EOSC WITHIN NATIONAL STRATEGIES FOR DIGITAL SKILLS

GAP ANALYSIS REPORT

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Abbreviations

AC	Associated Countries
BBSc	Business Balance Scorecard
DG CNECT	Directorate-General for Communications Networks, Content & Technology
DG EAC	Directorate-General for Education & Culture
DG GROW	Directorate-General for Internal Market, Industry, Entrepreneurship & SMEs
DG RTD	Directorate-General for Research & Innovation
EC	European Commission
EOSC	European Open Science Cloud
ESCO	European Skills, Competences, Qualifications & Occupation
EU	European Union
ICT	Information & Communications Technology
IT	Information Technology
LLL	Lifelong Learning
PESTEL	Political, Economic, Social, Technological, Environmental & Legal
QA	Quality Assurance
SRIA	Strategic Research & Innovation Agenda
SWOT	Strengths, Weaknesses, Opportunities & Threats
TGB	Technopolis Group Belgium

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1 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 Competences Framework related to digital skills. As to the established formal policies, there is not a stand-alone

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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.

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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.

2 Background Information of the GAP Analysis

2.1 Gaps assessed by EOSC "Skills and Training" Working Group

The **"Skills and Training" Working Group** is working on building competence (skills) and capabilities (training) for EOSC. The goal is to provide a framework for a sustainable training infrastructure to support EOSC in all its phases and ensure its uptake. To do so, the WG has identified several gaps which include:

8. 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;
9. 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;
10. 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;
11. Lack of expertise: There is not sufficient support to the technological development for "FAIR-by-design";
12. Lack of legal/IPR and data ethics expertise;
13. Lack of interdisciplinarity, coordinated and coherent approaches to skills and competences building and for education and training provision;
14. Fragmentation in training resources; Quality and FAIRness of training and learning resources remains a challenge.

According to the above-mentioned gaps, EOSC will target activities to improve the skills of researchers and other relevant EOSC stakeholders, as well as improve the training offered. An important objective will be for EOSC skills and training to permeate educational curricula and competence centres. The priorities according to which EOSC main target will be achieved comprise:

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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.

On the above framework, GAP Analysis should provide the basis for assessing:

1. Data intensive science and open science: role and connection with public and industry sectors.
2. Data profiles in research track. Role of university curricula in building profiles/ capacities.
3. Role and placement of EOSC related skills in institutional, national, thematic, industry Digital Competence Centres in the wider national scheme. Special consideration for HPC and AI related competence centers is required
4. Best use of existing human and technical infrastructure (e.g., libraries, data centres).

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2.2 Objectives of the Report

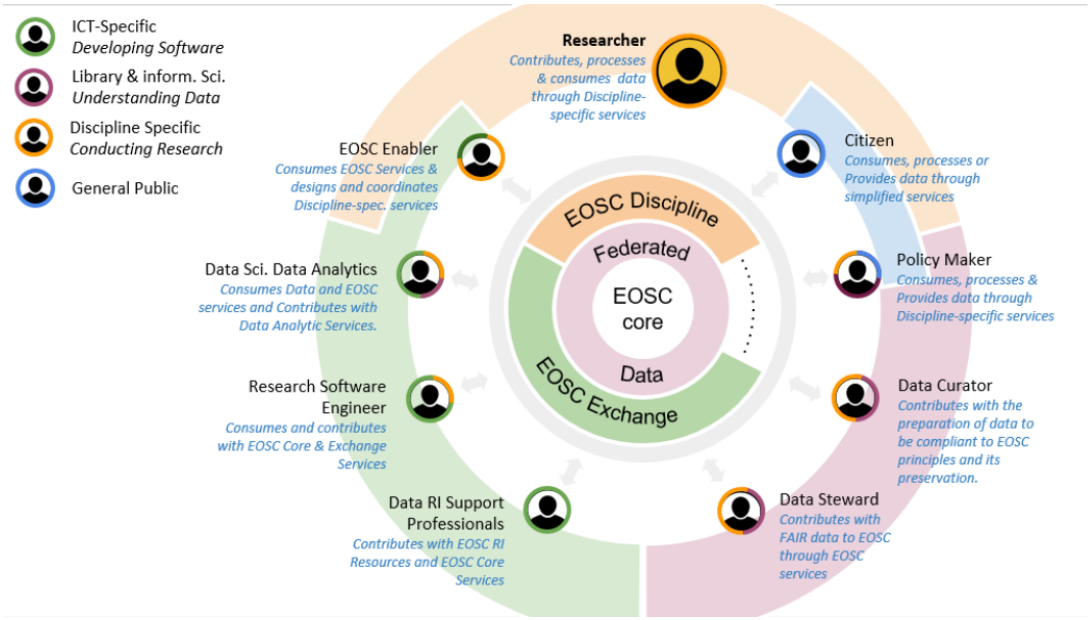
The objective of the GAP Analysis report is to identify gaps and overlaps of existing national initiatives on Digital Skills compared to the envisioned EOSC Skills and Training goals and priorities proposed in the EOSC Strategic Research & Innovation Agenda (SRIA).

2.3 GAP ANALYSIS-Methodology

2.3.1 Methodological framework

The gap analysis aims to examine and asses the performance in the countries under consideration, for the purpose of identifying the differences between their actual status and where EOSC SRIA goals on digital skills and training are focused on.

In order to leverage the potential of EOSC for open and data-intensive research, a key challenge for Europe is to ensure the availability of highly and appropriately skilled people with an excellent knowledge of standards and best practices for delivering, using, sharing, analysing open and FAIR data, and applications and tools (services). Therefore, it is required a concerted effort in education and training to develop and up-skill human resources, in the field of data science that includes data analytics, statistics, machine learning, data mining and data management, and thus fostering open science practice in research, industry and public sector. In essence, an emerging need calls for the development of a labour force qualified with the adequate skill profiles, as those indicated by the EOSC Ecosystem, which are called as EOSC actors, covering the following knowledge areas (i) the data intensive science from the software/infrastructure perspective, (ii) the data sharing and re-use processes, (iii) the discipline domain exploration and analytical view, (iv) the public's contributions into the EOSC value chain. The following diagram presents this grouping of EOSC actors.



Exploring EOSC SRIA aspects for Gap Analysis model development

EOSC SRIA sets out a framework of priorities towards the achievement of its goals in various sectors, indicating prerequisite conditions as it is the Training and Skills area, demonstrates barriers and major gaps in the European

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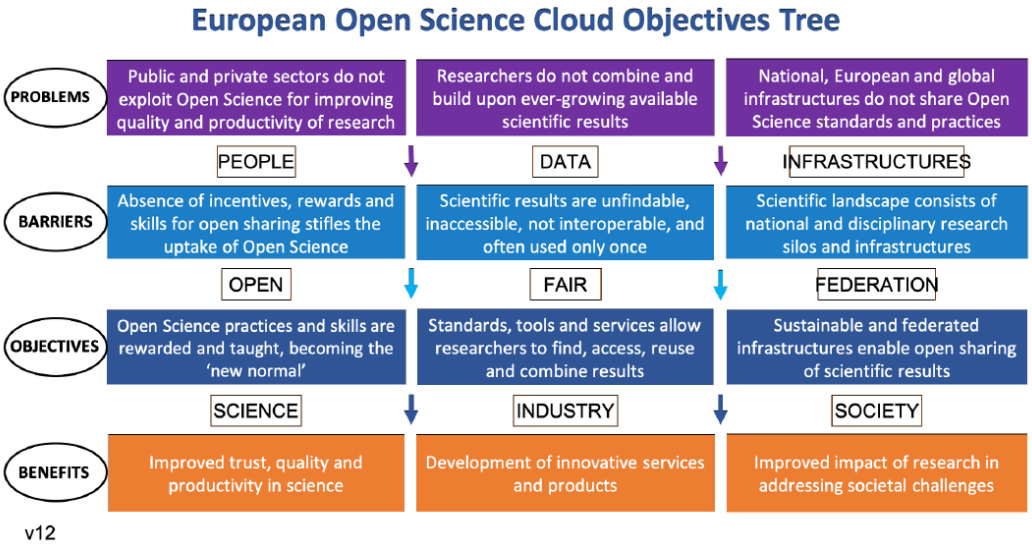
countries landscape that need to be addressed or overcome. With the aim to tackle all the aspects that will generate the specific fields to be explored by the Gap Analysis, a further analysis on the SRIA goals and priorities focusing on Skills and Training issue, is outlined below.

In fact, as regards to EOSC, building the European deployment of open science requires addressing three main challenges relating to people (scientists and data professionals), knowledge (documents, data and software) and infrastructures:

- Convincing scientists that open science will allow them to do better and more rewarded research;
- Enriching publications, data and software in order to make them usable by machines and scientists;
- Federating infrastructures in order to make them all available to scientists across borders and across disciplines;

that lead to the EOSC objectives depicted in the EOSC Objectives Tree of the following picture:



Since, the GAP Analysis aims to depict the distance between the actual situation and the new era implementing the EOSC objectives, it requires to investigate for every country case, the existence, the extend and any other implications of the barriers addressed in the above EOSC Objectives Tree, in relation to the skills and training field.

- In fact, based on the analysis of objective, the following issues have to be tackled, from the aspect of training and skills;
- Rewards, incentives and skills for Open science practicing, including infrastructures for open research and scientists' motivation;
- Standards, tools and services that allow researchers to find, access reuse and combine results, regarding research and public data, in a FAIR and open way, avoiding SILOs.

Besides, skills and training is approached by SRIA as a boundary condition, meaning that it constitutes a prerequisite to implementing the EOSC ecosystem. In particular the priorities that have been specified under Skills and Training field form the sound base for an ideal policy roadmap that could be localized to every country with the aim to achieving harmonization with SRIA, taking into account its status on digitalization, research and open science, digital literacy of its population, education and active labour market policies, as well as the broader

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economic and social development factors. In order to address the aspects for structuring the Gap Analysis model, which come out from the outlined priorities and targets of SRIA regarding Skills and Training (referred in section 6.4, p. 22, 1.5.1), and with the aim to be effective by producing a valuable and substantial outcome, aligned with the actual reality, we take into consideration the overall actual performance of the countries based on the results of the Landscape Report including the detailed facts referred in the Country Reports, as well as the major Gaps presented in SRIA in relation to the Skills and Training.

Therefore, the following issues are emerged to be further explored by the Gap Analysis, which are presented along with the SRIA priorities:

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

1.1 Education on EOSC knowledge fields

1.2 Lifelong learning on EOSC knowledge fields and digital skills

1.3 Recognition (evaluation and reward mechanisms) of EOSC professionals and researchers

1.4 Professionals digital career paths development

1.5 EOSC professionals' mobility to industry and public domain

1.6 Standardization of digital skills profiles

1.7 Recognition and accreditation models of digital skills

1.8 Quality assurance framework and certification mechanisms for trainers and trainees to ensure continuous improvement, accountability and sustainability, in alignment to the technology progress and any social or economic emergencies

1.9 Digital competence centers, networks of experts or any other alliances (working on the co-development of common practices and tools, stimulating and promoting the mobility of students, digital professionals and domain experts, and creating mobility opportunities beyond EOSC such as industrial internships).

Priority 2: Educating students and researchers

2.1 Higher education curriculum on digital skills on EOSC knowledge field aligned with industry demand

2.2 Training of researcher in open science principles

2.3 Lifelong learning and upskilling for citizens and researchers on EOSC knowledge field

2.4 Bridging researchers to industry

2.5 Advanced learning environments on EOSC knowledge fields

2.6 Recognition (evaluation and reward mechanisms) of EOSC researchers

2.7 Networks of researchers and EOSC professionals in open science

2.8 Mobility of researchers

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

3.1 Quality assurance and certification framework for learning material for lifelong learning, ensuring up to date with technology and policy changes

3.2 Framework for lifelong learning pathways for different data/EOSC profiles

3.3 Training/Educational Repositories on EOSC knowledge filed as part of digital competence centers or universities entities

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3.4 Open learning and communication environments/platforms applying open science principles

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

4.1 National policies and initiatives on open/data science

4.2 National policies and initiatives on digital skills

4.3 National policies and initiatives on emerging technologies (AI, HPC, Cybersecurity etc)

4.4 Linking universities, research, public domain and industry

2.3.2 Development of Gap Analysis Model

The thematic area of the evaluation to be performed entails two major pillars of national strategy, the Digital Skills and Training and the Open Science. In order to assess the performance of every country in the field, 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 as presented in the above schema, 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

According to the issues emerged by the SRIA Skills and Training Priorities, which outlined in the previous section, specific questions have been developed to cover these issues and have been organized in the structure of the gap analysis model that has been analyzed above. The following table aims to depict this cross-relation between questions developed and the SRIA priority issues, organized in the two pillars of strategies:

Country		Questions Related to the item	Maturity Level
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	
		Is there any accreditation system on data scientists, especially for public employees?	
		Are digital skills profiles standardised?	
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	
		Is there any legislation on digital skills?	
	Policies	Is there a formal policy on digital skills and training?	
		Are there initiatives included in other national policies on digital skills and training?	
		Are there any important initiatives on digital skills by other stakeholders?	
		Are there any national platforms on training provision?	

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Country		Questions Related to the item	Maturity Level
	Technologies & infrastructure	Is there any official content provider?	
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	
		Is there a rewarding process for career researchers on open science practices?	
		Is there any process for career development for researchers?	
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	
		Is there any legislation on open data / science/ AI?	
		Is there any cooperation of the private sector, the public sector and the research?	
	Policies	Is there a formal policy on open data or open science?	
		Is there any formal policy on AI?	
		Is there any formal policy on Cybersecurity?	
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	
		Are there any important initiatives on open data/science, AI, cybersecurity?	
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	

In the last column of the above table, there is the section of the Country Report that most probably provides the answer to the question.

