

### D3.3: Draft Policy Recommendations

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#### Abstract:

This Deliverable proposes initial draft policy recommendations to assist in removing or diminishing barriers to the EOSC and to Open Science. The deliverable covers four areas: Open Science and Open Scholarship; Data Protection, Assurance and Special Information Regulation Regimes; Procurement; and Ethics. The Open Science and Open Scholarship section includes consideration of Scholarly Communications; Intellectual Property Rights; Access to Infrastructures, Services and Resources; and KPIs/Metrics for Open Science. For each area, draft policy recommendations are proposed for further consultation.

This document comprises five papers: The main deliverable and four 'White Papers', one on each of the four areas described above.

#### Dissemination Level

- PU: Public  
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## EXECUTIVE SUMMARY

This Deliverable presents draft policy recommendations aimed at addressing strategic and operational challenges to the establishment of an EOsc which will provide a trusted, open environment for the scientific community for storing, sharing and reusing scientific data and results.

The recommendations aim to establish the policy environment necessary for the effective access to, operation and use of the EOsc by lowering barriers to interaction with the EOsc while encouraging its use and enabling the free flow and re-use of data, skills and services, and facilitating access to research infrastructures, since these form EOsc's main components.

The work comprises of four subtasks - **Open Science and Open Scholarship, Data Protection, Procurement and Ethics**. The Open Science and Open Scholarship area covered Scholarly Communications, Intellectual Property Rights, Access Policies, Metrics and Incentives. Based on a consideration of drivers and constraints in each policy area to identify issues and opportunities for the EOsc, the recommendations aim to help define and achieve good practice in the EOsc. They have been drafted during a period in which the EOsc concept and model have been in the process of being defined, and in which Open Science policy in particular has also been evolving rapidly. The work has drawn on EC policy documents relating to the EOsc; deliverables already published by the EOscpilot project on EOsc governance, architecture, Rules of Participation and interoperability; the EOscpilot Science Demonstrator projects; views and requirements expressed by stakeholders in workshops and interviews; and the knowledge and expertise of the T3.1 team.

The draft recommendations recognise some of the opportunities the EOsc presents, to act proactively in several areas and achieve high standards for data sharing, ensure clear guidelines for ethical behaviour, thereby reconciling the requirements of the GDPR with FAIR data in a coherent OS policy framework for Europe which also facilitates EU member states in their policy-making role.

The Open Science and Open Scholarship recommendations are broadly in line with the EC's updated Recommendation on Access to and Preservation of Scientific Data and with the recommendations of the OSPP, HLEG EOsc and FAIR Data Expert Group. The D3.3 draft recommendations recognise the need for stakeholder groups to work together to define clear standards of conduct and outputs in the area of Open Science, for minimal agreed sets of standards for data, metadata and protocols, for certification and assurance, and for moves towards openness and consistency in infrastructures' access policies; for a comprehensive IPR framework encompassing ownership, rights clearance and management; and for embedding Open Science in the evaluation of researchers, promoting and supporting next generation metrics and supporting the recommendations with policy services such as an Open Science Monitor and Registry for the EOsc.

The Data Protection recommendations suggest defining the purpose of all data recording and processing and applying a concept of tiered consent whilst monitoring for developments in implementation of the GDPR in member states, supported by training in data protection and implementation of automated solutions such as privacy-by-design and privacy-by-default solutions, data tagging and a personalized policy catalogue to provide assurance.

The Procurement recommendations recognise that the Procurement Directive 2014/24/EC is likely to apply to the EOsc for purchasing of services, particularly in cases where purchasers are publicly funded. It is suggested that stakeholders consider exploiting aggregated procurement in the EOsc to realise cost efficiencies. The Directive also imposes criteria to be satisfied before organisations can share resources within EOsc. This may limit the scope of services to those in the public interest, or the governance amongst the organisations sharing may need to conform to Directive requirements.

In the area of Ethics it is recommended that the EOsc, its users and providers demonstrate ethical practices, that an EOsc Ethics and Legal Advisory Board is established to coordinate task groups to address specific issues relating to ethics, and that ethics training and outreach activities are conducted.

