Supporting eosc

Skills 4 eosc

Draft Open Science Career Profiles - Minimum Viable Skillsets

Lead Partner:	Digital Curation Centre (UEDIN)
Version:	**1.0**
Status:	**Version open for co-creation - public consultation**
Dissemination Level:	**PUBLIC**
Document Link:	**https://doi.org/10.5281/zenodo.7686263**
DOI	**10.5281/zenodo.7686263**

Abstract

This short paper invites comment on proposed Minimum Viable Skillsets (MVS) for the European Open Science Cloud (EOSC) designed by the Skills4EOSC project. The MVS draw on established competences frameworks and resources defining the Open Science (OS) mission, activities, or outcomes expected of relevant roles. MVS synthesise these, profiling each role as an aid to developing new curricula, career paths and courses. A simple MVS format is proposed to articulate key skills and competences that enable researchers, professionals, and stakeholders to fulfil the OS expectations of the EOSC.

COPYRIGHT NOTICE

Co-funded by the European Union

co-funded by UK Research and Innovation

Skills4EOSC has received funding from the European Union's Horizon Europe research and innovation Programme under Grant Agreement No. 101058527 and from UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee [grant number 10040140]

This work by Parties of the Skills4EOSC Project is licensed under a Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/). The Skills4EOSC project is co-funded by the European Union Horizon Europe programme under grant n° 101058527 and by UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee under grant n° 10040140.

DELIVERY SLIP

	Date	***Name***	***Partner/Activity***	***Date***
From:		Angus Whyte	UEDIN/ T2.1	28.02.23
Moderated by:		Dominique Green	UEDIN/ WP2	28.02.23
Contributor:		Karla Avanço	AMU/ T2.1	15.12.22
Contributor:		Sara Di Giorgio	GARR/ T2.1	15.12.22
Contributor:		Arnaud Gingold	OPERAS-AMU/ T2.1	15.12.22
Contributor:		Laurence Horton	UEDIN/ T2.1	15.12.22
Contributor:		Bojana Koteska	UKIM/ T2.1	27.02.23
Contributor:		Katerina Kyprianou	GRNET/ WP3	17.01.23
Contributor:		Ognjen Prnjat	GRNET/ WP3	17.01.23
Contributor:		Päivi Rauste	CSC/ T2.1	15.12.22
Contributor:		Luca Schirru	KUL/ ELSI WP	28.02.23
Contributor:		Claire Sowinski	INIST- CNRS/ T2.1	15.12.22
Contributor:		Gabriela Torres Ramos	INIST- CNRS/ T2.1	15.12.22
Contributor:		Nida van Leersum	TU-DELFT/ T2.1	27.02.23
Approved by:		Emma Lazzeri	GARR	28.02.23

DOCUMENT LOG

Issue	***Date***	***Comment***	***Author***
v.0.1	***27.02.2023***	*Initial draft based on internal outputs of task T2.1 and WP2, further WP3 collaboration on policymakers MVS, plus wider project consultation and feedback.*	*Angus Whyte (UEDIN), Dominique Green (UEDIN), Sara Di Giorgio (GARR).*
v.1	***28.02.2023***	***Complete draft***	***As above***

TERMINOLOGY

https://eosc-portal.eu/glossary

Terminology/Acronym	*Definition*
EOSC	European Open Science Cloud
FAIR	Findable, Accessible, Interoperable, Reusable
MVS	Minimum Viable Skillset
OS	Open Science
RDA	Research Data Alliance

Contents

1 Executive summary

1.1 Introducing Minimum Viable Skillsets

A main priority of Skills4EOSC is to prioritise and define the 'minimum viable skillset' (MVS) for EOSC actors, including researchers and the various professional roles that support them in practising Open Science effectively, as well as policy makers and other stakeholders. The MVS is a key resource for the project's core objective of advancing Open Science (OS) skills.

