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22 October 2021

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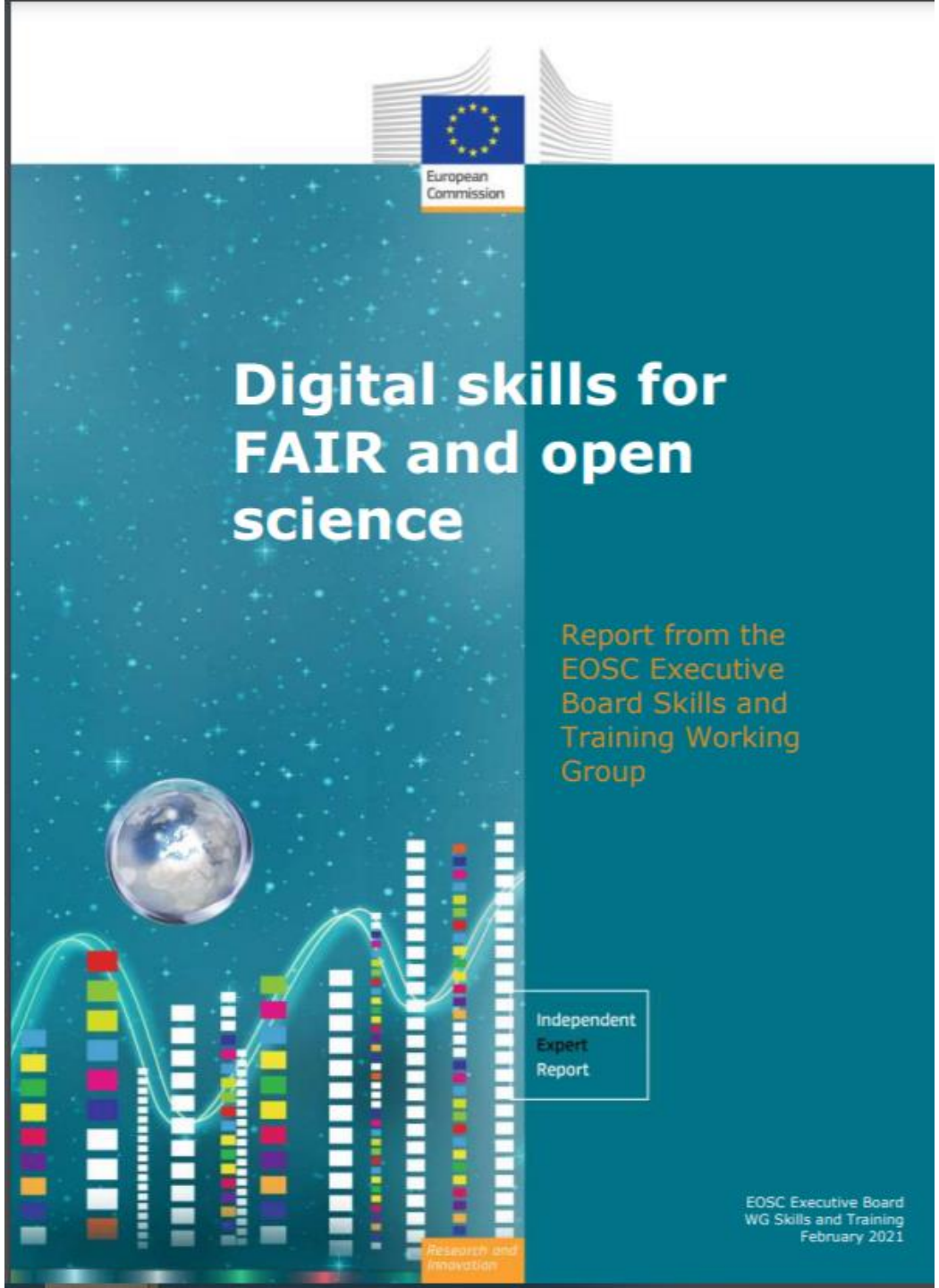
EUA co-chair EOSC Working Group on Skills and Training (2020)

