemented within the RS community.<sup>10</sup> As a Research Infrastructure, RESILIENCE plays a crucial role in raising awareness about these practices and their benefits, as well as offering access to training materials and guidance. The creation of the 'D2.4 – Data Management Plan'<sup>11</sup> is an important step in the right direction and its correct implementation remains a priority in the PPP, IP and the development of the RESILIENCE service catalogue.

Since easy access to data is crucial for many researchers, RESILIENCE focuses its efforts during the PPP on providing core FAIR data services to reach the widest possible community, including: a RESILIENCE community on Zenodo, an elaborate TNA program, a data hub and discovery environment and a list of useful existing services provided by other research infrastructures (RIs) and e-infrastructures, such as ARGOS and EUDAT. These specific data services were selected as a priority not only based on what is needed in the community but also what can be achieved with the available means. During the PPP, the focus is still mainly on laying the organisational, administrative, technical and legal foundations for the infrastructure.

Another crucial step in the creation of a robust service catalogue is establishing a clear framework for how national nodes will operate and contribute to the RI. By defining the role of the national nodes and identifying their key priorities, areas for investment and activities to be pursued, we are building a more comprehensive and organised structure for integrating qualitative services. Since this is such an important part of our implementation strategy, chapters 5 and 6 are dedicated to this topic and will provide more details on it.

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D3.5 User stories catalogue – 1<sup>st</sup> batch – [https://www.resilience-ri.eu/wp-content/uploads/2023/11/RESILIENCE\\_WP3\\_D3.5\\_User-Stories-Catalogue-1st-Batch\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2023/11/RESILIENCE_WP3_D3.5_User-Stories-Catalogue-1st-Batch_01.00_FINAL.pdf).

<sup>10</sup> Confidential deliverable D3.2 from the Design Phase – Grant 871127 – RESILIENCE "Report on data management roadmap"

<sup>11</sup> D2.4 Data Management Plan

## 4.2 EOSC and the advancement of Open Science

Research Infrastructures (RIs) like RESILIENCE play a pivotal role in fostering an Open Science culture and advancing the digital transformation of research by embracing the FAIR principles.<sup>12</sup> To contribute to this wide effort, RIs must integrate their services, tools, and digital research outputs into the broader EOSC ecosystem, a pan-European initiative that enables seamless data sharing and processing across national and disciplinary boundaries. The EOSC has been prioritised by the European Commission since 2015 and is the result of coordinated efforts involving numerous and diverse stakeholders across the European research landscape.<sup>13</sup> This collaborative approach seeks to align RIs with EOSC policies, standards and frameworks, ensuring the smooth connection between them and the cloud.

By contributing to this initiative, we ensure that our research outputs and services are not only accessible to local and regional communities but also visible and impactful globally. One of the ways RESILIENCE aims to achieve this is by committing to follow the EOSC rules of participation and its interoperability framework (cf. chapter 9 – Open Science Policy). In turn, the EOSC plans to deliver significant added value to the RI communities by providing advanced services, tools, and infrastructures that support high-quality, transparent, and reproducible research.<sup>14</sup> A significant development in the ongoing effort to connect RIs across Europe is the recent launch of the first operational European-level node in the EOSC Federation: the EOSC EU Node. It offers useful services such as File Sync & Share and Large File Transfer, which facilitate the efficient management and sharing of large datasets within our community.

With the science clusters swiftly moving towards integration with the EOSC Federation, the best way for RESILIENCE to reach its goal of integrating its services into the broader EOSC ecosystem is to focus on aligning with the Social Sciences and Humanities Open Cloud (SSHOC).<sup>15</sup> Their focus is specifically on building the SSH part of the EOSC Federation which means that our participation in this collaborative cluster is crucial to ensure that our contributions are integrated with other community-driven resources to meet the broader needs of the SSH research landscape. RESILIENCE is also actively considering the integration and adaptation of relevant services and tools developed by other communities to meet users' needs.

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<sup>12</sup> ESFRI roadmap 2021 – strategy report on research infrastructures, <https://roadmap2021.esfri.eu/strategy-report/> ; [https://rea.ec.europa.eu/open-science\\_en](https://rea.ec.europa.eu/open-science_en)

<sup>13</sup> [https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open-science/european-open-science-cloud-eosc\\_en](https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open-science/european-open-science-cloud-eosc_en)

<sup>14</sup> <https://www.esfri.eu/esfri-events/3rd-esfri-ris-eosc-workshop>

<sup>15</sup> <https://sshopencloud.eu/sshoc-eosc>

### 4.3 Collecting Services in line with SSHOC and EOSC guidelines

During the PPP, information on existing datasets and community services (also called in-kinds) is being collected and evaluated as part of the ongoing work of 'T2.2 – Preparing User Services'. The development of a service description template and the overall collection process, including evaluation and onboarding into the RESILIENCE service catalogue, require ongoing review and refinement during the PPP and beyond.<sup>16</sup> The rest of this section covers an overview of the work done so far.

As part of the preparatory phase, categories were defined and implemented primarily to evaluate and collect detailed information about potential community (in-kind) services. However, during the previous Design Phase, RESILIENCE already developed its own method for categorising services.<sup>17</sup> How these different categorisations relate to one another, the methodology of collecting information for this catalogue, its results and the procedures for onboarding will be discussed in more detail in 'D2.2 – User Services Catalogue'.<sup>17</sup>

To facilitate the integration of our services into the SSHOC and EOSC Federation, the drafting of our service templates and the categorization of those services, has been guided by the frameworks provided by the SSH Open Marketplace and EOSC Marketplace, which was developed under the EOSC Future project. This process was carried out in collaboration with the RESILIENCE WU Data to ensure that the templates were user-friendly for partners and aligned with the relevant EOSC categories.<sup>18</sup> Key resources that were used to inform this effort included EOSC's Portal Profiles and the SSHOC Metadata Guidelines.<sup>19</sup>

Ultimately it was decided to base the online forms meant to gather detailed information on in-kind tools and services from partner institutions, on the EOSC Resource Profile and Data Source Profile.<sup>20</sup> This decision was made because the EOSC Resource Profile and Data Source Profile provided a higher level of specificity than what the SSH Open Marketplace typically mandates, reflecting our expectations towards the consortium members to provide detailed information about their in-kind contributions. While the principles, categories and templates we previously followed remain valid, we are entering a transitional phase. With

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<sup>16</sup> D2.2 User Services Catalogue. [https://www.resilience-ri.eu/wp-content/uploads/2024/05/RESILIENCE\\_WP2\\_D2.2\\_User-Services-Catalogue\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/05/RESILIENCE_WP2_D2.2_User-Services-Catalogue_01.00_FINAL.pdf)

<sup>17</sup> <https://www.resilience-ri.eu/news/resilience-services-at-a-glance/>

<sup>18</sup> [https://wiki.ni4os.eu/index.php/Resource\\_Category\\_and\\_Subcategory](https://wiki.ni4os.eu/index.php/Resource_Category_and_Subcategory)

<sup>19</sup> <https://wiki.eoscfuture.eu/display/PUBLIC/EOSC+Portal+Profiles>  
<https://marketplace.sshopencloud.eu/contribute/metadata-guidelines>

<sup>20</sup> <https://wiki.eoscfuture.eu/display/PUBLIC/B.+v4.00+EOSC+Resource+Profile>  
<https://wiki.eoscfuture.eu/display/PUBLIC/D.+v4.00+EOSC+Data+Source+Profile>

the recent decommissioning of the EOSC Marketplace in favour of the newly launched EOSC EU Node, we need to reassess and adapt our integration processes to align with the evolving capabilities and structure of the new platform.

Now that the first community service descriptions are being collected, the planning preparation of new initiatives on data collection and services can commence, though the capacity to do so will depend largely on the maturity of the local consortium and resources available. To streamline the national node activities for optimal integration into the RESILIENCE service catalogue and the wider EOSC ecosystem, it's important that the needs of both local and broader RS communities are considered.

#### 4.4 The Quality and Sustainability of services as a Prime Objective

Integration within the wider SSHOC ecosystem also involves aligning with the technical criteria set by these platforms, including achieving high levels of technical readiness (T/SRL) and adhering to the FAIR principles. By ensuring compliance with these standards, RESILIENCE enhances the quality, maturity and visibility of its service offerings.

Research services are often developed for specific projects or localised teams, which can create barriers to broader access and usability. Without broader design considerations and sustainable funding, these services risk becoming inaccessible over time. Therefore, evaluating the quality and sustainability of each service is essential to RESILIENCE's commitment to providing accessible and robust offerings to the community. This evaluation aims not to assess the inherent quality of the service itself but rather to offer an informed foundation for further development, advising on enhancements that enable services to align more closely with the EOSC rules of participation and other standards.

As noted earlier, the RESILIENCE service catalogue must address the unique needs of the RS community. By maintaining close engagement with this community, RESILIENCE can offer flexibility in showcasing tools and services that are still in development, provided that the status is clearly indicated and that users are engaged in the testing phase. This approach allows tools and services with lower TRLs to be shared with select users who are aware of their experimental nature if certain baseline criteria are still met.

A technology validated in a relevant environment (TRL-5), for instance, can already provide significant value if supported by comprehensive user documentation and a responsive help desk. RESILIENCE can act as an intermediary, helping providers prepare user support and documentation while involving early adopters from our community. This dual approach allows some researchers early access to promising new tools and

resources, and provides valuable input and feedback to service providers, fostering a collaborative “win-win” environment.

