EOSC WITHIN NATIONAL STRATEGIES FOR DIGITAL SKILLS
Gap Analysis Study

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Executive Summary

The Gap Analysis Study was commissioned by EOSC with the purpose to identify gaps and overlaps of existing national initiatives on Digital Skills compared to the envisioned EOSC Skills and Training goals and priorities proposed in the EOSC Strategic Research & Innovation Agenda (SRIA) initially launched on July 2020.

It is based on the preliminary landscape analysis for national Digital Skills initiatives in Europe which reviewed rather thoroughly 9 countries, i.e. Denmark, Finland, Greece , France, Hungary, Lithuania, The Netherlands, Portugal, Switzerland, that constitute the reference ground for the gap analysis. Therefore, the aim of the gap analysis is to examine and asses the performance of the countries under consideration, referred above, for the purpose of identifying the differences between their actual status and where EOSC SRIA goals on digital skills and training are focused on, which are targeted through the following priorities

Priority 1: Developing the next generation of data/EOSC professionals.

Priority 2: Educating students and researchers.

Priority 3: EOSC to become a trusted and long-lasting knowledge hub of learning materials and tooling

Priority 4: Developing an EOSC leadership programme to foster the right policy environment for skills and training.

A specific model for conducting Gap Analysis has been developed, recognizing two major fields of national strategies to be considered: the Digital Skills and Training and the Open Science. Furthermore, in order to assess the performance of every country under consideration, four dimensions have been elaborated as basic components for the design, implementation and delivery of these two pillars of a national strategy, meaning

- People, entailing the Actors of EOSC according to SRIA, that are being benefitted or immediately affected by the policies and interventions in the field

- Processes & Governance, for planning, design, implementation, evaluation, delivery of related policies

- Policies, meaning formal integral policies, related policies that address the specific field, national and other stakeholder initiatives having essential impact in the field, and including legislation and institutional framework

- Technologies and Infrastructures, including digital platforms and repositories, that enable the policies implementation, encourage participation of the People, and facilitate policy and interventions implementation

With a view to cover all the issues entailed in the SRIA Skills and Training Priorities, various questions, which have been organized under the above mentioned model, have been developed for supporting countries performance assessment. In parallel, 4 maturity levels (Awareness, Exploring, Developing, Integrated) associated with numerical grades (1,2, 3, 4 respectively) have been specified, with a view to rank in a unified way the thorough assessment of the performance per question, per strategy pillar, pillar dimension and overall.

By adapting the above model, some important findings came up at the aggregate level that leaded to identify the main gaps. Regarding the Digital Skills strategy pillar, and especially the people dimensions, very few curricula related to EOSC recommendations on advanced, core expertise data skills for scientists were identified. Even though an important activity is undergoing in the related Lifelong Learning (LLL) policies, little advanced training was identified to be targeting scientists, while there is no evidence for the establishment of National

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Competences Framework related to digital skills. As to the established formal policies, there is not a stand-alone national strategy and policy for digital skills in almost all countries assessed. Although, various initiatives on digital skills and training are partially identified, in the national strategies for LLL as well as in strategic plans for artificial intelligence and cybersecurity, while as far as it concerns to initiatives on digital skills implemented by various stakeholders, no coordination has been identified in the consolidation of their outputs to policy level or even to initiative level. From a governance mechanisms point of view for the upgrade of digital skills, it seems to exist a fragmentation, and different approaches and techniques for digital skills and competences' interdisciplinarity are adopted by the various countries, which are not institutionalized though any legislative / regulatory framework. In particular, the National Coalitions for Digital Skills have a rather limited role in coordinating the efforts for digital upskilling. There is a wide disparity between the different National platforms on training provision under which a "learning environment" is conceptualized or materialized in the various countries studied and this is probably due to the fact that there is no clear definition of scope, a national gap to cover or a "blueprint" to be followed. Although, there is a number of examples supporting the provision of content for the upgrade of digital skills, the 'owner' in each country differs in status, thus leading to different approaches to the planning and the development of the content

Regarding the strategy pillar addressing Open Science, the vast majority of cases the courses related to open science and open data practices are actually part of an ICT or business-related curriculum (spearheaded by courses related to data analytics and data science) and not "fit for purpose" courses towards Open Science that actively focus for example on educating on and promoting FAIRness principles. It appears to be a significant gap in almost every country surveyed on Rewarding process for career researchers on open science practices. Even though, most countries have a very firm and developed process for the career advancement of researchers, usually under a formal legal framework, what is clearly missing is a set of guidelines or similar support measures to help policy makers develop and formalize clear career pathways that are custom designed to target researcher profiles close to Open Science principles. Several countries are developing specific mechanisms and measures to promote collaboration between academia, industry and government as well as mobility between researchers from foreign countries, but without providing strong coordination or support to ensure sustainability. Regarding advanced learning environments applying open data principles, only few countries have consolidated available resources in such an organized and accessible way as to be considered formal, monitored and managed learning environments. Considerable difference has been observed, however, in the degree to which the learning infrastructures are available and utilized specifically for Open Science purposes, bringing to light a gap to be bridged.

Concerning the policies on open science, a third of the countries surveyed have moved forward with an integrated and well-planned open science policy, while the majority of the countries have very recently set out a national policy on AI and recognize the importance of incorporation of cybersecurity in their national strategies, putting a priority on the training and skills development in this respect. It is worth noticing that the Initiatives on open data/science, AI, cybersecurity tend to consider EOSC principles. As far as Governance mechanisms concerns, the issue of Data Ethics is very rarely tackled while it is under investigation the broader adaptation of open science policies by regional or national organizations even in cases of an integrated governance mechanism. Almost half of the countries of the sample are far from establishing legislation on open science / access or open data, while the one third of these, seem to perform well and efficiently regarding cooperation among research – public – private domains, fostering the application of research and innovation to the public services and the industry products and services, having set up companies and governance structures of blended type.

Based on the above findings, several gaps have been identified which include:

1. Lack of digital core expertise; not enough adequately trained people to meet current demand for open and data intensive science needs, let alone increasing demand, nor is there a concerted effort in skills and capacity development which is a crucial element to build and exploit the full potential of the EOSC.

2. Lack of a clear definition of digital professional profiles; Data scientists, data stewards, data curators and research software engineers are some of the different actors needed for the development of data-driven, data intensive science.

3. Existence of disparities; Although the reliance on the emerging new scholarly data and software support profiles are cornerstone elements in the implementation of FAIR data mandates there is a very diverse and uneven picture across Europe;

4. Lack of expertise: There is not sufficient support to the technological development for "FAIR-by-design".

5. Lack of legal/IPR and data ethics expertise.

6. Lack of interdisciplinarity, coordinated and coherent approaches to skills and competences building and for education and training provision.

7. Fragmentation in training resources; Quality and FAIRness of training and learning resources remains a challenge.