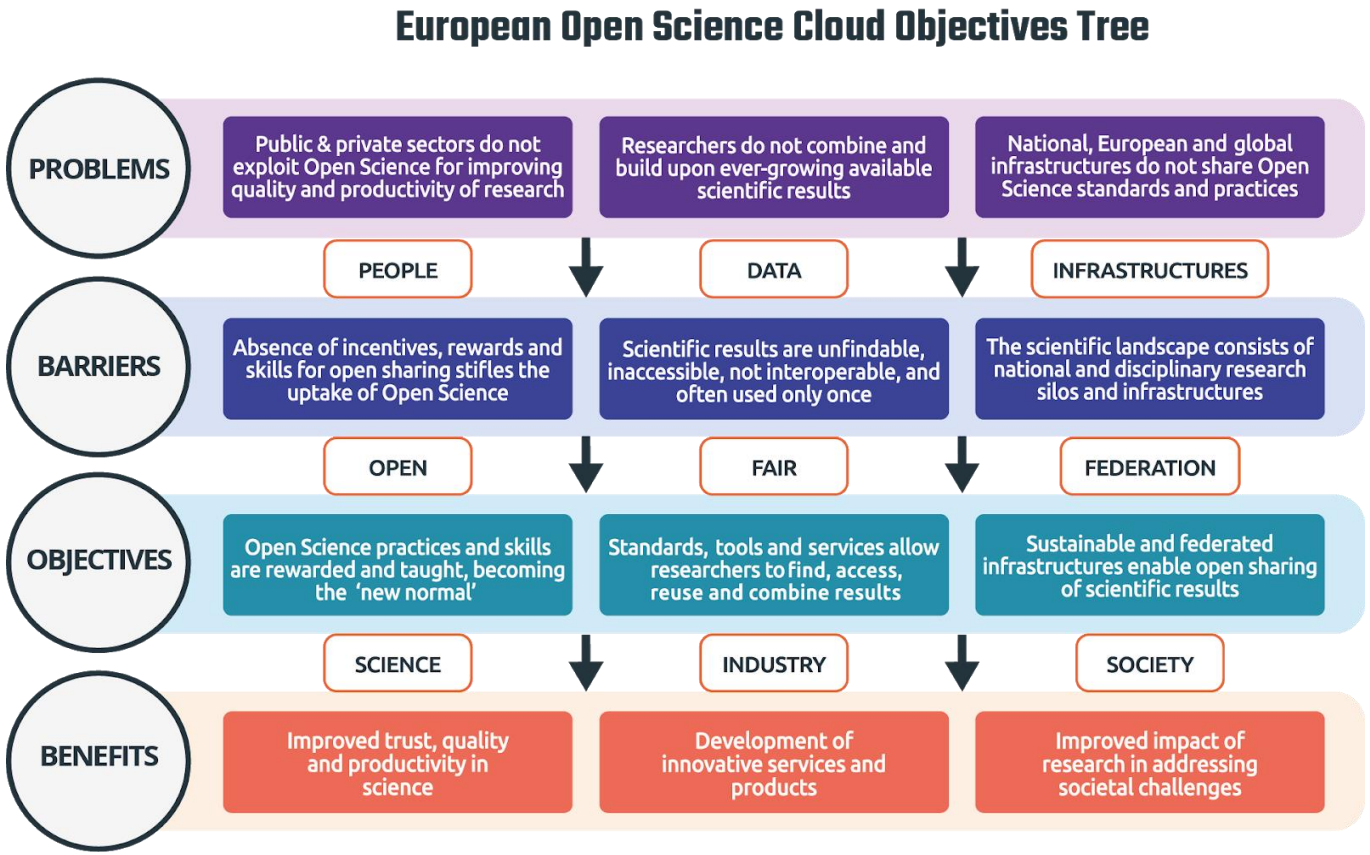


42 members from MS/AC, EC and EC related projects with different type of expertise