#### 4.5 Developing a Service Strategy as an ongoing process

Seeing how the development of OS principles and guidelines is an ongoing process at both the European level and within our specific RS community, it is vital to continuously evaluate and respond to the most pressing user needs. During the remainder of the PPP, RESILIENCE will continue to expand its short-term service strategy based on ongoing work in WP2 and WP3. In future phases like the IP, community engagement will become even more integral to refining our service strategy. Concrete plans on how to continuously collect input for the service catalogue can be developed once the catalogue is up and running.

As articulated in our principal guidelines in chapter 3, RESILIENCE services are designed to be stakeholder-driven and responsive to market and digital innovations. This commitment necessitates that the RESILIENCE service catalogue evolves over time, incorporating input from researchers, developers, service providers, and various projects. Additionally, RESILIENCE will integrate service development discussions into its initiatives, drawing lessons from practices like DARIAH’s Strategy Days and regular regional meetings. These types of events have proven invaluable for other RIs to gather more insights into community needs by offering opportunities for stakeholders to convene, assess past progress, and collaboratively develop forward-looking strategies.

By fostering a dynamic service strategy informed by best practices from established RIs like DARIAH and CLARIN, RESILIENCE will not only address current user needs but also anticipate future demands, positioning itself as a proactive leader in the evolving landscape of OS. This strategic approach ensures that our services remain relevant, user-focused, and aligned with both academic and technological advancements.



## 5. RESILIENCE as a distributed research infrastructure and the role of national nodes

### 5.1 RESILIENCE as a service provider

RESILIENCE is a distributed infrastructure, developed by and for the Religious Studies (RS) community. The research infrastructure (RI) is to be organised around a central hub that coordinates a pan-European network of services that are delivered through national nodes. The headquarters of the RI, which will be based in Italy, will have a coordinating role with a focus on the operational and strategic management of the RI, financial planning, monitoring, and sustainability.<sup>21</sup>

Other roles of the headquarters include the coordination of the regular meetings and interaction between the national nodes, communication and training activities (train-the-trainer principle), the implementation of the RI policies, as well as Open Science (OS) support to the community. The headquarters also operates and supports several services that are crucial to the functioning and service offer of the RI to the Religious Studies community. These are complemented by services from the RS community and the RESILIENCE members (national node contributions). Overall, four types of services provided by RESILIENCE can be identified:

- **Core services managed by RESILIENCE:**  
RESILIENCE headquarters is responsible for the overall coordination, delivery, maintenance and evolution of the service. These services appear in the RESILIENCE service catalogue.
- **Core services managed by a National Node institution:**  
An institution participating in a national consortium is responsible for the delivery of the service but receives support (financial and/or human resources) from headquarters. These services should be clearly branded as RESILIENCE and include clear communication towards the BoD and GenA concerning the status, continuity, and development roadmap of the service. These services appear in the RESILIENCE service catalogue.
- **Community services:**  
Services managed by community members and made available to the wider community as in-kind

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<sup>21</sup> RESILIENCE\_WP1\_D1.3\_FSP\_FinancialSustainabilityPlan\_01.00\_FINAL.pdf, p. 15.



contributions by the national nodes. Services that demonstrate sustainable structures and a high level of T/SRL, are discoverable in the RESILIENCE service catalogue.

- **Internal services:**

These are services necessary for managing and operating the RI and can be both technical and non-technical. Examples are the website, the communication platform, ... Internal services are managed by the headquarters and are not part of the RESILIENCE service catalogue.

More information on what is envisioned as core services is provided in chapter 6 'Central hub core services'. The following subsections of this chapter explore the role of the national nodes, and the status-, planning-, and priorities in the service preparation.

## 5.2 Role of the national nodes

As a distributed infrastructure the role of national nodes is important for the local interaction with the community and understanding and supporting the specific needs at institutional, regional and national level. In addition, the community's (in-kind) contributions of services, data and expertise to the RESILIENCE service catalogue will be crucial to the successful growth and uptake of the RI in a wider European and international context. The headquarters coordination and support staff will support the regular interaction between the different national nodes that are a member of the RI. The national nodes in their turn help grow the RESILIENCE user base in their country to increase scientific, technology and data exchange. **As such the national nodes have a responsibility to:**

### a) Build a local network and identify user needs

- Build a local network of partners on the national, regional and institutional level who work together on the advancement of RS research through the sharing of data, services, and expertise.
- Support the local network of partners in delivering high quality interoperable data and services in line with the needs at a local level.
- Collect local user stories to develop a suitable service and training offering covering the needs of the RS community within the country.

### **b) Service contribution**

- Identify the national resources available for the implementation of nodes and bring together a local consortium to jointly submit proposals and work on projects that will strengthen the research as well as the available RIs.
- Share information on relevant data, services and expertise (e.g. online training courses) with the broader RESILIENCE community by contributing these resources (in-kinds) to the RESILIENCE service catalogue.
- Presenting and making available the core services and community contributions from other members to the national research landscape.

### **c) Outreach and engagement**

- Facilitate interaction and collaboration on services between the institutions and other local actors in the country.
- Engage with the local community and communicate on the progress, opportunities and engagement activities of the RI. Collect feedback from the local network to serve as input for the RI strategy at the European level.
- Widen the communication on RI activities and services to the broader community more indirectly related to RS research.
- Engage with policy makers to ensure national/regional commitments for the investment aimed at strengthening the RI through the national node contribution and shared facilities.
- Seek alignment with other national RI consortia such as DARIAH, CLARIN and CESSDA to ensure optimal collaboration, reuse of tools, data and services, and sharing of expertise to stimulate cooperation and prevent duplication.

### **d) Monitoring for funded nodes**

- Define local Key Performance Indicators (KPI) and collect data for monitoring.
- Develop local policies (access policy, data policy ...) and monitor their impact in line with the RESILIENCE RI policies.

The above activities go beyond service preparation and implementation, yet all these activities are crucial to ensure a high level of engagement of the local community to achieve the successful alignment and



integration of data, services and expertise within the distributed infrastructure. In summary national nodes should:

- Establish and grow a collaborative network of local partners to advance RS research by sharing data, services, and expertise.
- Identify and coordinate regional and national resources for implementing nodes and form consortia to submit joint RI proposals.
- Contribute national data, services, and expertise to the broader RESILIENCE community.
- Communicate on and gather feedback for European level strategy and engage with policymakers to secure national support.
- Align with other national research consortia (e.g., DARIAH, CLARIN, CESSDA) to enhance collaboration, share resources, and avoid duplication.

### 5.3 Service preparation – Status and Key Priorities

Currently our focus is on establishing national networks and securing political and financial commitment from member states. This means that there is limited ongoing activities and service development as many partners, with Italy and Bulgaria being the exception, are still in the process of securing financial support for the strengthening of their local consortium and infrastructure. Currently most efforts are focused on strengthening the local network and collaboration on proposals to gain political and/or financial support from their ministries/national authorities.

Therefore, ongoing activities concerning services include collecting information on existing local data and community (in-kind) services, with continuous review and refinement of the service description template and onboarding process. These efforts, detailed in chapter 4 'Steps Towards a RESILIENCE Service Catalogue', lay the groundwork for addressing the **priority needs** identified by WP3 Users:

1. Discoverability of data sources and data access (cf. section 5.4.1)
2. Networking, mobility and TNA (cf. section 5.4.2)
3. RDM and data deposit according to the FAIR principles (cf. section 5.4.3)

These priorities are relevant to both the central hub and the national node communities and can be used as a guideline to prioritise activities in proposals and plan the service development for the implementation phase (IP), which is why each of the subsections in '5.4 - Activity and Resource Planning for the

Implementation Phase' is structured around those needs. It's important to stress again the need to reuse existing services, both 'as is' or to build and expand upon. RESILIENCE nodes should focus on gaps in the service offering and seek alignment with existing initiatives and other local RI consortia such as DARIAH, CLARIN and CESSDA to ensure optimal collaboration and prevent overlap in service delivery.

The results of the work done by WP3 showed that the topic 'Software and tools' had a similar priority to RDM, though the user stories were insufficiently detailed to understand what specific tools were meant.<sup>22</sup> Researchers mentioned better possibilities to customise a search result, which can be linked to the priority on 'Discoverability of data sources and data access'. Others mentioned the need for a translation tool to expand the choice of research literature. For modern languages there are several translation tools available, including the free eTranslation tool, a cutting-edge neural machine translation service provided by the European Commission.<sup>23</sup> While eTranslation is a valuable resource for EU institutions, public administrations, and universities, it may not fully meet the specific needs of the RESILIENCE community. Therefore, it is important to continue to explore and evaluate various translation services to identify those that best address our requirements. This approach ensures that we can at least partially meet the demand for translation services while acknowledging the need for more tailored solutions.

There is however also a need to better process ancient and rare languages, as demonstrated by the user stories collected as part of the Italian ITSERR project.<sup>24</sup> The identification of opportunities and implementation of Artificial Intelligence (AI) and Machine Learning (ML) processes can result in improved access to data sources (e.g. through OCR, HTR, image recognition) as well as helping researchers with the analysis of the corpus they are investigating (e.g. NER, data classification). **AI & ML can thus be considered an additional 4<sup>th</sup> priority for RESILIENCE** (cf. section 5.4.4).

