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D6.2 Initial core competence centre structures

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Abstract

This report lays out the set-up of the FAIR core competence centre, including human resources, initial knowledge base design and tools, communications infrastructure, defined responsibilities, and expectations on service levels. The document focuses on the design and functionality of the competence centre and how it will meet the needs of its user base.

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Abbreviations and Acronyms

| | |
|--------------|--|
| FAIR | Findable, Accessible, Interoperable, Reusable |
| EOSC | European Open Science Cloud |
| INFRAEOSC | European Commission H2020 INFRAEOSC-05-2018-2019 |
| INFRAEOSC-5b | Projects resulting from INFRAEOSC-05-2018-2019 sub topic b (EOSCPillar, NORDIC, Expands, ESOC Synergy, NI4OS, FAIRsFAIR) |
| ESRFI | European Strategy Forum on Research Infrastructure |
| WP2 | FAIRsFAIR work package 2 - FAIR Practices: Semantics, Interoperability and Services |
| WP3 | FAIRsFAIR work package 3 - Policy and Practice |
| WP4 | FAIRsFAIR work package 4 - Fair Certification |

Executive Summary

The overall objective of FAIRSF AIR is to accelerate the realization of the goals of the EOSC by opening up and sharing all knowledge, expertise, guidelines, implementations, new trajectories, courses and education on FAIR matters. To support this, FAIRSF AIR is tasked to set up a single FAIR Data Stewardship Competence Centre which this report defines as a shared hub of expertise in implementing FAIR data stewardship principles, offering leadership, coordination and cataloguing services to connect relevant people, guidance, learning resources and curricula in different thematic areas.

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1. Introduction

The overall objective of FAIRSF AIR is to accelerate the realization of the goals of the EOSC by opening up and sharing all knowledge, expertise, guidelines, implementations, new trajectories, courses and education on FAIR matters. It seeks to establish a level playing field for all European member states (and beyond) when contributing to scientific and scholarly communities, in re-using data from scientists and scholars elsewhere. All this is made possible by the coordinated effort of twenty-two partners spanning eight member states who are working together to define guidelines towards a FAIR approach to data and service management for data repositories across disciplines.

To support the emergence of a FAIR data culture, FAIRSF AIR aims to interact with a broad range of research communities to bring together best practice from a range of domains and establish a virtual Competence Centre providing access to advice, training and services.

No well-established definition of Competence Centre is found in literature; in D6.1 we offered the following definition of a FAIR Competence Centre:

“FAIR Data Stewardship¹ Competence Centre: A shared hub of expertise in implementing FAIR data stewardship principles, offering leadership, coordination and cataloguing services to connect relevant people, guidance, learning resources and curricula”

In building its Competence Centre, FAIRSF AIR is adopting a mix of bottom-up and top-down approaches. The former is based on an assessment of research community requirements as expressed in the open consultation (“[Overview of needs for competence centres](#)”). The latter entails mechanisms that facilitate connections between stakeholders. The Competence Centre will therefore be an essential focal point of expertise that provides access to advisory services, promotes harmonisation and coordination across a variety of stakeholders, and disseminates training resources, opportunities and other useful resources. It will additionally direct requests from the community to sources of relevant expertise.

FAIRSF AIR is just one of many projects and initiatives currently working to foster a FAIR data culture (other examples include GO FAIR, OpenAIRE, etc.). FAIRSF AIR will not compete with already existing efforts but will instead focus on identifying how best to make existing competence centres and their services and resources visible and enrich them to address additional competences needed to make data FAIR where suitable. FAIRSF AIR will prioritise the development of resources for communities currently lacking access to discipline-specific or generic support.

¹ As outlined in the EOSC Pilot
https://www.eoscpilot.eu/sites/default/files/fair4s_eoscpilot_skills_framework.pdf

2. Scope of the Competence Centre

The landscape analysis conducted in D6.1: Overview of needs for competence centres, outlined a number of recommendations which are required to support the features as illustrated in Figure 1.

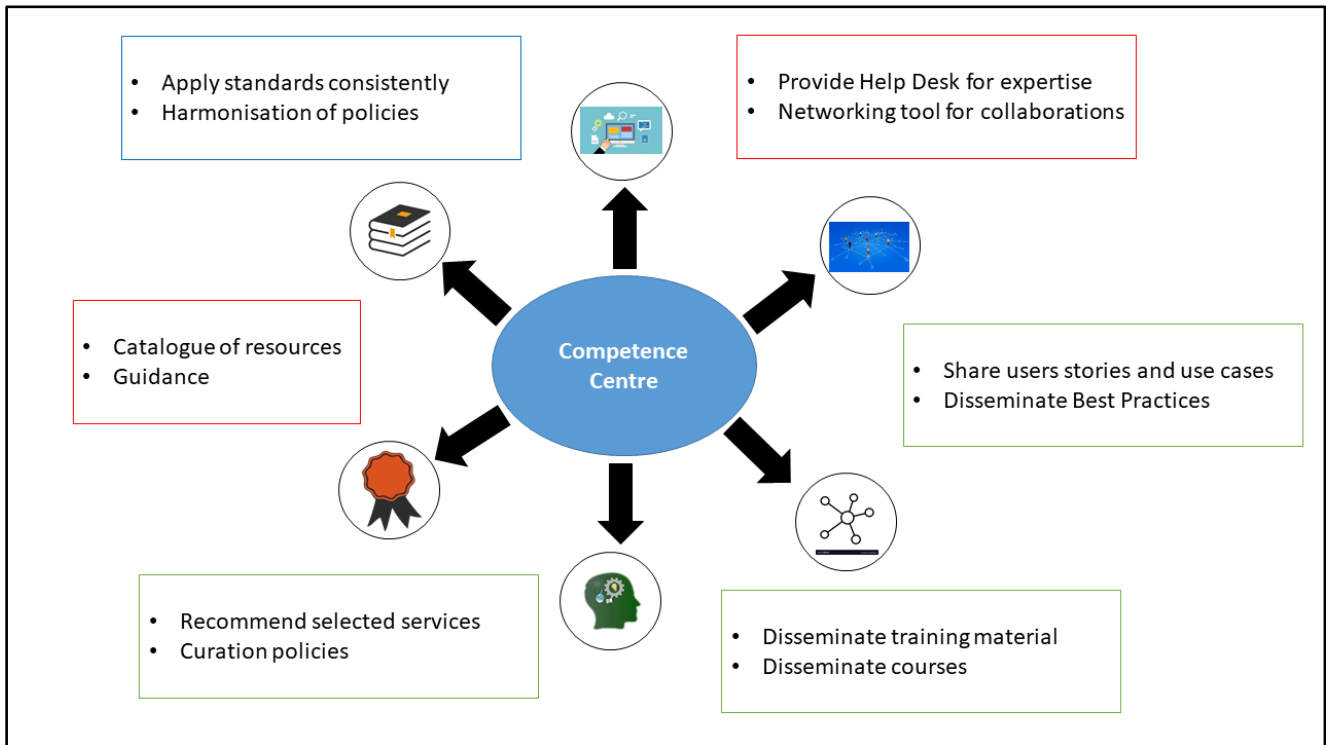


Figure 1: Summary of competence centres features - access to tools and resources. Coloured boxes correspond to the three activities areas, Advisory (red)-Harmonisation (blue)-Dissemination (green).