Co-chairs Natalia Manola (OpenAIRE) & Vinciane Gaillard (EUA)
Rapporteur: Iryna Kuchma (EIFL)

Report
Editors: Michelle Barker, Natalia Manola, Vinciane Gaillard, Iryna Kuchma, Emma Lazzeri and Lennart Stoy

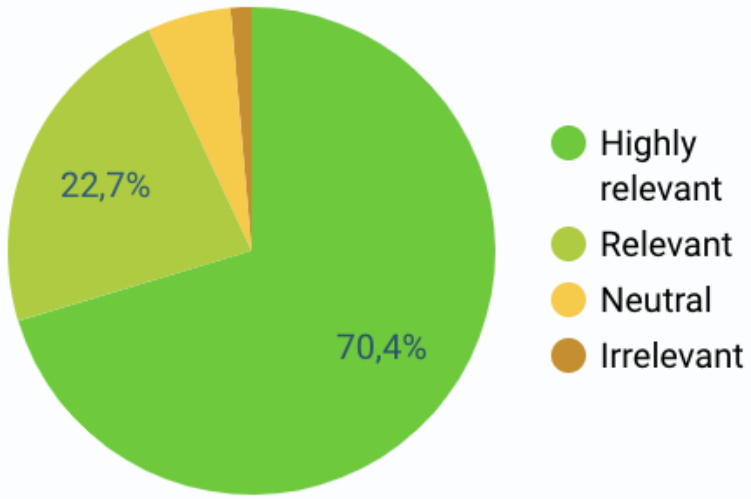
EOSC : a Web of FAIR Digital Objects and Related Services for Science



1. Open Science practices and skills are rewarded and taught, becoming the "new normal"
2. Standards, tools and services allow researchers to find, access, reuse and combine results
3. Sustainable and federated infrastructures enable open sharing of scientific results

Skills and training a key factor for success of EOSC

September 2020 SRIA consultation feedback



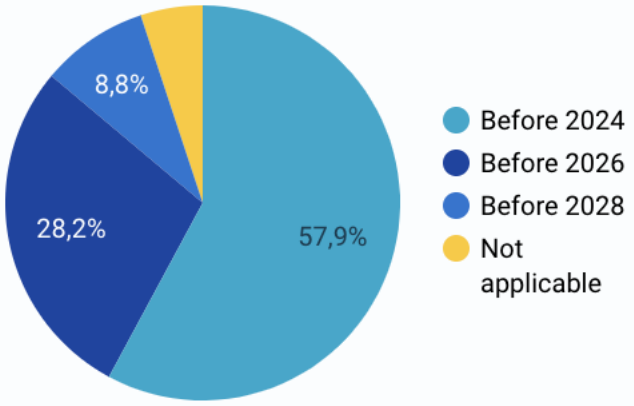
P17: Develop Open Science training and professionalise associated roles.

Relevance

	P17 - How re...	Record Count
1.	Highly relevant	140
2.	Relevant	55
3.	Neutral	12
4.	Irrelevant	7
5.	Highly irrelevant	2

1 - 5 / 5

Urgency



Digital Skills for FAIR and Open Science

Digital skills: “A range of abilities to use digital devices, communication applications, and networks to access and manage information” (OECD, July 2020)

In the context of FAIR and Open Science, these skills **include an understanding of data, software and tools**.