The draft policy recommendations presented here will be the subject of further consultation: within the EOSCpilot project, discussion will take place about the proposed policies' interaction with the draft Rules of Participation, the draft Governance Framework, the draft EOSC Business Model and the proposed EOSC architecture; more generally, consultation will take place with a range of EOSC stakeholders to gather input on their views on the draft recommendations proposed in this Deliverable and discuss with them to formulate a set of final policy recommendations for presentation in Deliverable D3.6. Liaison will also take place with Task 3.2 to ensure the policy recommendations, where possible, will lead to machine-readable policies which can be used by the Open Science Policy Registry and Monitor.



## 1. INTRODUCTION

The EOScpilot project supports the first phase in the development of the European Open Science Cloud (EOSC) as described in the EC Communication on the European Cloud Initiative<sup>1</sup>. The project contributes to the development of European open science policy and best practice and aims to achieve an important step towards building a dependable and accessible environment where outputs from publicly funded research are appropriately open and there are clear incentives and rewards for the sharing of data, software and other research outputs.

Work Package 3 of the EOScpilot project aims to establish the policy environment required for the effective access to, operation and use of the EOOSC, by lowering the barriers to interaction with the EOOSC and where possible helping to encourage its use.

WP3 achieves this by organising the work into six separate Deliverables. The first of these, D3.1, Policy Landscape Review, published in January 2018<sup>2</sup>, conducted a high-level review of the European policy landscape relevant to the European Open Science Cloud, touching upon macro-policy issues of EU directives, laws and regulations to highlight the policy corpus of the EOOSC and prioritise the policy areas in need of immediate action. The deliverable identified four areas in which policy actions are required: infrastructures and services, data, skills and procurement. It also provided six high-level recommendations which are detailed in Box 1 for ease of reference.

Deliverable 3.3 follows on from the work of D3.1 to propose draft policy recommendations intended to support the implementation of the EOOSC. Recommendations and, in some cases, suggestions for their implementation, primarily target the EOOSC Governance and Rules of Participation as well as the key stakeholder groups who will be interacting with the EOOSC, i.e. at funders/ministries, Research Infrastructures (RIs) and e-infrastructures, funders/ministries, and research producing organisations (RPOs) for policy actions which will facilitate the creation of the European Open Science Cloud. The Deliverable addresses each of the four areas identified in D3.1, although skills are also the focus of WP7 of EOScpilot, and in addition the Ethical dimension of the EOOSC is addressed.

The draft policy recommendations presented here will be the subject of wide consultation with stakeholders to validate them and produce a set of Final Policy Recommendations in Deliverable D3.6. The draft recommendations presented here in D3.3 are therefore subject to change as a result of further feedback to be gathered in the coming months.

The work of D3.3 will be followed by a further phase of work, which will be described in Deliverable D3.6 (Final Policy Recommendations), in which the draft policy recommendations will be discussed and validated with a range of stakeholders. The draft policy recommendations presented here in D3.3 are therefore subject to be altered as a result of further feedback to be gathered in the coming months.

In parallel with this work, Task 3.2 of WP3 has produced a first specification for an Open Science Policy Monitor (D3.2), which could in due course be developed into a core EOOSC service. Supporting this is ongoing work towards D3.5 (Open Science Policy Toolkit) and D3.4 (Open Science Policy Registry) which aim to specify, respectively, tools and a policy registry which may be used to supply the Monitor with machine-readable policy information. The policy recommendations developed by Task 3.1 help to inform the work of Task 3.2 and, taken together, the final policy recommendations and specifications for automated policy services are expected to provide a significant contribution to the definition of the EOOSC model.