Based on the exemplars, survey and interviews, recommendations were proposed for an initial FAIRsFAIR Data Stewardship Competence Centre structure and implementation revolving around three activity areas, Advisory-Harmonisation-Dissemination. These have been reviewed and updated as follows:

- **Advisory**
 - Provide a networking tool to enable stakeholder collaboration
 - Provide a help desk, to route people to expertise in thematic areas
 - Adapt and, where necessary, co-develop training and guidance resources to support evaluation and assessment of FAIR-enabling activities
 - Establish a catalogue of resources, either independently or in collaboration, to support FAIR data practices
- **Harmonisation**
 - Apply emerging standards to more consistently describe learning resources relating to FAIR data stewardship
 - Provide leadership in harmonisation of policies, tools and resources

- Dissemination
 - Assess and recommend selected services and resources to make discoverable to targeted communities
 - Enable sharing of user stories and use cases and best practices as well as information on tools, resources and training
 - Develop curation policies for aggregated content
 - Dissemination of training materials and delivery of courses

We are conscious that there is the potential for duplication of effort and overlap between projects in setting up competence centres and knowledge bases and that this is inevitable, and even desirable, as each project focuses on their own objectives and user communities. With this in mind, within the FAIRsFAIR project we have taken a step back and are reviewing what approach we should adopt and how best we can leverage initiatives already under way, to work collaboratively for content aggregation and syndication. We have defined the characteristics of a minimal viable competence centre against which we will measure our progress.

Accordingly, the main focus of this report is on the recommendations relating to how we will provide an online platform and help desk functionality in the first iteration of the FAIR Competence Centre. We also describe our preliminary work on Knowledge Base development.

3. Competence Centre Structure

The role of the Competence Centre is one of a virtual hub undertaking a number of roles to coalesce the different activities and bringing together the different elements of the FAIRsFAIR project into a focal point of reference, ultimately in support of EOSC.

In the initial start-up phase (M12 - M24 of the project), the competence centre will be structured around the following functions and support the following activity areas:

- Communication, dissemination and outreach
 - Provide a mechanism to collect and share user stories and use cases
 - Provide a communication forum to support cooperation and communication between user communities
 - Working closely with relevant initiatives (e.g, EOSC Skills and Training WG), establish a cataloguing platform to improve the findability of resources e.g. training materials, guidelines etc
 - Provide access to emerging tools available for community testing (e.g., WP4 tools to assess the FAIRness of data)
- Competence Centre Implementation
 - Procure and manage an online platform

- Launch and moderate a help desk
- Knowledge base (KB) development²
 - In the first instance, implement a classification scheme to the materials from the first data stewardship stand of the CODATA/RDA Data Science School
 - Working with the community, particularly the Cluster projects and INFRAEOSC-5b projects, define an approach to review and add relevant content to the KB(s)
 - In cooperation with relevant stakeholders, review knowledge base solutions that will support longer-term sustainability and community curation over time

Underpinning the development of the competence centre and knowledge base functions will be the ongoing development of user stories and collaboration with communities. Appendix 1 recaps the initial user stories that have informed our work to date. D6.1 Overview of needs for competence centres³ defined eight user stories outlining potential drivers that would influence different communities to interact with the FAIRsFAIR competence centre.

An iterative approach to developing the competence centre will be adopted due to the changing landscape and the need to avoid duplication whilst consultations with existing competence centres are in course.

4. Minimal Viable Competence Centre

The FAIRsFAIR Competence Centre was conceived as a standalone entity in the project planning stage, but in reality, it is one of many centres that fit the FAIRsFAIR definition of a competence centre. The EOSC ecosystem is likely to include a diverse range of competence centres that similarly offer support to communities in their implementation of FAIR data stewardship in the context of open science and data science. These may address particular disciplinary/thematic, national, regional or institutional communities.

Consideration of what constitutes a ‘Minimum Viable Competence Centre’ is needed in the broader work to define a ‘Minimum Viable EOSC’, as the development of competences and capabilities is essential to the EOSC. FAIRsFAIR needs to play its part, by offering definitions for further discussion. FAIRsFAIR can also facilitate synchronisation of competence centre structures across projects to support the relevant Working Groups of the EOSC Board and Secretariat.

A number of INFRAEOSC and related initiatives are particularly relevant to the FAIRsFAIR competence centre, as their scope includes some form of ‘knowledge hub’ that supports the relevant stakeholders in production of FAIR data. These include:

² A KB is a searchable collection of resources to support users of the competence centre

³ Herterich, Patricia, Davidson, Joy, Whyte, Angus, Molloy, Laura, Matthews, Brian, & Kayumbi Kabeya, Gabin. (2019). D6.1 Overview of needs for competence centres. FAIRsFAIR. <https://www.doi.org/10.5281/zenodo.3549790>

- EOSC-hub competence centres, supporting ESFRI cluster projects as described in that project's report D8.1 Report on progress, achievements and plans of the Competence Centres.⁴
- Individual ESFRI cluster projects that provide hubs coordinating the provision of training on disciplinary themes, including:
 - ENVRI-FAIR, which is establishing a training platform and catalogue for environmental research infrastructures⁵
 - SSHOC, establishing a network of training nodes,⁶ and an inventory of learning resources in social science and humanities⁷
 - EOSC-life, providing trainings to biomedical research infrastructures and the broader life science community,⁸ including the TeSS catalogue of learning resources⁹
 - PaNOSC, developing an e-learning platform for users and staff of photon and neutron facilities¹⁰
 - ESCAPE, providing training, education and capacity building for scientists and engineers in astronomy and particle physics¹¹
- INFRAEOSC-5b projects, that also provide hubs coordinating training on a national, regional or thematic basis, including:
 - EOSC Nordic, which is establishing a Knowledge Hub “to foster competence building and knowledge sharing among stakeholders and relevant professional environments”¹²
 - NI4OS-Europe, which is setting up a training repository for training material, event information, and information about trainers
 - EOSC-Pillar, which offers a helpdesk and documentation for promoting FAIR practices and support to FAIR-oriented data stewardship
 - EOSC Synergy, which is establishing online platforms to be used for MOOC training and Hackathon as a Service
 - ExPaNDS, which seeks to “deliver training materials through the e-learning platforms made available on the EOSC” to users of photon and neutron research facilities

In addition, many (hundreds, if not thousands) of research infrastructures and institutions offer some form of curated selection of online learning materials or other resources for professional

⁴ <https://documents.egi.eu/public/ShowDocument?docid=3485>

⁵ <https://training.envri.eu/>

⁶ <https://www.sshopencloud.eu/training>

⁷ <https://zenodo.org/record/3596003#.XlacyRNKhTY>

⁸ <https://www.eosc-life.eu/services/training/>

⁹ <https://tess.elixir-europe.org/>

¹⁰ <https://www.panosc.eu/work-packages/work-package-8-staff-and-user-training/>

¹¹ <https://projectescape.eu/about-us>

¹² <https://www.eosc-nordic.eu/organisation/>

skills development. The GO-FAIR implementation network Data Stewardship Competence Centres IN, is an international network of support centres operating at national and institutional level. The Research Data Alliance includes a variety of Interest and Working Groups that also seek to coordinate professional development of FAIR data stewardship.

The focus of FAIRsFAIR Competence Centre on supporting communities to establish a FAIR culture overlaps with the above initiatives. Some overlap at the operational level is also likely. Despite sharing common aims and vocabulary the above projects lack a common definition. FAIRsFAIR has offered one in D6.1, and is also well positioned to offer leadership in articulating the desirable characteristics of a FAIR competence centre.

The project could offer input to the EOSC Training & Skills Working Group, which in 2020 is seeking to define organizational models for regional/thematic/EU competence centers and their coordination. Although FAIRsFAIR focuses more specifically on implementing FAIR principles than the WG, which also includes open science in its scope, the characterisation below may be useful for its purposes.