As a young community in its preparatory phase, it is important to prioritise the service development in such a way that brings the most value to our community while remaining feasible in terms of available resources and expertise. The following section provides an overview of the activities the RI should focus on to be able to fulfil the priority needs of our community as identified by the work of WP3 Users. Most proposed activities are directed towards national nodes and the local consortia, while the central hub takes on a coordinating

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<sup>22</sup> D3.5 User stories catalogue - 1<sup>st</sup> batch - [https://www.resilience-ri.eu/wp-content/uploads/2023/11/RESILIENCE\\_WP3\\_D3.5\\_User-Stories-Catalogue-1st-Batch\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2023/11/RESILIENCE_WP3_D3.5_User-Stories-Catalogue-1st-Batch_01.00_FINAL.pdf).

<sup>23</sup> The [web page](#) of eTranslation is free to use for EU institutions, public administrations, universities ... from EU countries. Registration is required. eTranslation also offers a web service API for machine-to-machine connections. [https://commission.europa.eu/resources-partners/etranslation\\_en](https://commission.europa.eu/resources-partners/etranslation_en)

<sup>24</sup> Italian Strengthening of the ESFRI RI RESILIENCE. <https://www.itserr.it/>

role with a focus on the interconnection of the nodes data and services as well as support and training (train-the-trainer principle).

#### 5.4 Activity and Resource Planning for the Implementation Phase

The following section of text is conceived as input for new projects on the institutional, regional, national and European level to help strengthen the RI and fulfil the main user needs of our community. It is by no means intended to be limiting as local communities will display different levels of maturity in delivering these priority services and it remains important to define targeted solutions corresponding to the local needs. Nonetheless, we believe it is useful to provide a structured framework that can guide the planning and implementation of activities across different levels of maturity. This framework aims to ensure that all national nodes can effectively contribute to the overall goals of RESILIENCE, while also addressing specific local needs.

The tables below present the activities for national node consortia, required staff, required hardware, and support staff from headquarters involved in each of the identified priorities. Some specifics to keep in mind when reading the table:

- The tables for the four priorities focus on the activities by national nodes and the local consortium.
- Headquarters will provide support in the form of coordination, advice and support for usage of central services, and training (train-the-trainer). The specific activities and estimation of resources for headquarters staff are not included in the tables below but are part of chapter 6 'Central hub core services'.
- The activity list is not intended as a complete overview but as a way to plan, involve stakeholders and budget activities as part of local implementation projects.
- The required staff overview is intended to start a discussion with relevant stakeholders to establish such a project. As calculating staff effort would be highly dependent on the complexity and size of the project activities (not to mention the differences in wages across countries), the overview simply provides a yearly indication of investment with the minimum range focusing on nodes with a lower funding availability.
- The software/hardware overview provides core hardware expectations for such projects in order to budget properly for long lasting sustainability. In this case a relatively modest estimation of yearly investment is provided as most projects will be able to use existing institutional infrastructure (e.g. the existing library catalogue or digitization scanners).

- All estimations are applicable for the IP of the RI, though some of the RESILIENCE consortium partners might have earlier opportunities to advance their local data, services and training offer.

#### 5.4.1 Activities related to improved discoverability of data sources and data access

This subsection addresses the first user need of improved **discoverability of data sources and data access**, as identified by WP3 Users.

Access to digitised collections is still a major challenge for researchers within the RS. While important collections at grand institutions such as the British Library, Vatican Library and BnF provide performant discovery platforms giving access to semantically rich metadata and high-quality digital representations in an interoperable way, many smaller institutions do not have the same capacity and more obscure collections remain inaccessible online. Although there is a certain variation between partners of RESILIENCE, both in the quality of platforms and the amount of digitised material made available, the effort towards increasing the availability of resources and data for RS research remains a necessary priority to this day. The priority is not limited to digitisation actions alone, but also includes the identification and curation of relevant collections and the sharing of materials with the wider community according to the practices and standards defined in the 'D2.4 – Data Management Plan'.

Digitisation of relevant library, archival and heritage collections (by nodes)	
<b>Activity</b>	
	Identify and curate relevant physical collections for digitization in collaboration with collection experts (librarians, archivists). The same can apply for digital born objects.
	Draft digitization plan (standard formats, resolutions, file name convention) together with the digitization department (e.g. Library) or external service provider. This plan should follow the conventions as specified in the D2.4 Data Management Plan.
	Draft budget and allocate resources for digitization, storage and persistent access. Incorporate in project proposal for additional funding if possible/necessary.
	Digitise physical objects and create sufficient metadata according to domain specific conventions (cf. D2.4 Data Management Plan).
	Store digital representations in a secure way. Preserve digital representations long term according to the OAIS reference model <sup>25</sup> (optional).
	Make metadata records and digital representations accessible through a sustainable web platform/online catalogue in a FAIR compliant way.
	Provide a metadata export of the collection, including a persistent link to the catalogue record and digital representation, for integration into the RelReSearch discovery environment according to the conventions specified in D2.4 Data Management Plan.
<b>Required staff</b>	(FTE percentage depends on the size of the project)

<sup>25</sup> <http://www.oais.info/>

National node coordinator		
Project officer		
Collection expert (library staff, archivists ...)		
RS expert		
Digitisation expert (for rare and fragile materials)		
Scanning staff		
OCR/HTR lab staff		
Metadata cataloguer		
Infrastructural administrator – library/archive IT department (for ingest, exports ...)		
<b>Required software/hardware</b>		
Scanning and/or photographic equipment		
Storage		
Online catalogue		
Online digital representation viewer		
PID/resolver system (e.g. handle server)		
Data exporter, API or OAI-PMH		
Digital preservation system		
<b>Headquarters support</b>		
Open science officer for advice on policy, formats, standards ...		
Software architect/developer for advice and validation of data delivery		
Investment	Min. amount in EUR annual	Max. amount in EUR annual
Staff at nodes	5 000	35 000
Staff at headquarters	cf. 6.3	cf. 6.3
Hardware at nodes	5 000	15 000
Hardware at headquarters	cf. 6.3	cf. 6.3

Table 1: Digitisation of relevant library, archival and heritage collections (by nodes)

#### 5.4.2 Networking, mobility and transnational access

This subsection focuses on the second user priority of enhancing **networking, mobility, and Transnational Access (TNA)**, as identified by WP3 Users.

The RESILIENCE TNA Programme offers physical and virtual (as opposed to digital: virtual implies those sources that are only available via onsite computer and/or networking access) access across national borders to the most significant tools and (re)sources in those disciplines related to the study of religion. The TNA service is an answer to the need of scholars to have direct and effective access to sources located in different countries. Often, such collections have not been digitized, and access to these sources is restricted. In order to provide excellence-driven access to its physical resources, TNA partners offer assistance to researchers seeking to conduct a research visit at one of the host facilities offering this service. The goal of TNA therefore

is to facilitate direct and effective access for scholars to the objects of their research: TNA hosts grant access to their collections of manuscripts, rare books, documents and materials, and provide instructions to effectively make use of their collections.

Networking, mobility and transnational access (by nodes)		
<b>Activity</b>		
TNA community and outreach activities: conferences, newsletters, social media, events		
Managing TNA Fellows: research stays, point of contact, communication, evaluation, networking activities		
Coordinating, maintaining, and growing the national network of TNA Hosts: research stays, communication, evaluation and monitoring, networking activities		
Reporting on all TNA related activities to RESILIENCE HQ		
Ensuring the TNA Portal is up to date for the national TNA Hosts		
<b>Required staff</b> (percentage depends on the size of the project)		
TNA national host officer		
Access programme coordinator		
Training and education officer		
TNA Host Coordinator/ Contact Person		
<b>Required software/hardware</b>		
TBD		
<b>Headquarters support</b>		
Financial and legal administration of TNA Grants, TNA Fellow Agreements, and TNA Host Agreements		
EU-level monitoring and reporting of the programme		
Coordinating the TNA Hosting Network at the EU level where necessary		
Investment	Min. amount in EUR annual	Max. amount in EUR annual
Staff at nodes	cf. 5.4.2	cf. 5.4.2
Staff at headquarters	10 000	25 000
Hardware at nodes	NA	NA
Hardware at headquarters	NA	NA
Mobility grants by headquarters	0	95 000

Table 2: Networking, mobility and transnational access (by nodes)

### 5.4.3 Research data management and data deposit according to the FAIR principles

This subsection addresses the third user need related to **Research Data Management (RDM) and data deposit according to the FAIR principles**, as identified by WP3 Users.

This priority primarily focuses on the provision of training, advice, and support for the community. Although some partners within RESILIENCE have access to local university or institutional RDM training, services, and support, many members of the consortium, as well as the broader RS community, still lack such resources. Additionally, the absence of local support systems, such as institutional data repositories, further complicates the situation. Consequently, the RS community has yet to fully engage with RDM practices and to recognize the significance of data as an integral component of their research.

RESILIENCE has the objective to facilitate the creation and support of an OS culture within their research communities and to drive the digital transformation of research towards the uptake of the FAIR Data Principles. To do so, there is a need to create and distribute tailored training materials that align with the specific needs and contexts of the RS community with practical examples, case studies, and step-by-step guides based on familiar scenarios. As always, this should be based on existing materials and in close collaboration with related initiatives from other RIs such as DARIAH and OPERAS. Additionally, it is important to leverage national initiatives such as GARR in Italy and SURF in the Netherlands, which provide valuable resources and support for RDM and OS practices on a local level.

The coordination of OS activities as well as the OS training of the national nodes staff (train-the-trainer principle) will be the responsibility of the Open Science officer which is to be appointed by the RESILIENCE headquarters during the IP (cf. inclusion of a 0.5 FTE Open Science Officer position in the 'D1.3 – Financial Sustainability Plan'<sup>26</sup>). The national nodes can facilitate the advancement of local OS and RDM practices by the RS community by focusing on the following activities.