In the chapters which follow in this report, Chapter 2 describes the methodology deployed. Chapters 3-6 then summarise the work undertaken and present the draft policy recommendations by topic. The work is divided into the areas of Open Science and Open Scholarship (Chapter 3); Data Protection, Assurance and Special Regimes (Chapter 4); Procurement (Chapter 5); and Ethics (Chapter 6). The Open Science and Open Scholarship chapter is further subdivided into four topics: Scholarly Communications, Intellectual Property

<sup>1</sup> COM(2016)178 final <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52016DC0178>

<sup>2</sup> <https://eoscipilot.eu/content/d31-policy-landscape-review>

Rights, Access Policies, and Metrics and Incentives. For each of these areas, the main drivers and constraints to achieving the EOSC have been considered, the relevant landscape and information sources have been reviewed and discussed, and draft policy recommendations are proposed. The detail of this work is contained in four supporting White Papers. D3.3 itself in Chapters 3-6 contains a brief summary of the work for each area, and presents the full list of draft policy recommendations. The reader is referred to the White Papers for the supporting information behind the proposed policy recommendations. The White Papers can be found at:

- Open Science and Open Scholarship: <https://eoscpilot.eu/content/d33-Draft-Policy-Recommendations-White-Paper-1-Open-Science>
- Data Protection, Assurance and Special Regimes: <https://eoscpilot.eu/content/d33-Draft-Policy-Recommendations-White-Paper-2-Data-Protection>
- Procurement: <https://eoscpilot.eu/content/d33-Draft-Policy-Recommendations-White-Paper-3-Procurement>
- Ethics: <https://eoscpilot.eu/content/d33-Draft-Policy-Recommendations-White-Paper-4-Ethics>

Chapter 7 presents the full list of draft policy recommendations in table form with indications of the implications and impacts per for stakeholder groups. Conclusions are drawn in Chapter 8.

## 2. METHODOLOGY

The work of D3.3 involved building on the policy landscape review work conducted for D3.1. The recommendations from D3.1 are given in Box 1. The work was performed in four subtasks, addressing respectively Open Science and Open Scholarship, Data Protection, Procurement and Ethics. The four subtasks approached their work separately, albeit with frequent meetings to discuss and coordinate, and the methodologies deployed by each team differed in accordance with their needs. Some activities were, however, common to the four subtasks. The reports of the EOScpilot Science Demonstrators, for example, were analysed for issues and experience of relevance to the policy areas under study.

Policy Workshops were held at the first EOSc Stakeholders Forum, 28-29 November 2017 in Brussels, and at the EOScpilot All Hands event, 8-9 March 2018 in Pisa. Both these workshops used interactive survey software to gather input from the audience during the workshop, supplemented with discussions. Structured interviews with SD representatives and policy experts from ministries and research infrastructures were conducted from November to January based on a policy questionnaire. Desk research work continued throughout to gather and analyse relevant sources of information, with great effort concentrating also in staying up-to-date with trends and achievements that were happening in parallel to this work. The approaches used are described and referenced in the four respective White Papers which support D3.3.

Liaison with the Rules of Participation team (WP 2) took place during the preparation of D3.3. A dedicated workshop was held at the All Hands meeting in Pisa discussing the draft Governance Framework, the draft Rules of Participation and the draft Policy Recommendations.

The information gathered from these activities was used by each team to develop draft policy recommendations, which were then further analysed to identify their implications and impacts for four stakeholder groups, namely the EOSc governance/Rules of Participation, Funders/Ministries, Research Producing Organisations and Research Infrastructures. The latter three groups are the explicit targets of the policy engagement work of WP3; the EOSc governance and/or Rules of Participation are inevitably targeted or implicated by many of the draft recommendations.

The overall picture formed by the recommendations from the four subtasks taken together is discussed in the Conclusions section in Chapter 8. The Conclusions are of necessity preliminary, given the formative nature of the EOSc itself, the rapidly changing policy backdrop against which some areas of the draft policy recommendations have been formulated, and most of all the draft nature of the recommendations themselves, which will now be the subject of consultation to validate, amend and improve them. Further liaison will also take place with the Rules of Participation team as the policies and RoP should complement one another. Final policy recommendations will be presented in Deliverable D3.6.