Competence Centre Characteristics:

1. Defines the organisation's mission to support research data management or stewardship, including adoption and implementation of FAIR and open principles
2. Provides one or more services to support research data management or stewardship for identified users or audiences, user communities [and provides metadata about the service to an EOSC catalogue]
3. Identifies the scope of the competences it aims to develop, in fulfilling its mission
4. Documents the training or other methods it uses to develop competences
5. Applies a CC-BY or CC-0 license to its learning resources or other outputs
6. Makes learning resources metadata findable through a local and/or third-party catalogue or discoverable through third-party catalogues
7. Makes learning resources accessible under clear conditions, and described using community-agreed terms
8. Advises its users on the assessment of FAIR data stewardship activities and outputs
9. Plans for the sustainability and continuity of its operations
10. Leads or participates in FAIR policy development

These characteristics will be further discussed with the projects and initiatives mentioned, via the 5b Synchronisation Task Force and other channels, in parallel with further development of FAIRsFAIR's Competence centre.

5. Online Platform Development

The central component of the FAIRsFAIR Competence Centre will be the Online Platform, as functionally described in Figure 2. This will form the main entry point into the Competence Centre for users (individuals, institutions, organisations), providing an open and inclusive discussion space to bring together different communities of users.

The online platform will be as open as possible, but registration may be required to access some functionality. A users' registration process will allow queries, answers, comments and events notifications to be posted and discussion topics tagged where the feature is allowed. However, whilst users can connect and access the Online Platform content, this communication is not restricted to one-direction only. In fact, the online platform will also allow users to deposit learning resources, share example good practices from their respective disciplines, and crucially, actively interact with other users. The Online Platform administrator and group moderators will regularly monitor the exchanges taking place on this space to ascertain users' compliance with the platform policies and encourage the type of discussions from which potential collaborations between users can rise. Maintaining the platform active by triggering discussions, labelling topics to allow effective search, encouraging prompt answers to queries, posting about and linking events of interest taking place will contribute to attracting a growing number of users thus disseminating a FAIR culture.

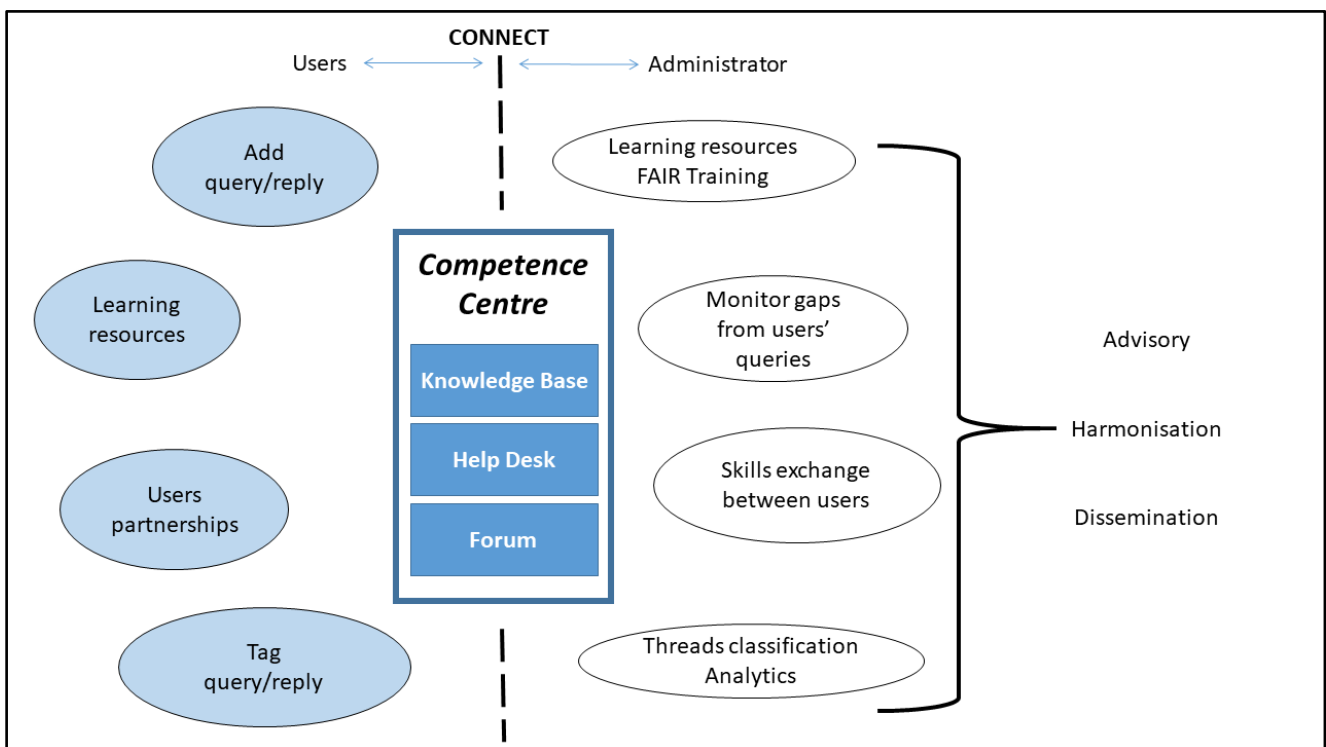


Figure 2. Competence Centre: Online Platform instantiating the shared hub of expertise.

Whilst from users' perspective, an online platform will represent the gateway to the competence centre, linked to local competence centres too, facilitating collaboration by identifying patterns across them. By 'local' we mean competence centres that have a specific institutional, national, regional or thematic focus, including for example the centres and knowledge bases set up by INFRAEOSC-5b projects. In fact, the FAIRSF AIR competence centre can only be effective if it stimulates collaborations.

In this initial phase, the following core functionalities will be implemented:

- A forum where questions are asked and experts provide answers: This will be achieved by means of the Help Desk where competence centre discipline experts will provide replies to users' queries posted on the Forum.
- Users' queries are posted on the Forum, and visible not only to the moderator but to other users too. This will allow and encourage interactions Users-Users whereby answers or comments will be provided, albeit subject to monitoring from the moderator.
- Compliance with the policies, safeguard and supervision will be the Online platform moderators' tasks.
- An access route to a Knowledge Base which constitutes a FAIR collection of resources (Training material, guidelines, best practices across domains). On the online platform, users will find links to the aforementioned resources. The online platform will be linked to the Knowledge Base but is not itself the Knowledge Base.
- A User stories space where concrete examples of user stories of competence centres, across domains, are presented.

As collaborations between FAIRSF AIR WP6 and the INFRAEOSC-5b projects develop, additional functionalities will be implemented. That may include (but not limited to):

- Guidance and training material available in languages other than English.
- Opportunities to explore harmonisation activities and collaborations.
- Newsfeed on latest developments and events in skills development and training for data stewards and related research support professions and related events

5.1. Help desk and online forum moderation

A key requirement of the Competence Centre is the capacity to deal with requests from the community in essence to respond to queries from those looking for expert help. A help desk can

perform several functions, including acting as a point of contact for the Competence Centre, a space for users to gain assistance and get answers to questions.

Reflecting on the functionality that the help desk needs to provide we have considered how the Competence Centre can offer this service effectively and efficiently, taking account of the resources available in the project and that as this is a new resource the volume of requests for advice is as yet unknown. We will need to monitor and analyse the volume of requests and activity on the forum in order to establish a baseline from which we will make informed estimates for the future feasibility of and sustainability of this approach to providing help and advice. From the open consultation conducted as part of the landscape analysis, the responses indicated that the main requirements and need for information would relate to training and guidance to help put FAIR into practice.