Research data management and data deposit according to the FAIR principles (by nodes)
<b>Activity</b>
Identification of the current level of understanding, the application of OS and RDM practices as well as the barriers perceived by the local RS community.
Identification of local support and training initiatives by local RDM competences centres, universities, SSH RI etc.
Development of an OS and RDM training activities plan to create awareness and support the uptake of OS practices by the local communities.
Organisation of training events and preparation of training resources in collaboration with other local institutional RDM support centres and local SSH RIs.
Promotion of good data practices, awards and incentives, e.g. by spotlighting FAIR data publications by local community members.
<b>Required staff</b> (percentage depends on the size of the project)
National node coordinator
National node training officer

<sup>26</sup> D1.3 Financial Sustainability Plan – [https://www.resilience-ri.eu/wp-content/uploads/2024/08/RESILIENCE\\_WP1\\_D1.3\\_FSP\\_FinancialSustainabilityPlan\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/08/RESILIENCE_WP1_D1.3_FSP_FinancialSustainabilityPlan_01.00_FINAL.pdf)

RDM expert (can be in collaboration with institutional RDM support staff)		
RS researchers providing input concerning domain specific examples and practices		
<b>Required hardware</b>		
NA		
<b>Headquarters support</b>		
Open science officer for advice, support and training (train-the-trainer).		
Investment	Min. amount in EUR annual	Max. amount in EUR annual
Staff at nodes	5 000	35 000
Staff at headquarters	cf. 6.4	cf. 6.4
Hardware at nodes	NA	NA
Hardware at headquarters	cf. 6.4	cf. 6.4

Table 3: Research data management and data deposit according to the FAIR principles (by nodes)

#### 5.4.4 Identification of opportunities and implementation of AI & ML processes

This subsection focuses on the fourth user priority of **identifying opportunities and implementing AI & ML processes**, as identified by WP3 Users

The evolutions within AI & ML brings many opportunities for RS researchers, from improved machine-readable access to digitised sources (e.g. OCR, HTR, translation) to better understanding the links and relations in a corpus and beyond (e.g. NER for Linked Data, data classification ...). There are many out of the box AI tools available that can be of assistance to researchers such as the earlier mentioned free eTranslation tool of the European Commission (EC) as well as commercial solutions offered by cloud providers such as Google and Amazon.<sup>27</sup> It is possible to find free tools for smaller processing tasks, though paid services should not necessarily frighten off researchers as costs are generally low and processing capacity can be scaled more easily. Some default AI processes, like Optical Character Recognition (OCR) and Handwritten Character Recognition (HTR), yield exceptional quality for modern materials.

However, for rare and ancient languages as well as specific handwriting, custom solutions can be required but before starting work on those, it's worth exploring what other research groups, locally and internationally, are doing with AI to process and analyse similar materials. AI and ML customisation – from data preparation to model design-, training-, and evaluation – require expertise and resources.<sup>28</sup> Pooling resources, reusing models and sharing outcomes will help enhance the effectiveness and quality of AI in SSH

<sup>27</sup> <https://cloud.google.com/solutions/ai>; <https://aws.amazon.com/ai/services/>

<sup>28</sup> AI development life cycle: <https://www.paloaltonetworks.com/cyberpedia/ai-development-lifecycle>



and RS research. It's also worth considering a partnership with departments specialising in AI at universities. Some universities even offer specific AI & ML services, from project support to training of fellow staff members.<sup>29</sup> As AI is a novice application in the field of RS, these partnerships are crucial to achieving successful results. The below table focuses on the activities and staff needed to establish AI projects in collaboration with, for example, computational sciences research groups.

Identification of opportunities and implementation of AI & ML processes (by nodes)		
<b>Activity</b>		
Specification of the problem definition by researchers.		
Researchers, assisted by library/archive staff are needed to identify the data sources.		
Data needs to be prepared and cleaned (e.g. tagging, ground truth ...) by researchers in preparation of the AI model training.		
AI engineers have to select the most suitable models and techniques to build upon and perform the model training.		
Relevant metrics and feedback needs to be provided by researchers to evaluate the performance of the model.		
AI engineers have to deploy the model in the production environment to start the processing.		
<b>Required staff</b> (percentage depends on the size of the project)		
Researchers with insight into AI development lifecycle.		
AI engineers.		
Library/archive staff to help with the data selection.		
<b>Required hardware</b>		
CPU		
GPU		
Storage		
HPC (depending on volume and complexity)		
Scratch space (HPC related)		
<b>Headquarters support</b>		
Project manager for directing researchers with AI questions to the right contacts / potential project partners.		
Investment	Min. amount in EUR annual	Max. amount in EUR annual
Staff at nodes	10 000	40 000
Staff at headquarters	cf. 6.4	cf. 6.4
Hardware at nodes*	5 000	20 000
Hardware at headquarters*	cf. 6.4	cf. 6.4

\* Or use of external computers offered by HPC centres and e-Infra providers (cf. chapter 7 'Synergy possibilities with other RI & e-Infrastructures')

Table 4: Identification of opportunities and implementation of AI & ML processes (by nodes)

## 6. Central hub core services

Besides relying on in-kind services provided by national nodes, RESILIENCE is also preparing some core services during the PPP. Those are mostly based on existing initiatives in the European e-Infrastructure landscape and work done in previous projects, although some small steps are taken towards new initiatives

<sup>29</sup> For example, the KU Leuven Institute Leuven.AI facilitates connections between research groups, provides training and support projects. <https://ai.kuleuven.be/resources/resources>

as well in preparation of the Implementation Phase (IP). Resources to onboard, implement and bring existing services to a higher level are limited as the PPP focuses on service preparation and setting up the governance, legal and financial frameworks. Nevertheless, the core services being prepared address the main needs of our user community and align with the priorities identified in the previous chapters, which are 1. Discoverability of data sources and data access, 2. Networking, mobility and transnational access, and 3. Research data management and data deposit according to the FAIR principles.

The below section provides the context of these evolving services and refers to other documents for more detailed information on the service description and implementation status. Each section also includes a table with the activities, required staff, required hardware, and support staff from headquarters involved. Some specifics to keep in mind when reading the table:

- The support from the headquarters staff is incorporated in line with the cost items specified in 'D1.3 – Financial sustainability plan'.<sup>30</sup>
- The support from headquarters staff will largely depend on the possibility of hiring specialised staff members such as an open science officer and software architect, which is influenced by the growth in membership during the IP. Hence support from the central hub will be limited at the start of the project with the potential to increase over time.
- All estimations are applicable for the IP of the RI.

## 6.1 RESILIENCE community on Zenodo for FAIR data publication

**Aligns with user priority 3. Research data management and data deposit according to the FAIR principles.**

The exploration of solutions for data repositories was among the first initiatives undertaken by the RESILIENCE Working Unit (WU) Data. The use of data repositories is relatively new in the RS community, which presents RESILIENCE with an opportunity to align community practices with established best practices. During the initial stages of this exploratory work, the focus was on investigating EUDAT services, specifically B2SHARE and B2FIND. Meetings were held with EUDAT representatives, and these services were jointly explored by WU Data and RS scholars, resulting in a positive evaluation.

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<sup>30</sup> D1.3 Financial Sustainability Plan [https://www.resilience-ri.eu/wp-content/uploads/2024/08/RESILIENCE\\_WP1\\_D1.3\\_FSP\\_FinancialSustainabilityPlan\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/08/RESILIENCE_WP1_D1.3_FSP_FinancialSustainabilityPlan_01.00_FINAL.pdf)

Another key platform identified early on for its potential within the RS community is Zenodo. Zenodo is a general-purpose open repository developed under the European OpenAIRE program and operated by CERN. It enables researchers to deposit research papers, datasets, software, reports, and other digital artefacts, providing each submission with a persistent Digital Object Identifier (DOI) for easy citation.<sup>31</sup> Given its broad scope – accepting not only datasets but also publications, posters, presentations, and more – Zenodo is particularly appealing to the RS community, where such resource types are more familiar than research data. This versatility helps lower the barrier to adopting data repositories, encouraging wider use by the community. A dedicated RESILIENCE community on Zenodo can play a vital role in promoting open access and data-sharing practices, offering an accessible platform where researchers can publish their data and receive proper citation and credit.

In the evaluation of the two platforms, Zenodo came out as the preferred platform for the RS community. The platform is widely known and used by researchers from different domains, adheres to the FAIR principles, and accommodates a wide range of research outputs, which aligns well with the community's current practices. Furthermore, Zenodo's backing by the European Commission (EC) and data storage at CERN ensures long-term sustainability, while its compliance with Plan S for Open Access Repositories makes it a preferred choice for EC-funded projects.<sup>32</sup>

RESILIENCE has already established a community space on Zenodo, primarily used by the consortium to share outputs of the PPP as work progresses.<sup>33</sup> However, researchers from the broader RS community are encouraged to submit their work to the RESILIENCE community as well, provided they comply with metadata requirements outlined in the 'D2.4 – Data Management Plan' and publish their data under an open licence, with CC-BY as the default. This licence allows for the broad reuse of materials, including by commercial entities, as long as proper attribution is given. Exceptions to this rule are made for privacy, intellectual property, ethical concerns, and dual-use issues.