### Box 1: D3.1 Recommendations

1. Produce consistent policies at the EU, member state and institutional level.
2. Standardise interactions at the organisational and institutional (micro) level.
3. Focus on the interactions with the four parts of the quadruple helix, particularly the interactions with industry, where the greatest inefficiencies currently exist.
4. Focus on interactions with platforms (particularly in sharing economy context), in order to maximise value, protect data ownership and portability and avoid vendor lock-in.
5. Automate the application of policies supporting open science by increasing openness and supporting data protection by design and default, as well as data sovereignty for the user.
6. Support the development of the e-Infrastructures services that could use the EU GDPR as a competitive advantage.

## 3. OPEN SCIENCE AND OPEN SCHOLARSHIP

### 3.1. Introduction

Encouraging and supporting the practice of Open Science is a key part of achieving the aims of the EOOSC and it is only through coherent policies, that such an effort could be achieved. Open Science (OS) is an umbrella term declaring elements of “open” in the way that research is performed, connected and disseminated in a research lifecycle to facilitate re-use. Many have attempted to unfold these components but results vary in correlation to the approach that is followed. However, there is common ground between the majority of such approaches, regardless of the way in which they are interpreted, including Open Access to publications, Open and FAIR Research data, Open Educational Resources, Research Collaboration artefacts (open peer review, open data citation, open workflows, open methodologies, etc.) and Citizen Science activities.

This section provides an overview of policy recommendations relevant to Open Science and Open Scholarship, focusing on requirements relating to:

- **open infrastructures and services** which will be connected and federated through the EOOSC,
- **research outputs** which will be produced in this trusted European Open Science environment, and
- practices of **monitoring** OS trends, demands and impact, following the new ways in which research is being performed and evaluated, so that progress is ensured in the EOOSC.

The draft policy recommendations target the EOOSC Governance/Rules of Participation, Funders/Ministries, Research Producing Organisations (RPOs), Research Infrastructures and policy makers as the actors which would adopt and implement them. They were drawn from thorough examination of key drivers and constraints to the free flow of data in relation to Open Science and Open Scholarship, taking into consideration practices reflecting the entire life-cycle of the research process. This revealed the numerous issues and variables potentially influencing the implementation and take-up of the EOOSC.

The draft policy recommendations for Open Science consider the areas of Scholarly Communications, Intellectual Property Rights, Access to infrastructures, services and other resources and Metrics, Rewards and Incentives.

### 3.2. Drivers and Constraints

Full information on the consideration of the drivers and constraints and the resulting draft recommendations is contained in the supporting White Paper for Open Science which is available at <https://eoscpilot.eu/content/d33-Draft-Policy-Recommendations-White-Paper-1-Open-Science>. What follows is a brief summary.

Examination of drivers and constraints revealed key issues that Open Science and Open Scholarship policy in the EOOSC should address. Requirements are divided in areas concerning infrastructures and services, research processes and outputs as well as recommendations for research evaluation and monitoring in the EOOSC.

#### 3.2.1. Infrastructures and Services

**Services** facilitate and often drive research lifecycle activities in the development and uptake of the EOOSC. Together with supporting **infrastructures** that are connected to the EOOSC, either as service suppliers or service consumers, they effectively become the vehicle for converging technical and legal requirements for resources/data exchange and interoperability and have the capability to significantly improve the uptake of open science.

Open Science constraints related to infrastructures and services are mostly the result of three types of factors:

- knowledge-related issues ranging from lack of awareness of the existence of certain infrastructures to the lack of expertise required for using such infrastructures, especially when coming from different

disciplines. This siloed knowledge effectively hinders free access to infrastructures across borders, sectoral or geographical

- fragmentation in technology, such as the lack of a single access point for all digital infrastructures or the lack of interoperability between infrastructures
- inconsistency in access, rules and conditions which unnecessarily increases the access costs and subsequently curtails open access use of infrastructures.

A substantial proportion of the drivers contributing to openness in terms of infrastructures and services are found in the form of central policies, both at the Member State and the EU level.

Such initiatives may be seen as top-down. However, there is a consistent effort for them to reflect user needs, wider cultural and societal needs as well as other considerations such as cost/ benefit ratio and the rise of citizen science. Research infrastructures, e-Infrastructures and other services and resources have developed access policies and data procedures and policies as part of the technical, legal and organisational frameworks within which they operate. Particularly for Research Infrastructures, the European Charter for Access to Research Infrastructures defines three different access modes: excellence-driven, market-driven and wide, and recommends that access to any RI may be regulated according to one of these or any combination of them.