The notion of a 'minimum viable' product is well established in agile software development. It has recently been applied to the design of the EOSC itself, and the 'Minimum Viable EOSC' is based on a 'subset of EOSC resources necessary for forming the added-value and opportunities considered essential to be provided by the EOSC at a given moment in time'. In a similar manner, the MVS are a subset of essential skills to accomplish the Open Science mission, and are derived from existing resources (e.g. competence frameworks, skills reports). The MVS will help address gaps identified in the EOSC Strategic Research and Innovation Agenda, i.e. a lack of OS and data expertise, lack of a clear definition of data professional profiles and corresponding career paths, and fragmentation in training resources. By profiling the role of each EOSC actor, the MVS will help trainers identify the main ingredients of courses and curricula they need for building capacity in those roles, in each case based on relevant competence frameworks and skills resources.

Please use our EU Survey questionnaire to give us any comments you may have. We welcome your feedback on the MVS approach described in this paper, including the format of the examples that we offer, their content, and the priorities we identify for further profiles.

1.2 Definition

A Minimum Viable Skillset (MVS) describes essential skills and concepts required to deliver Open Science (OS) outcomes for communities and organisations. Each MVS for a research-related role identifies its OS mission, the typical activities it undertakes in delivering OS outcomes, and the essential skills and competences required for this. An MVS may be associated with a career profile describing disciplinary variations in skills and competences needed, or guidance on the improvement in proficiency levels needed for career path progression.

Each MVS is role-specific, however a role may be described with alternative titles where these are very closely related, i.e. they share substantially the same mission for Open Science and 80% of their activities, skills and competences.

1.3 Method and Example: MVS for Policymakers

Skills4EOSC includes various work packages (WP) that will use the MVS to inform their work on training and curriculum development. The task producing the MVS (T2-1) has benefited from feedback that partners across these WP have provided, in the interest of ensuring that the MVS design and content meet their needs. In drafting each MVS based on desk research, our approach is also to seek the direct involvement of the 'user' WP in each case, plus the input of a parallel WP advising on ELSI (ethical, legal and social) aspects of each WP tasks. The first example provided in this report illustrates the results of this process. It is a working draft that will be annotated further, to include keywords and better reflect the ELSI aspects of the essential skills and competences.

1.4 Relation to Existing Work

The MVS are informed by a wide range of recent work to define skills relating to EOSC, and particularly for roles under the general heading of 'research data professionals'. These sources are referenced in a Zotero bibliography as described in section 5, which also lists key references for the MVS design and selection of roles. These include outputs of the EOSC Working Group on Skills & Training, FAIRsFAIR project, OBERRED project, Open Science Career Assessment Matrix, and the RDA Interest Group on Professionalising Data Stewardship. We also align with more role-specific work conducted in relevant domains including policy making (Joint Research Council) and data science (EDISON).

1.5 Roles: Current MVS Priorities

The MVS aim to meet training needs for a range of 'EOSC Actors'. Section 4 describes the broader range of roles we are considering within the scope of this work. The initial set of profiles includes:

- Policymakers
- Data Steward, Data Curator, Data Librarian, and Data Manager
- Knowledge Broker, Civil Servant
- RI Service Manager, User Support Professional
- Undergraduate, Researcher (Early Career, Principal Investigator)
- Legal Advisor, Ethics Advisor

2 Example MVS for Policymakers

Two draft MVS have been drafted, aiming to address training needs of policymakers in two categories. The first ('type1') are Research Policymakers seeking to facilitate the production of Open Science, and the second ('type 2') the broader category of Policymakers interested in other policy matters and in using OS outputs to inform their work. Further work on these and other profiles is outlined in section 4.

Policy Maker

Type 1: Research Policy/Decision Makers Facilitating OS

Organisational context:

- Ministries (about research and beyond)
- Governmental organizations
- National agencies
- National funding organizations
- Research Performing Organisations
- Data Protection Authorities

Open Science mission for this role

Create the appropriate awareness and the circumstances that foster the support of Open Science programs, and uptake of Open Science practice for effective policy making in service of the common good.

Contributes to which Open Science outcomes?

The main objective of this type of Policy maker is to set the ground for 'evidence informed policy making' (Topp et al. 2018) by establishing the right environment that supports Open Science and fosters the use of Open Science in policy and decision making. This is mainly achieved through the following:

- Setting up the right frameworks, incentives, and financial support to enhance the use of Open Science and ensure its continuous support.
- Creating the appropriate partnerships with key stakeholders.
- Building a team of experts.