Gap analysis

- Lack of open science and data expertise
- Lack of a clear definition of digital professional profiles and career paths for these roles
- Fragmentation in learning and training resources

Four priority areas

Developing the next generation of FAIR and open science professionals

→ **roles, skills and interactions of actors**

Collaborating to enhance digital skills for FAIR and open science in Europe

→ **competence centres concept**

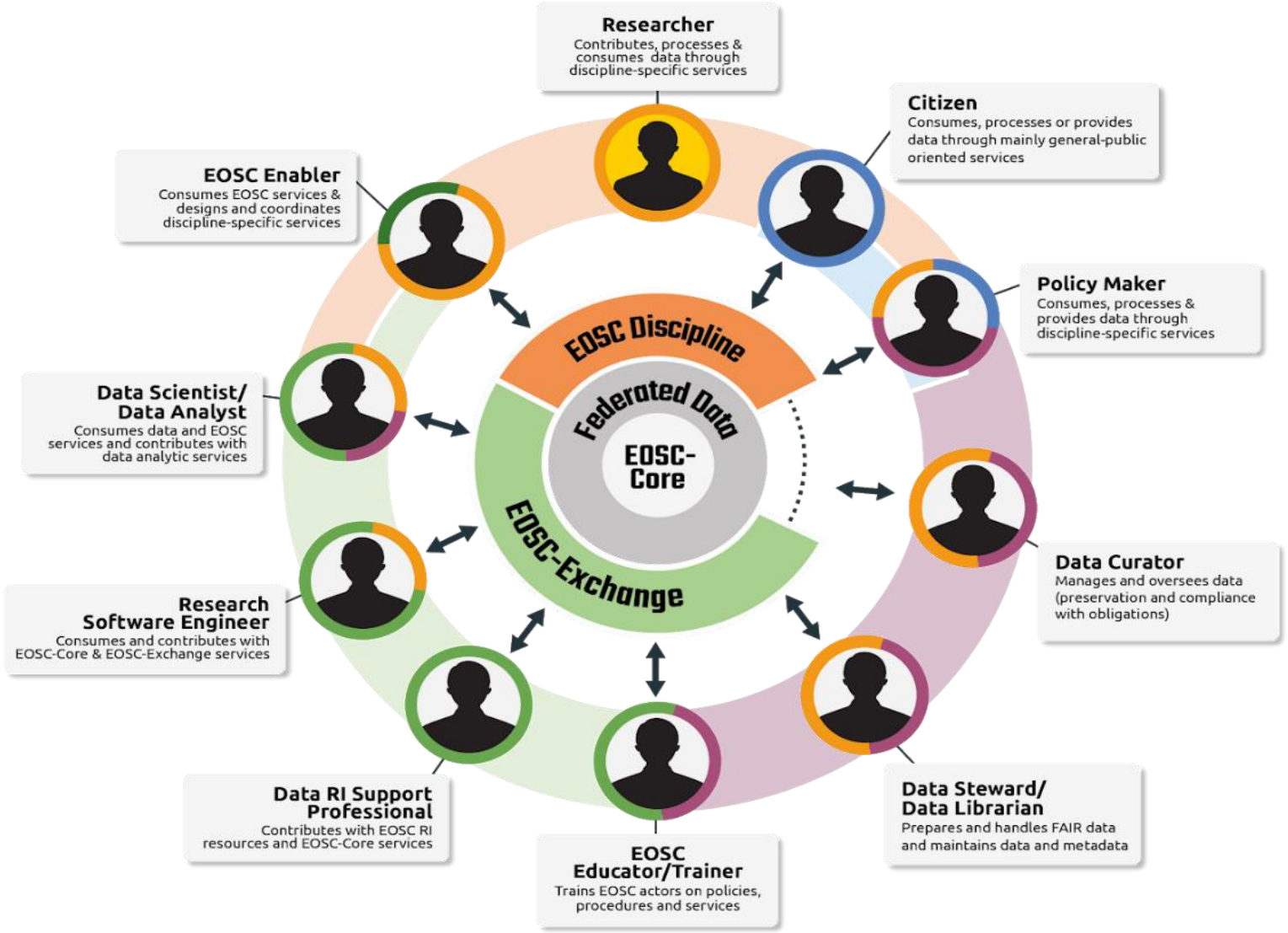
Building a trusted and long-lasting federated knowledge hub of training materials and related tools