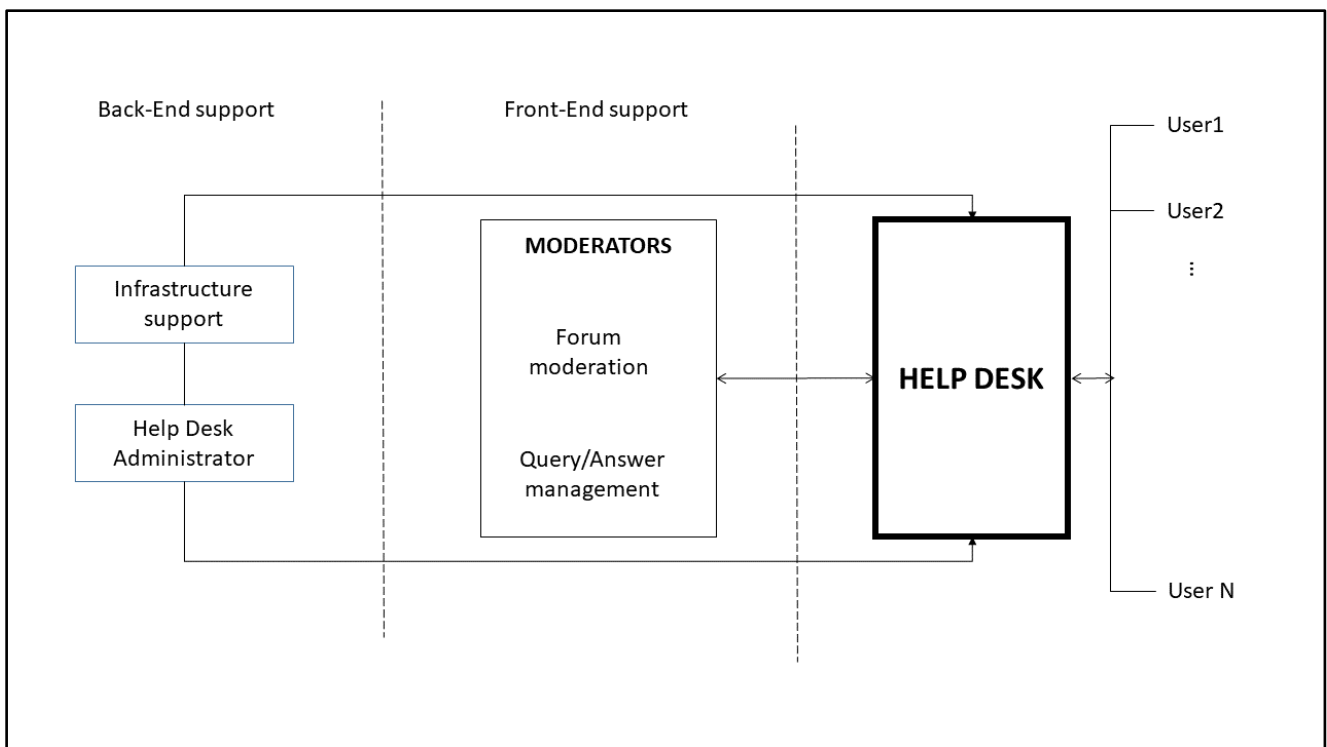


Figure 3. Help Desk (HD) flow chart: Queries from users are handled by a first line of Front-End support team of moderators who manage the Q/As. The HD administration, the infrastructure management are supported by a Back-End team of technical IT staff hosting the HD.

The Help Desk function will be operated through the online platform acting as a single point of contact into the Competence Centre. At this stage in the project, with the human resources available, it is not practical to establish a formal help desk on FAIR, capable of responding to requests through a dedicated ticketing system and network of experts, or with set service levels for response times. In the first instance, the help desk functionality will be delivered on a best-

effort basis. The use of the help desk, the types of questions and volume, will be monitored and the approach to staffing the helpdesk, including the level of expertise required, will be kept under review. In the short term, it may be that we need to limit the scope of queries to a limited range of topics as a means to identify the feasibility of providing a sustainable approach. In addition, the staffing capability will be informed through further consultation with the INFRAEOSC related projects. Understanding what the competence centre capabilities that they will deliver on implementing FAIR, will provide additional information on the landscape to inform the FAIRSF AIR help desk capabilities.

Using the online platform to provide the help desk functionality, reduces the need to establish additional systems and enables an integrated approach to help, including opportunities for community support and access to expertise and resources from outside of the FAIRSF AIR project.

Using the online forum for the help desk will provide flexibility in how queries are responded to and how help is provided as well as having the ability to develop functionality as the project progresses. Additionally, embedding the help desk function within the online platform enables the establishment of an open searchable source of questions-and-answers which in time will build up into resource that can be analysed to provide insights into the issues, and gaps in areas of support that the community requires as well as providing a knowledge base of frequently asked questions and responses.

The forum will have moderator roles assigned to members of the work package team to ensure that it operates effectively and that requests directly to the project are responded to.

The role of a moderator will be:

- Monitoring messages and posts to ensure that they are appropriate and taking action if necessary. Ascertaining compliance with the policies and safeguard regulations
- Providing a help desk function and ensuring that no request for help/information goes without a reply
- Keeping the forum active by regularly posting items to encourage new discussions and participating in the discussions
- Reviewing the posts to ensure that the forum remains on topic and relevant
- Analysing the post topics to identify any common themes or gaps that the Competence Centre can feedback into other parts of the FAIRSF AIR project, for example the provision of extra training materials on a given topic.

5.2. Practical tasks of the Online Platform

Whilst 5.1 describes the development of the help desk and online forum, at the peak of its maturity and development, the Online Platform will translate the aforementioned functions into a series of tasks expected to include:

- Advisory
 - A user registration system to access the FsF forum
 - Be welcoming to new users
 - Beginner and practitioner material
 - Require registration to submit/answer
 - Incentivise users to ask/answer questions
 - Promote rules of discourse and moderator guidance
 - Broker skills exchange between research infrastructures and institutions to help ensure training and development
 - Provide access to training materials annotated using Terms4FairSkills
 - Provide a search access to the Knowledge Base
 - Encourage “community experts” to get involved e.g to act a as a moderator for their own areas of expertise
 - From research domains – e.g. INFRAEOSC-04
 - From regionals - e.g. INFRAEOSC-5b
 - Through the Forum, provide discussion board function, where users can submit topics for discussion and discussion threads can be created
- Harmonisation
 - Sharing of best practises across domains whilst fostering a community of harmonised FAIR principles
 - Improve information flow in cross-border and cross-discipline settings, on FAIR/open science skills delivery and acquisition helping to deliver contributions to open science
- Dissemination
 - a. A mechanism for users to submit content through the active role of moderators
 - b. Feedback area - suggestions, surveys
 - c. The discussion board/help desk functionality should help build the Knowledge Base.