The assessment of the country performance in each issue reflected in the question, is based on an evaluation of the related maturity level. In particular, four maturity levels have been specified as follows:

MATURITY LEVEL		
Awareness	*Grade 1*	There is an understanding of the need for and the benefits of the issue but nothing concrete has yet happened
Exploring	*Grade 2*	The issue is explored thought initiatives (even pilot ones) at any level (national, regional, communities, etc.) and/or by any level of stakeholders (university, local authority, government etc.)
Developing	*Grade 3*	Key stakeholders across different levels are committed to supporting and implementing the issue. Planning efforts for new policies and strategies are in place and/or part of those are practicing
Integrated	*Grade 4*	Practices, technologies and policies are regularly reviewed and updated as being part of an integrated ecosystem

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3 GAP Analysis per Country

3.1 Denmark

Denmark		Questions Related to the item	Maturity Level	Documentation
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	Developing	There is a recently set up, three-year BSc in Data Science by IT University of Copenhagen (ITU).
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Integrated	From 2015 onwards, it has become a requirement that everyone over 25 should have a specially organised and shortened adult vocational training programme (EUV) in which digital skills is a discrete thematic module, via the FVU-Digital (revised on 2019), even though it leaves behind the adults with low levels of qualifications, while it enhances digital competences for teachers, constituting a background for specific modules in the educational diploma curriculum . The Digital Strategy 2016-2020 puts emphasis on the Digital Competences and the continues training (especially on digital security) for Public Employees. The Danish Technology Pact is a national collective effort engages adults, children and young people in technical and digital education programmes especially on STEM skills.
		Is there any accreditation system on data scientists, especially for public employees?	Developing	Denmark has a bipartite accreditation system. A) The Danish Accreditation Institution, that is an academically independent authority, plays a crucial part in ensuring the quality and relevance of higher education programmes across the country. B) The various qualifications offered in the Danish education and training system are organized in accordance with the national qualifications framework for lifelong learning, which launched on 2010, and has eight levels covering all levels from the leaving examination of primary and lower secondary school to the PhD degree, covering VET as well. Although, there is no formal integral digital competence framework, discrete initiatives exist as "Digital Competency Wheel 1 and 2" by Center for Digital Dannelse based on DigComp.
		Are digital skills profiles standardised?	Exploring	No indication exists on a standardisation of digital skills profiles.
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	Developing	No one organisation or other authority can claim to be the national coordinating mechanism for the digital skills policies. Although, some initiatives, entities and partnerships perform monitoring and coordinating work

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Denmark		Questions Related to the item	Maturity Level	Documentation
				on digital skills policies such as the Danish Technology Pact, the Danish National Coalition and the Teknologipagten (the Technology Covenant).
		Is there any legislation on digital skills?	Integrated	New Legislation named 'Digital-Ready' enacted in 2018.
	Policies	Is there a formal policy on digital skills and training?	Developing	A strategic priority for Denmark is that "Everyone should be equipped to operate in the digital transformation", although no national strategy on Digital Skills is in place, but policies on Digital Skills are addressed by the Digital Strategy 2016–2020 : A Stronger and More Secure Digital Denmark (2016), the Strategy for Denmark's Digital Growth, the Danish Cyber and Information Security Strategy (2018), the National Strategy for Artificial Intelligence and the Research and Innovation Strategy.
		Are there initiatives included in other national policies on digital skills and training?	Integrated	Many innitiatives are part of the national policies. As an example, an initiative of the Strategy for Denmark Digital Growth (2018), is the Danish Technology Pact (Teknologipagten), that is led by the Ministry for Economic Affairs, formed as a partnership between the Danish government, the business community and educational institutions.
		Are there any important initiatives on digital skills by other stakeholders?	Integrated	Many initiatives are in place or have been completed in the near past, while the most important ones are the Digital Hub Denmark and the SME Digital Initiative.
	Technologies & infrastructure	Are there any national platforms on training provision?	Developing	Denmark has not only covered digital skills in the VET curriculum but has also created courses solely focused on digital and ICT professions, as it is the IT-formidler.dk and the ITTA platform. Although, courses accreditation system is actually lacking.
		Is there any official content provider?	Developing	The DTU Learn for Life centre, established in April of this year, aims to become the Technical University of Denmark's central platform for continuing education, and will provide knowledge, support and assistance to partners about lifelong learning.
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Developing	There is a recently set up a three-year BSc in Data Science by IT University of Copenhagen (ITU). Apart from Data Science MSC courses available in some universities which include Data Stewardship elements, there are also some courses specifically oriented towards Open Science, such as the FAIR data stewardship course offered by DeiC.
		Is there a rewarding process for career researchers on open science practices?	Exploring	All the universities have local research support units, who in various degrees support researchers with their award applications and reporting. The Elite Research Initiative is the unifying brand name for a series of initiatives designed to honour and support the biggest research talents in Danish research.

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Denmark		Questions Related to the item	Maturity Level	Documentation
		Is there any process for career development for researchers?	Integrated	Concerning the career development of researchers, the Danish academia is relatively competitive and open to external researchers, although informal contacts (with Danish insiders) are still important at the moment of getting a position. A framework of the academia positions is set up. The Academic Job Bank (jobbank.dk) and Euraxess Denmark (euraxess.dk) are the main portals offering jobs related to the Danish Academia.
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Integrated	Danish Centre for Applied Artificial Intelligence supports access of companies to human resources (researchers). The Danish Technology Pact is a national collective effort with the business domain promoting training. Universities held performance contracts for 2015-2017 that included further performance targets on knowledge transfer activities to the business domain.
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	Developing	The public research is organised under the Ministry of Higher Education and Science, which manages and monitors the Danish Open Access strategy. Danish e-infrastructure Cooperation (DeiC) coordinates the national digital research infrastructure as an umbrella virtual organization for the Danish universities. National Forums for Data Management was formed in 2015, with representatives from the Danish universities and national libraries and a secretariat from DeIC to promote academic and research initiatives in research data management within universities, and link them in a national and international cooperation. The government created a Data Ethical Council in early 2019 to facilitate a public debate about i.e. the use of technology, data and AI in both the public and private sector. Public Danish funders with an Open Access Policy include Danish Council for Independent Research (DFF), Danish National Research Foundation, Danish Ministry of Science, Technology & Innovation, Innovationsfonden and Nordic Council of Ministers.
		Is there any legislation on open data / science/ AI?	Developing	In May 2017 the Danish local, regional and central governments agreed on a common Framework for Federal Digital Architecture (FDA) including a number of reference architectures that focuses on data sharing, cross-organisational processes and a coherent IT-infrastructure. In spring 2019 guidelines on architecture description including common rules for concept and data modelling v.2.0 were established.
		Is there any cooperation of the private sector, the public sector and the research?	Integrated	There is a strong link between research community and the industry, implemented via partnerships such as the Technology Pact and the Digital Hub Denmark, while the Danish Centre for Applied Artificial Intelligence aims to support Danish companies on AI, via providing easy access to cutting-edge expertise in machine learning, artificial intelligence and big data by supporting networks and collaboration in the field and offering access to data platforms and human resources. Denmark has quite large private research foundations such as the Independent Research Fund Denmark, the Innovation Fund Denmark, the DNRF, the Carlsberg Foundation, the Novo Nordisk Foundation that do not have open access policies. The Althouhg, Lundbeck company, the Lundbeck Foundation and the Velux Foundations: Villum Foundation and Velux Foundation have a clear policy on Open Access, as well as the publicly funded research foundations.

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Denmark		Questions Related to the item	Maturity Level	Documentation
	Policies	Is there a formal policy on open data or open science?	Developing	Denmark does not have an integrated Open Science Policy. Although, it is in place a national Open Access Strategy and a national strategy for Research data management. Six out of eight higher-education institutions have an Open Access policy, while the seventh is working to implement a more comprehensive Open Science policy.
		Is there any formal policy on AI?	Integrated	The Danish government launched its National Strategy for Artificial Intelligence on 14 March 2019, which puts emphasis on an ethical and human-centred approach to artificial intelligence.
		Is there any formal policy on Cybersecurity?	Integrated	The Danish Cyber and Information Security Strategy (2018) with 25 initiatives aims to strengthen government security, improve the competences of the population, and ensure more coordinated efforts in the information security space. Iin early 2019 the government launched strategies to improve cyber and information security
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Integrated	Utilising data as a driver of growth in trade and industry and strengthening cybersecurity in companies are key priorities for The Strategy for Denmark's Digital Growth.
		Are there any important initiatives on open data/science, AI, cybersecurity?	Developing	Some initiatives focus on up-skilling for Science and Research, such as the Danish inter-institutional project Skills and Competencies for Open Science and Digital Literacy in Danish Research Libraries ran from March 2018 - May 2020, and the Digital Skills for Library staff and Researchers LIBER Working Group
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	Developing	The goal is 100% Open Access to publicly funded research publications by 2025. Each of the 8 Danish universities has their own local Open Science Support Unit, typically based at the university libraries.
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	Developing	One central national aggregator collects publication data from Danish universities primarily is the Danish National Research Database (forskningsdatabasen.dk) . Mainy data repositories are in place and a quite large number of digital infrastructures & services available for research purposes. Denmark is profited from NeIC activities regarding cooperation on research and research infrastructure across the Nordic region. Danish universities make also agreements with publishers bilaterally, there are no national consortia agreements to publishing.

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3.2 Finland

Finland		Questions Related to the item	Maturity Level	Documentation
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	Developing	Many Universities offer MSc and courses on data science. Digital Finland Framework (2018) ensures future-oriented digital skills for all, by encouraging the use of Mass Open Online Courses (MooC) and the train-the-trainee approach for digital skills in education. The Artificial Intelligence Programme 2025 and the Cyber Security Strategy promote Higher education on AI and Cyber Security, respectively. CSC offers also versatile and high-quality training in scientific computing, data management, and information networks.
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Integrated	Vocational Training in all sectors is very well developed in Finland, being inclusive for all target groups (Adults, Students, Employees, Migrants etc) and are based on a personal study plan and accompanied by competences assessment. The ongoing strategies on AI and Cybersecurity recognise the need to enhance related skills via vocational training models.
		Is there any accreditation system on data scientists, especially for public employees?	Developing	No formal certification or accreditation framework to cover digital up-skilling processes and outputs exists actually. Although, the ongoing work for the development of Open Science/Data and digital transformation policies, aiming to be concluded by mid next year, will address the issue at least for researchers. Many Masters degrees on Data Science are offered via the universities and discrete courses by VET providers
		Are digital skills profiles standardised?	Developing	Although ICT industry is a principal export sector for Finland, there is no indication of a formal framework on profiles for digital professionals. Even though, one of the main priorities in the public sector is to develop the digital-based curriculum, new learning environments and digital materials at comprehensive schools as well as an expansion in digitising public services.
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	Developing	No one central authority carries on the integral national responsibility for digital skills planning and implementation, and this role is split among national authorities as its is the Finnish National Agency for Education and the Ministry of Education and Culture. Although, at present, national working groups and panel of experts are working on the development of the Transformation 2030 Strategy for researchers,

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Finland		Questions Related to the item	Maturity Level	Documentation
				and the Open Data Policy, producing meantime recommendations referring to digital skills competences and training.
		Is there any legislation on digital skills?	Integrated	Liberal Adult Education Act has been revised on 2018. There no special legislation on digital skills
	Policies	Is there a formal policy on digital skills and training?	Developing	There is no integrated policy on digital skills, although digital skills policies are entailed in other digital policies such as the Digital Finland Framework, the Artificial Intelligence strategy, The Digitalisation, Experimentation and Deregulation programme for public sector ICT, and the digital transformation programme for the regional government, health and social services reform. Furthermore, policies for digital upskilling on data science are under development with deadline by the end of 2021
		Are there initiatives included in other national policies on digital skills and training?	Integrated	Many national programmes are in place funded by ministries with the support of the Finnish Innovation Fund Sitra on educational content provision and the digital upskilling for adults, including weaker groups of the population, as well as governmental projects as "The Software Robotics by the Finnish Government Shared Services Centre for Finance and HR"
		Are there any important initiatives on digital skills by other stakeholders?	Integrated	Many initiatives are carried out by schools, vocational institutions, educational institutions, funded by specific projects.
	Technologies & infrastructure	Are there any national platforms on training provision?	Developing	No one national platform exists for providing courses on enhancing digital skills for all. Even though it is worth mentioning Digivisio that is a joint project of all Finnish higher education institutions which opens up national data resources for learning for the use of the individual and society and the long-term digital television
		Is there any official content provider?	Developing	In 2030, Finland plans to have an open and recognized learning ecosystem, which will also benefit both research and innovation activities and working life.
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Developing	Most of the universities in Finland offer Master Degrees in Data Science. AI and Cybersecurity strategies promote open and data science training and skills enhancement
		Is there a rewarding process for career researchers on open science practices?	Developing	Well established model on academics' promotion is established
		Is there any process for career development for researchers?	Integrated	The researchers career profiles are well described along with the requirements. Funding comes mainly from public sources and research is mainly offered by universities. Academy of Finland, EURAXESS Finland, https://www.euraxess.fi/, and universities websites provide information and assistance to mobile researchers.
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Integrated	Since collaboration between research, public and private domain is enforced, mobility mechanism is well developed. A lot of work regarding mobility and skills recognition is being conducted by the Nordic Alliance such as it the recently signed Ministerial Declaration Digital North 2.0 (on 29.09.20) that intents

