

Digital skills for FAIR and open science

Report from the EOSC Executive Board
Skills and Training Working Group

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**EUROPEAN OPEN
SCIENCE CLOUD**

Priority areas/major sections of the report

Developing the next generation of FAIR and open science professionals: Presents a framework of all the EOSC actors (roles) in the EOSC ecosystem for whom skills and training is relevant.

Collaborating to enhance digital skills for FAIR and open science in Europe: Reviews organizational approaches to implement training activities and programmes, through the concept of competence centres.

Building a trusted and long-lasting knowledge hub of learning and training resources and related tools: Provides insights for an EOSC federated training catalogue as part of a sustainable training infrastructure that supports EOSC actors.

Influencing national open science policy for skills by supporting strategic leaders: Analyses the framing of digital skills required in EOSC in the wider European agenda for skills, to provide recommendations for Member States (MS) and Associated Countries (AC) on how to support EOSC in national skills policies and strategies.

<https://op.europa.eu/en/publication-detail/-/publication/af7f7807-6ce1-11eb-aeb5-01aa75ed71a1/language-en/format-PDF/source-190694287>

1. Utilise the Framework of Actors in the EOSC Ecosystem 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.

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.

5. Build a learning and training catalogue utilising the specifications for development recommended by this WG to maximise interoperability.

6. Include learning and training resources in the EOSC Interoperability Framework (EIF).

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.
- Develop and promote an EOSC Skills and Training Ambassadors programme to advise national decision-makers.
- Advocate for the inclusion of skills and training of FAIR and open science into major European and national funding instruments.

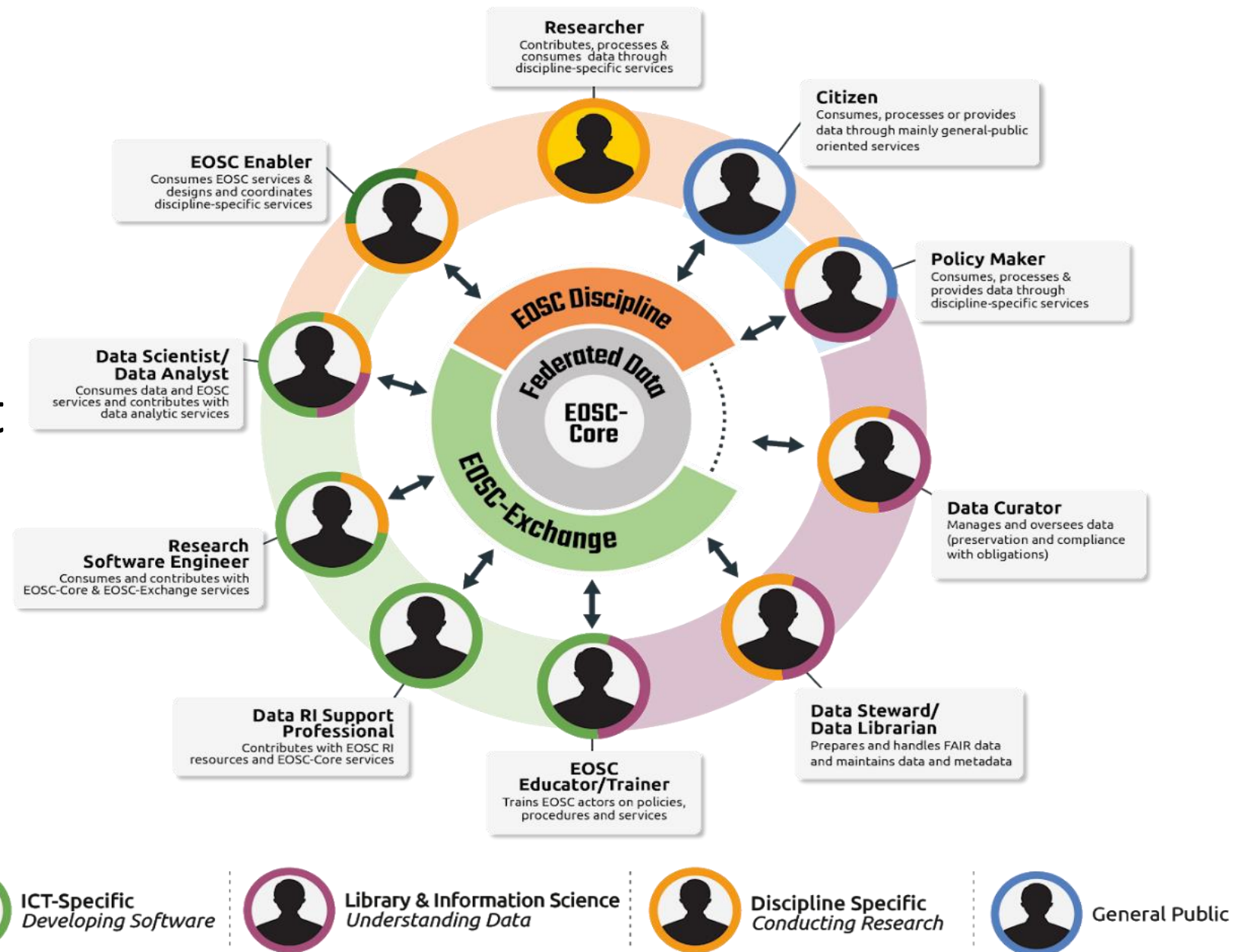
Description of 10 roles within the EOSC ecosystem, one situational example for each role and a list of required skills