As we collect queries and responses, we should add them to a knowledge base

 - Classify responses
 - Auto and/or manual

- Suggest terms to users for self-classification.
- Make them searchable

Thus, we capture the community knowledge - build a pool of knowledge

5.3. Technology options to support the Online Platform

WP6 is currently setting up a Discourse-based Forum as the underlying technology that will support the Online Platform described in sections above. [Discourse](#) is an open-source discussion platform with built-in moderation and governance systems that can be deployed on a cloud server. The FAIRSF AIR competence centre Discourse instance will be run by the STFC. Its following features will support the core functionalities of FsF competence centre:

- Discussion forum
- Mailing list
- Long-form chat room
- A search function, albeit limited

Discourse has the advantage of:

- Being Open Source
- Presenting easy integration into other platforms (e.g. GitHub)
- Offering Thread classification by topics
- Presenting customization options

Whilst Discourse is the choice to support the interactive online platform, other possible extensions to it are being envisaged as part of a long-term comprehensive solution. WP6 will explore linking the Discourse-based solution to the existing FAIRSF AIR website or developing a bespoke FAIRSF AIR Competence Centre website and database. Other long-term solutions are contingent on the development of collaborations with INFRAEOSC-5b projects. Discourse was chosen as it has been successfully used by the [Freya Project](#) to run the [PID Forum](#). The Freya Project team members have been able to provide advice on the setting up of the platform.

6. Knowledge Base Development

The Competence Centre will offer access to a Knowledge Base, consisting of a searchable collection of resources to support users of the competence centre. Knowledge Base development covers the following aspects:

- Content definition and identification
- Classification and curation of content
- Knowledge base functionality and design

6.1. Knowledge Base Content

Resources to populate the Knowledge Base will be collected for the duration of the project, including reusable, openly-licensed materials created by the FAIRSF AIR project and other relevant projects and initiatives. Content will include resources of the following types:

- Training modules/materials: these are materials that can be re-used in the classroom or via online teaching as part of a training session. These may be class/workshop outlines; suggested session structures; exercises; handouts; presentations; tests, and other elements of a taught, instructor-led session.
- Tutorials: these are resources suitable for online, self-led learning and may include video presentations, exercises and tests.
- Guidelines: these are resources which outline major principles of FAIR data and how it can be supported, mandated, created and used.
- Meta-guides: these are resources that attempt to identify and group other resource types. Examples include literature reviews, landscape summaries, reading lists, and mapping exercises.

6.1.1 Content available for inclusion

Content for the Knowledge Base may include the following materials which are already or are soon to be available. These include:

- Materials co-developed with organisations and services collaborating in FAIRSF AIR T3.3, and resources resulting from FAIRSF AIR WP2 and WP4 tailored for use by repositories.
- Training materials provided by FAIRSF AIR.
- A selection of resources identified in the cross-WP Landscape Analysis. These include articles, reports and other grey literature covering relevant policies, infrastructures, tools, studies, repositories, support initiatives, competence centres and other sources of expertise, and work on skills development, all related to making data FAIR. This work is available online in draft form here:
<https://docs.google.com/spreadsheets/d/1WIKeMPhPTGuHWehumct-gl-itHuCINRXCpkd-kUNQgk/edit#gid=0>
- Resources selected by the FAIR WG task force on FAIR practice to inform their report.
- Other possible resources include the material being made available in other collections. Prominent examples include FAIRSharing, Re3Data, EOSCHub, ELIXIR TeSS, ARDC, OpenAIRE and similar initiatives, but it is important that the work of building the Knowledge Base is cooperative without replicating effort already taking place elsewhere, especially disciplinary collections generated by the ESFRI clusters.

6.1.2 Development of new content

There will be a mechanism for the submission of further content from the user community, which is discussed in section 5 Online Platform Development, above. We note that it would be useful to develop criteria to support the appropriate and ethical commissioning of new material. A submission page could follow the lead of, e.g. the re3data submissions page at <https://www.re3data.org/suggest>, or the Open RDM Training Materials community collection at <https://zenodo.org/communities/dcc-rdm-training-materials/?page=1&size=20>, each of which is clear on the scope of the resources sought, and their access conditions.

In addition, new materials will be actively developed by identifying new training materials from appropriate sources. In the first instance, this includes materials created in FAIRsFAIR WPs 2, 3 and 4, and working with T6.4 of WP6.

6.1.3 Content from CODATA-RDA schools

The CODATA-RDA Research Data Science Schools have been successfully redeploying - and in some cases creating - training materials since 2016 for an international blend of students who wish to study research data science and research data stewardship. Training materials from the data stewardship strand of the data schools will be made available on an online basis under an open source licence, and will be actively incorporated into the Knowledge Base.

The format of these materials will be similar to those provided by the Carpentries (<https://carpentries.org/>); See, for example, the ‘Lessons’ section of Data Carpentry at <https://datacarpentry.org/lessons/>. In particular, the training resources will be structured with timings suggested for the teaching of each section, and materials will be largely text-based (rather than using video) in order to be accessible to individuals and institutions with low Internet connectivity levels. This matches with the priorities of the CODATA-RDA schools to deliver materials to Low- and Middle-Income Countries, and so supports the usability of this Knowledge Base content for users with these technical restraints. Questions will be set at the end of each section.

The proposed process for the ingest of these and similar teaching/training materials is as follows:

- Collect material
- Review material
- Divide into chunks for repurposing
- Make generic or tailorable where appropriate
- Classify using the terms4FAIRskills terminology (<https://terms4fairskills.github.io>)
- Provide guidance on use and specialisation.

- Identify gaps in topic coverage.

As noted in Section 5, there will be a forum where enquiries about FAIR data can be raised. The status of these queries (answered/not answered, topic theme) will be regularly monitored. The forum, in a first instance, will provide insights on the popularity of topics and potential areas for developing content.

6.2. Classification and Curation

As outlined above a number of resources and content sources have already been identified as initial candidates to form the basis of a FAIRsFAIR Knowledge Base on which we will test our approach to classification and curation.

6.2.1 Classification and description

We have considered how to classify and describe materials in the knowledge base and intend to adopt the EOSCpilot set of minimal and recommended properties for learning resources¹³. The full set of metadata properties are outlined in Appendix 2, the core properties for classification of resources (including guidance and tools not just learning resources) include:

- Audience
- Competence topic
- Domain
- Level (skill)
- Language

There are a number of well-established subject ontologies that would be appropriate for use by the FAIRsFAIR project. In deciding on an ontology, consideration has to be given to what will be most useful for content providers and users, the complexity of applying it and since the Competence Centre is generic how well it represents different subjects. Finally, we briefly considered where there are synergies with other projects and initiatives.

We have reviewed the appropriateness of four different subject or discipline classifications that could be applied to identify domain specific resources.

¹³ EOSCpilot *D7.5: Strategy for Sustainable Development of Skills and Capabilities*.

<https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5c3a4f135&appId=PPGMS>

- Re3data¹⁴ - subject classification based on DFG review boards¹⁵. Fairsharing.org’s Subject Resource Application Ontology (SRAO) ontology is based on Re3data.
- Frascati “Fields of R&D”¹⁶ - from the OECD and used by national governments for reporting purposes. Also used by the Research Data Alliance for classifying activities on its website.
- ESRFI domains¹⁷ - used by the EC to classify clusters.
- Wikipedia ‘Outline of Academic Disciplines’¹⁸ - used by the FAIR WG practice task force.

Given the cross-disciplinary scope of FAIRsFAIR we identify the topic of the resource with the FAIR competence(s) it addresses, rather than any domain-specific topics that may be relevant. It is nevertheless important to represent the source domain, particularly where this is relevant to a domain repository whose user community overlaps with that of the selected resource. For this reason, our preference is for the Re3data subject schema. As this is used to classify data repositories it will also be consistent with work being undertaken in FAIRsFAIR on repositories.

The FAIR competence topic will in the short term be represented using the FAIR4S framework developed in EOSCpilot. This framework is the basis for the Terms4FAIRskills initiative, which is “building a terminology for the skills necessary to make data FAIR and to keep it FAIR”¹⁹. The terminology being developed by terms4FAIRskills will provide a more granular set of terms, enabling resources to be identified with more precision to the FAIR data stewardship activities and competencies they are about.