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Finland		Questions Related to the item	Maturity Level	Documentation
				to increase mobility of employees and researchers, promote data-driven innovation and a fair data economy
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	Integrated	The Digital and Population Data Services Agency, launched this year, leads the way, reforms society and supports citizens in their interaction with public administration. Open Knowledge Finland (OKFI), founded in 2012, is a registered not-for-profit association, having members individuals, companies and other organizations, with the aim to promote opening and usage of open knowledge and advance development of open society in Finland. FinnOA is also an unofficial network of the people interested in enhancing open science. Ministry of Education and Culture is funding national level open science activities coordination done by the Federation of Finnish Learned Societies
		Is there any legislation on open data / science/ AI?	Developing	Finland has set in place a set of legislation concerning related digital governance issues such as Act on the Openness of Government Activities, Act on Shared Support Services for eGovernment, Act on Secondary Use of Health and Social Data, Act on Public Administration Information Management, Act on the Information Management Governance in the Public Sector
		Is there any cooperation of the private sector, the public sector and the research?	Integrated	The innovation system is based on intensive collaboration between universities and industry (ranked 2nd in the world). The most important mechanism for joining research to industry, is SITRA, while CSC is a non-profit state enterprise, national research system, providing high-quality information technology services to the government. The Finnish Academy is a funding agency that promotes open science. The National Node of Research Data Alliance (RDA) is hosted at CSC – IT Center for Science Ltd.
	Policies	Is there a formal policy on open data or open science?	Developing	Promotion of open science and research is a joint effort by the entire research community, having setup actually governmental expert panels on Culture of open scholarship, Open data, Open access, Open education, which produce recommendations (as the Finnish Declaration of Open Science and Research 2020–2025) in compliance to EOSC principles. Finland's Digital Transformation 2030 Strategy for research community is actually under development. Other policies on Open Science are the Policy for Open Access to Scholarly Publications that is actually in planning stage, the Policy for Open Scholarship, the Policy for Open Access to Research Data and Methods, and the Policy for the Open Education and Educational Resources
		Is there any formal policy on AI?	Integrated	The Artificial Intelligence Programme 2025 launched on 2019, gives also special attention to the field's innovation activities, preparedness for changes to working life, increasing education and upgrading the qualifications of those in the labour market
		Is there any formal policy on Cybersecurity?	Integrated	Finland's Cyber Security Strategy ws set up for 2017–2020 and it is now under reform.
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Integrated	The Digital Finland Framework aims to ensure world's best innovation and business environment for companies seeking to develop innovative products, services and solutions

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Finland		Questions Related to the item	Maturity Level	Documentation
		Are there any important initiatives on open data/science, AI, cybersecurity?	Developing	Especially on AI, it is worth mentioning the expending features of the virtual assistant Aurora, the free online course Elements of AI Course by Finnish Center for Artificial Intelligence (FCAI) and the job tech company Headai
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	Integrated	The platform Fairdata.fi offers guidance on open science principles application. Courses are offered for researchers on open science via Open Science: tutkijoiden ja tutkimushallinnon peruskurssi verkko-opiskeluna and MOOC: Avoimen tieteen verkkokurssi portals. The Library of Open Educational Resources (OER) aoe.fi, provides sharing facility and access to open educational resources from all levels of education.
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	Integrated	The platform Fairdata.fi offers metadata tool, research dataset finder, storage areas of digital information for tens or even hundreds of years and for actual use, constituting the central point for research work applying open data science principles. The https://findocnet.fi/ is another portal enabling research work for all researchers along the country. Finlands is profited from NeIC activities regarding cooperation on research and research infrastructure across the Nordic region. FinELib is a consortium of Finnish universities, research institutions and public libraries, that negotiates e-resource license agreements for the Finnish scholarly community. Finnish Social Science Data Archive (fsd.tuni.fi) promotes open access to research data as well as transparency, accumulation and efficient reuse of scientific research, by implementing the FAIR data principles. The Finnish National Board on Research Integrity (TENK, tenk.fi), appointed by the Ministry of Education and Culture, promotes learning issues and brings together various other sources of research

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3.3 France

France		Questions Related to the item	Maturity Level	Documentation
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	Developing	In France there are a number of academic courses related to Data Science and Engineering, Digital Marketing and Data Science, Data Science for Business, Digital Transformation, Public Health Data Science in terms of MSc. Also, there are academic curricula in data analysis and data mining. Several related courses are embedded within other curricula.
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Developing	Grande École du Numérique was established in September 2015, as a multistakeholder partnership that aims to promote development of innovative ICT training offers outside of the business schools and technical universities evaluation, based on the Digital Competence Framework for Citizens. France also performs well in the Digital public services dimension thanks to the high number of e-government users and showing progress in the provision of digital public services for business. The digital transformation component of the country's public service modernisation programme ('Action Publique 2022') was launched in October 2017 and notably aims to digitise all public services by 2022 (DESI 2019).
		Is there any accreditation system on data scientists, especially for public employees?	Developing	French Government has endorsed a Digital Competence Framework System based on DigiComp 2.0 to develop, measure, and certify digital competences for all. In this framework, France has developed the PIX platform that allows all citizens to evaluate and also certify their digital competence. In 2019, France set up a national framework for digital competences (Framework for digital competences) using the European Digital Competence Framework, which covers education levels from primary school to university. This adds to the existing PIX platform for digital skills.
		Are digital skills profiles standardised?	Developing	MScs in data science are accredited level 7 of the RNCP "Répertoire National des Certifications Professionnelles", a government recognition mechanism dedicated to scrutinising programmes' suitability for the job market. France Competences among others has certified data analyst and data scientist skills. Data analysis and data mining bachelor studies are standardised level 6.

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France		Questions Related to the item	Maturity Level	Documentation
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	Developing	The coordination and governance for Digital Skills policy planning and implementation in France is carried out by the French digital coalition for skills and jobs that was set up in 2016
		Is there any legislation on digital skills?	Developing	There is not in place a legislation on digital skills, yet there is an inter-ministerial Sector Plan for Diversity in the Digital Professions.
	Policies	Is there a formal policy on digital skills and training?	Exploring	The national strategy / policy of France for digital skills is mainly reflected in the National Plan for Inclusive Digital and launch of Digital in Common(s), launched in September 2018.
		Are there initiatives included in other national policies on digital skills and training?	Developing	France has brought in two new compulsory courses on digital and computer sciences in secondary schools as of 2019. France has created a new inter-university diploma called Teaching ICT in upper secondary schools in 2019. So far, over 2,000 teachers have been trained in 19 universities. Other initiatives include putting in place a MOOC for upper secondary school teachers. France has also launched an initiative under its national artificial intelligence (AI) strategy.
		Are there any important initiatives on digital skills by other stakeholders?	Integrated	The French Digital Skills & Jobs Coalition is carrying out a number of initiatives to boost digital skills Also, through the Ambition Inria 2023 project, the French national research institute for digital science and technology, which goal is to accelerate, through digital research and innovation, the construction of France's scientific, technological and industrial leadership in European dynamics has launched partnerships with industry though the founding of joint laboratories with leading industry players in France and Europe and with global leaders who invest in France.
	Technologies & infrastructure	Are there any national platforms on training provision?	Developing	The French platform Pix.fr is a free online public service open to everyone to assess and develop digital skills. Due to the interactive tests of gradual difficulty and in the form of practical exercises, it allows all citizens to take stock and improve their digital knowledge and skills. The platform prepares the participants to take the Pix Certification, the digital skills certification initiated and recognized by the State, listed in the specific directory of France's Competences (eligible for the CPF).
		Is there any official content provider?	Developing	The French platform Pix.fr is a free online public service open to everyone to assess and develop digital skills. Due to the interactive tests of gradual difficulty and in the form of practical exercises, it allows all citizens to take stock and improve their digital knowledge and skills. The platform prepares the participants to take the Pix Certification, the digital skills certification initiated and recognized by the State, listed in the specific directory of France's Competences (eligible for the CPF).
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Developing	In France there are a number of academic courses related to Data Science and Engineering, Digital Marketing and Data Science, Data Science for Business, Digital Transformation, Public Health Data Science in terms of MSc.

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France		Questions Related to the item	Maturity Level	Documentation
				Also, there are academic curricula in data analysis and data mining. Several related courses are embedded within other curricula
		Is there a rewarding process for career researchers on open science practices?	Exploring	In the established National Strategy, the creation of a research data award to reward outstanding teams and projects in this field is incorporated
		Is there any process for career development for researchers?	Integrated	In France, scientists are civil servant, the salary at different stages (junior > senior) of the career is defined by the government. INRA can act on the transition from one stage to the following one on the base of criteria it has defined.
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Exploring	The French institutional framework does not include incentives or an integrated strategy to foster cooperation between academia and industry. However, the CIFRE aims to improve the collaboration between industrial and academic research, by allowing a PhD student to spend time both in a research institute and in a firm. Beyond the joint research goal of collaboration, a CIFRE also aims to create competencies for the PhD student.
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	Developing	The French National Centre for Scientific Research (CNRS) and the Open Science Committee are the main stakeholders involved with France's Research, Data, and Open science framework.
		Is there any legislation on open data / science/ AI?	Integrated	In France, several legislative texts set the framework for the publication and sharing of open data. The national policy was adopted in 2015. In addition to this, a Digital Republic Act4 was passed in 2016 that includes open data as one of its cornerstones. In France, the final text of a new law on Open Access has been adopted on June 29, 2016 (Article 17) with reference on the Research code and completed by an article L. 533-4 AI des not have a regulation framework apart from the establishment of the related strategy.
		Is there any cooperation of the private sector, the public sector and the research?	Developing	According to ERA report, French firms' propensity to cooperate with either universities or higher education institutions, or with governmental, public or private research institutes, was similar to the EU-28 score. Its score on the number of public-private collaborative papers per capita was slightly above the EU-28 benchmark. By contrast, it was well below the EU-28 benchmark for the share of public R&D funded privately. Inria is the French national research institute for digital science and technology. World-class research, technological innovation and entrepreneurial risk are its DNA. In 200 project teams, most of which are shared with major research universities, more than 3,500 researchers and engineers explore new paths, often in an interdisciplinary manner and in collaboration with industrial partners to meet ambitious challenges. As a technological institute, Inria supports the diversity of innovation pathways: from open source software publishing to the creation of technological start-up's (Deeptech). Finally, the CIFRE aims to improve the collaboration between industrial and academic research, by

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France		Questions Related to the item	Maturity Level	Documentation
				allowing a PhD student to spend time both in a research institute and in a firm. Beyond the joint research goal of collaboration, a CIFRE also aims to create competencies for the PhD student.
	Policies	Is there a formal policy on open data or open science?	Integrated	In July 2018, the Ministry of Higher Education, Research, and Innovation adopted the ambition National Plan for Open Science In 2019, the French National Centre for Scientific Research (CNRS) adopted the Roadmap for Open Science
		Is there any formal policy on AI?	Integrated	In March 2018, the French AI strategy, entitled AI for humanity has been launched. The main objectives of the French AI strategy as highlighted by the French President are to: (a) Improve the AI education and training ecosystem to develop and attract the best AI talent; (b) Establish an open data policy for the implementation of AI applications and pooling assets together; (c) Develop an ethical framework for a transparent and fair use of AI applications. The French AI strategy devotes particular attention to a better understanding of future labour demand and skill needs to prepare successfully for professional transitions.
		Is there any formal policy on Cybersecurity?	Integrated	The French national digital security strategy was announced in October 16th, 2015 and is designed to support the digital transition of French society.
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Developing	There are already formulated strategies
		Are there any important initiatives on open data/science, AI, cybersecurity?	Developing	There are already formulated strategies
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	Developing	In the field of scientific libraries, France has just recently signed a collaboration agreement with the Association of European Research Libraries (LIBER). Moreover, there is a landmark partnership agreement of the French Ministry of Higher Education, Research and Innovation (MESRI – Ministère de l'Enseignement Supérieur, de la Recherche et de l'Innovation) and the French Centre national de la Recherche Scientifique (CNRS) with the Research Data Alliance
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	Developing	Iny 2018, the French Ministry for Higher Education, Research and Innovation launched the "National Plan for Open Science". The plan is clear and well-structured, considerably ambitious, with three main commitments: (a) Generalise open access to publications, (b) Structure research data and make it available through open access, 9c) Be part of a sustainable European and international open science dynamic. The ministry set up an Open Science Committee with 270 experts, some of whom are involved through a series of thematic "collèges" and project groups and a collaborative forum to identify pragmatic, collective and collaborative methods to achieve the plan's objectives. They also have a French Open Science Monitor and according to the first results based on open data, 36% of

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France		Questions Related to the item	Maturity Level	Documentation
				French research outputs are openly available online. In 2019, the French National Centre for Scientific Research (CNRS) adopted the Roadmap for Open Science The main digital infrastructures & services available for research purposes infrastructures consist of four computing infrastructures (GENCI, CCIN2P3, Grid'5000, and France Grilles) and two network infrastructures (RENATER and FIT). Most of these infrastructures are integrated into European or international infrastructures.

3.4 Greece

Greece		Questions Related to the item	Maturity Level	Documentation
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	Exploring	There are several graduate level coursed on data science analytics offered by universities (such as University of Piraeus, University of Macedonia, Athens University of Economics and Business) as well as courses offered at undergraduate level, mainly within ICT degree curricula.
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Exploring	With the enactment of law 3879/2010 ("Development of Lifelong Learning and other provisions"), a national holistic strategy on lifelong learning (LLL) was for the first time created in Greece and the National Network for Lifelong Learning was set up, consisting of all LLL governing bodies and LLL service providers. The General Secretariat for Vocational Education, Training and Lifelong Learning, falling under the Ministry of Education and Religious Affairs, is the executive body of lifelong learning and is among others responsible for the use of new technologies and promotion of digital environment in LLL programmes. According to the Index of Readiness for Digital Lifelong Learning Final Report 2019 "Greece has a general national strategy on life-long learning with digital learning policy being an integral part of it, but has not been investing sufficiently in education and digital learning tools in

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Greece		Questions Related to the item	Maturity Level	Documentation
				recent years". Lately however there has been a considerable effort towards the digital aspects of lifelong learning (Rebrain Greece, Mechnism for Diagnosis of Market needs).
		Is there any accreditation system on data scientists, especially for public employees?	Exploring	EOPPEP, Greece's National Organisation for the certification of qualifications and vocational guidance, develops and implements the National Accreditation & Certification System for non-formal education, including initial and continuing vocational training and adult education. There is no indication of a formal accreditation system especially for data scientists.
		Are digital skills profiles standardised?	Exploring	Currently, there is no framework formally established in the country, as per DIGICOMP guidelines. However, in the context of the Digital Transformation Bible that is soon to be published for consultation, the need for introducing a digital competence framework in Greece is stated and relative actions are already being implemented within the context of Technical Assistance provided by DG Reform. As a first result, Citizen Digital Academy includes a self- assessment tool based on DigiComp v2.1 (21 competences organized in 5 areas). An interesting development is that Law 4622/2019 on the "executive State" introduced 3 new job specialties in the public sector, one of which is Data Analyst.
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	Developing	The General Secretariat of Digital Governance and Simplification of Procedures of the Ministry of Digital Governance, specifically to the Department of Digital Economy, Investments and Digital Skills/Directorate of Digital Strategy is the responsible body of the National Coalition for Digital Skills in Greece, hence responsible for Digital Skills policy planning and implementation in the country.
		Is there any legislation on digital skills?	Exploring	Law 4623/2019 establishes a Digital Skills department withing the General Secretariat of Digital Governance and Process Simplification, among the responsibilities of which are the design and implementation of ICT educational programs for the public sector, the organization and coordination of the national coalition on digital skills, and design and monitoring with other competent ministries of digital skills initiatives.
	Policies	Is there a formal policy on digital skills and training?	Exploring	Greece's national policy on digital skills is currently mainly expressed through the National Digital Skills Coalition Action Plan 2017-2020: Enhancing Digital Skills and Jobs in Greece (EDSGR). Currently, the Digital Transformation Bible is under development, which it is expected to include specific policies for digital skills & competences.
		Are there initiatives included in other national policies on digital skills and training?	Integrated	Greece's digital skills initiatives are mainly expressed through the National Digital Skills Coalition Action Plan 2017-2020: Enhancing Digital Skills and Jobs in Greece (EDSGR).
		Are there any important initiatives on digital skills by other stakeholders?	Integrated	The EDSGR includes 12 priorities. For each priority, a stakeholder/ member of the National Coalition is responsible for the line coordination and the achievement of strategic goals through actions, the monitoring and assessment of implementation, as well for the continuous feedback and update of the Action Plan with actions in its policy area, aiming at building synergies in an horizontal and vertical way, with other stakeholders.