→ **Specifications for training catalogues**

Influencing national open science policy for skills by supporting strategic leaders

→ **national strategies**

Framework of Actors in the EOSC Ecosystem



Researcher

Overview	The researcher is the main target of the EOSC ecosystem and interacts with it to obtain, process, produce, deposit and share research data, using mainly high-level services provided by the ecosystem.
Examples	A researcher would browse and identify data related to different genetic variants of the flu available in a FAIR data repository and perform a phylogenetic study on samples through a service from the EOSC marketplace, creating a graphical representation as a phylogenetic tree to include in an article, referencing the data sources and processing pipelines.
Required skills	• General knowledge on the EOSC ecosystem, covering the EOSC-Core and EOSC-Exchange interdisciplinary services for data access, sharing, reuse and processing, and relevant discipline-specific services. • Knowledge of the added value that EOSC services provide to research and publication workflows. • Understanding of how to assess the FAIRness of services when searching for and producing research data. • Skills to apply EOSC services wherever they support the research and innovation lifecycle and contribute to their development. • Training and communication skills to teach and educate other researchers and students on how to conduct research in the frame provided by EOSC.

EOSC Enabler

Overview	An EOSC Enabler is a researcher in a particular discipline with technical, open science and FAIR skills who can design and partially implement discipline-specific applications using EOSC services and data, who will act as a bridge between the scientific community and the technical services.
Examples	An EOSC Enabler could be a researcher with technical skills who integrates a common genomic data processing suite so it runs on EOSC federated research infrastructure, retrieving and storing data which is discoverable and is properly formatted, and is accessible and reusable using EOSC-Core and EOSC-Exchange services.
Required skills	• Skills to use EOSC-Core and EOSC-Exchange interdisciplinary services for data access (as defined in the EIF and RoP), sharing, reuse and processing. • Deep understanding of FAIR principles. • Skills to design and coordinate the development of new high-level EOSC discipline-specific services. • Training and communication skills to transmit and educate researchers and technicians on the open science, FAIR and EOSC ecosystem concepts and services, as well as their added value for research communities. • Data facility management skills to understand the services and resources needed to conduct the activity of a research group or institution in the context of open science.

Data Scientist/Data Analyst

Overview	A Data Scientist or Data Analyst is an expert on data processing, not necessarily from a specific discipline, who is capable of evaluating data quality, extracting relevant knowledge from data and representing such knowledge.
Examples	A Data Scientist or Data Analyst could be an expert who develops a general-purpose machine learning algorithm that could efficiently run on the EOSC federated research infrastructures that are consuming data from EOSC services.
Required skills	• Technical skills to use EOSC-Core and EOSC-Exchange services for data access, sharing, reuse and processing. • Deep understanding of FAIR principles for both data and software. • Theoretical knowledge and technical skills to design, develop and deploy data related services that comply with EIF, and are registered and discoverable through the EOSC platform. • Training and communication skills to teach and educate researchers and technicians on how to use the tools or to transmit the outcome of the analysis.

Research Software Engineer

Overview	A Research Software Engineer is an ICT expert who designs, implements, maintains and/or integrates services and software in the EOSC ecosystem to enable FAIR and open science, ensuring the fulfilment of software quality, reproducibility and sustainability.
Examples	A Research Software Engineer could be designing, building and maintaining software that is compiled and installed by someone else. Research Software Engineers may require other ICT skills of different roles such as ICT Managers, Development Operations Engineers or Database Programmers.
Required skills	• Ability to acquire knowledge necessary to implement, use and onboard EOSC-Core and EOSC-Exchange services. • Understanding of the requirements to implement FAIR principles for data and software. • Training and communication skills to teach and educate researchers and technicians on how to undertake research software engineering, and potentially how to use the software and services implemented.