Also in the Strategic Research and Innovation Agenda (SRIA) of the European Open Science Cloud (EOSC)

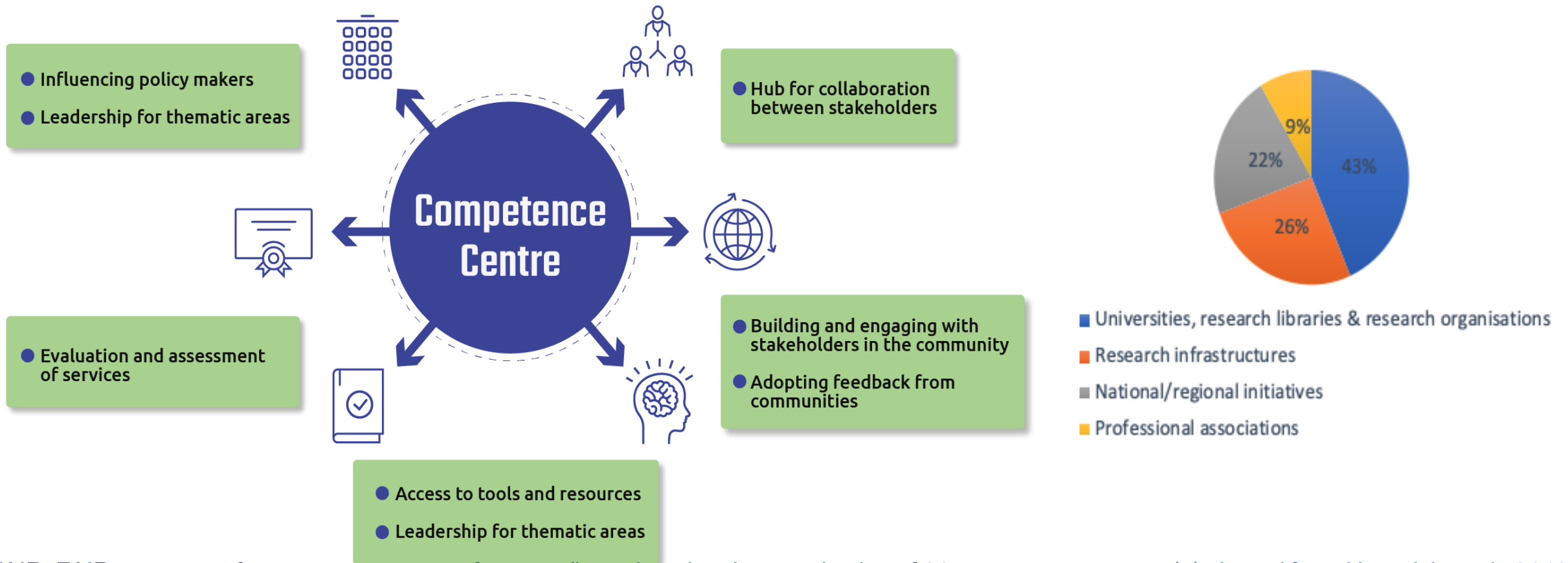
<https://www.eosc.eu/sites/default/files/EOSC-SRIA-V09.pdf>