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Greece		Questions Related to the item	Maturity Level	Documentation
	Technologies & infrastructure	Are there any national platforms on training provision?	Developing	The National Digital Academy is currently the national training platform and offers more than 200 online digital courses to enhance citizens' digital skills, organized around 30 thematic units. Content has been prepared and uploaded by more than 30 providers from both public and private sectors.
		Is there any official content provider?	Developing	The National Documentation Centre (NDC) is the main national content provider that offer courses on enhancing digital skills in Greece.
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Exploring	There are a number of stakeholders offering research support through informative or training events based on their expertise and area of influence. Athena RC has initiated and leads a series of webinars on Open Science in Greek language in collaboration with the Cypriot NOAD. These events are organised in a monthly basis and have proven to be successful in uniting the academic and research community under the Open Science and the EOSC umbrella. Other stakeholders offering training courses on open science and open data practices include the Hellenic Academic Libraries Link - HEALLink, University of Patras Library, the Greek portal for open access, the Open Research Software, the Greek Open Technologies Alliance (GFOSS), etc.
		Is there a rewarding process for career researchers on open science practices?	Awareness	Law 4310/2014 foresees the provision of (mainly financial) motives to support career researchers but without any specific targeting at Open Science practices.
		Is there any process for career development for researchers?	Exploring	Career development in academia is a fairly well described process, but actual implementation varies. Regarding public sector, researchers enter the system usually through the well-established recruitment processes by ASEP. No formal process exists for career development into the private sector
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Exploring	According to the ERA Progress Report for the period 2016-2018, Greece recently developed the "Research – Create – Innovate" action, that promotes the collaboration between research laboratories and businesses. Furthermore, clusters, the creation of spin off companies, science parks and Technology Transfer Offices are also being promoted.
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	Developing	The General Secretariat for Research and Technology (GSRT) is the Greek public service assigned with the task of defining, as well as coordinating the implementation of, the national policy for Research, Technological Development, and Innovation. Also, GRNET, National Infrastructures for Research and Technology is the main infrastructure and service enabler for open science in Greece, and leads the coordinated development of e-infrastructures and services in Southeast Europe (SEEREN, SEE-GRID series, HP-SEE, VI-SEEM, NI4OS projects) and the wider region.
		Is there any legislation on open data / science/ AI?	Developing	Law 4310/2014 supports open access to publicly funded research and also article 4 of Law N. 4485/2017 on Organisation and operation of higher education, arrangements for research and other provisions, mentions "open resources" as one of its mission without however specifying the type of resources. Law N. 3979/2011 on E-government and relevant regulations with amendments up to Law N.

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Greece		Questions Related to the item	Maturity Level	Documentation
				4483/2017 and Law N. 4305/2014 on Open Access to and Further Use of Public Sector Documents, Information and Data with amendments up to Law N. 4483/2017 include specifications for public bodies' infrastructures and introduce Creative Commons licenses to some outputs, respectively.
		Is there any cooperation of the private sector, the public sector and the research?	Exploring	According to the ERA Progress Report for the period 2016-2018, Greece recently developed the "Research – Create – Innovate" action, that promotes the collaboration between research laboratories and businesses. Furthermore, clusters, the creation of spin off companies, science parks and Technology Transfer Offices are also being promoted.
	Policies	Is there a formal policy on open data or open science?	Exploring	Greece has not implemented a national Open Access/ Open Science policy yet. There are ongoing efforts by the National Open Science Task Force that worked to produce a National Open Science Plan. The plan includes provisions for open access to scientific outputs produced from publicly funded streams and for better access to and FAIR-aligned infrastructures and services also according to EOSC standards and rules of participation as they are coming. It also proposes a roadmap for implementation.
		Is there any formal policy on AI?	Developing	Currently, the Digital Transformation Bible is under development, which it is expected to include specific policies for AI.
		Is there any formal policy on Cybersecurity?	Integrated	In March 2018 the Greek national strategy on cybersecurity was approved.
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Exploring	There are ongoing efforts by the National Open Science Task Force that worked to produce a National Open Science Plan. The plan includes provisions for open access to scientific outputs produced from publicly funded streams and for better access to and FAIR-aligned infrastructures and services also according to EOSC standards and rules of participation as they are coming. It also proposes a roadmap for implementation.
		Are there any important initiatives on open data/science, AI, cybersecurity?	Exploring	The National Documentation Centre organises several seminars and activities around the development of digital skills in the fields of Research and Science.
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	Exploring	HELIX Data is the national data repository and at the same time operates as a national aggregator of data repositories. Currently, it harvests content from institutional data repositories included in HARDMIN. Also, according to OpenDOAR there are 36 institutional repositories and digital libraries in Greece covering almost all academic libraries research outputs and digital material, from which 7 are compatible with OpenAIRE thus offering greater visibility of Greek research in the European area. Furthermore the National Documentation Center (EKT) as an electronic and physical infrastructure of national scope has an institutional role to collect, aggregate, organise, document, disseminate and digitally preserve scientific, technological and cultural information, content and data, produced in Greece. To this end it has embraced Open Science and already provides several content related

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Greece		Questions Related to the item	Maturity Level	Documentation
				services to promote it (such as OpenArchives.gr and SearchCulture.gr), as well as guidelines and tools for open access and open data.
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	Developing	GRNET (The National Infrastructures for Research and Development) provides several infrastructures and services for the research community and academia, mainly at a "platform as a service" level which also serve Open Science needs

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3.5 Hungary

Hungary		Questions Related to the item	Maturity Level	Documentation
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	Exploring	There are some data science coursed offered in university level (undergraduate and graduate), as for example Eötvös Loránd University and Budapest University of Technology and Economics.
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Developing	The Digital Workforce Programme (https://digitalisjoletprogram.hu/en/content/dwp-digital-workforce-program) was officially launched in 2018 and contains initiatives and activities to support lifelong learning digital skills.
		Is there any accreditation system on data scientists, especially for public employees?	Exploring	The Hungarian Accreditation Committee is a national-level, independent body of experts tasked with the external evaluation of the quality of educational and related research activities and the internal quality assurance (QA) systems of higher education institutions in Hungary. Currently few related courses are accredited, mainly at MSc level.
		Are digital skills profiles standardised?	Developing	Based on concluded projects, the Government issued the 1341/2019. (VI. 11.) Government decree about the development and implementation of a Digital Competence Framework System based on DigiComp 2.1 to develop, measure and certify digital competences for all.
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	Developing	The digital skills governance landscape in Hungary is quite centralized under the Digital Success Program which is monitored by DJP ltd, a state-owned company under the supervision of Ministry of Innovation and Technology. It must be noted however that Ministry of National Economy also plays a significant part in the overall governance as owner of the Digital Workforce programme.
		Is there any legislation on digital skills?	Developing	Two new regulations on vocational training, higher education and public education entered into force (11/2020, 12/2020 government regulation) emphasising the importance of digital skills.
	Policies	Is there a formal policy on digital skills and training?	Integrated	Government initiatives to improve digital skills are mainly based on two key strategies: the Digital Education Strategy and the Digital Labour Force Programme.
		Are there initiatives included in other national policies on digital skills and training?	Integrated	There are several initials emanating from the policy documents, the majority of which is routed for funding under ESIF programs.

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Hungary		Questions Related to the item	Maturity Level	Documentation
		Are there any important initiatives on digital skills by other stakeholders?	Developing	Several stakeholders offer initiatives on digital skills (SZTAKI, KIFU, Universities).
	Technologies & infrastructure	Are there any national platforms on training provision?	Developing	The Industry 4.0 National Technology Platform was established May 2016 under the leadership of the Institute for Computer Science and Control (SZTAKI), Hungarian Academy of Sciences, with the participation of research institutions, companies, universities and professional organizationswith the full support of the Government of Hungary. Other potential platform providers to operate at a national level include the Digital Pedagogical Methodology Centre, KIFÜ and SZTAKI.
		Is there any official content provider?	Exploring	Most content providers operate via funding from ESIF projects, although there are some MOOCs offered by universities (Debrecen, Obuda) and the National Library.
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Exploring	University of Debrecen offers a course on data stewardship in Biology which could serve as an example for further deployment.
		Is there a rewarding process for career researchers on open science practices?	Awareness	Hungary has designed some initiatives in the form of grants to reward excellence in research. The open science aspect is still at early stages (mainly within some pioneering institutions such as Debrecen University). The Peer review of the Hungarian Research and Innovation System recommends the strengthening of rewards in R&I.
		Is there any process for career development for researchers?	Exploring	The government decree No. 395/2015 lists criteria for assessing the performance of individual researchers in their scientific careers. Legal regulations define the minimum levels of base salaries that universities could pay to scientists. However Graduate education and careers in research do not seem to be attractive for the young researchers in Hungary.
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Exploring	Public research separated from innovation activities, with only limited attempts at multidisciplinary or multi-sectoral approaches, according to EU's Peer Review of Hungarian R&I.
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	Developing	The National Research, Development and Innovation Office is a government administration body operating as a central government office with primary responsibility for the Government's public funding of research, development and innovation activities, supervised by the Minister for Innovation and Technology. A special Committee has been established with the aim of elaborating proposals for national solutions to policy and strategy tasks in relation to Open Access and Open Science
		Is there any legislation on open data / science/ AI?	Exploring	Hungary has not created any regulation on Open Science. The Act on Higher Education only declares that the doctoral dissertations (and their preliminary research theses) must be accessible for everyone (Act CCIV of 2011). Regarding AI, a planned legislation will introduce obligations for developers, deployers, and certain type of users of

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Hungary		Questions Related to the item	Maturity Level	Documentation
				AI systems and foresees provisions empowering regulatory authorities to assess compliance with the new framework.
		Is there any cooperation of the private sector, the public sector and the research?	Exploring	According to the ERA Progress Report Hungary is lagging behind EU average in terms of links between the Research Community and the Industry. According to the EU's Peer Review of Hungarian R&I, Cooperation between science and industry in Hungary is at an early stage of development. The perception of benefits by both industry and academia is still limited, with key barriers being the restricted availability of funds targeting the cooperation and burdensome, bureaucratic procedures.
	Policies	Is there a formal policy on open data or open science?	Exploring	The special Committee under the National Research, Development and Innovation Office has been reactivated recently and is expected to provide its recommendations on national Open Science policy soon.
		Is there any formal policy on AI?	Integrated	Hungarian AI strategy has been made available in September 2020 (https://ai-hungary.com/files/e8/dd/e8dd79bd380a40c9890dd2fb01dd771b.pdf)
		Is there any formal policy on Cybersecurity?	Integrated	Hungary was one of the first countries in Central Europe to formulate its national cybersecurity strategy. The National Cyber Security Strategy of Hungary (NCSS) was adopted in 2013 based on the foundations of EU and NATO cybersecurity principles and follows the mainstream take on cybersecurity strategies (values, environment, objectives, tasks, and tools).
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Exploring	There are already formulated strategies on AI and Cybersecurity which include several initiatives related to skills development. Open Science initiatives are expected to be included in the forthcoming policy.
		Are there any important initiatives on open data/science, AI, cybersecurity?	Exploring	Initiatives on Open Science do exist in Hungary and are mainly managed by the HUNOR consortium, although several other stakeholders are also providing them (MOOCs, awareness raising, online platforms). AI strategy is just published so initiatives are expected in the near future.
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	Developing	• Debrecen University and National Library coordinates the institutional repository DEA and the profile and research database of the University of Debrecen, which offers up-to-date information about researchers' academic achievements, scientific work and open access awareness. • The members of the HUNOR (HUNgarian Open Access Repositories) consortium are dedicated to promoting Hungarian research both nationally and internationally and to achieving effective dissemination of scientific outputs through the implementation of a national infrastructure of open access repositories. • The Hungarian Research Data Alliance and its members participate in several open science related activities including awareness raising, trainings, creation of the Hungarian data repository network, standardization of data services and AI research. • KIFU the Governmental Information Technology Development Agency is offering a complete spectrum of e-infrastructure services for the wide and complex user community comprising practically all of the Hungarian research, education, and public collection institutions/organizations. The rich service portfolio covers networked

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Hungary		Questions Related to the item	Maturity Level	Documentation
				communication, cloud and HPC processing, FAIR storage of research data, as well as multimedia applications and provision of virtual research environments.
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	Developing	• Debrecen University uses a MOOC platform to provide the services and prioritizes on Scholarly Publishing, Research Integrity and Metrics & Rewards. • The Carpathian Basin Online Education Center (K-MOOC): To date, 22 Hungarian higher education institutions have joined the system, with a total of 49 courses available. 14 universities across the border participate in the initiative. This imitative has a complementary system at videotorium.hu, where some universities share their courses via multimedia form. • The Open Science portal could serve as a platform for providing digital skills training in the field, as it is quite informative and is already offering a lot of information on the subject