Data Research Infrastructure Support Professional

Overview	A Data Research Infrastructure Support Professional is an ICT expert who manages and operates research infrastructures and the necessary services for the storage, preservation and processing of research data.
Examples	A Research Software Engineer could be designing, building and maintaining software that is compiled and installed by someone else. Research Software Engineers may require other ICT skills of different roles such as ICT Managers, Development Operations Engineers or Database Programmers.
Required skills	• Knowledge of the EOSC ecosystem principles and concepts. • Technical skills to securely deploy and maintain EOSC-Core and EOSC-Exchange services related to processing and storage, or to data resources such as repositories and databases. • Training and communication skills to teach and educate any other actor on how to use research infrastructures. • Facility management skills to understand the services and resources needed to sustain research activity in the research infrastructures of scientific communities supported in the context of the EOSC ecosystem.

EOSC Educator

Overview	An EOSC Educator is an expert who designs, organises, shapes content and manages and/or coordinates training activities in the context of EOSC, participating in the delivery of the training. The EOSC Educator deeply understands the EOSC ecosystem and supervises the training activities.
Examples	An EOSC Educator may be responsible for the training activities related to EOSC in a major project or initiative (including at institutional or national level) that would organise training and enrol trainers and trainees in summer schools and regular training, potentially providing sessions on EOSC awareness.
Required skills	• Deep understanding of the EOSC ecosystem and principles, i.e., EIF and RoP. • Deep understanding of FAIR and open science principles, for transferring knowledge and delivering training material according to these principles. • Awareness on EOSC-Core and EOSC-Exchange services and on the benefits of their application in an interdisciplinary context. • Knowledge of learning environments that can be applied efficiently within the EOSC context, in cross-disciplinary ways. • Good understanding of the needs of various stakeholders to design and apply learning and training resources appropriate to different learning pathways. • Communication skills.

Data Curator

Overview	A Data Curator is an expert on the management and oversight of an organisation's entire data to ensure compliance with policy and/or regulatory obligations for long-term preservation and to provide higher-level users with high quality data that is easily accessible in a consistent manner.
Examples	A Data Curator could collect and publish a dataset of genomic samples related to influenza with geographic annotation using domain-specific standard formats, ensuring the FAIRness of the data.
Required skills	• Deep understanding of FAIR principles and ability to use services for data publication and preservation. • Ability to validate the fulfilment of open science principles in EOSC-Core and Exchange services related to data. • Training and communication skills to teach and educate any other actor on how to provide and exploit curated data. • Knowledge and technical skills to contextualise research results, i.e., exchange and reuse existing research-related metadata (on researchers, projects, publications, organisations, equipment, etc.) contained in research information systems (such as Current Research Information Systems) or others.

Data Steward/Data Librarian

Overview	A Data Steward is an expert on the preparation and treatment of data including data selection, storage, preservation, annotation provenance and other metadata maintenance, and dissemination. Data librarians are professional library staff who are experts on RDM, using research data as a resource or supporting researchers dealing with data (description, archiving and dissemination). Other closely related roles will also be considered under this category.
Examples	A Data Steward could be an expert who validates, recodes, trims or applies any other action on each source dataset of genomic samples related to influenza to guarantee that they can be properly used and integrated according to domain-specific standard formats.
Required skills	• Deep understanding of FAIR principles to ensure that research data from various domains is aligned with FAIR and CARE (Collective benefit, Authority to control, Responsibility, Ethics) principles. • Ability to use EOSC-Core and EOSC-Exchange services for data publication and preservation and to facilitate the continued development of an infrastructure and library services to support data discovery, curation, preservation and sharing according to those principles. • Ability to validate the fulfilment of open science principles in EOSC-Core and EOSC-Exchange services related to data. • Ability to advise faculty and students on RDM according to the FAIR and CARE principles, including the discovery and reuse of existing datasets, through the EOSC services and ecosystem.