and EOSC Glossary, Dec 2020

<https://docs.google.com/document/d/1zcF95LChshSCv1biqS-AWG12VRyRyzZ5SKyMF5cyk3k/e/dit#>



The competence centre concept, 23 interviews



FAIRsFAIR summary of competence centres features (based on the characterisation of 36 competence centres) ([adapted from Herterich et al., 2019, p. 9](#))

Almost all case studies offered a range of the skills & competencies services commonly associated with competence centres

Provision of training

Data services or research software engineering

Guidance resources and advisory services (including policy advice and implementation)

Development of communities (e.g., communities of trainers)

Catalogues of resources, services or policies

Creation or dissemination of standards

Evaluation and assessment services (for trainers and trainees, training materials, etc.)

Hub for collaboration between stakeholders

This list was adapted from the FAIRsFAIR work ([Herterich et al., 2019](#); [Newbold et al., 2020](#))

Interviews/Case studies

Skills & competencies

- Skills & competencies focus
- Training approaches alignment
- Assessment/certification, enabling qualification that is broadly recognized
- Definition of competence centres

Alignment and collaborations

- Alignment with national initiatives to create digital skills
- European collaborations
- What type of alignment and/or coordination by EOSC?

Governance, business models & sustainability approaches

- Main lessons learnt from the development of current operating structures
- Business models & sustainability
- Governance & decision making process, community engagement and representation, accountability to stakeholders

Recommendations for EOSC Learning and Training Catalogue implementation

Embrace user centrality from the outset

- Develop an understanding of how users will interact with the learning and training catalogue
- Involve EOSC users at all stages of development
- Ensure users' needs are incorporated into design of learning and training catalogue

Align metadata of learning and training resources and ensure they become FAIR objects

- Provide federated catalogue standard through mapping of community standards
- Provide descriptive metadata as linked open data
- Provide a minimal set of learning and training resource metadata
- Integrate the FAIR principles into learning and training catalogue development

Ensure technical interoperation of catalogues and underlying processes

- Outline the process for onboarding a learning and training catalogue
- Define a set of supported harvesting channels
- Ensure machine discoverability and harvestability of learning and training resources
- Use open APIs to enable interoperability, adhere to open standards and use open-source software

Embed quality assurance mechanisms in selecting and exposing learning and training resources

- Create and make publicly available curation and quality assurance policies
- Define quality criteria for training service providers and learning and training resources (as a community effort) and implement quality assessment

Ensure sustainability and future development

- Set up community governance structure and create trust
- Engender a coordinated approach among stakeholders in skills development in order to share learning and training resources in a FAIR way, promote broader application of useful resources and avoid duplication of effort
- Ensure revenue is based on services, and not on data; data should be a community property
- Conduct cost-benefit analysis in maintaining the EOSC federated Learning and Training Catalogue and set it up according to the current best practice and economy of scale
- Enable well-structured feedback and collaboration mechanisms

National skills policies and strategies

Fragmentation of governance and diverse priorities in upgrading digital skills (across sectors, on a national-wide basis; many efforts and initiatives are in progress; however, no aligned approach identified)

Absence of national policy on competency building

- It is difficult to identify the most suitable approach for upgrading digital skills. No one size fits all. Responsibility for digital skills, research and education is often split across different national authorities.
- This stresses upon the need to establish national strategies with an integrated overview of objectives.