3.6 Lithuania

Lithuania		Questions Related to the item	Maturity Level	Documentation
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	Exploring	There are some courses offered by a few Lithuanian universities (Vilniaus university, Kaunas University of Technology).
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Exploring	The National Association of Distance Education (NADE) was established in July 1998 with the purpose to promote the creation of the Information Society of Lithuania by developing distance education (DE) and improving its quality.
		Is there any accreditation system on data scientists, especially for public employees?	Exploring	Currently in Lithuania there are no visible improvements in transparency of digital qualifications: credit transfer between formal, non-formal and industry-based ICT educations and certifications and there is

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Lithuania		Questions Related to the item	Maturity Level	Documentation
				no mechanism to implement discussions about the recognition of informal education on ICT/ digital skills. Also, the translation of the DigComp framework in Lithuania is implemented by the Education Development Centre.
		Are digital skills profiles standardised?	Awareness	There is no indication of a formal framework on profiles for digital professionals in Lithuania.
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	Exploring	The coordination and governance for Digital Skills policy planning and implementation in Lithuania is carried out by the Lithuanian National Digital Coalition (NDC). The activities of the National Coalition and the relationship with other organizations are coordinated by the association “Langas į ateitį” (“Window to the Future”) ,an organization established by socially responsible business, since 2002 developing ICT skills in Lithuania and promoting a safe use of the Internet as well as public and private electronic services.
		Is there any legislation on digital skills?	Awareness	There is no indication of any legislation on digital skills in Lithuania.
	Policies	Is there a formal policy on digital skills and training?	Integrated	The interinstitutional action plan for the implementation of the information society development program “Digital Agenda of the Republic of Lithuania” for 2014–2020, launched in 2017, includes several measures for enhancing digital skills. In addition, through the National Skills Strategy project (2020-2021), Lithuania has started collaboration with the OECD and European Commission to develop a more strategic, whole-of-government and cross-sectoral approach to skills policy
		Are there initiatives included in other national policies on digital skills and training?	Developing	The efforts in the country for improving the digital skills agenda are also promoted by the National Digital Coalition for the Promotion of Digital Skills for Jobs, who has as mission to increase employment and to achieve a more effective use of digital potential and cooperate in implementing information society development programme 2014–2020 Digital Agenda for Lithuania, yet their operation does not receive much recognition and is rather confined.
		Are there any important initiatives on digital skills by other stakeholders?	Developing	The main digital skills initiatives implemented in the country are within the project "Connected Lithuania", implemented throughout Lithuania by the association “Langas į ateitį” (“Window to the Future”). The activity of "Window to the Future", as an example of cooperation between private business and the state in achieving common goals
	Technologies & infrastructure	Are there any national platforms on training provision?	Awareness	There is no indication of a formal national platform on training provision in Lithuania.
		Is there any official content provider?	Developing	The National Association of Distance Education (NADE), established in July 1998 promotes the creation of the Information Society of Lithuania by developing distance education (DE) and improving its quality. Among its many activities is organizing distance education courses, preparing, and adapting distance education programs, promotion of research in the field of distance education and organizing workshops, seminars and conferences.

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Lithuania		Questions Related to the item	Maturity Level	Documentation
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Awareness	The first steps towards establishing some formal educational material are taking place in Lithuania (for example from Kaunas University of Technology which maintains online seminar and conference material available to all). Also, Kaunas University of Technology (KTU) developed an accredited online course on Research Data Management for PhD students.
		Is there a rewarding process for career researchers on open science practices?	Awareness	The Research Council of Lithuania adopted Guidelines for Open Access to Research Results: The Guidelines encourage other research performing institutions in the country to adopt similar open access and open research data policies. This is considered as a first step to promote and award OS research and indicates the country's intention to further explore this system.
		Is there any process for career development for researchers?	Exploring	Lithuanian universities and research institutions offer study and employment opportunities to researchers at all levels of their career, from doctoral students through to high level researchers. The Research Council of Lithuania provides a wide range of funding tools for research competence and skills development. The career system in universities supports indicators such as teaching hours, academic papers and similar but does not support knowledge transfer to industry. Ministry of Education and Science is trying to solve these problems with the results-based university funding model (more value is attributed to R&D contracts with industry) and the Recommendations on the intellectual property management in universities.
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Exploring	According to the ERA Progress Report for the period 2016-2018, Lithuania's performances are consistently just below ERA averages in several priorities, including the shares of firms cooperating with governmental, public, or private research institutes (33% decrease), and for shares of firms collaborating with universities or higher education institutions (35% decrease).
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	Developing	The Research Council of Lithuania is the institution coordinating open access activities in Lithuania. The Council collects and systematises the data on open access databases used in Lithuania, on legal, financial, and other developmental aspects, participates in the open access policy formation and encourages dissemination of the open access concept.
		Is there any legislation on open data / science/ AI?	Developing	Lithuania has a Law on Higher Education and Research, which covers Open Access and research data.
		Is there any cooperation of the private sector, the public sector and the research?	Developing	The links between the research community and the Industry activity are supported by Lithuania's vibrant cluster community. Clusters first appeared in Lithuania several decades ago, but the pace of clusterisation increased dramatically during the period 2010–2015, with the implementation of EU financial instruments supporting their development. Regarding ICT there are around 20 clusters and 5 clusters in the field of innovations and food technologies.
	Policies	Is there a formal policy on open data or open science?	Developing	Lithuania has not implemented a national Open Access/Open Science policy yet but Working Group for developing it was set up on 16 January 2020 by the Minister of Education, Science and Sport. Currently

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Lithuania		Questions Related to the item	Maturity Level	Documentation
				the most relevant policy document on Research, Data, and Open science is the Research Council of Lithuania's "Guidelines on Open Access to Scientific Publications and Data" (2016) , which covers both publications and data. Skills are not addressed, but responsibilities for various aspects of Open Access and Open Data are covered in detail. The focus of Lithuania's policy on Research, Data, and Open science is more on rights than on obligations, and the inference is that universities are responsible for developing their own policies, procedures, guidance, and monitoring systems.
		Is there any formal policy on AI?	Integrated	The Lithuanian Artificial Intelligence Strategy: A Vision of the Future published in April 2019 provides recommendations to the government of the Republic of Lithuania, with the goal described: "To modernize and expand the current AI ecosystem in Lithuania and ensure that the nation is ready for a future with AI." The recommendations are intended both to help the nation utilize the economic potential of AI systems and avoid potential societal pitfalls.
		Is there any formal policy on Cybersecurity?	Integrated	The Lithuanian Cyber Security Strategy published in August 2018 defines the most important pillars of the national cyber security policy. The Strategy is aimed at strengthening the development of the state's cyber security and cyber defence capabilities preventing and investigating cybercrimes, promoting cyber security culture and the development of innovation, enhancing close private-public partnership (PPP) and international cooperation, and ensuring the fulfilment of international cyber security obligations within the country until 2023.
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Exploring	Some pilot informal initiatives, included in other national policies, are implemented in the country.
		Are there any important initiatives on open data/science, AI, cybersecurity?	Developing	The main initiative specifically targeting up-skilling for Science and Research, particularly in the areas pertinent to EOSC objectives in Lithuania includes Project "Up2U" . The key objective of the project is to bridge the gap between secondary schools and higher education & research by better integrating formal and informal learning scenarios and adapting both the technology and the methodology that students will most likely be facing in universities.
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	Exploring	Open R&D Lithuania network is a cooperative platform of the open access R&D centres and laboratories of 14 Lithuanian Universities, 13 Public Research Institutes and seven Science and Technology Parks. The following open access databases are available in Lithuania: a) National aggregated open access repository – the Lithuanian Academic Electronic Library eLABa; this information system includes e-documents, such as theses and dissertations ETD. The data stored in the Lithuanian Academic Electronic Library eLABa becomes accessible in international aggregated databases DART-Europe, DRIVER, NDLTD and others, b) Inter-institutional research publication and research data archives: The Lithuanian humanities and social sciences research data archive LIDA, the full-text database Lituanistika, the national

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Lithuania		Questions Related to the item	Maturity Level	Documentation
				open access research data archive (MIDAS), c) Institutional research databases: The Registry of Open Access Repositories Mandatory Archiving Policies, ROARMAP, states that there are 3 institutional repositories in Lithuania: the Lithuanian University of Health Sciences, Vytautas Magnus University and Mykolas Romeris University open access databases.
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	Developing	Through the Open R&D platform the network of stakeholders has united their respective R&D intellectual potential, infrastructure and resources in order to provide scientifically based solutions to problems raised by both businesses and society. Collectively the network is able to offer over 2.500 services for scientific research and experimental R&D. The drive to create a platform which is easy and practical to use by businesses was pushed even further through the creation of the e-science gateway platform (www.e-sciencegateway.eu). This gateway serves as the main access point to Lithuanian R&D infrastructures, Universities and Research Institutes which are all able to promote their facilities and know-how. This way, Open R&D Lithuania has created a system which will serve companies who know what they are looking for, enabling them to order services online via the gateway, or direct their queries to the network in the search of assistance and guidance in the right path.

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3.7 The Netherlands

The Netherlands		Questions Related to the item	Maturity Level	Documentation
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	Developing	There are several Data Science & Big data graduate degrees in the Netherlands offered by many universities, as well as some undergraduate degrees (and several undergraduate courses within ICT curricula).
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Integrated	Digital learning is fully embedded in the national "Digitalisation Strategy" laid out recently by the government, including lifelong learning. To improve the connection between supply (education) and demand (the business sector) and to encourage lifelong learning (retraining and further training), a Human Capital Agenda for ICT (HCA ICT) has been set up under the leadership of Team ICT.
		Is there any accreditation system on data scientists, especially for public employees?	Developing	NVAO, the Accreditation Organisation of the Netherlands and Flanders, has provided accreditation to some courses for data scientists (for example the Data Science and society programme from Tilburg University and the joined Bachelor Data Science programme with Eindhoven University of Technology), while others are in planning (for example the Master's degree in Data Science and Artificial Intelligence offered by Eindhoven University of Technology and the Data Science & Business Analytics MSc offered by University of Amsterdam).
		Are digital skills profiles standardised?	Exploring	No formally accepted Digital Competence framework is established, although some initiatives have taken place (such as DigiComp in primary and secondary education by the SLO). Furthermore, as part of the EDISON project, it has been proposed to launch the Netherlands National Initiative for accelerating and coordinating activity in the area of Data Science professional training and education.
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	Developing	The Dutch digital skills landscape is pluralistic. It includes ministries (at least 3 ministries as policy makers), national funding bodies as well as organizations with the responsibility for providing IT services. Strong coordination between stakeholders ensures an efficient governance scheme.
		Is there any legislation on digital skills?	Exploring	The Dutch digitalization strategy was officially adopted by the government in 2018.

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The Netherlands		Questions Related to the item	Maturity Level	Documentation
	Policies	Is there a formal policy on digital skills and training?	Integrated	Digital skills development is fully integrated and plays a significant role in the Digitalization strategy, one of the "ambitions" of which is the "Everyone can participate and we work together" motto. The strategy recognizes that this will require everyone to learn basic skills as soon as possible and continue to learn and develop in later life.
		Are there initiatives included in other national policies on digital skills and training?	Integrated	There are several initials emanating from other policy documents, such as the Digital Government Agenda, the Dutch strategic plan for AI, the Dutch National Research Agenda, the Strategic Agenda for Higher Education and Research 2015-2025 , the "Connecting Science and Society" strategy 2019-2022 of the NWO (National Research Organization) , and the Digital Society Research Agenda of the VSNU (association of universities).
		Are there any important initiatives on digital skills by other stakeholders?	Integrated	Several stakeholders offer initiatives on digital skills (ECP, SURF, VSNU, Network of Libraries, etc).
	Technologies & infrastructure	Are there any national platforms on training provision?	Developing	Netherlands is quite advanced in terms of national content providers that offer courses in enhancing digital skills (ECP, SURF, Dutch Digital Delta, Kennisnet, etc) , although the focus rests highly on basic and average skills to support the strategic goals set in the Digitalization Strategy.
		Is there any official content provider?	Developing	• Kennisnet offers several services related to digital content for skills such as lesopsence.nl (to organize distance education), Wikiwijs (an educational platform where teachers search, find, reuse, create and share digital learning resources), Teacher24 (support the daily practice of the teacher with practically applicable articles) etc. • The network of Libraries and National Library offer several courses through the Dutch Library and Basic Skills programme, started in 2015. • An online education portal is planned under the Dutch Technology Pact 2020. • According to the Acceleration Agenda for Innovation in Education by the 1st of January 2023, higher education institutions in the Netherlands shall offer lecturers and students the opportunity to determine and use an optimal mix of (digital) educational resources for learning and teaching processes.
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Developing	As part of the National Plan for Open Science, several training courses and tools are being developed to support the above objectives: • Training courses for researchers through universities and universities of applied sciences. • Research Data Netherlands (RDNL) , a partnership involving 4TU. Research Data , Data Archiving and Networked Services (DANS) and SURFsara , offers the "Essentials 4 Data Support" online course an introductory course for those who (want to) support researchers in storing, managing, archiving and sharing their research data. • Training courses for research are also provided through SURF. In addition to training courses, SURF

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The Netherlands		Questions Related to the item	Maturity Level	Documentation
				also provides consultancy. • The eScience Center offers training courses such as 'data carpentry' and 'software carpentry' which focus entirely on open science and open source. Such training courses, in particular those aimed at making data FAIR, are also provided by Dutch Center for Life Sciences (DTL) in the context of ELIXIR (part of the strategic roadmap for scientific infrastructure of the Dutch government). • The PhD Candidates Network of the Netherlands actively emphasises the importance of providing researchers in the Netherlands with the best possible training in the skills required to be able to carry out open science.
		Is there a rewarding process for career researchers on open science practices?	Exploring	Academic research in general is rewarded by the government. The Royal Netherlands Academy of Arts and Sciences offers several awards for research (early career), the NWO offers Talent Programs and there are several national grants and awards available. Regarding Open Science, DANS, in collaboration with DTL, is developing a system for the assessment of research data in accordance with the FAIR principles. Furthermore, a new scheme for accreditation is currently under development through collaboration of Ministry of Science & Education, representatives of all academic associations, as well as the scientific community to create clear career paths related to Open Science. The Protocol for Research Quality Assurance in Higher Professional Education (BKO) for universities of applied sciences contains elements of open science, but also other criteria allowing institutions an option to choose.
		Is there any process for career development for researchers?	Integrated	Dutch Universities categorise their personnel according to the Universitair Functie Ordenen (UFO: University Job Classification) system, based on the collective labour agreement of universities. PhD is considered generally as the first major step.
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Integrated	There is high mobility and dynamics to the Dutch academic job market, which is in fact an open system and is becoming increasingly international. Around 30 per cent of PhD graduates continues a career at university and around 70 per cent leaves university. About a third of these working graduates proceed to the private sector (not R&D intensive), a quarter finds a job at public research institutions (R&D intensive private sector) or at UMCs (academic hospitals), and another quarter goes abroad (Rathenauu Institut report).
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	Integrated	Open Science is governed by a National Steering Group chaired by the Ministry of Science & Education and supported by an Advisory Board (chaired by SURF and including representatives from 14 bodies).
		Is there any legislation on open data / science/ AI?	Developing	Regarding Open Access, since 2015, the Dutch Copyright Contract Act offers every researcher in the Netherlands the right to make his or her articles open access after a 'reasonable period' if these articles emerged from research funded entirely or in part by Dutch public funds. The Netherlands has a sophisticated and mature legal and policy framework for cybersecurity.