The Terms4FAIRskills terminology is still in development but will be a significant contribution to the description of FAIR competencies, when available. The FAIRsFAIR project will work with the terms4FAIRskills to test the classification of content using the terminology developed initially looking at the materials developed as part of the schools and training events.

Further consideration is needed of a metadata format to represent the terms in Table 1 (Appendix 2). This choice is partly dependent on recommendations to be made by the EOSC Training & Skills Working Group regarding standards to be used in a training materials catalogue,

¹⁴ <https://www.re3data.org/>

¹⁵ https://www.dfg.de/en/dfg_profile/statutory_bodies/review_boards/subject_areas/index.jsp

¹⁶ https://read.oecd-ilibrary.org/science-and-technology/frascati-manual-2015/concepts-and-definitions-for-identifying-r-amp-d_9789264239012-4-en#page17

¹⁷ Energy, Environment, Health and Food, Physical science and engineering, social and cultural innovation, E-Infrastructure

¹⁸ https://en.wikipedia.org/wiki/Outline_of_academic_disciplines

¹⁹ <https://terms4fairskills.github.io/>

but options are likely to include IEEE LOM²⁰, LRMI²¹, bioschemas²², and schema.org. The choice will also depend on the platform used to host learning resources, and further consideration will be given to partnering with (e.g.) FAIRsharing.org, TeSS, and Data Management Training Clearinghouse.

6.2.1 Curation

The curation of the Knowledge Base will be overseen by the WP6 project partners. In the first instance the selection of and classification of materials will be undertaken by the project partners as we test and refine the selection policies, metadata and classification schemes. The main curation functions:

- Selection of content
- Creating metadata
- Classification of content
- Reviewing and checking of content
- Updating and annotating records

A content selection policy has been drafted (see Appendix 3). This will be developed and refined as the project progresses and will be used to select initial content from the resources outlined earlier.

As we develop the Knowledge Base and collaborations with for example INFRAEOSC-5b projects, we will explore the practicalities and feasibility of sharing aspects of Knowledge Base curation with partners outside of the FAIRsFAIR project for example the submission of material directly to the Knowledge Base, the review of materials or the curation of a subset of materials.

Keeping the Knowledge Base content, either hosted material or linked to content, up to date will require processes to support the checking and validation of the content, the actual workflows will be developed once the platform technology has been finalised.

Periodic review of the material will need to be undertaken to ensure that material remains current and relevant. A regular report will be run to provide the list of items to be reviewed based on:

- Date material was originally produced
- Date content was added to the Knowledge Base

²⁰ https://standards.ieee.org/standard/1484_12_1-2002.html

²¹ <https://publishers.org/our-markets/prek-12-learning/learning-resource-metadata-initiative-lrmi>

²² <https://bioschemas.org/>

The material will be reviewed by a curator to ascertain if the content is still relevant and appropriate action taken. In order to support the ongoing validation of the content a process of automatic link checking will be undertaken and broken links will be investigated.

We will investigate the feasibility and practicality, or reviewing usage metrics to determine whether content is being accessed and where material has not been accessed to re-assess the relevance of the material.

Records of when material has been reviewed will be maintained and when the next review date will be. Reviewing of resources will be staggered so that the review process is manageable and conducted in a timely manner.

Alongside regular processes to check content there will be feedback from the user community and input from project partners, for example WP3 is undertaking monitoring of policy change which would feed into ensuring policy materials are kept up to date.

Users will be able to provide feedback on the Knowledge Base content and in parallel to the ability to suggest material for inclusion, users will be able to make suggestions for the withdrawal of materials. Any requests to withdraw material will be considered by the Knowledge Base curators and assessed against all relevant policies. Only Knowledge Base curators will be able to delete or withdraw material.

6.2.3 Harmonisation

Resources stored in the Knowledge Base, and the Competence Centre in general, are generated by multiple sources and one may use vocabularies specific to one domain which context might not be familiar to another. This will invariably lead to ambiguities. In order to allow an effective access and use of available resources, efforts will be made to harmonise vocabularies by using Terms4FAIRskills terminology -Terminology ([terms4FAIRskills | terms4fairskills.github.io](https://terms4fairskills.github.io)) for the skills necessary to make data FAIR and to keep it FAIR - in the classification of resources. Clarity will be enhanced by adopting the consistent and descriptive terminology developed in Terms4FAIRskills. To harmonize terminology resources and improve the interoperable description of the material there is a need for the curators and creators of the material to agree on a common vocabulary. The Competence Centre will issue guidelines to ensure alignment across the material provided by users. Therefore, FAIRSFAR will promote and implement harmonisation by provisioning material in compliance with the terminology being developed by Terms4FAIRSkills.

In these regards, the material developed in the Knowledge Base, particularly the training material, will be associated with activities involved in making data FAIR, and use Terms4FAIR skills formalised terminology describing competencies, skills and knowledge. Some of the use cases concerned are expected to include:

- facilitating the annotation, discovery and evaluation of FAIR-enabling materials (e.g. training) and resources;
- describing learning resources in FAIR data stewardship

6.3. Knowledge Base Functionality and Technology

The Knowledge Base represents the rich repository and source of information in the competence centre, integrating content from multiple sources.

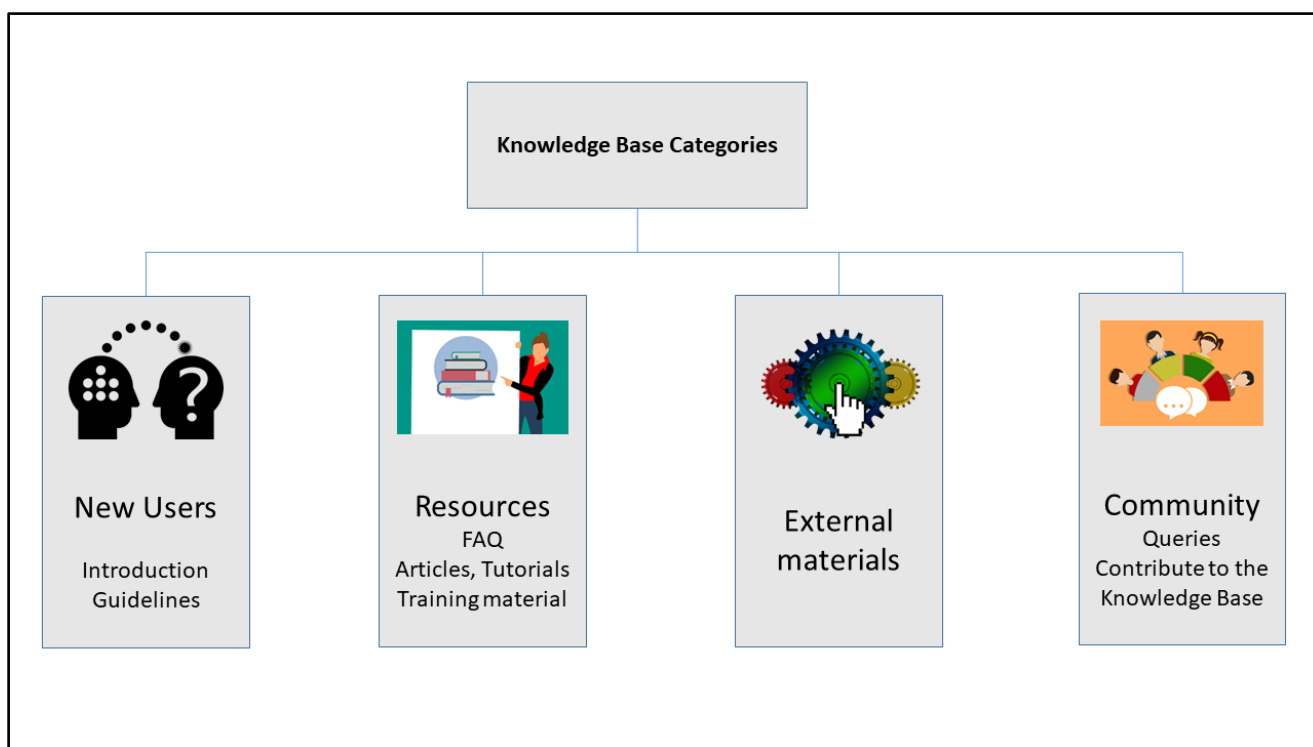


Figure 4. Knowledge Base functionalities: a) Introductory guidelines; b) Resources: training material, articles, tutorials; c) Links to external material; d) Community: queries, users’ contribution to Knowledge Base