Citizens

Overview	Citizens targeted in EOSC are any kind of people having interest in one or several scientific disciplines (including, but not limited to, the open source community or commercial companies undertaking research), who want to get information or contribute to a citizen science initiative or other initiatives of general public interest, or have their own interest in learning and addressing a specific challenge which is not part of his/her professional activity.
Examples	A citizen with an interest in open science may agree to anonymously sharing their health information and track some lifestyle indicators such as sport activity, in return for receiving feedback on their health status.
Required skills	• Basic knowledge on the concept of EOSC principles (with a special focus on privacy and legal boundaries). • Basic ICT skills to use generic and specific applications and tools for citizen participation.

Policy Maker

Overview	Policy makers gather information through consultation and research and reduce and extract from the information a policy, set of policies or a strategic framework which serve to promote a preferred course of action and could include financial support to research.
Examples	A Policy maker could be the governing board of a public health directorate who provides information from clinical practice and accesses the incidence trends of a specific disease to implement their healthcare plans.
Required skills	• Reasonable knowledge on the EOSC ecosystem, with special focus on open science, privacy and security and FAIR principles, and ability to understand the extent and limitations of EOSC discipline-specific and generic services to support the EOSC principles. • Facility management skills to understand the services and resources needed to conduct the activity of the scientific community in the context of EOSC.

Recommendations

Developing the next generation of FAIR and open science professionals

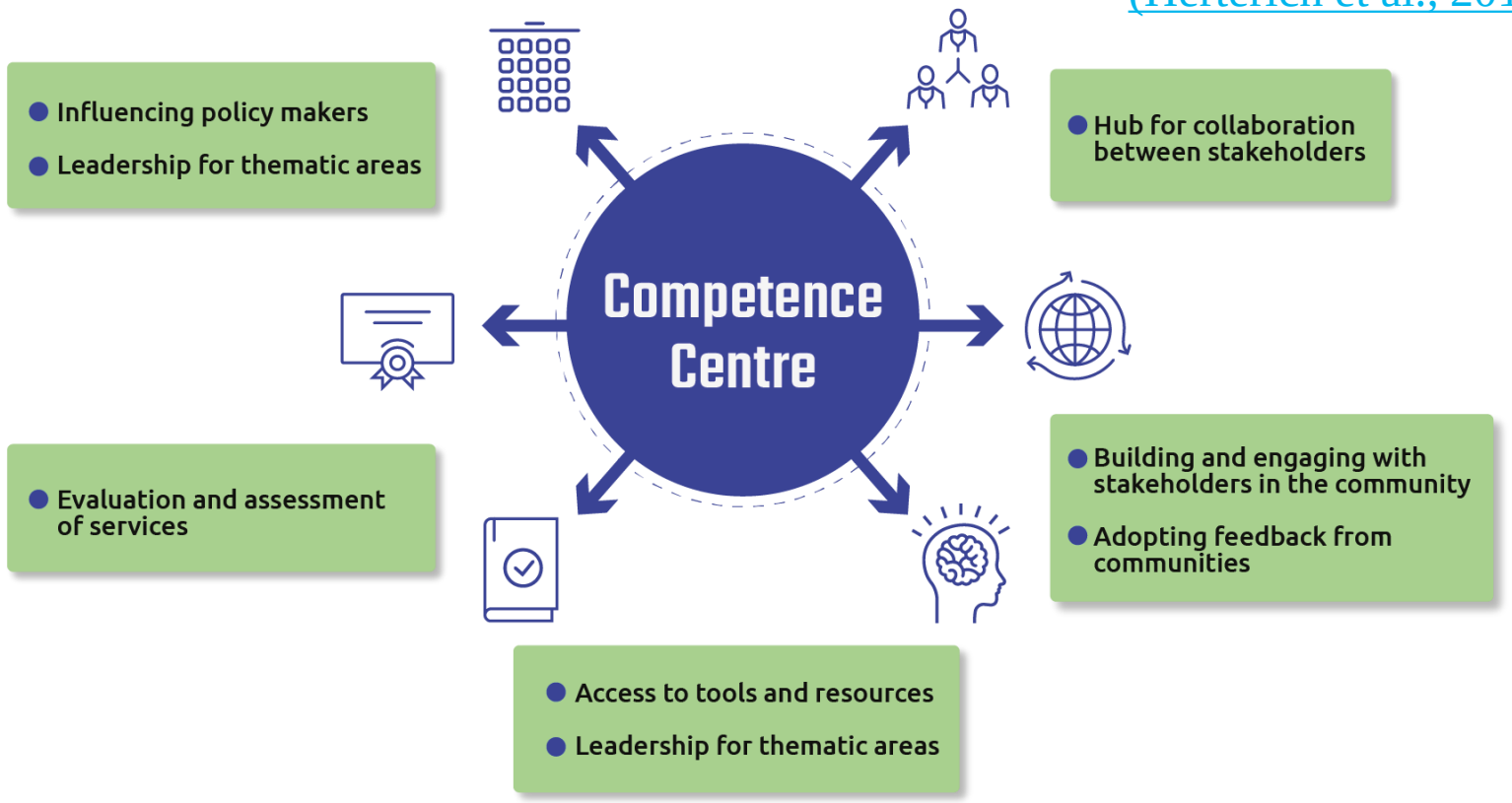
→ **roles, skills and interactions of actors**