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The Netherlands		Questions Related to the item	Maturity Level	Documentation
		Is there any cooperation of the private sector, the public sector and the research?	Developing	Netherlands enjoys strong links between the Research Community and the Industry, as is evident from the European Research Area Progress Report (2018).
	Policies	Is there a formal policy on open data or open science?	Integrated	The National Plan for Open Science published in 2017 is the main policy document driving initiatives towards transition to an Open Science system.
		Is there any formal policy on AI?	Integrated	In October 2019, the Dutch government has released its strategic action for artificial intelligence. The policy report presents a range of policy initiatives and action plans to strengthen Netherlands' competitiveness in AI on the global market.
		Is there any formal policy on Cybersecurity?	Integrated	The National Cyber Security Strategy 2 is the current national strategic document. NCSS was initially adopted in 2013, and the country's cybersecurity framework is renewed every two years.
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Developing	Regarding Data related policies, the government published the Data Agenda (NL Digitaal) which sets out how data can be used (even) better to improve policy-making and resolve social issues and recognizes that to adopt a data-driven approach. The Netherlands Organization for Scientific Research (NWO) has published its 2019-2022 Strategy "Connecting Science and Society" which promotes the Open Science principles, acknowledges the importance of new skills and describes initiatives for further developing high-grade ICT infrastructures The Digital Society Research Agenda , formulated by the joint Dutch universities (VSNU) in accordance with the Dutch National Research Agenda, elaborates seven programme lines underlying universities' joint efforts towards a futureproofing education in a digital society, including "Responsible Data Science".
		Are there any important initiatives on open data/science, AI, cybersecurity?	Developing	In May 2019 NPOS changed to a programme, with 10 projects in the field of the Open Science topics. The Dutch Strategic Action Plan for Artificial Intelligence, adopted in October 2019, underlines the importance of investing in AI-relevant skills for everyone, focusing both on advanced digital skills (e.g. data science) and on basic competences. The 'Rijks Data Science Programme', is an initiative of the Ministry of the Interior and Kingdom Relations (BZK) in collaboration with Statistics Netherlands (CBS). As part of this programme, 35 young graduates will join CBS for one or two years to receive training with an emphasis on the development of knowledge and skills in the field of data science. Further training and lifelong learning are fostered with the STAP-scheme a €200 million investment to create training opportunities in AI and digital skills for individuals – and with a multi-annual programme for the improvement of Lifelong Development, with particular focus on digital skills.
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	Developing	A major step in the Policy implementation is the establishment of the National Platform for Open Science (NPOS) which brings together the parties that have initiated, formulated, or support the National Plan. The focus for the Platform is to create acceleration with regard to the three key areas of the National Plan Open Science. Several projects are launched within the NPOS initiative and part of

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The Netherlands		Questions Related to the item	Maturity Level	Documentation
				them are related to the area of digital skills for open science. Furthermore, an open call launched by NWO invited organizations to submit proposals for establishing themselves as Digital Competence Centers which will be also responsible for promoting digital skills in open science. The call ended in September 2020, so results are expected soon.
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	Integrated	A major step in the Policy implementation is the establishment of the National Platform for Open Science (NPOS) which brings together the parties that have initiated, formulated, or support the National Plan. The focus for the Platform is to create acceleration with regard to the three key areas of the National Plan Open Science. Several projects are launched within the NPOS initiative and part of them are related to the area of digital skills for open science.

3.8 Portugal

Portugal		Questions Related to the item	Maturity Level	Documentation
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	Developing	Project NAU is a national initiative, led by FCT, which includes the development and operation of a MOOC platform. The platform contents include, among others, courses with scientific content, such as data processing, for researchers and university students.
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Developing	The INCoDe.2030 programme in October 2019 released the Digital Competence Dynamic Reference Framework (QDRCD) a tool for population' digital skills' evaluation. Based on the Digital Competence Framework for Citizens. The Decree-Law no. 88/2006 regulates Technological Specialization Courses.

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Portugal		Questions Related to the item	Maturity Level	Documentation
		Is there any accreditation system on data scientists, especially for public employees?	Developing	The National Qualifications System (SNQ) was created in December 2007 with primary objective to raise the qualification levels of the active population.
		Are digital skills profiles standardised?	Awareness	There is no indication of a formal framework on profiles for digital professionals in Portugal.
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	Developing	The promotion and coordination of INCoDe.2030 involves three permanent bodies: a) The National Forum for Digital Competences, b) The INCoDe.2030 Coordination Structure, c) The INCoDe.2030 Technical Secretariat. Also, an Observatory for Digital Competences has been set up by the Directorate-General for Statistics in Education and Science, which monitors and reports on digital skills initiatives and programmes.
		Is there any legislation on digital skills?	Developing	There is not in place a legislation on digital skills, yet the INCoDe.2030 initiative is an inter-ministerial action; therefore, it is formally regulated.
	Policies	Is there a formal policy on digital skills and training?	Exploring	The INCoDe.2030 initiative is the main public policy tool for digital skills in Portugal. It is an inter-ministerial action, launched in April 2017, that addresses the concept of digital competences in a broad manner.
		Are there initiatives included in other national policies on digital skills and training?	Integrated	The Portuguese ICT Strategy 2020, approved in 2017, under the third axis, includes Measure 9: ICT centre of competences, for defining the operation model and driving the development of an ICT centre of competences and in general promoting the development of Digital Competences.
		Are there any important initiatives on digital skills by other stakeholders?	Integrated	The INCoDe.2030 covers a wide range of measures involving the various governmental areas. The main initiatives are implemented under the inclusion, education and qualification measures.
	Technologies & infrastructure	Are there any national platforms on training provision?	Developing	Project NAU is a national initiative, led by FCT, which includes the development and operation of a MOOC platform. The platform contents include, among others, courses with scientific content, such as data processing, for researchers and university students.
		Is there any official content provider?	Integrated	The Foundation for Science and Technology - FCT is the national funding agency for science, technology, and innovation and coordinates public policy for the Information and Knowledge Society in Portugal and ensures the development of national scientific computing resources and related content.
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Developing	The Decree-Law no. 88/2006 regulates Technological Specialization Courses. Several Portuguese universities offer MSc degrees in advanced data science and analytics (Lisbon, Porto) while others provide e-learning courses. The Foster Portal is an e-learning platform that brings together the best training resources aimed at those interested in learning more about Open Science and want to develop strategies and skills to implement Open Science practices in their work.
		Is there a rewarding process for career researchers on open science practices?	Exploring	Some pilot informal initiatives are implemented in the country.

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Portugal		Questions Related to the item	Maturity Level	Documentation
		Is there any process for career development for researchers?	Integrated	In 2016, Portugal adopted 'Fostering Scientific Employment' (Decree-Law 57/2016) aiming to improve researchers' working conditions, career prospects and promote the employment of PhD holders.
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Exploring	The Portuguese institutional framework does not include incentives or an integrated strategy to foster cooperation between academia and industry.
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	Exploring	The Foundation for Science and Technology. FCT supports the scientific community in Portugal through a range of funding schemes, tailored for individual scientists, research teams or R&D centres.
		Is there any legislation on open data / science/ AI?	Exploring	There is not in place a legislation on open data / science/ AI and the related policies are currently under development.
		Is there any cooperation of the private sector, the public sector and the research?	Exploring	According to the ERA Progress Report Portuguese firms cooperated with either universities or higher education institutions, or with governmental, public, or private research institutes at a rate of 10 %, which is below both the EU-28 level and the ERA average.
	Policies	Is there a formal policy on open data or open science?	Exploring	A preparation of a National Policy for Open Science is underway in Portugal. The work is initiated by the Government and Ministry for Science, Technology and Higher Education. The website set up for Open Science in Portugal, describes the four pillars of the policy.
		Is there any formal policy on AI?	Integrated	AI Portugal 2030: An innovation and growth strategy to foster Artificial Intelligence in Portugal in the European context.
		Is there any formal policy on Cybersecurity?	Integrated	Advanced Computing Portugal 2030: Dynamic and evolutive process aimed to promote and expand Advanced Cyberinfrastructure (ACI) in Portugal by a factor of 100 in the coming decade and until 2030.
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Exploring	Some pilot informal initiatives, included in other national policies, are implemented in the country.
		Are there any important initiatives on open data/science, AI, cybersecurity?	Developing	The INCoDe.2030 initiative, as the main public policy tool for digital skills in Portugal, includes measures on specialisation and research: a) Advanced Computing Portugal 2030: Dynamic and evolutive process aimed to promote and expand Advanced Cyberinfrastructure (ACI) in Portugal by a factor of 100 in the coming decade and until 2030, b) AI Portugal 2030: An innovation and growth strategy to foster Artificial Intelligence in Portugal in the European context.
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	Developing	The open access repositories activities in Portugal are undergoing a strong momentum as the reflex of the growing interest and involvement of the Portuguese academic and scientific community in the questions related with Open Access to scientific literature. Currently, there are in Portugal 51 scientific open access repositories in a production stage and aggregated in the national portal - RCAAP Portal. Altogether, the running IR's, gather more than 600 000 scientific documents in open access.

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Portugal		Questions Related to the item	Maturity Level	Documentation
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	Developing	With regards to digital research infrastructures there are currently 4 underway in the country: a) INCD Portuguese National Distributed Computing Infrastructure, b) RCTS Science, Technology and Society Network, c) RNCA National Advance Computing Network, d) UC-LCA Laboratory for Advanced Computing.

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3.9 Switzerland

Switzerland		Questions Related to the item	Maturity Level	Documentation
Digital Skills	**People - Actors of EOSC**	Is there any academic education on data science/engineering?	Developing	In Switzerland there are a number of academic courses related to Data Science and Engineering, and Big Data in terms of MSc. Also, there are academic curricula in data analysis and data mining. Several related courses are embedded within other curricula.
		Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Developing	Swiss MOOC Service is helping to accelerate the online presence of Swiss HEIs by offering access to a community of MOOC creators with experience, training sessions and studios available.
		Is there any accreditation system on data scientists, especially for public employees?	Developing	Currently in Switzerland, there is no national framework been established, yet based on EU DIGICOMP. To some extent the "Lehrplan 21" harmonises the curriculum and integrates media education, yet digital competences do not appear and is not given transversal status in educational policy. Only the use of digital tools in other subjects is discussed and explored. In the above framework, the Swiss Science, and Innovation Council SSIC has proposed (position paper on digital competences 2017), a competent framework, within the EU framework
		Are digital skills profiles standardised?	Developing	Currently in Switzerland, there is no national framework been established, yet based on EU DIGICOMP. To some extent the "Lehrplan 21" harmonises the curriculum and integrates media education, yet digital competences do not appear and is not given transversal status in educational policy. Only the use of digital tools in other subjects is discussed and explored. In the above framework, the Swiss Science, and Innovation Council SSIC has proposed (position paper on digital competences 2017), a competent framework, within the EU framework
	Processes & governance	Is there a coordination or central governance mechanism on digital skills and training development?	Developing	The Federal Department of the Environment, Transport, Energy and Communications DETEC is responsible for coordinating the Confederation's implementation measures within the federal administration and for the ongoing development of the Digital Switzerland strategy. This work is carried out within the framework of the Confederation's «Digital Switzerland» Coordination Group. The Confederation's «Digital Switzerland» Office, based within OFCOM, supports the Coordination Group in terms of organisation and content.
		Is there any legislation on digital skills?	Exploring	The digital skills' upgrade is only included as a priority in the Digital Switzerland strategy