Main activities

- Promotes and supports OS.
- Engages all the appropriate target audiences & key stakeholders.
- Identifies actions to advance national policies on FAIR and OS.
- Understands the importance of addressing gaps in provision of digital skills for FAIR and OS.
- Promotes digital skills for data intensive science transferable across different sectors.
- Sets up policies or a strategic framework which serve to promote a preferred course of action and could include financial support research.

Essential skills and competences

- Good understanding of OS and its practices.
- Ability to establish the appropriate strategy, frameworks and course of actions to foster and enhance OS.
- Ability to mobilize human resources.
- Ability to mobilize financial resources.
- Ability to advocate and mobilize key enablers (lobbying).
- Ability to identify the relevance between evidence and policy context.
- Ability to assess the financial sustainability of policy outcomes

Policy Maker

Type 2: Evidence-informed Policy and Decision Maker

Organisational context:

- Ministries (about research and beyond)
- Governmental organisations
- National agencies
- National funding organisations
- Research Performing Organisations
- Data Protection Authorities

Open Science mission for this role

Gather information through consultation and research and reduce and extract from the relevant information a policy, set of policies or a strategic framework, which serve to address a specific issue (European Commission. Directorate General for Research and Innovation. and EOSC Executive Board. 2021, p.22).

Contributes to which Open Science outcomes?

The objective of this type of policy maker is to ensure “evidence informed policy making” (Topp et al. 2018) by designing policies that are based on relevant and credible

research data. This is achieved through the following:

- Thorough research of available open data and identification of information that is timely, relevant, and credible.
- Appropriate consultation of researchers and other stakeholders like citizens, considering the specificity of their activity (scientist vs. politician) and role (honest broker vs. issue advocate).
- Synthesis of gathered information to design a policy relevant to a specific issue.

Main activities

- Identifies available OS outcomes relevant to an issue that requires a policy.
- Collaborates with expert communities for elicitation, review and evaluation of data and design of a policy.
- Deploys appropriate monitoring and evaluation to measure the impact of a policy designed based OS outcomes.
- Ensures inclusiveness in evidence's production and evaluation.
- Promotes and supports OS.

Essential skills and competences

- **Knowledge of OS practices:** thorough understanding of the opportunities, limitations, and constraints of OS in policy making, special focus on privacy, security, and FAIR principles and other legal and ethical issues of OS.
- **Knowledge management:** identify the relevance of outputs with a specific issue, synthesize outputs of research and consultation, facility management skills to understand the services and resources needed to conduct the activity of the scientific community.
- **Monitor the landscape:** ability to monitor and evaluate existing policies.
- **Policy evaluation**: ability to monitor and evaluate policy implementation

Sources of further information:

OECD, 2020 "Building Digital Workforce Capacity and Skills for Data-Intensive Science." OECD Science, Technology and Industry Policy Papers 90. https://doi.org/10.1787/e08aa3bb-en.

Engelhardt, Claudia, Raisa Barthauer, Katarzyna Biernacka, Aoife Coffey, Ronald Cornet, Alina Danciu, Yuri Demchenko, et al. 2022. *How to Be FAIR with Your Data*. https://www.univerlag.uni-goettingen.de/handle/3/isbn-978-3-86395-539-7.

European Commission. Directorate General for Research and Innovation., and EOSC Executive Board. 2021. "Digital Skills for FAIR and Open Science: Report from the EOSC Executive Board Skills and Training Working Group." LU: Publications Office. https://data.europa.eu/doi/10.2777/59065 .

Group, EOSC Glossary Interest. 2020. "EOSC Glossary." https://doi.org/10.5281/zenodo.4472643 .

Topp, Lene, David Mair, Laura Smillie, and Paul Cairney. 2018. "Knowledge Management for Policy Impact: The Case of the European Commission's Joint Research Centre." *Palgrave Communications* 4 (1): 1–10. https://doi.org/10.1057/s41599-018-0143-3 .