1. **Utilise the Framework of Actors in the EOSC Ecosystem** (Figure 3) in the development of initiatives, skills, training, reward and recognition frameworks and career paths necessary to support further development and mainstreaming of FAIR and open science.
2. **Coordinate and align relevant skills curricula and training frameworks** by generating a consensus on a core European higher education curriculum to deliver FAIR and open science skills at university level.

"Shared hubs 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."

Competence centre concept

(Herterich et al., 2019)



Recommendations

Collaborating to enhance digital skills for FAIR and open science in Europe

→ **competence centres concept**

3. **Encourage and support the competence centres approach** as a framework for increasing coordinated provision of aligned training to support FAIR and open science.
4. Facilitate **increased integration of FAIR and open science courses** with university qualifications.

Recommendations

Building a trusted and long-lasting federated knowledge hub of training materials and related tools

→ **Specifications for training catalogues**

5. **Build a training catalogue** utilising the specifications for development recommended by this WG to maximise interoperability.
6. **Include training and learning resources in the EOSC Interoperability Framework (EIF).**

Recommendations

Influencing national open science policy for skills by supporting strategic leaders
→ **national strategies**

7. Develop an EOSC Skills and Training Leadership Programme to:

- Increase coordination of European and national policies, programmes and networks supporting the skills elements of FAIR and open science by assisting stakeholders to align initiatives.
- Develop and promote an EOSC skills and training ambassadors programme that is composed of highly specialised experts, mentors and champions who can provide senior leaders with relevant insights to influence national policy.
- Advocate for the inclusion of skills and training of FAIR and open science into major European and national funding instruments.

Recommendations

Influencing national open science policy for skills by supporting strategic leaders
→ **national strategies**

8. Support EOSC leaders to achieve specific aims such as:

- Accelerate or update national open science policies to directly align with the main EU level strategic and policy documents related to the development of digital skills, such as the Digital Europe Programme, the European Skills Agenda and the Digital Education Action Plan.
- Align national open science policies to all key national digital, research, education (at all levels) or employment strategies that include a skills component, and encourage the development and implementation of a National Skills Strategy that includes digital skills for the research sector.
- Ensure FAIR and open science principles are being applied and included in the European Digital Education Content Framework, scheduled by Digital Education Action Plan 2021-2027, or develop a Digital Education Content Framework specific to FAIR and open science.

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Thank you for your attention