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	Policies	Is there a formal policy on digital skills and training?	Developing	The Federal Council wants Switzerland to exploit the opportunities of digitalisation to the full. On 5 September 2018 it adopted its Digital Switzerland strategy for the next 2 years. Among its objectives the further improvement of the digital empowerment of people is included.
		Are there initiatives included in other national policies on digital skills and training?	Developing	In September 2018, the Federal Council launched a new national research program on the theme of digital transformation. The training, learning and digital transformation modules study the impact of digitization on training (content, skills, and transmission of skills), on lifelong learning and on the main institutions in charge of training
		Are there any important initiatives on digital skills by other stakeholders?	Developing	In September 2019, the Swiss Digital Initiative (SDI) was launched in Geneva aiming at a long-term and sustainable process with the objective of ensuring ethical standards in the digital world. Another important initiative on digital skills is the Digital Skills & Spaces program of the Zurich University of the Arts (ZHdK). It strengthens and cultivates skills that are particularly relevant for the digital age. This includes existing and new skills.
	Technologies & infrastructure	Are there any national platforms on training provision?	Integrated	Swiss MOOC Service is the national Open edX platform for institutions of higher education of Switzerland and is open for other organisations and corporations as well. The platform is compatible with Swiss data protection laws and hosted in Switzerland. Swiss MOOC founded by leading Swiss universities EPFL, ETH, SUPSI, USI and HES-SO and financially supported by the Swiss universities' P5 program is a one stop shop to help Universities and other organisations kickstart their online education presence
		Is there any official content provider?	Developing	Swiss MOOC Service is helping to accelerate the online presence of Swiss HEIs by offering access to a community of MOOC creators with experience, training sessions and studios available.
Open Science	**People - Actors of EOSC**	Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Developing	The Winter School of the University of Lausane aims at promoting interdisciplinary research that advances the use and value of open data. It targets PhD students and researchers from different disciplines – including public administration, management, information systems, computer science, and law. The Winter School provides an overview of state-of-the-art research and helps develop research proposals related to open data use cases and benefits, platforms and ecosystems as well as citizen involvement and foundational rights in open data creation.
		Is there a rewarding process for career researchers on open science practices?	Developing	Research funders and higher education institutions value scientists' Open Access publications equally to their publications in subscription journals when assessing and rewarding their work, according to the Swiss Academies factsheets.
		Is there any process for career development for researchers?	Developing	Switzerland has the highest proportion of PhD holders among the countries belonging to the Organisation for Economic Cooperation and Development (OECD). This figure is the result of intensive basic research activities conducted to a large extent by young researchers at Swiss higher education institutions. Moreover, according to Swiss Education, Research and Innovation policy for 2017-2020 young researchers are offered viable career prospects and various measures are intended to help them

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				make academic career a more viable option. These measures include mobility programmes at PhD level and the creation of new jobs for young researchers.
		Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Exploring	Some initiatives to promote industry and academia collaboration are undertaken in Switzerland. For example, SERI is running the annual Academia-Industry Training (AIT) programme which offers around twenty young Swiss researchers and entrepreneurs the opportunity to expand their horizons and develop their potential and their international network by introducing them to dynamic ecosystems and promising markets. Also, some academic and research institutions are formally implementing collaboration mechanisms and processes with industry.
	Processes & governance	Is there a coordination or central governance mechanism on open science or open data?	Integrated	The Federal Department of the Environment, Transport, Energy and Communications DETEC is responsible for coordinating the Confederation's implementation measures within the federal administration and for the ongoing development of the Digital Switzerland strategy. This work is carried out within the framework of the Confederation's «Digital Switzerland» Coordination Group. The Confederation's «Digital Switzerland» Office, based within OFCOM, supports the Coordination Group in terms of organisation and content.
		Is there any legislation on open data / science/ AI?	Exploring	Switzerland is establishing a modern and coherent legal basis for exploiting the potential of the data economy.
		Is there any cooperation of the private sector, the public sector and the research?	Exploring	According to Switzerland's Research and Innovation Overview (2015) one-fifth of Switzerland's enterprises are associated with knowledge transfer related activities. Even though knowledge transfer policy related objectives, indicated in Swiss National ERA Roadmap, were not fully implemented, optimal circulation and transfer of scientific knowledge were enhanced. Since 2018 Swiss Innovation Agency took over the functions of the Commission for Technology and Innovation CTI (the federal agency concerned with promoting science-based innovation). In addition, according to Swiss Education, Research and Innovation Policy For 2017–2020 to enhance knowledge and technology transfer the ETH Domain will have to reinforce its position as a key academic partner for Swiss, international companies and the public sector. Switzerland scores very highly on the indicator: the number of public-private collaborative papers per capita (ERA Report, 2018).
	Policies	Is there a formal policy on open data or open science?	Integrated	The Swiss national strategy for Open Access (OA) to publications aims at ensuring the cost transparency for public funds and the coordination among stakeholders, especially higher education institutions and their libraries. The time horizon of this national strategy covers the period 2021-2028.
		Is there any formal policy on AI?	Developing	Switzerland is in the progress of establishing a related strategy.
		Is there any formal policy on Cybersecurity?	Integrated	Switzerland established in 2018 the national strategy for the protection of Switzerland against cyber risks (NCS) 2018-2022.
		Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Exploring	There are already formulated strategies in the fields of open data/open access, and cyber-security. Switzerland is in the progress of establishing an AI strategy.

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		Are there any important initiatives on open data/science, AI, cybersecurity?	Developing	The fields of activity for the period 2021-2024 include Open Access, Research Assessment, FAIR Data and Services, Exploratory and Integrative Projects and Research Data Digital Infrastructures. Other initiatives: • The adoption of a new Federal Council Bill for education, research, and innovation for the period 2017-2020 • A call for supporting digital books open access publications launched in 2015 • The 'Scientific information: Accessing, processing and saving' program launched by the Swiss Confederation for the 2013- 2016 • The Swiss edu-ID and the Swiss Academic Cloud managed by SWITCH aimed at upgrading the Swiss university network, establishing a Swiss edu-ID as a common identity management platform for the entire higher education system and developed a cloud infrastructure for the Swiss academic community.
	Technologies & infrastructure	Are there in place any advanced learning environments applying open data principles?	Developing	The Consortium of Swiss Academic Libraries obtains licenses for scientific resources (electronic journals, eBooks and databases). It offers a broad range of services and supports the efforts to establish a national open access strategy. The Swiss National Science Foundation (SNSF) supports scientific research in all academic disciplines, from history to medicine and the engineering sciences. The Swiss Cooperative Storage Facility enables cooperative storage for 5 libraries
		Is there any mechanism/platform for researchers' cooperation based on open science principles?	Developing	According to the Swiss Roadmap for Research Infrastructures 2019, the main digital infrastructures & services available for research purposes include: a) High-Performance Computing and Networking (HPCN-24), b) Common Data Centre for Astronomy, Astroparticle and Cosmology (CDCI), and c) Swiss Centre for Musculoskeletal Biobanking and Imaging and Clinical Movement Analysis

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4 Comparative Analysis

In the chapter to follow a comparison, among all countries assessed, is performed resulting in ‘quantified’ scores, and allowing the identification of gaps per topic and thematic area.

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Questions Related to the item									
Is there any academic education on data science/engineering?	Developing	Developing	Developing	Exploring	Exploring	Exploring	Developing	Developing	Developing
Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	Integrated	Integrated	Developing	Exploring	Developing	Exploring	Developing	Integrated	Developing
Is there any accreditation system on data scientists, especially for public employees?	Developing	Developing	Developing	Exploring	Exploring	Exploring	Developing	Developing	Developing
Are digital skills profiles standardised?	Exploring	Developing	Developing	Exploring	Developing	Awareness	Awareness	Exploring	Developing
Is there a coordination or central governance mechanism on digital skills and training development?	Developing	Developing	Developing	Developing	Developing	Exploring	Developing	Developing	Developing
Is there any legislation on digital skills?	Integrated	Integrated	Developing	Exploring	Developing	Awareness	Developing	Exploring	Exploring
Is there a formal policy on digital skills and training?	Developing	Developing	Exploring	Exploring	Integrated	Integrated	Exploring	Integrated	Developing
Are there initiatives included in other national policies on digital skills and training?	Integrated	Integrated	Developing	Integrated	Integrated	Developing	Integrated	Integrated	Developing
Are there any important initiatives on digital skills by other stakeholders?	Integrated	Integrated	Integrated	Integrated	Developing	Developing	Integrated	Integrated	Developing
Are there any national platforms on training provision?	Developing	Developing	Developing	Developing	Developing	Awareness	Developing	Developing	Integrated
Is there any official content provider?	Developing	Developing	Developing	Developing	Exploring	Developing	Integrated	Developing	Developing
Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	Developing	Developing	Developing	Exploring	Exploring	Awareness	Developing	Developing	Developing
Is there a rewarding process for career researchers on open science practices?	Exploring	Developing	Exploring	Awareness	Awareness	Awareness	Exploring	Exploring	Developing
Is there any process for career development for researchers?	Integrated	Integrated	Integrated	Exploring	Exploring	Exploring	Integrated	Integrated	Developing
Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	Integrated	Integrated	Exploring	Exploring	Exploring	Exploring	Exploring	Integrated	Exploring
Is there a coordination or central governance mechanism on open science or open data?	Developing	Integrated	Developing	Developing	Developing	Developing	Exploring	Integrated	Integrated
Is there any legislation on open data / science/ AI?	Developing	Developing	Integrated	Developing	Exploring	Developing	Exploring	Developing	Exploring
Is there any cooperation of the private sector, the public sector and the research?	Integrated	Integrated	Developing	Exploring	Exploring	Developing	Exploring	Developing	Exploring
Is there a formal policy on open data or open science?	Developing	Developing	Integrated	Exploring	Exploring	Developing	Exploring	Integrated	Integrated
Is there any formal policy on AI?	Integrated	Integrated	Integrated	Developing	Integrated	Integrated	Integrated	Integrated	Developing
Is there any formal policy on Cybersecurity?	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated
Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	Integrated	Integrated	Developing	Exploring	Exploring	Exploring	Exploring	Developing	Exploring
Are there any important initiatives on open data/science, AI, cybersecurity?	Developing	Developing	Developing	Exploring	Exploring	Developing	Developing	Developing	Developing
Are there in place any advanced learning environments applying open data principles?	Developing	Integrated	Developing	Exploring	Developing	Exploring	Developing	Developing	Developing
Is there any mechanism/platform for researchers' cooperation based on open science principles?	Integrated	Integrated	Developing	Developing	Developing	Developing	Developing	Integrated	Developing

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Questions Related to the item										Ave
Is there any academic education on data science/engineering?	3	3	3	2	2	2	3	3	3	2,67
Is there a lifelong learning system on digital skills and training, and if so, is there any one targeted to public employees?	4	4	3	2	3	2	3	4	3	3,11
Is there any accreditation system on data scientists, especially for public employees?	3	3	3	2	2	2	3	3	3	2,67
Are digital skills profiles standardised?	2	3	3	2	3	1	1	2	3	2,22
Is there a coordination or central governance mechanism on digital skills and training development?	3	3	3	3	3	2	3	3	3	2,89
Is there any legislation on digital skills?	4	2	3	2	3	1	3	2	2	2,44
Is there a formal policy on digital skills and training?	3	3	2	2	4	2	2	4	3	2,78
Are there initiatives included in other national policies on digital skills and training?	4	4	3	4	4	3	4	4	3	3,67
Are there any important initiatives on digital skills by other stakeholders?	4	4	4	4	3	3	4	4	3	3,67
Are there any national platforms on training provision?	3	3	3	3	3	1	3	3	4	2,89
Is there any official content provider?	3	3	3	3	2	3	4	3	3	3,00
Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	3	3	3	2	2	1	3	3	3	2,56
Is there a rewarding process for career researchers on open science practices?	2	3	2	1	1	1	2	2	3	1,89
Is there any process for career development for researchers?	4	4	4	2	2	2	4	4	3	3,22
Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	4	4	2	2	2	2	2	4	2	2,67
Is there a coordination or central governance mechanism on open science or open data?	3	4	3	3	3	3	2	4	4	3,22
Is there any legislation on open data / science/ AI?	3	3	4	3	2	3	2	3	2	2,78
Is there any cooperation of the private sector, the public sector and the research?	4	4	3	2	2	3	2	3	2	2,78
Is there a formal policy on open data or open science?	3	3	4	2	2	3	2	4	4	3,00
Is there any formal policy on AI?	4	4	4	3	4	4	4	4	3	3,78
Is there any formal policy on Cybersecurity?	4	4	4	4	4	4	4	4	4	4,00
Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	4	4	3	2	2	2	2	3	2	2,67
Are there any important initiatives on open data/science, AI, cybersecurity?	3	3	3	2	2	3	3	3	3	2,78
Are there in place any advanced learning environments applying open data principles?	3	4	3	2	3	2	3	3	3	2,89
Is there any mechanism/platform for researchers' cooperation based on open science principles?	4	4	3	3	3	3	3	4	3	3,33
Ave	3,36	3,44	3,12	2,48	2,64	2,32	2,84	3,32	2,96	

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According to the above table, and related scoring, identified areas where action should be taken refer to (by order of gap measurement*):

1. Is there a rewarding process for career researchers on open science practices?	**1,89**
2. Are digital skills profiles standardised?	**2,22**
3. Is there any legislation on digital skills?	**2,44**
4. Are there educational modules on open science and open data practices in the universities curricula or other ongoing training systems of the universities?	**2,56**
5. Is there any academic education on data science/engineering?	**2,67**
6. Is there any accreditation system on data scientists, especially for public employees?	**2,67**
7. Are there initiatives included in other national policies on open data/science, AI, cybersecurity?	**2,67**
8. Is there any cross-sector (research-industry-public sector) cooperation for persons mobility and employability?	**2,67**
9. Are there any important initiatives on open data/science, AI, cybersecurity?	**2,78**
10. Is there a formal policy on digital skills and training?	**2,78**
11. Is there any cooperation of the private sector, the public sector and the research?	**2,78**
12. Are there any national platforms on training provision?	**2,89**
13. Are there in place any advanced learning environments applying open data principles?	**2,89**
14. Is there a coordination or central governance mechanism on digital skills and training development?	**2,89**

**the lower the value, the greater the gap*

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5 Synthesis of findings

5.1 Digital Skills

5.1.1 People & Actors of EOSC

Data science/engineering curricula in academia. In all countries assessed, there are a variety of academic courses related to Data Science and Engineering, Data Analysis, Data Mining, Digital Marketing and Data Science, Data Science for Business, Digital Transformation, Public Health Data Science, Big Data, Artificial Intelligence. Most of them are addressed to post graduate students (MSc), however in some countries similar curricula are part of the undergraduate studies, mainly in the disciplines related to ICT. Specific modules are also embedded, as standalone courses, within curricula of several other disciplines. Many Universities offer the related MSc, undergraduate degrees, or courses, however the approach to the planning and the development of the related curricula, at national level and under a specific educational strategy, seems disparate. ***Very few curricula related to EOSC recommendations on advanced, core expertise data skills for scientists were identified (see relevant topic on Open Science section).***

Lifelong Learning (LLL) on digital skills. Several initiatives are identified in the LLL with various scope and content for different target groups. Almost all countries exhibit formal or less formal systems for LLL, within the education and VET sector, with modules related to digital skills, however the scoping differs according to policies' priorities and gaps to tackle in each country. ***Even though an important activity is undergoing in the related LLL policies, many of them financed by ESF, little advanced training was identified to be targeting scientists***. It seems that general public, businesses, and labour force are, in most cases, the preferred targeted groups. The related documentation can be reached in national strategies for digitalisation and several national initiatives or in the training delivered by various stakeholders, including competent governmental authorities. E-government initiatives may involve training of public employees to upgrade digital skills. Several methods have also been put in place, for most countries, to evaluate the outcomes of the training delivered.