The format and technology required to deliver the Knowledge Base content and functionality requires further evaluation and consideration, as such a decision has yet to be made and is a work in progress for the project.

There are a number of different approaches that could be considered and it requires careful consideration to ensure that the solution chosen supports the requirements of the user communities, taking account of sustainability, potential for collaboration and work in other projects. The external landscape is evolving with multiple approaches being developed in projects and across the ESRFI clusters to deliver catalogues of materials via project websites e.g EOSC-Hub training catalogue²³, training materials via the PaNOSC website²⁴, ELIXIR's training portal TeSS²⁵ or initiatives to make information available via platforms such as github e.g FAIR Cookbook²⁶ as part of the FAIR Plus project. Any Knowledge Bases developed as part of the FAIRsFAIR project need to establish their place as part of this varied and rich landscape, looking to ensure that approaches are complementary.

We are drawing on the work already undertaken in other projects to inform our decisions. The EOSC-Hub report, "Training materials about common services and thematic services²⁷" provides details of the evaluation they undertook in deciding on their solutions for a catalogue of materials and the EOSC Pilot report "Strategy for Sustainable Development of Skills and Capabilities²⁸" presented a summary of alternative models for delivering training registries, providing valuable insights for us to consider in our evaluation and decision making and our focus in the next months is to finalise selection and implementation of the platform. The options reviewed in the above reports will be extended to reflect recent developments in those platforms, choices made in the ESRFI clusters and INFRAEOSC-5b projects, and the scope of the forthcoming INFRAEOSC projects to enhance the EOSC Portal.

7. Next Steps and future work

This document sets out our approach to setting up the competence centre structure. We adopt an incremental approach to building the competence centre (online platform and knowledge base), to enable review and assessment of the practicality of the proposed structure and to make adjustments as necessary. Given the changing landscape in which we are working, and since we want to avoid unnecessary duplication, we will need to have ongoing consultations with the user communities, to ensure the approach undertaken meets the stakeholders needs. We will report on the operation of the competence centre and the knowledge base development in our next report due in February 2021.

²³ <https://www.eosc-hub.eu/training-material>

²⁴ <https://www.panosoc.eu/training-material/>

²⁵ <https://tess.elixir-europe.org/>

²⁶ <https://fairplus.github.io/the-fair-cookbook/intro.html>

²⁷ <https://www.eosc-hub.eu/sites/default/files/EOSC-hub%20D11.1%20v1%20Approved%20Public.pdf>

²⁸ <https://eoscpilot.eu/sites/default/files/eoscpilot-d7.5-v1.1.pdf>

In summary, our ongoing work and future tasks will focus on:

Online Forum set-up

- Setting-up and testing the FAIRdataforum to instantiate the online platform
- Design of platform and initial content of platform
 - Evaluation of technologies and approaches to knowledge base generation
- Build a team of moderators for the forum

Knowledge Base

- Fixing classification schemes and metadata scheme
 - Liaise with EOSC Training & Skills WG on selection of appropriate metadata standards and formats for learning resources
 - Test the proposed classification and metadata classification scheme against the initial selection of content
 - Agree and finalise metadata schema
 - Apply terms4FAIRskills to initial material
- Preparing training material for inclusion
- Test selection policies with initial set of learning resources selected from the sources identified
- Mechanism for populating Knowledge Base

Policies

- Policies and moderation guidelines
 - Establish moderation guidelines and user terms and conditions for the online platform
 - Ensure GDPR and privacy policies issues are established in the setting up of the processes and technology options, finalise policies and responsibilities.

Collaborations

- Setting up arrangements with other projects.
 - Establishing a community of experts
 - Define and clarify the interactions, links, level of integration between the online platform and FsF, EOSC similar online platforms

References

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<http://doi.org/10.5281/zenodo.3549791>

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Angus Whyte, Ellen Leenarts, Jerry de Vries, Frans Huigen, Eileen Kuehn, Gergely Sipos, Vasso Kalaitzi, Elly Dijk, Sarah Jones, Kevin Ashley. (2019). D7.5: Strategy for Sustainable Development of Skills and Capabilities. <https://eoscpilot.eu/sites/default/files/eoscpilot-d7.5-v1.1.pdf>

Appendix 1: User Stories

The user communities are based on the eight stakeholder groups identified in the Turning FAIR into Reality report²⁹. These user stories and the characterisation of selected competence centres, aid interpretation of the results of the open consultation survey, interviews and workshop feedback to help refine the user stories into concrete recommendations for the FAIRsFAIR Competence Centre.

Reviewing the user stories from the landscape analysis in D6.1 we present stakeholder groups and suggest specific topics that may be of interest to them along with sources of relevant knowledge that can be shared via the competence centre.

| User Community | Areas to be covered | Possible sources of knowledge (indicative rather than exhaustive) |
|---|---|---|
| Research communities (academic and industry) wanting to find generic and discipline-specific resources to make research data FAIR | <ul style="list-style-type: none"> assessing FAIRness of data data management planning finding FAIR aligned and/or trusted repositories finding FAIR data for reuse Standards to support data interoperability | <p>Generic: OpenAIRE, DCC, FOSTER</p> <p>Discipline-specific: Cluster projects and INFRAEOSC-5b projects, ESFRIs (e.g., Elixir and CESSDA), RDA, FAIRsharing</p> |
| Data stewards and service providers | <ul style="list-style-type: none"> standards that should be considered to support making outputs FAIR becoming a trusted service provider sharing knowledge and tackling shared challenges with peers | <p>Generic: OpenAIRE, DCC, FOSTER, GO FAIR Foundation</p> <p>Discipline-specific: FAIRsharing, Cluster projects and EOSC 5B projects, ESFRIs (e.g., Elixir and CESSDA), RDA</p> |
| Publishers | <ul style="list-style-type: none"> to understand latest practices and recommendations on making data FAIR be enabled to align services and author guidelines to | FAIRsharing, STM 2020 research Data Year, Enabling FAIR Data, RDA WG on Policy Standardisation |