UNESCO. 2022. "Building Capacity for Open Science." UNESCO Digital Library. 2022. https://unesdoc.unesco.org/ark:/48223/pf0000383326.locale=en .

3 MVS Design

The MVS provides a recipe or set of requirements for a learning resource, aiming to help trainers and others find and reuse existing ones, or inform their production of new learning resources. The MVS design includes definitions of the main elements in a template used for the Policymakers example.

Table 1. Dictionary of MVS Elements

Definition	Min-Max	Word length
***Role**: label summarising a mission that contributes to Open Science activities or outcomes, plus bullet-points listing kinds of organisations expected to fulfil these.*	1 * per MVS	1-5
***OS Mission**: description of a role's scope or responsibility for performing Open Science activities, on behalf of a competence centre, organisation, or community.*	1 per MVS	10-50
***OS Activity**: set of actions that apply technical competences and soft skills towards desired Open Science outcomes, with varying levels of proficiency.*	2-5 per MVS	3-5
Essential skills and competences: *A list of one or more soft skills, plus one or more technical competences:* *Soft skill: personal attribute or aptitude required to perform an activity, and which is improved with practice in the activity.* *Technical competence: knowledge or skill required to perform activities in science, scholarship, stewardship, software, or data engineering, and to maintain the policy, legal, ethical and social conditions for desired outcomes.*	1-6 per activity	5-20
***OS Outcome**: Open Science capability, output or objective that a role may contribute to the implementation of by carrying out OS activities.*	1-3 per MVS	5-20
***Learning resource:** A persistent resource that has one or more physical or digital representations, and that explicitly involves, specifies or entails a learning activity or learning experience.*	0-10	

MVS for the emerging data professional roles (e.g. Data Steward) will include variations of the 'essential skills and competences' to indicate the proficiency levels that may be expected at different career stages. We propose to use the following definitions of these:

3.1.1 Proficiency levels

- Basic: awareness of the essential technical competences and soft skills required.
- Intermediate: knowledge and experience in applying relevant technical competences and soft skills, confidently and routinely with little or no supervision.
- Advanced: knowledge and experience in applying relevant technical competences and soft skills, for complex and specialist needs, with the ability to supervise others.

3.1.2 Career stages

1) Foundational stage/ PhD Student Open Science Practitioner (OSP1) [R1 - R2]
2) Intermediate stage/ Recognised Open Science Practitioner (OSP2) [R2-3]
3) Advanced stage / Leading Open Science Practitioner (OSP3) [R3 -R4]

These are synthesised from recent work by the EC Joint Research Council in the policymaking context (Schwendinger et al, 2022), and from the 4 levels of the European Framework for Research Careers (European Commission, 2011).

3.1.3 Notes

1) Learning resource definition is from the Learning Resource Metadata Initiative (LRMI)[1]
2) Relevant learning resources may be tagged/identified with the relevant MVS but they do not need to be listed in the MVS itself.
3) A model is proposed below in Figure 1, to illustrate how elements relate to each other and define these relationships as properties. It is based on the model defined for terms4FAIRskills.[2] The main differences are as follows:
    i) Mission is added, to be explicit about the scope of a role's function in relation to Open Science
    ii) Technical 'competence' is used instead of 'concept'
    iii) 'Open Science Outcome' instead of 'Data stewardship guideline'
    iv) Activities contribute to implementation of Outcomes

1. https://www.dublincore.org/specifications/lrmi/lrmi_terms/2020-11-12/#LearningResource
2. https://terms4fairskills.github.io/

v) Learning 'resource' instead of 'medium', so we can map the MVS to metadata standards for such resources, and allow these resources to be linked to MVS via shared terms in catalogues or registries that use the standards (e.g. in EOSC portal).