Data science skills' certification. Most countries endorse the DIGICOMP, and the EU framework, as the sound reference for the certification of digital skills and some of them have established National Qualifications Systems. MSc are certified level 6, whereas undergraduate studies level 5. Most Qualification Systems have as primary objective to raise the qualification levels of the active population in digital skills. ECDL is the most commonly used process for ICT skills certification. ***No certification on advanced digital skills is identified; almost all qualification and certification systems are related to the LLL national policy.***

Standardisation of digital skills profiles. In almost all countries, ***there is no evidence for the establishment of National Competences Framework related to digital skills***. Only a few countries include in the competent framework data analyst and data science advanced skills professional profiles.

5.1.2 Processes & Governance

Coordination and governance on digital skills and training development. There seems to be a rather limited existence/ application of coordination and central governance mechanisms on digital skills and competences building and related training provision, in most countries. ***There is not a unified approach on how digital skills development and training provision coordination are performed***, while ***each country seems to adopt different approaches and techniques for digital skills and competences' interdisciplinarity***. ***There seems to be a fragmentation regarding the establishment of a governance system for the upgrade of digital skills***. There are few cases where one single institution or mechanism has the overall responsibility of coordinating the digital skills and training development and delivery process, while it is remarkable that ***the National Coalitions***

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for Digital Skills have a rather limited role in coordinating the efforts for digital upskilling of the various target groups.

Legislation on digital skills. With regards to existing legislation on digital skills building and related training provision, the gap analysis has showed that in almost all countries (with the exception of Denmark), ***there is not any legislative / regulatory framework in place, that addresses the digital skills and competences building in a holistic approach***. Most of the related laws and legal acts include some aspects of the digital skills development process, while in some cases there are laws that establish or appoint the institutions responsible for designing and implementing digital skills initiatives and programmes, with ***no indication on the quality framework involving the digital knowledge upskilling process***.

5.1.3 Policies

Formal policies on digital skills and training. The existence of an institutional framework (at national level) and the establishment of a competent national strategy seem to facilitate the implementation and the follow up of the embedded activities for digital skills and digital literacy efforts. According to our findings the ***absence of a stand-alone national strategy and policy for digital skills in almost all countries assessed is revealed***. 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. In addition, in several cases, ***the priorities of different actors of the digital skills ecosystem lay in silos in relation to open science and open data***. In a nutshell there are limited cases where an integrated policy on digital skills exist, whereas these policies are usually entailed in other national strategies and policies.

Initiatives on digital skills and training included in other national policies. Digital skills' initiatives are mainly expressed through the related digital policies/strategies and action plans that have been developed to serve the objective of the digital transformation of each country. ***Initiatives on digital skills and training are also identified in the national strategies for LLL as well as in strategic plans for artificial intelligence and cybersecurity***. Overall, the level of dispersion of initiatives on digital skills in other national policies identified is rather low, which suggests a unified approach where the digital upskilling is mainly promoted through the national digital agendas.

Initiatives on digital skills implemented by stakeholders. Digital skills' initiatives are mainly developed and implemented by the stakeholders already involved with delivering digital upskilling and training in their country. Overall, the level of dispersion of stakeholders involved with digital skills and training delivery identified is rather low, which suggests that specific stakeholders in each country are dealing with the digital upskilling, contributing in this way in ensuring a more steady and structured approach on the implementation of the digital skills agenda. An important number of projects, being actually the pilot for developing knowledge and documentation, are in place. ***In most of the cases, no coordination has been identified in the consolidation of their outputs to policy level or even to initiative level***.

5.1.4 Technologies & infrastructure

National platforms on training provision. The existence of coordinated learning environments to facilitate digital skills upgrade is usually supported by the operation of national platforms. The most common approach is based on MOOC, however a number of other platforms (*ECP, SURF, Dutch Digital Delta, Kennisnet, Industry 4.0 National Technology Platform-HU, National Digital Academy-GR, Pix.fr, Digivisio-FI, IT-formidler.dk and ITTA-FI*) performing the field. ***There is a wide disparity between the different platforms under which a "learning environment" is conceptualised or materialised 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***. Many of

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them are established under collaborative schemes, with Universities participating in the partnerships. In most countries, they are oriented to upgrade digital skills for general public, whereas only FR and DK link these services to certification.

Digital skills' content providers. As mentioned above, 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***. Moreover, the content development is related to the use of the platform and a variety of stakeholders deliver training courses on digital skills, through the use of them. In education, content is developed for students and teachers, usually by the competent Ministry. Universities and Libraries also deliver training courses. In most cases the content is related to distance learning/education provision.

5.2 Open Science

5.2.1 People & Actors of EOSC

Educational modules and curricula. Skills development in Open Science principles and practices as part of university education or training is regarded as a major factor towards capacity building and establishing a critical mass of professionals to serve the current demand. Our findings however suggest that ***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***. The emphasis on ICT related courses is on one hand encouraging, since several EOSC related skills are strongly empowered (as for example Data curation / stewardship, Research software development, ICT infrastructure operations), but on the other hand courses that would develop other skills for Open Science expected to be encountered in different disciplines (such as law, ethics, humanities) are seriously lacking (for example Intellectual Property Rights management of Open Data, Ethics of open data utilization in the private sector, etc). Moreover, even though there are several well-established courses mainly at graduate level in most of the countries studied, a variable spectrum of availability depending on the country was observed and in any case these courses are quite few in absolute numbers. ***Specific Open Science related courses are limited to few selected examples either interdisciplinary (Switzerland, Lithuania) or domain-specific (Hungary) and form the exception rather than the rule.*** An important aspect that differentiates the countries studied is the availability of Open Science modules in environments close to academia and research, such as R&D Institutions, networks, scientific centres (see for example the Netherlands and Greece) which serve as an alternative – but close to universities – source of digital upskilling.

Rewarding process for career researchers on open science practices. ***Providing clear incentives and rewards to career researchers for adopting and practicing Open Science principles*** in their work constitutes an important motive towards pursuing improvement of their digital skills. ***Unfortunately, the current situation presents a significant gap in almost every country surveyed***. In general, academic research is rewarded by the government or other R&D institutions where there is participation also from the private sector, for example in the form of grants or credits, however ***very few countries have established clear, specific incentives for complying with Open Science principles*** (Finland, Denmark, Switzerland). Other countries, such as the Netherlands, are clearly planning specific award schemes based on Open Science related performance, but ***most of the countries do not yet differentiate their rewards if Open Science research principles are followed***. That said, there are several "pilot" or individual initiatives undertaken is some countries that reward excellence in Open Science research (Portugal, Hungary).

Researchers' career development. A formal process for career development for researchers provides constant motivation for excellence and thus opens up prospects for links with highly sought-after positions in Industry and facilitates professional work in Academia. Thus, the existence of such processes ensures a higher

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influx of potential Open Science practitioners. ***Most countries have a very firm and developed process for the career advancement of researchers, usually under a formal legal framework***. The development paths though are much more detailed and specific for an academic career than for public sector service or as gateways to the industry and the private sector and cannot thus be considered integrated into the ecosystem. There are differences observed between the countries in terms of degree of awareness, transparency, performance assessment or administrative establishment of the processes. Examples of practices that are considered favourable to attracting new researchers are the civil servant status administered to researchers in France, existence of collective labour agreements with Universities in the Netherlands and support of well-organized programs to offer related jobs in Denmark, Finland and Switzerland. There is however room for improvement in several countries, especially as relates to advancement transparency and methods for rendering the academic career more attractive. ***What is also 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.***

Cross-sector (research-industry-public sector) cooperation. A strong cross-sector mobility and employability environment ensures a better and faster upskilling of digital skills and contributes to reaping the benefits of a multi-sector training approach, central to the Open Science culture. Our findings indicate that there are several types of gaps to bridge among the countries surveyed, even though there are clearly some leading examples. More specifically, ***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.*** The most advanced countries have formally established open mechanisms to promote such collaborations (Denmark, Finland, Netherlands), whereas the majority of the remaining ones have clearly recognized the benefits of such an environment (strategically or operationally), ***but without providing strong coordination or support to ensure sustainability. In some countries the efforts are quite limited both in scope and in impact.***

5.2.2 Processes & Governance

Coordination and governance on open science/data. A dedicated and integrated Coordination Entity for Open Science or Open Data Policies is settled down only in two countries (FI, NL) while in other countries this role undertakes the general-purpose organization accountable for Digital Strategy (CH, PT). Although DK does not have an Open Science strategy but a well-established open access strategy, the governance structure for the policy ownership is shared among the government, the universities, and the libraries. In most countries the stewardship of the open science policy relies on national or research councils. ***The issue of Data Ethics is very rarely tackled while it is under investigation the broader adaptation of policies by regional or national organizations even in cases of an integrated governance mechanism.***

Legislation on open data/science/AI. ***Almost half of the countries of the sample are far from establishing legislation on open science / access or open data, while only two have set up a statutory scheme on data, even though their policies are not fully integrated***. Although, even in cases of well-established policies, this does not mean that these are the same well institutionalized. In conclusion, it seems that the institutionalization of open science does not keep pace with its development

Cooperation of the private, public sector and the research. ***Only 3 out of 9 countries 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.*** Clusters and Competence Centres are some mechanisms enabling collaboration and mobility of researchers to the private/public domain acting as

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knowledge ambassadors. Although, there is still a lot of ground to be covered on the issue of collaboration between research and public/ private domains.

5.2.3 Policies

Formal policies on open science/data. ***The need for developing and adapting an open science policy has recognized as a key priority in all countries, but less than a third of them have moved forward with an integrated and well-planned open science policy***, while another third has in place either open science policies limited to research or scholarship communities or open access policies. It seems that universities and research councils are eager to promote open science, especially in cases of "backward" countries

Formal policies on Artificial Intelligence. ***The majority of the countries have very recently set out a national policy on AI***, promoting training and labour force upskilling on AI, foreseeing the increasing need of employability on AI scientists/engineers in the near future, while some emphasis is placed on the ethical and human-centred approach to AI.

Formal policies on Cybersecurity. The last years all countries have recognized the need to develop and integrate cybersecurity policies as a key pillar in their national strategies, aiming to arm themselves against cybercrime attacks. ***Training and skills development on cybersecurity is an inherent priority of those policies***.

Initiatives on open data/science, AI, cybersecurity included in other national policies. In case of well-established and integrated open data/science, AI, or cybersecurity policies, it seems that other national strategies regarding digitalisation and/or growth of the industry sector, digital training and skills or research and innovation are structured by encompassing the principles of open data/science, AI, or cybersecurity sciences and promote specific initiatives. Besides, it is worth mentioning the active participation of universities and the private sector into promoting these strategies by adapting and developing their own policies. In most of the rest of the countries assessed, ***there is limited elaboration of the enhancement of principles on open data/science, AI, or cybersecurity sciences into other national strategies.***

Initiatives on open data/science, AI, cybersecurity. The countries are geared towards upskilling and training interventions, while they adapt inclusive policies for all citizens, focusing mainly on students of all grades (tertiary, elementary and secondary education), but also on adults and even minorities as migrants with the aim to integrate them in the labour force. The cooperation with the private sector is also promoted, while ***the initiatives tend to consider EOSC principles***. Furthermore, the Nordic Council has set up integrated policy guidelines concerning its member countries and develops trans ministerial networks working on projects, especially promoting EOSC principles.

5.2.4 Technologies & infrastructure

Advanced learning environments applying open data principles. The existence of open, collaborative and coordinated learning environments to facilitate dissemination of Open Science principles and advancement of related digital skills is considered a key priority for EOSC. ***There is a wide disparity between the different forms 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 or a "blueprint" to be followed***. Accordingly, our research identified many different types of networks, resources, assets and infrastructures that could be regarded as constituting such an environment, ranging from centralized well-established platforms to less known "niche" initiatives, ***but few -if any – coordinated entities or groups of stakeholders that have the***

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institutional, organizational and operational capacity to immediately undertake the role of a central hub to foster education and training initiatives specifically targeted towards researchers and Open Science ("Competence Centre") . Another finding is that there are many different types of potential stakeholders involved, but universities and libraries play a dominant role in creating learning environments and wherever strong coordination or a functioning association was identified, the results appear to be much more encouraging. The positive aspect is that almost all countries have some initiatives and facilities in place, therefore a motivated researcher is almost certainly going to find support in developing her digital skill in open science. ***However, few countries have consolidated available resources in such an organized and accessible way as to be considered formal, monitored and managed learning environments.***

Research cooperation mechanisms based on open science principles. A key requirement for promoting Open Science is the existence of technological based platforms to facilitate collaboration, data sharing, knowledge exchange, learning and access to other related value-added services for the community. One of the prerequisites of such platforms is the existence and utilization of widespread research infrastructures. The situation in the countries studied is quite satisfactory since advanced research infrastructures have been established everywhere. ***Considerable difference has been observed, however, in the degree to which these infrastructures are available and utilized specifically for Open Science purposes***. Finland, Denmark, France and the Netherlands are leading in this aspect as they provide a multitude of collaboration platforms specifically targeted at researchers who practice (or intend to) Open Science. ***For the remaining countries there is definitely a gap to be bridged***, not in the sense of lack of platforms / technology but rather in its promotion and exploitation for the benefit of researchers of Open Science. ***Coordination is another key aspect identified, since several stakeholders appear as owners or providers of such platforms*** (universities, associations of libraries, national documentation centres, etc).

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