²⁹ Directorate General for Research and Innovation (European Commission). Turning FAIR into reality. <https://doi.org/10.2777/1524>

| | | |
|-----------------------|---|--|
| | support a FAIR publishing ecosystem | |
| Policy makers | <ul style="list-style-type: none"> ● be aware of the content and coverage of other stakeholders' FAIR data policies ● be enabled to point researchers to existing tools and training relating to FAIR | SPARC Europe, DCC, OpenAIRE, Science Europe, FAIRsharing, RDA WG on Policy Standardisation |
| Coordinating fora | <ul style="list-style-type: none"> ● better understand where there are gaps in services and guidance ● better understand where harmonisation is needed | <p>Generic: OpenAIRE, GO FAIR Foundation, EOSC Working Groups, Science Europe</p> <p>Discipline-specific: Cluster projects and INFRAEOSC-5b projects, ESFRIs (e.g., Elixir and CEESDA), RDA, FAIRsharing</p> |
| Research funders | <ul style="list-style-type: none"> ● to support production of FAIR data in order to achieve value for funding money ● be enabled to point researchers to existing tools and training relating to FAIR | <p>Generic: OpenAIRE, DCC, FOSTER, SPARC Europe, Science Europe, GO FAIR</p> <p>Discipline-specific: Cluster projects and EOSC 5B projects, ESFRIs (e.g., Elixir and CEESDA), RDA, FAIRsharing</p> |
| Research institutions | <ul style="list-style-type: none"> ● better understand the service landscape and best practices ● find shared resources to support researchers ● find tools and services to support FAIR data production and use | <p>Generic: OpenAIRE, DCC, EUA, GO FAIR DSCC INs, LCRDM</p> <p>Discipline-specific: Cluster projects and INFRAEOSC-5b projects, ESFRIs (e.g., Elixir and CEESDA), RDA, FAIRsharing</p> |
| Standards bodies | <ul style="list-style-type: none"> ● to understand how standards are used at the moment and where there are gaps | <p>Generic: OpenAIRE, DCC, Science Europe, RDA</p> <p>Discipline-specific: Cluster projects and EOSC 5B projects, ESFRIs (e.g., Elixir and CEESDA), RDA, FAIRsharing</p> |

| | | |
|--|--|--|
| | <ul style="list-style-type: none">• Be aware of organically grown best practice developments | |
|--|--|--|

Additional user stories will be created and shared as part of the work of the Competence Centre.

Appendix 2: Classification and description properties

| Property | Type | Multiplicity | Description |
|------------------|--------------------------|--------------|---|
| Title | Text | one | The title of the learning material |
| Description | Text | one | A short summary describing the learning material |
| PID | Text, URL, PropertyValue | one | Persistent identifier of learning material, e.g. DOI |
| Url | URL | one | Link to the learning material |
| Author | Person, Organisation | many | Author of the learning material |
| Date modified | Datetime, Date | one | Date/time of most recent change of learning material excluding metadata |
| Keywords | Text | many | Keywords describing the learning material |
| Licence | CreativeWork, URL | one | The licence of the learning material |
| Domain | Text | many | A field of science or expertise from re3data subject classification (see note in section 6.2.1) |
| Level | Text | one | expertise level: basic, intermediate, or expert |
| Competence topic | Text | many | A competence derived from the FAIR4S framework or (when available) terms4FAIRskills |
| Target group | Audience | many | Based on FAIR4S framework (EOSCpilot D7.5) |
| Language | Text | one | Language code based on ISO 639 |

Table 1. Learning resource properties

Appendix 3: Policy

An initial set of policies are being developed to provide the operating framework for the setting up of and ongoing management and development of the Competence Centre, including the Knowledge Base and online forum. We recognise that these are not static and will be updated and finessed as the Competence Centre and Knowledge Bases evolve, taking account of user feedback and any changing requirements.

- General policies
 - Access policy
 - User code of conduct
 - GDPR and Privacy
- Knowledge Base Content Policies
 - Criteria for selection
 - Withdrawal/deselection

It is the intention that the Competence Centre and resources will be publicly available and that access to content, be that metadata, full text of other full data types will be made available to access free of charge. Users will however be required to abide by a user code of conduct and terms of service. Public access to any materials provided by the Competence Centre will be conditional on acceptance of any terms and conditions under which resources are made available and re-use of material will be dependent on the terms assigned to individual items.

Registration will be required to access certain functions for example to post questions or to respond to questions on the online platform. Appropriate policies to manage personal information, data protection and privacy issues will be put in place and considered as part of the technology developments.

Draft Knowledge Base Content Policies

Criteria for selection

The criteria for selection will be periodically reviewed, taking account of community feedback and collaborations, and where necessary adapted and developed throughout the initial establishment and ongoing operation of the Competence Centre to ensure that the Knowledge Base reflects the needs of the user communities and supports FAIR principles. The selection criteria will apply to aggregated and developed content that is hosted by or linked to. The importance of each criteria in decision making may be different depending on whether material is hosted, created as part of the FAIRSF AIR project or linked to.

The selection criteria will consider:

- Scope
 - Subject
 - Content type/Format
 - Licence Terms
 - Country of origin
 - Language
 - Skill level
- Quality/validation
 - Currency
 - Availability/reliability/stability
 - Authority of creator

The Competence Centre Knowledge Base curators will consider submissions and suggestions from users and will assess them for inclusion against the selection criteria.

Scope

Subject

The FAIRSF AIR Competence Centre will be generic in terms of subject scope, rather than discipline specific or thematic and will incorporate materials of relevance irrespective of the subject focus as long as it fits within the remit of how to make data FAIR and addresses the action points in the Turning FAIR report.

The Knowledge Base will not select and include material that contains sensitive information or data.

As outlined in section 6.1 the selection of content will focus on:

- Training modules/materials
- Tutorials
- Guidelines
- Meta-guides

Format

Relevant content may be produced in different forms, the format of the content will not be a consideration in the selection criteria as long as the material is available. The format of the material may influence whether the content is held in the Knowledge Base or if it is linked to another platform.

Licence Terms

We expect content in the Knowledge Base to be freely available and with an appropriate open licence. Content that is not freely available or has overly restrictive licence terms will not be selected. It is the responsibility of the content producers to ensure that they have obtained the relevant copyright and other IP rights if their content contains material for which they do not hold the copyright and that the content is licensed appropriately.

Country of Origin

One of the aims of the Competence Centre is to bring together resources, and the sharing of best practice as such content in the Knowledge Base is considered based on the relevance to FAIR data regardless of the country of origin that the content is produced in or region it supports.

Language

Initially the focus will be on English language content, as the operating language of the Competence Centre. Non-English language content may be included in the Knowledge Base providing that there is enough information for the content to be assessed for suitability for example an English language summary, or the availability of descriptive metadata. As we work with communities the opportunity to include non-English language content may be increased as we develop relationships with content providers.

Skill Level

It is envisaged that the Knowledge Base will contain materials that are selected and suitable for different skills level incorporating introductory and practitioner level materials.

Quality/validation of content

In order to establish a level of quality material will be reviewed before being added to the Knowledge Base. In addition to considering the scope of the material against the selection criteria

when assessing material the Knowledge Base curators will consider the currency of the material and the authority of the creator of the material be that an individual, project or organisation. For material that is held in full in the Knowledge Base there will be a checking of the files to ensure that they are available and not corrupted. For material that is linked to rather than held in the Knowledge Base the reliability and stability of the source will also be considered to ensure where possible that material will be reliably available.

Withdrawal/Deletion Policy

In order for the Knowledge Base to be useful and valuable to the community it may on occasion be necessary to delete or withdraw material. Criteria for deselection of material will consider the following factors:

- content is no longer available
- content is no longer current or relevant e.g it may have been superseded by a new version
- a resource location is no longer reliable or stable e.g frequently unavailable
- material is found to be in violation of copyright, other licence terms or legal requirements

In some cases material may be withdrawn but a record for that content will be retained highlighting the reason for withdrawal. The usefulness of this approach will be assessed as the project progresses.

Metadata Policy

The metadata will be in English. Where a title is in a non-English language, both the original language and an English language translation should be provided.

The metadata will be openly available for re-use.