The vision for the European Open Science Cloud includes supporting and furthering Open Science, the ongoing transition to collaborative working in research, and the achievement of substantial and sustainable knowledge sharing. The EOsc is envisaged as a federated environment for scientific data sharing and re-use, based on existing and emerging elements in the member states, to accelerate and support the transition to more effective open science and open innovation. This naturally provides a driver towards harmonisation in the policies and rules of infrastructures, services and other resources participating in the EOsc, particularly those infrastructures which are accessed virtually, access to which is likely in future to be through the EOsc.

### 3.2.2. Research Outputs

The sharing of **research outputs** is perhaps the point where Open Science is manifested with the greatest possible intensity. The Open Science and Open Scholarship activity focused around Scholarly Communication, FAIR data principles, Data Stewardship and IPR issues. Scholarly communication is mostly performed within the context of Research Producing Organisations (RPOs). RPOs - libraries in particular - are key facilitators of open science, as they instruct students, young researchers and faculty in their research conduct and contribute to researcher empowerment through information handling and digital literacy. Researchers, especially early career researchers, have rapidly recognised the benefits of un-paywalled research as an important contribution to their primary goals of research excellence and impact. FAIR developments promise to enhance sharing of data-sets with short- and long-term provisions. Public funding bodies and Ministries (as second-level funding bodies for Open Science), play a key role in the way scholarly communication is performed and in how it evolves over time.

A service or data(set) being FAIR (i.e. Findable, Accessible, Interoperable, Reusable) does not directly imply that it is also open. In this regard there is also some discussion about “levels” of legal openness, which relate to IPR ownership and licensing, confidentiality issues, trade secrets etc. Similarly, Open does not necessarily mean FAIR. Many datasets, trainings and services are open without being FAIR.

This OPENness vs. FAIRness discussion has introduced some ambiguity on the (technical) features that need to be added to FAIR data/services/infrastructures. Furthermore, proper metadata, citation and accessibility of accompanying software are necessary to make data useful to prospective users. This is often encountered in the medical field when accessing patient health history (unstructured, undocumented records) or in humanities where working on already existing data constitutes a large part of the research itself.

**Open Access (OA) and Research Data Management (RDM)** policies on the institutional level in Europe had been primarily developed as the result of the need to increase access to research and quality of scientific work but also as a direct outcome of public funders’ mandates or response to specific regulatory and policy

interventions such as EU Recommendations (Access to and Preservation of Scientific Information, 2012<sup>3</sup>), Directives (PSI 2013<sup>4</sup>, INSPIRE<sup>5</sup>), Regulations (GDPR<sup>6</sup>, Regulation proposal for the free flow of non-personal data<sup>7</sup>) and/or guidelines/prerequisites of specific financial programmes. These policies have as a clear goal the increase of free flow of knowledge, also known as the 5<sup>th</sup> Freedom, across the European Union and reflect core European concerns involving a combination of issues, such as re-use of Public Sector Information, ethics and data protection, intellectual property rights.

Similar considerations have been at the heart of the strategy and operations of public funders (both ministries and funding agencies) as well as private entities which fund research and support excellence.

However, these categories of stakeholders require additional guidance and support regarding more detailed aspects of implementing Open Access, such as costs related to managing, opening access to and preserving research outputs (e.g., Article Publishing charges - APCs or storage fees<sup>8</sup>). Another crucial aspect involves the ways in which acknowledgment to the funder may be provided, as well as how compliance with funding conditions - particularly regarding open science - is monitored and implemented.

IPR policies are a crucial component of the Open Science and Open Scholarship ecosystem: they set the key rules for the ownership of most of the digital assets and they regulate the flow of such assets both within the organisations producing the research and between RPOs and other stakeholders (government, business, general audience). In that sense, they may constitute major drivers, but also key constraints in the development of Open Science. IPR policies are deployed to address issues in relation to the acquisition, management and exploitation of intangible assets on which IPR subsists, and to produce value, either in monetary or non-monetary terms.