By LDK Consultants

National skills policies and strategies (2)

Absence of a stand-alone national strategy for digital skills in almost all countries assessed

- In most of the countries the policy for digital skills development is usually part of the overall national strategy for the digital transformation and the extent to which focus is given on digital skills varies.
- Digital skills ecosystems are complex. In many cases, the priorities of different actors in the ecosystem in relation to FAIR and open science are not shared or aligned due to siloisation.

By LDK Consultants

National skills policies and strategies (3)

Lack of a rewarding career process for researchers who are practicing open science

Open science strategies are mostly focused on research and infrastructure, with few references in relation to digital skills

Lack of modules on FAIR and open science in university curricula or other university training systems

Little coordination or central governance mechanism on digital skill and training development

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Maturity level

Awareness 1 There is an understanding of the need for and the benefits of the issue, but concrete action has yet happened

Exploring 2 The issue is explored through initiatives (including pilots) at any level (national, regional, communities, etc.) and/or by any type of stakeholder (university, local authority, government, etc.)

Developing 3 Key stakeholders across different levels are committed to supporting and implementing initiatives. Planning efforts for new policies and strategies are in place or some of these have been implemented

Integrated 4 Practices and policies are regularly reviewed and updated to ensure an integrated ecosystem

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Questions

Is there a rewarding career process for researchers who are practicing open science?

Are digital skills profiles standardized?

Is there any legislation on digital skills?

Are there modules on FAIR and open science in the universities curricula or other university training systems?

Is there any academic education on data science/engineering?

Is there any accreditation system for data scientists, especially for public employees?

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Questions (2)

Are any digital skills initiatives included in national policies on FAIR and open science, AI and cybersecurity?

Is there any cross-sector (research-industry-public sector) cooperation to enable employee mobility and employability?

Are there any important initiatives on FAIR and open science, AI, cybersecurity?

Is there a formal policy on digital skills and training?

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Questions (3)

Is there any cooperation for digital upskilling with the private sector, the public sector and the research?

Are there any national platforms on training provision?

Are there advanced learning environments in place that are applying open data principles?

Is there a coordination or central governance mechanism on digital skills and training development?

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Recommendations for national open science policies for skills

Develop an EOSC Skills and Training Leadership Programme to:

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- Advocate for the inclusion of skills and training of FAIR and open science into major European and national funding instruments.

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Recommendations for implementing EOSC skills agenda

- Develop a mechanism (such as a maturity model) for providing data to evaluate the effectiveness of skills and training policies and initiatives.
- Coordinate and align relevant skills curricula and training frameworks by generating a consensus on a core European higher education curriculum to deliver digital skills for FAIR and open science at university level
- Develop reward and recognition frameworks that are integrated with new career paths to incentivize FAIR and open science practices for all research sectors staff across MS and AC.

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Recommendations for implementing EOSC skills agenda (2)

Complement digital upskilling for open science with a robust, coordinated support network (utilizing existing initiatives) for supporting infrastructures (e.g., a federated training catalogue).

Foster a robust, transparent, and participative governance structure for digital skills for FAIR and open science that supports the diversity of requirements across all disciplines, provides clear channels for feedback, and is compatible with other related initiatives at national and European level.

By LDK Consultants

LDK reports

EOSC within National Strategies for Digital Skills: Recommendations Report:

<https://zenodo.org/record/4461658>

EOSC within National Strategies for Digital Skills: Gap Analysis Study

<https://zenodo.org/record/4461480>

EOSC within National Strategies for Digital Skills: Landscape Report

<https://zenodo.org/record/4461379>

EOSC within National Strategies for Digital Skills: Consultation and Focus Group

Report <https://zenodo.org/record/4461636>

Thank you! Questions?

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