Additionally, the RESILIENCE WU Data has explored participation in the Horizon-Zen Early Adopter program. This new Horizon-Zen grant aims to enhance Zenodo with FAIR-enabling capabilities and provide support to communities in implementing domain-specific metadata and processes. RESILIENCE has engaged with this program to consider the development of a domain-specific metadata template for RS

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<sup>31</sup> <https://about.zenodo.org/>

<sup>32</sup> <https://www.coalition-s.org/addendum-to-the-coalition-s-guidance-on-the-implementation-of-plan-s/principles-and-implementation/>

<sup>33</sup> <https://zenodo.org/communities/resilience>

research objects. However, through the preparation of the deliverable D2.4, which outlines initial recommended practices, guidelines, and services for FAIR-compliant data management within RESILIENCE, it became evident that an extended domain-specific metadata template is unnecessary at this stage. The RS community is still in the early stages of embracing Open Science and RDM practices. Zenodo’s existing metadata template, which aligns with the DataCite Metadata Schema, already offers a robust framework for good practice. RESILIENCE has added additional mandatory fields to enhance the FAIRness of digital objects submitted to its community.<sup>34</sup> The WU Data will continue to monitor user needs and adjust as necessary.

As the update of FAIR data management practices was identified as a key need by WP3 (cf. chapter 4), RESILIENCE commits itself to raising awareness and offering training. To address the knowledge gaps, the PPP focuses on educating and building capacity within its consortium and associated partners.<sup>35</sup> For the IP, a dedicated Open Science officer is proposed to coordinate future efforts, which include – in close collaboration with existing initiatives<sup>36</sup> and competence centres<sup>37</sup> – developing tailored training materials, organising workshops, curating online resources, building a support network, and promoting success stories to demonstrate the benefits of FAIR practices.

More information on sharing data according to the FAIR principles, the minimal metadata requirements for publishing outputs in the RESILIENCE Zenodo community and future plans are detailed in ‘D2.4 – Data Management Plan’.<sup>38</sup> To develop this service further, the following actions for the IP can be identified:

RESILIENCE community on Zenodo for FAIR data publication (by headquarters)	
Activity	
	Continue to add learning resources to the overview provided as part of D2.4 Data Management Plan.
	Provide OS & RDM train-the-trainer webinars and workshops to local nodes managers and staff.
	Create a network of curators to review submissions to the RESILIENCE community on Zenodo for metadata completeness and overall quality of submissions.

<sup>34</sup> D2.4 Data Management Plan, Annex IV. Metadata requirements Zenodo RESILIENCE community.

<sup>35</sup> To familiarise our community with the FAIR principles, a RESILIENCE panel on ‘FAIR Data in Religious Studies in the Context of the EOSC’ was organised as part of the European Academy of Religion (EuARE) 2023 conference. Later, an online Workshop on ‘FAIR Principles and Religious Studies’ was organised providing our community a more in-depth introduction to the topic with a concrete example of data management by one of our community members. Participants also had the opportunity to ask questions in relation to their own research context. The webinar presentations on the topic of data management and making data compliant with the FAIR principles was recorded and is available to our community via the RESILIENCE YouTube channel. Similar initiatives will follow as the RESILIENCE Services Unit is currently preparing the development of the RESILIENCE Training Framework which includes an Online Training Prototype for Librarians/Archivists on FAIR Data.

<sup>36</sup> E.g. <https://operas-eu.org/>

<sup>37</sup> <https://www.skills4eosc.eu/network/competence-centres>

<sup>38</sup> [https://www.resilience-ri.eu/wp-content/uploads/2024/09/RESILIENCE\\_WP2\\_D2.4\\_Data\\_Management\\_Plan\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/09/RESILIENCE_WP2_D2.4_Data_Management_Plan_01.00_FINAL.pdf)

Connect with other SSH RI Open Science officers to pool knowledge and resources on FAIR data publication practices.		
Follow up on Zenodo’s roadmap and version releases as well as broader OS, RDM and FAIR practices.		
Advocate the benefits of good RDM practices and data publication to our community. Provide low barrier introductions and training, where possible in collaboration with existing initiatives and competence centres.		
Keep improving procedures and policies concerning data publication in the context of RESILIENCE.		
Create a pool of RDM and data publication experts from national nodes to run an RDM support desk.		
<b>Required staff</b> (percentage depends on the size of the project)		
OS & RDM experts		
RS experts for specific community dataset examples		
Data curators		
<b>Required hardware</b>		
Not applicable as publication on Zenodo is free for 50 Gb datasets		
<b>Headquarters support</b>		
Open science officer for coordination, knowledge building, outreach		
Communication/community engagement officer		
Investment	Min. amount in EUR annual	Max. amount in EUR annual
Staff at nodes	cf. 5.4.3	cf. 5.4.3
Staff at headquarters	5 000	10 000
Hardware at nodes	NA	NA
Hardware at headquarters	NA	NA

Table 5: RESILIENCE community on Zenodo for FAIR data publication (by headquarters)

## 6.2 Trans-National Access

**Aligns with user priority 2. Networking, mobility and transnational access.**

Work on the content of this section, as well as the table with related activities, required staff, hardware, support and financial estimations for TNA is still in progress and will be included in the final version of this deliverable.

## 6.3 Data hub and discovery environments

**Aligns with user priority 1. Discoverability of data sources and data access.**

To resolve the need for discoverability of data sources that give access to a wide variety of digital objects, RESILIENCE currently has two services – RelReSearch and IxTheo – available among its partners.

RelReSearch was developed as part of the RelReS project to create a discovery platform where diverse digital resources and databases relevant to RS could be searched in a standardised and streamlined manner.<sup>39</sup> Designed to meet the increasing demand from scholars for easy and efficient access to large datasets, RelReSearch enables users to explore metadata coming from various providers on a single platform. Recognising the shared objective of providing access to primary and secondary resources and data related to religion, RESILIENCE has integrated RelReSearch into its service catalogue. This ensures ongoing hosting and maintenance of the platform, while also creating opportunities for future enhancements and the addition of new collections.

To further enhance the discoverability of research materials for the RS community, RESILIENCE has established a collaboration with the University Library of Tübingen, which manages the Index Theologicus (IxTheo), a leading international bibliography of Theology and Religious Studies.<sup>40</sup> While RelReSearch primarily focuses on making digital resources and datasets, often used as primary sources, more accessible, IxTheo serves mainly as a database for research publications. However, IxTheo is gradually expanding to include references to research data. With the University Library of Tübingen as an Associate Partner, RESILIENCE strengthens its relationship with a provider of free and open access services for the global academic community, supported by funding from the German Research Foundation (Deutsche Forschungsgemeinschaft).

In October 2022, the KU Leuven team, which led the pilot demonstrator as part of the RelReS project, submitted a report to the RESILIENCE BoD, outlining the future direction of RelReSearch. In addition to a comprehensive SWOT analysis, the report proposed various ideas and actions to establish RelReSearch as an open and FAIR data platform for the RS community. With broad agreement, it was decided to onboard RelReSearch as a core service managed by a RESILIENCE member to the central hub.<sup>41</sup>

The first step involved updating the platform's design to align with the RESILIENCE branding. To raise awareness and announce the rebranding, new instructional videos were created and promoted.<sup>42</sup> Additionally, a separate introductory video targeting potential new data providers was recorded and shared.

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<sup>39</sup> Research Infrastructure for Religious Studies project, Grant agreement N° 730895, <https://reires.eu/>.

<sup>40</sup> <https://ixtheo.de/>

<sup>41</sup> <https://www.resilience-ri.eu/news/reiresearch-adopted-by-resilience-in-its-service-catalogue/>

<sup>42</sup> <https://www.resilience-ri.eu/news/what-can-reiresearch-do-for-you/>

Following the release of these materials, an online demonstration was held in December 2023, offering users and potential providers an in-depth look at the platform with an opportunity to ask questions.

More work is required to make the platform truly useful for our community, the most important being the addition of new data providers who can offer rich metadata for optimal discovery of relevant resources. As the extension of ReReSearch is not part of the work of the PPP, the focus currently lies on defining the procedures for integration, the minimal metadata requirements, approved licences, and standards to be used. This information is part of 'D2.4 – Data Management Plan'.<sup>43</sup> Though larger improvements to the platform will require additional resources through both European projects and national node funding during the IP, the LIBIS team is available for the inclusion of new datasets according to the accepted standard formats and delivery procedures and will explore other small improvements to enhance the user experience.

Because some useful datasets in RS are not in the scope of ReReSearch, WP2 in collaboration with WP4, have also created an online overview of useful datasets.<sup>44</sup> This has the added benefit of more flexibility as no technical interoperability is required and relevant closed/commercial databases can be listed if this is found appropriate.<sup>45</sup>

IxTheo, ReReSearch and the overview of datasets are complementary services. As specified in chapter 5 'RESILIENCE as a distributed research infrastructure and the role of national nodes', RESILIENCE can decide to integrate decentralised (in-kind) services into their core facility in consultation with the original service owner and the community. These types of services get the status of 'core services managed by a RESILIENCE member' and

- can be developed and hosted by partners but preferably enjoy some sort of central support,
- should comply to a quality service level (preferably a minimum T/SRL of 7) and include clear communication towards the BoD and GenA concerning the status, continuity, and development roadmap of the service,
- should be transferable to another hosting location/organisation,
- should be clearly branded as RESILIENCE.

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<sup>43</sup> [https://www.resilience-ri.eu/wp-content/uploads/2024/09/RESILIENCE\\_WP2\\_D2.4\\_Data\\_Management\\_Plan\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/09/RESILIENCE_WP2_D2.4_Data_Management_Plan_01.00_FINAL.pdf)

<sup>44</sup> <https://www.resilience-ri.eu/datasets/>

<sup>45</sup> Requirements and procedure for inclusion of new references in this list are described in D2.4 Data Management Plan.