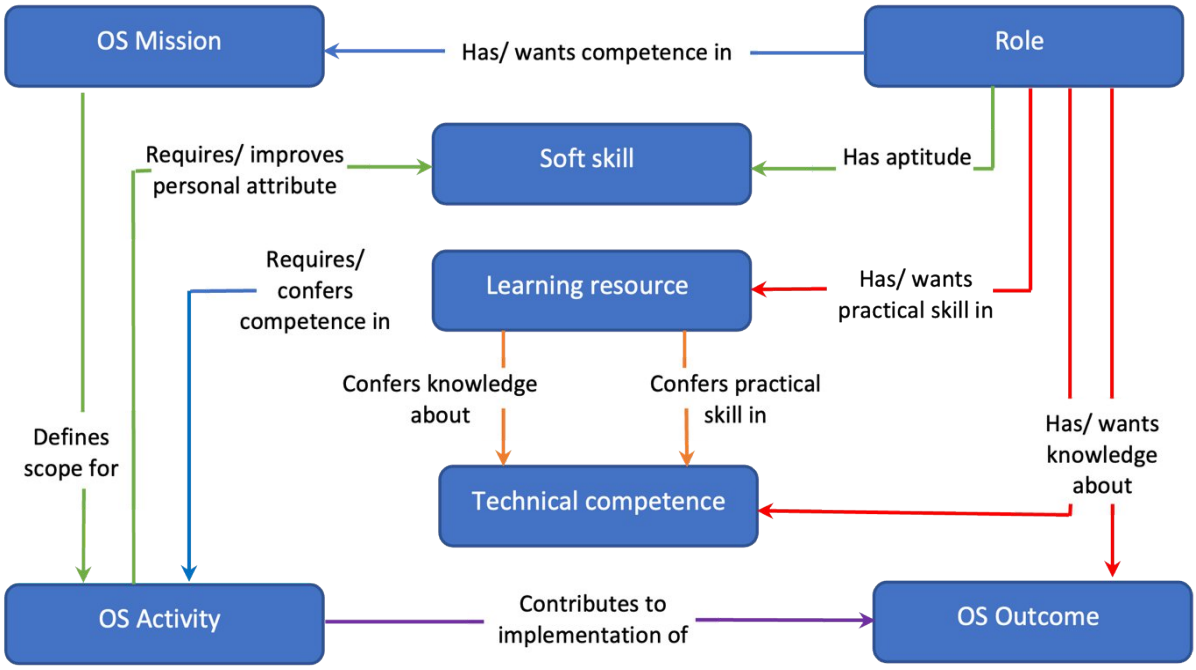

Fig.1 – Elements and Properties of a Minimum Viable Skillset

4 Next Steps

4.1 Defining roles for MVS and releasing an MVS catalogue

The initial set of MVS is scheduled for release through Skills4EOSC Deliverable D2.1 at the end of May 2023. This will cover at least 10 roles, the final number depending on two factors: the extent to which we find a need to group very similar roles into the same MVS and the extent to which we see a demand for further roles to be included in the initial set.

Figure 2 shows the overall set of roles we consider within scope, with those in progress highlighted (in orange).

4.2 Integrating ELSI Skills

Skills4EOSC is undertaking parallel work to identify ethical, legal, and social aspects of the skills profiles. This will be fully integrated into the Policymakers example given in section 2, and in the remaining profiles.

4.3 Keyword tagging of the MVS

We intend to tag each MVS with keywords from controlled vocabularies, to express in more concrete terms the relationships between an MVS and any existing learning resources that trainers and learners may wish to use with it. The two main sources of keywords that will be used are:

- Terms4FAIRskills ontology terms: these identify skills relating to activities that may be used to make data FAIR and keep it FAIR. As such they do not comprehensively cover Open Science. However based the substantial overlaps we propose to tag MVS at the 'activities' and 'outcomes' level with equivalent terms from the ontology.
- EOSC Future learning paths: these define various categories of EOSC actor and identify relevant roles that each require training in. We propose to tag MVS at the 'OS mission' level, to ensure that MVS users can make effective use of the EOSC Future learning paths and the training resources that these lead to.