As such, RelReSearch differs from IxTheo which, with its own governance and branding, is a valuable community (in-kind) service. Both services have their strengths and can benefit from future synergies, with IxTheo being more mature as an international bibliography of theology and RS and RelReSearch as a discovery service for primary and secondary source materials such as older manuscripts and printed books. In time the discovery of resources through the RelReSearch platform could be expanded to include metadata on:

- Manuscripts and prints
- Research articles (academic bibliography)
- Research data
- Research databases (e.g. relevant databases hosted by others such as IxTheo)
- Services
- Tools
- Training materials and courses
- People (e.g. active researchers involved in the RESILIENCE community)

Data hub and discovery environments (by headquarters & RESILIENCE member)		
<b>Activity</b>		
Platform maintenance (software updates, security ...).		
Onboarding of data providers.		
Normalisation / validation of datasets.		
User requirements gathering.		
Extension of platform to extend new data types.		
Implementation of new features improving User Experience.		
Communication and training activities for data providers.		
Communication and training activities for end-users.		
<b>Required staff</b> (percentage depends on the size of the project)		
Senior software architect		
Web developer		
Data analyst		
Project manager		
<b>Headquarters support</b>		
Software architect/developer		
Communication/community engagement officer		
Investment	Min. amount in EUR annual	Max. amount in EUR annual
Staff at nodes	21 000	28 142



Staff at headquarters	5 500	25 000
Hardware at nodes	5 500	25 000
Hardware at headquarters	NA	NA

Table 6: Data hub and discovery environments (by headquarters & RESILIENCE member)

## 6.4 RDM support

**Aligns with user priority 3. Research data management and data deposit according to the FAIR principles.**

During the RESILIENCE Design Phase (DP) that ran from 2019 to 2021, the current research practices in RS were examined with the help of both surveys and interviews. Their results were presented and discussed in the DP deliverable 'D3.2 – Report on data management roadmap'.<sup>46</sup> These research practices were also situated in the broader context of trends and evolutions in the FAIR data landscape. The comparison between the current state of RDM practices in RS and best practices in the wider landscape concluded with a roadmap for RESILIENCE to improve data management practices within our community:

*Both the survey results and interviews made it clear that, although researchers in Religious Studies are aware of the existence of certain data management solutions and tools, they do not very actively look into using them. RESILIENCE can help fill this gap by providing trainings and guidelines that direct scholars to community best practices and useful data management solutions. A helpdesk can provide support to researchers who are interested in making their data FAIR compliant while technical solutions are still being planned or developed. This can also help increase community engagement. Considering the variety of research data, practices and topics in Religious Studies, a stronger European network can improve data management practices that are particular to smaller research communities within Religious Studies.<sup>47</sup>*

The first step in enhancing RDM support for the RS community was incorporated into the above-mentioned deliverable through the inclusion of a standard Data Management Plan (DMP) template containing specific guidance relevant to the RS community. The guidelines provided in this template serve as a foundation for completing a DMP in ARGOS, an online, machine-actionable DMP tool developed by OpenAIRE. ARGOS

<sup>46</sup> Confidential deliverable D3.2 from the Design Phase – Grant 871127 – RESILIENCE “Report on data management roadmap”.

<sup>47</sup> *Ibid.*, p. 80.

has been recognized as a valuable tool for supporting early-stage RDM practices within the Religious Studies field. Further details about this service, along with instructions for its use, can be found in 'D2.4 – Data Management Plan' of the current project. The same deliverable also contains information and guidelines about other recommended tools such as Zenodo and B2Drop as well as references to relevant learning resources on Data Management Planning.<sup>48</sup>

As specified in 'D2.4 – Data Management Plan', the PPP efforts are mainly directed towards the training of the consortium members and associated partners, though smaller initiatives are being taken to onboard the wider RS community into the concepts of Open Science (OS) such as the September 2023 'Webinar and Workshop on FAIR data management in Religious Studies'.<sup>49</sup> This approach is in line with the current capacity and expertise on the subject by the consortium partners involved. Using a train-the-trainer approach will boost the understanding of OS and RDM practices of the consortium and ensure further distribution of the recommended tools, practices and learning resources within our community.

From the IP onwards the RESILIENCE consortium will increase its effort towards RDM support. As such the WU Data has identified the following actions to ensure the adoption of the FAIR principles within the broader community:

1. Developing Customised Training Materials
2. Organizing Workshops and Webinars
3. Curating Online Resources
4. Building a Support Network
5. Promoting Success Stories

Further details on these activities can be found in 'D2.4 – Data Management Plan', which also highlights the importance of incorporating a dedicated expert in OS practices, particularly within the SSH domain, with a specific focus on RS. Ideally, this role would be filled by a staff member at RESILIENCE headquarters, reflected by the inclusion of a 0.5 FTE Open Science Officer position in the 'D1.3 – Financial Sustainability Plan'.<sup>50</sup> The Open Science Officer would be responsible for initiating and guiding the development of outlined actions in collaboration with the team. Any future initiatives will prioritise leveraging existing

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<sup>48</sup> [https://www.resilience-ri.eu/wp-content/uploads/2024/09/RESILIENCE\\_WP2\\_D2.4\\_Data\\_Management\\_Plan\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/09/RESILIENCE_WP2_D2.4_Data_Management_Plan_01.00_FINAL.pdf)

<sup>49</sup> <https://www.resilience-ri.eu/news/fair-data-management-in-religious-studies-research/>

<sup>50</sup> [https://www.resilience-ri.eu/wp-content/uploads/2024/08/RESILIENCE\\_WP1\\_D1.3\\_FSP\\_FinancialSustainabilityPlan\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/08/RESILIENCE_WP1_D1.3_FSP_FinancialSustainabilityPlan_01.00_FINAL.pdf)

resources, with new materials being developed only when necessary to meet the unique needs of the RS community. In addition to the required headquarter support staff, RDM support will be complemented by in-kind contributions from the national nodes.

Besides RDM support for researchers dealing with small to normal data volumes, we can also benefit from the involvement of CINECA as a partner in RESILIENCE. The expertise of this partner will be utilised to provide services offering large-volume and secure data storage and transfer solutions to the RS community that adhere to RDM best practices. Also, the development of the EOSC EU Node is of interest. The EOSC EU Node is a reference node for EOSC, provided by the European Commission, that offers access to a diverse range of research outputs, services, and tools. The EOSC EU Node will offer the following services (currently under development) that are of interest to our community:

- File Sync & Share: Enable automatic file syncing and secure sharing across locations and teams.
- Large File Transfer: Streamline large file transfers online with added security and integrity

Their other envisioned services like Bulk Data Transfer, Notebooks, Virtual Machines, and Cloud Container Platform are of relevance to the IT experienced researchers of our community.<sup>51</sup> More information will be included in the 'D2.3 – IT Services Catalogue' once these services have been properly reviewed. Exploration of the EOSC EU Node has only recently commenced and is thus ongoing since the platform was officially launched at the 2024 EOSC Symposium on October 22.

RDM support (by headquarters)	
<b>Activity</b>	
	Dedicated RDM trainings with community specific examples (in collaboration with other RIs where possible).
	RDM helpdesk for questions concerning DMP, RDM tools, standards, data publication, licensing etc.
	Creation of learning resources such as knowledge clips with community specific examples (in collaboration with other RI where possible).
	Monitoring and inclusion of relevant RDM resources in RESILIENCE service catalogue created/offered by other RI and e-infrastructure providers.
	Follow up of evolution in the field (FAIR, TRUST, CARE ...).
<b>Required staff</b> (percentage depends on the size of the project)	
	Open science officer
	Communication and engagement officer
	OS & RDM experts
<b>Headquarters support</b>	
	Open science officer
	Communication/community engagement officer

<sup>51</sup> <https://open-science-cloud.ec.europa.eu/>

Investment	Min. amount in EUR annual	Max. amount in EUR annual
Staff at nodes	cf. 5.4.3	cf. 5.4.3
Staff at headquarters	15 000	40 000
Hardware at nodes	NA	NA
Hardware at headquarters	NA	NA

*Table 7: RDM support (by headquarters)*

## 7. Synergy possibilities with other RI & e-Infrastructures

In line with the guiding principles for establishing the RESILIENCE service catalogue, RESILIENCE aims to integrate into the wider European RI and e-infrastructure landscape by reusing what is available and useful to the RS community while in turn making its own unique service offering available to the wider European research landscape. In terms of synergy, the SSH cluster will be our focus point. In addition, generic service offerings made by the other science clusters, e-infrastructure providers as well as the EOSC EU Node will be considered. The below table provides a non-exhaustive overview of the initiatives with the most direct impact on the RESILIENCE service offering.

Name	Type	Interaction
Zenodo <a href="https://zenodo.org/">https://zenodo.org/</a> <a href="https://zenodo.org/communities/resilience/">https://zenodo.org/communities/resilience/</a>	Platform	Research output publication portal. Hosts the RESILIENCE community outputs. Cf. D2.4 Data Management Plan for more information on the usage of Zenodo.
ARGOS <a href="https://argos.openaire.eu/">https://argos.openaire.eu/</a>	Platform	DMP platform. Can be used by the RESILIENCE community for the creation of DMPs in case the funder or institution does not offer a solution. Cf. D2.4 Data Management Plan for more information on the usage of ARGOS.
DARIAH <a href="https://www.dariah.eu">https://www.dariah.eu</a>	RI	RI for Digital Humanities (DH) research. Provides access to data, tools, expertise and training for our community with interesting DH methods and computational data analysis, though training resources are applicable for humanities at large.
CLARIN <a href="https://www.clarin.eu/">https://www.clarin.eu/</a>	RI	RI for language research. Provides access to data, tools, services and training for our community with an interest in computational linguistics.
CESSDA <a href="https://www.cessda.eu/">https://www.cessda.eu/</a>	RI	RI for Social Science research. Provides access to data, tools, services and training, specifically related to data management and archiving. Relevant for our community with an interest in social studies, though training resources are applicable for humanities at large.
E-RIHS <a href="https://www.e-rihs.eu/">https://www.e-rihs.eu/</a>	RI	RI for Heritage Science research. Provides access to data, tools, services and training, specifically related to heritage interpretation, preservation, documentation, innovation and management. Relevant for our community with an interest in understanding, care and sustainable use of heritage.
EHRI <a href="https://www.ehri-project.eu/">https://www.ehri-project.eu/</a>	RI	RI for Holocaust research. Provides access to data, tools, services and training, specifically related to heritage interpretation, preservation, documentation, innovation and management. Relevant for our community with an interest in trans-national Holocaust research and data.
OPERAS <a href="https://operas-eu.org/">https://operas-eu.org/</a>	RI	RI supporting open scholarly communication in the SSH. Provides access to data, tools, services and training, specifically related to OS principles. Relevant for our community with an interest in exploring in depth the benefits of and best practices in OS, FAIR data publication etc. Also offers a platform for in-depth exploration of SSH research, called GoTriple.

<p>European Social Survey  <a href="https://www.europeansocialsurvey.org/">https://www.europeansocialsurvey.org/</a></p>	RI	<p>RI providing access to high-quality open access data measuring public attitudes, beliefs and behaviour. Relevant for our community with an interest in social studies.</p>
<p>Survey of Health, Aging and Retirement in Europe  <a href="https://share-eric.eu">https://share-eric.eu</a></p>	RI	<p>RI for studying the effects of health, social, economic and environmental policies over the life-course of European citizens and beyond. Relevant for our community with an interest in for example the impact of religion on (mental) health.</p>
<p>SSH Open Cluster  <a href="https://sshopencloud.eu/news/sshoc-ssh-open-cluster">https://sshopencloud.eu/news/sshoc-ssh-open-cluster</a></p>	Cluster	<p>RESILIENCE signed the SSHOC Memorandum of Understanding and participates in looking for synergies and sharing expertise.</p>
<p>OSCARS project  <a href="https://oscars-project.eu/science-clusters">https://oscars-project.eu/science-clusters</a></p>	Cluster project	<p>A wide range of publicly-funded RIs in Europe are organised in five major Science Clusters that work on the improved interoperability of data, services, training and expertise. Relevant for its cascading grant calls as well as the eventual integration of RESILIENCE into the SSH cluster.</p>
<p>EOSC EU Node  <a href="https://open-science-cloud.ec.europa.eu/">https://open-science-cloud.ec.europa.eu/</a></p>	Marketplace	<p>The newly launched (october 2024) EOSC EU Node offers easy access to diverse data, publications, software, and services to researchers and encourages providers to contribute research objects. Its tools include File Sync &amp; Share, Interactive Notebooks and Large File Transfer.</p>
<p>SSHOC Open Marketplace  <a href="https://marketplace.sshopencloud.eu/">https://marketplace.sshopencloud.eu/</a></p>	Marketplace	<p>Catalogue of services, tools, trainings, workflows, etc. Interesting, both for using what's on offer in the catalogue as well as for contributing RESILIENCE specific services to the wider community.</p>
<p>CINECA  <a href="https://www.cineca.it">https://www.cineca.it</a></p>	HPC site	<p>Cloud services and compute for compute-intensive data analysis. CINECA is a member of the RESILIENCE community.</p>
<p>EGI  <a href="https://www.egi.eu/">https://www.egi.eu/</a></p>	E-Infra	<p>Compute, storage, notebooks for compute-intensive data analysis.</p>
<p>EURO HPC  <a href="https://eurohpc-ju.europa.eu/">https://eurohpc-ju.europa.eu/</a></p>	E-Infra	<p>Compute for compute-intensive data analysis.</p>
<p>EUDAT  <a href="https://www.eudat.eu/">https://www.eudat.eu/</a></p>	E-Infra	<p>Storage, sync and share research data (B2Drop).</p>
<p>OpenAIRE  <a href="https://www.openaire.eu/">https://www.openaire.eu/</a>  <a href="https://catalogue.openaire.eu/search">https://catalogue.openaire.eu/search</a>  <a href="https://explore.openaire.eu/">https://explore.openaire.eu/</a></p>	E-Infra	<p>OpenAIRE provides services in support of OS, such as ARGOS. Also relevant for our community is OpenAIRE Explore, a comprehensive and open dataset of research information covering 191M publications, 62M research data, 396K research software items, from 141K data sources, linked to 3M grants and 320K organisations, all linked together through citations and semantics.</p>
<p>D4Science  <a href="https://www.d4science.org/">https://www.d4science.org/</a></p>	E-Infra	<p>D4Science is a Data Infrastructure connecting +24.000 scientists in +50 countries, integrating +50 heterogeneous data providers, executing +50,000 models &amp; algorithms per month; providing access to over a billion quality records in repositories worldwide. D4Science hosts +175 Virtual Research Environments to serve the biological, ecological, environmental, social mining, culture heritage, and statistical communities world-wide. Relevant for our community in terms of cloud computing, storage, and data access.</p>

<p>EOSC-A <a href="https://eosc.eu/">https://eosc.eu/</a></p>	<p>Network association</p>	<p>The ambition of the EOSC is to develop a 'Web of FAIR Data and Services' for science in Europe. EOSC will be a multi-disciplinary environment where researchers can publish, find and re-use data, tools and services, enabling them to better conduct their work. The EOSC Association provides a stakeholder platform and interacts with the ongoing EOSC projects, the member states and the EC to ensure its successful implementation and uptake.</p>
<p>LIBER <a href="https://libereurope.eu/">https://libereurope.eu/</a></p>	<p>Network association</p>	<p>LIBER supports and speaks up on behalf of universities, national and special libraries – their institutions and their users – across Europe. They also provide relevant documents and resources to support and enable the uptake of OS practices.</p>
<p>Fenix <a href="https://fenix-ri.eu/">https://fenix-ri.eu/</a></p>	<p>RI</p>	<p>The Fenix Infrastructure was created to align the services of six European supercomputing centres including CINECA. Originally targeted researchers associated with the European HPB but is now expanding to other communities as well.</p>

Table 8: Overview of the initiatives with direct impact on the RESILIENCE service offering

## 8. Access Policy

An essential aspect to consider when implementing specific services is how and under which circumstances users can have access to those resources. Although the access conditions are not necessarily the same for each service, there are some general principles that are outlined below.

An overview of an access policy for RESILIENCE was already described in 'D8.1 – Governance Model, HR Policy and Management, Access Policy' of the RESILIENCE Design Phase:

*The objective of the RESILIENCE Access Policy is to describe guidelines for access to RI facilities, resources and services provided to users. It specifies general principles on how the RI intends to regulate, grant and support access to its users from any sector. It indicates what type of access is provided and in which way. Of particular importance for the access policy is the maintenance of absolute transparency and open communication of access requirements and conditions.<sup>52</sup>*

The policy explains that RESILIENCE aims to provide, as much as possible, wide and unrestricted access to the tools and resources made available through the infrastructure considering the sustainability of those resources. This means that the emphasis is on open access to services unless there are practical reasons to impose limits on the number of users such as, for example, in a TNA program or for resources with limited capacity.<sup>53</sup>

The tools and services offered by RESILIENCE should in principle be freely available for use by the scientific and educational community. However, it may be decided that some services are offered against a fee or with other restrictions with the specification of clear conditions. Users will need to accept the general terms of service regulating access to the specific resources.

End-user licences can further specify the access conditions for each resource. When depositing a resource to the RESILIENCE service catalogue, providers will have to specify the licence(s) with which the resource will be distributed to end-users.

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<sup>52</sup> Confidential deliverable D8.1 from the Design Phase – Grant 871127 – RESILIENCE “Governance Model, HR Policy and Management, Access Policy”, p.37.

<sup>53</sup> Ibid., p.37-48.



## 9. Open Science Policy

### 9.1 Introduction

The RESILIENCE Open Science (OS) Policy reflects the values of our community that recognizes that access to scientific knowledge is a universal right. As such, RESILIENCE wishes to make the knowledge produced through its service offerings as openly accessible as possible for everybody (but as restricted as necessary in relation to legal opt-outs). RESILIENCE is committed to the advancement and wide dissemination of scientific knowledge on religion. With this policy, RESILIENCE sets the cornerstone for more open, collaborative, and responsive research on religion in support of the societal changes and challenges faced in an evolving world.

Open Science is defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as “[...] *an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community.*”<sup>54</sup>

RESILIENCE recognizes OS as one of its guiding principles and commits to it by:

- Supporting OS research practice and the uptake of the FAIR principles through support of skills development
- Enabling the free dissemination of knowledge and the accessibility of outputs related to OS
- Encouraging Open Access to publications and their metadata
- Encouraging and facilitating the sharing of data and software under free, Open Source licences
- Facilitating access to existing world class infrastructure and services in support of OS
- Engaging with related SSH research infrastructures to ensure effective dissemination of existing knowledge and cooperation to advance OS

The policy will typically be reviewed and updated every two years.