Open Science and Scholarship
- Data Scientist
- Data Analyst
- Early Career Researcher
- Citizen Scientist

OS Coordination and Governance
- Research Policymaker
- Principal Investigator
- Project manager/ Lab coordinator
- Research Infrastructure Manager

OS Data Support
- Data Steward
- Data Curator
- Data Librarian
- Data Manager
- RDM Coordinator

OS Infrastructure
- Data Archivist
- Research Software Engineer
- Data Engineer
- Service Manager
- User Support Professional

OS Research Support
- Research Manager
- Trainer/ Educator
- Legal Advisor
- Ethics Advisor
- Information Professional
- Scholarly Communications Specialist

Open Societal Engagement
- Policymaker
- Knowledge Broker
- Citizen Scientist
- Civil Servant
- Undergraduate

4.4 Aligning with EOSC Association Task Force Deliverables

The Skills4EOSC work to describe role and career profiles based on Minimum Viable Skillsets resonates strongly with parallel work in the context of the EOSC Association, especially the Task Forces working under the umbrella of the Advisory Group on Research Careers and Curricula. The project has overlapping membership with several of these Task Forces and our own task will seek further engagement with their work as it becomes available.

4.5 Establishing MVS Authoring and Publishing Process

The initial set of MVS will offer profiles for a significant cross-section of EOSC Actor roles. However it is not intended to be complete, and further work to promote the format will be undertaken, to encourage collaboration with projects and initiatives that may benefit by adopting the format. In the interest of long-term sustainability of the approach we aim to produce authoring and review guidelines, and facilitate submission of MVS to an editorial board. Further details will be set out in the first deliverable of the project, D2.1.

5 Sources for MVS Development

The MVS include references to further sources of information, as noted earlier. A Zotero bibliography has been compiled for development of the MVS, and is available at the following link:

https://www.zotero.org/groups/4892313/task_2.1_landscaping_and_mapping_skills_to_professional_profiles/library

Compilation of this bibliography was helped substantially by the efforts of the RDA Professionalising Data Stewardship Interest Group, which published its landscape report during the same period. Their work is one of a number of references used in writing the current report, and listed in the next (final) section.

6 References

No	Description/Link
R1	EOSC Association (2022) Strategic Research and Innovation Agenda (SRIA) of the European Open Science Cloud (EOSC). EOSC Partnership. https://eosc.eu/sria
R2	Manola, N. et al. (editors); European Commission, Directorate-General for Research and Innovation (2021). *Digital Skills for FAIR and Open Science: Report from the EOSC Executive Board Skills and Training Working Group.* Publications Office. https://data.europa.eu/doi/10.2777/59065
R3	European Commission, Directorate-General for Research and Innovation (2011), *Towards a European Framework for Research Careers*. https://cdn5.euraxess.org/sites/default/files/policy_library/towards_a_european_framework_for_research_careers_final.pdf
R4	Schwendinger, F., Topp, L. and Kovacs, V., (2022) *Competences for Policymaking*, EUR 31115 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-53454-9, doi:10.2760/642121, JRC129623. https://publications.jrc.ec.europa.eu/repository/handle/JRC129623
R5	OBERRED (2022) Skills Framework https://oberred.eu/skills-framework/
R6	Norwegian Career Assessment Matrix (NOR-CAM) https://www.uhr.no/en/_f/p3/i86e9ec84-3b3d-48ce-8167-bbae0f507ce8/nor-cam-a-tool-box-for-assessment-and-rewards.pdf
R7	OECD (2020), "Building digital workforce capacity and skills for data-intensive science", OECD Science, Technology and Industry Policy Papers, No. 90, OECD Publishing, Paris, https://doi.org/10.1787/e08aa3bb-en
R8	Ayres, B., Lehtsalu, L., Parton, G., Ádám Száldobágyi, Warren, E., Whyte, A., & Zimmer, N. (2022). RDA Professionalising Data Stewardship - Current Models of Data Stewardship: Survey Report. Research Data Alliance. https://doi.org/10.15497/RDA00075
R9	Mijke Jetten, Marjan Grootveld, Annemie Mordant, Mascha Jansen, Margreet Bloemers, Margriet Miedema, & Celia W.G. van Gelder. (2021). Professionalising data stewardship in the Netherlands. Competences, training and education. Dutch roadmap towards national implementation of FAIR data stewardship (1.1). Zenodo. https://doi.org/10.5281/zenodo.4623713