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<sup>54</sup> UNESCO (2021), UNESCO Recommendation on Open Science: <https://unesdoc.unesco.org/ark:/48223/pf0000379949.locale=en>

## 9.2 Open access to publications

RESILIENCE publications (e.g. public deliverables, presentations, reports, etc.) should be deposited in the RESILIENCE community on Zenodo under an open licence, with CC-BY being the default.<sup>55</sup> Publication related metadata are made available for reuse under the CCo waiver in line with the FAIR principles.<sup>56</sup>

## 9.3 Open data

RESILIENCE is committed to supporting our community in making their research data publicly available. The RESILIENCE community on Zenodo was specifically set up to better support our research community towards open and FAIR data sharing practices. All RESILIENCE's data and associated data services will apply open and FAIR principles. Researchers making use of the RESILIENCE community on Zenodo will be required to publish their data under an open licence, with CC-BY being the default. Exceptions are made for legal opt-outs due to privacy, intellectual property rights, ethical aspects, and aspects of dual use. More information on the RESILIENCE community on Zenodo and how to publish data are available in the 'D2.4 – Data Management Plan'.

## 9.4 Open source software

RESILIENCE software is made available as open source wherever possible, applying a licence approved by the Open Source Initiative (OSI).<sup>57</sup> Software development processes are expected to follow best practices as defined in the 'D2.8 – Software Development Plan Template' (SDPT).<sup>58</sup> RESILIENCE contributes to existing open-source software through active participation in relevant open-source communities (code contribution, roadmap input etc.).

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<sup>55</sup> <https://creativecommons.org/licenses/by/4.0/>

<sup>56</sup> <https://creativecommons.org/public-domain/cc0/>  
<https://www.go-fair.org/fair-principles/>

<sup>57</sup> <https://opensource.org/>

<sup>58</sup> RESILIENCE PPP D2.8 RESILIENCE Software Development Plan Template (SDPT). [https://www.resilience-ri.eu/wp-content/uploads/2023/12/RESILIENCE\\_WP2\\_D2.8\\_SW\\_Dev\\_Plan\\_Template\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2023/12/RESILIENCE_WP2_D2.8_SW_Dev_Plan_Template_01.00_FINAL.pdf)

## 9.5 Infrastructure provision for Open Science

RESILIENCE ensures that its selected OS infrastructures meet trusted quality standards and comply with FAIR principles (e.g. use persistent identifiers such as DOIs and ORCID<sup>59</sup>). RESILIENCE will adhere to the rules of participation and interoperability framework as specified by the EOSC.<sup>60</sup>

## 9.6 Education and training

RESILIENCE is committed to offering training courses and materials to increase knowledge and facilitate the adoption of OS by researchers in RS. RESILIENCE will make use of and disseminate existing materials to direct researchers to the relevant information for their level of training in OS principles. Any training resource created by RESILIENCE will be shared as Open Educational Resources (OER). For a more detailed overview on how we implement those OS and FAIR principles in our training services, see D2.6 - Training Management Plan.<sup>61</sup>

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<sup>59</sup> Such as <https://www.rd-alliance.org/trust-principles-rda-community-effort>

<sup>60</sup> Rules of participation and Interoperability Framework in development, i.e. as part of the work of the drafting of the EOSC Federation Handbook <https://eosc.eu/eosc-federation-handbook/>.

<sup>61</sup> D2.6 - Training Management Plan [https://www.resilience-ri.eu/wp-content/uploads/2024/12/RESILIENCE\\_WP2\\_D2.6\\_Training-Management-Plan\\_01.00\\_FINAL.pdf](https://www.resilience-ri.eu/wp-content/uploads/2024/12/RESILIENCE_WP2_D2.6_Training-Management-Plan_01.00_FINAL.pdf)

## 10. Conclusion

The “Service Preparation and Implementation Strategy” outlines a comprehensive approach to preparing and implementing high-quality, sustainable, and transparent services. By adhering to the guiding principles of expertise, excellence, transparency, sustainability and the FAIR principles, RESILIENCE aims to effectively support the Religious Studies and broader Social Sciences and Humanities research community.

Throughout this document, we have detailed the steps taken in both outlining an implementation strategy and creating a robust service catalogue, the roles and responsibilities of national nodes and the central hub, and the key priorities identified through extensive user feedback. Although still ongoing, significant progress has already been made during the PPP, including but not limited to, the establishment of national networks, the collection and evaluation of existing services, and the development of detailed service description templates.

The guiding principles detailed in this document provide a foundational framework for future service developments, prioritising sustainability, transparency, and community-driven design. Through collaborations with stakeholders, continuous engagement with the RS community, and responsiveness to evolving European RI landscapes, RESILIENCE is building a responsive and resilient service catalogue.

By combining decentralised community (in-kind) services by the national nodes with support and core services from a central hub, RESILIENCE enables flexibility and high standards aligned with OS and FAIR principles. As a distributed RI we have the opportunity to connect local expertise with a cohesive European network, allowing services to adapt dynamically to the diverse needs of the SSH community. Our main effort during the PPP has been mapping and expanding qualitative existing services and improving their availability to the wider RS community through the development of the D2.2 User services catalogue.

A clear distinction between the roles and responsibilities of the central hub (headquarters) and the national nodes ensures a smooth workflow whereas integrating and collaborating with the broader European RI ecosystem enhances visibility, interoperability, and utility for a wide range of SSH researchers. Focussing on certain activities identified through user needs analysis and estimating necessary (financial and human) resources will prepare us for the next phase of RESILIENCE where service development and enhancement can commence. By encouraging local partners to align with our (open) Access and Open Science policies, transparency and the uptake of the FAIR principles are guaranteed.



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While challenges such as ensuring service quality and adapting to the constantly evolving European RI landscape remain, our ongoing strategy development and collaborative efforts towards a flexible service catalogue helps address these issues. As we transition to the IP, our focus will shift to the development and implementation of both community (in-kind) and core services, ensuring they meet the needs of our community.

Future phases will also further refine the services already collected during the PPP, enhancing accessibility and integration with broader infrastructures such as the newly launched EOSC EU Node and the SSH Open Marketplace. RESILIENCE remains committed to providing a reliable and accessible service catalogue and the development of this deliverable marks a key step toward realising that vision.

## 11. Reference Documents

Reference documents are intended to provide background and supplementary information.

ID	Date	Title/Reference
R1	18/08/2022	GRANT AGREEMENT, Project: 101079792 – RESILIENCE PPP – HORIZON-INFRA-2021-DEV-02
R2	27/08/2024	D2.4 Data Management Plan – <a href="https://www.resilience-ri.eu/wp-content/uploads/2024/09/RESILIENCE_WP2_D2.4_Data_Management_Plan_01.00_FINAL.pdf">https://www.resilience-ri.eu/wp-content/uploads/2024/09/RESILIENCE_WP2_D2.4_Data_Management_Plan_01.00_FINAL.pdf</a>
R3	02/08/2024	D1.3 Financial sustainability plan – <a href="https://www.resilience-ri.eu/wp-content/uploads/2024/08/RESILIENCE_WP1_D1.3_FSP_FinancialSustainabilityPlan_01.00_FINAL.pdf">https://www.resilience-ri.eu/wp-content/uploads/2024/08/RESILIENCE_WP1_D1.3_FSP_FinancialSustainabilityPlan_01.00_FINAL.pdf</a>
R4	14/11/2023	D2.8 Software Development Plan Template (SDPT) – <a href="https://www.resilience-ri.eu/wp-content/uploads/2023/12/RESILIENCE_WP2_D2.8_SW_Dev_Plan_Template_01.00_FINAL.pdf">https://www.resilience-ri.eu/wp-content/uploads/2023/12/RESILIENCE_WP2_D2.8_SW_Dev_Plan_Template_01.00_FINAL.pdf</a>
R5	29/02/2024	D3.1 Workshops Proceedings – 1st Batch – <a href="https://www.resilience-ri.eu/wp-content/uploads/2024/03/RESILIENCE_WP3_D3.1_WorkshopProceedings1_01.00_FINAL.pdf">https://www.resilience-ri.eu/wp-content/uploads/2024/03/RESILIENCE_WP3_D3.1_WorkshopProceedings1_01.00_FINAL.pdf</a>
R6	31/03/2024	D3.3 Documented Use Cases – 1st Batch – <a href="https://www.resilience-ri.eu/wp-content/uploads/2024/04/RESILIENCE_WP3_D3.3_Documented-Use-Cases-1st-Batch_FINAL.pdf">https://www.resilience-ri.eu/wp-content/uploads/2024/04/RESILIENCE_WP3_D3.3_Documented-Use-Cases-1st-Batch_FINAL.pdf</a>
R7	31/10/2024	D3.5 User Stories Catalogue – 1st batch – <a href="https://www.resilience-ri.eu/wp-content/uploads/2023/11/RESILIENCE_WP3_D3.5_User-Stories-Catalogue-1st-Batch_01.00_FINAL.pdf">https://www.resilience-ri.eu/wp-content/uploads/2023/11/RESILIENCE_WP3_D3.5_User-Stories-Catalogue-1st-Batch_01.00_FINAL.pdf</a>
R8	29/05/2024	D2.2 User Services Catalogue – <a href="https://www.resilience-ri.eu/wp-content/uploads/2024/05/RESILIENCE_WP2_D2.2_User-Services-Catalogue_01.00_FINAL.pdf">https://www.resilience-ri.eu/wp-content/uploads/2024/05/RESILIENCE_WP2_D2.2_User-Services-Catalogue_01.00_FINAL.pdf</a>