### 3.2.3. Research Impact Assessment and Open Science Monitoring

**Research assessment** is at the core of Open Science, as it shapes researchers' behaviours, and guides them on how to communicate-disseminate-share their work. Policy monitoring is effectively a compliance measure. In the Open Access movement, there have been mechanisms showing the benefits of OA publishing and current state-of-the-art in following OA principles. With current policy moves embracing Open Science, the need to develop a mechanism which supports national OS uptake, trends and compliance with OS policies has already been recognised and addressed in national European Research Area (ERA) strategies. The ambition of the European Open Science Cloud is to contribute to leveraging open and FAIR practices and build the infrastructure to allow a step change in the practice of Open Science in Europe, parameters which the EOSCpilot Open Science Monitor has built upon.

Metrics are being used and often misused in an increasingly pervasive way in the evaluation of research. Universities' global ranking is in some respects based on inaccurate data and arbitrary indicators<sup>9</sup>. Promotions and career progress within universities are often based on h-index and the number of a researcher's articles in high-impact factor journals. Overall there is a bias on the use of quantitative metrics to evaluate research, which significantly affects researchers' careers, blurring the discussion on indicators and metrics with the discussion on career incentives and rewards.

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<sup>3</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012H0417&from=EN>

<sup>4</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013L0037&from=FR>

<sup>5</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007L0002&from=EN>

<sup>6</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0679&from=EN>

<sup>7</sup> [http://europa.eu/rapid/press-release\\_IP-18-4227\\_en.htm](http://europa.eu/rapid/press-release_IP-18-4227_en.htm)

<sup>8</sup> Most of the data repositories limit free storage of researchers' datasets to a certain amount of bytes which they have predefined (e.g., Zenodo or Dryad). Check also: <https://www.nature.com/sdata/policies/repositories>

<sup>9</sup> The Leiden Manifesto for Research Metrics  
[https://www.nature.com/polopoly\\_fs/1.17351!/menu/main/topColumns/topLeftColumn/pdf/520429a.pdf](https://www.nature.com/polopoly_fs/1.17351!/menu/main/topColumns/topLeftColumn/pdf/520429a.pdf)

Measuring of open science currently targets organisations (funders, RPOs, projects) and it is about practices and compliance to policy. The lack of an agreed framework including indicators, processes, services/APIs and trusted data sources has been a key limitation for systematic adoption.

Drivers for effective monitoring of research impact and open science centre around the understanding of the environment (e.g., new indicators, new ways to measure them), their adoption at various decision-making levels (funding, RPO), and the definition of an interoperable framework of trusted services and data.

### 3.3. Draft Policy Recommendations

The draft policy recommendations for Open Science and Open Scholarship are proposed as a result of the analysis of the drivers and constraints and are presented in Chapter 7. They assume a minimum capacity from the side of the stakeholder implementing them and are addressed to the key EOsc stakeholders, as mentioned above, who (i) need to produce and implement coherent and consistent Open Science and Open Scholarship policies, (ii) are part of the EOsc Governance, and (iii) are able to contribute to the EOsc's overall vision and mission.

#### 3.3.1. Policy Recommendations for Infrastructures and Services in the EOsc

##### 1. [Develop a Charter for Access to EOsc Infrastructures, Services and Other Resources](#)

A charter including ground rules, key principles and basic self-commitments would allow different stakeholders taking part in EOsc to have a clear understanding of their rights and obligations with respect to access.

##### 2. [Adopt the AARC framework for enabling an interoperable AAI infrastructure](#)

Use of single sign on/login services (or interoperable ones) for the entirety of the spectrum of EOsc services is essential for reducing transaction costs and encouraging use of EOsc infrastructures and services. An AARC framework will provide an incentive both to users and service providers and thus aggregate offer (services) and demand (users) and increase the utility of EOsc.

##### 3. [Adopt a minimum metadata schema and limited number of APIs to be considered as standard for services, infrastructures and other resources in the EOsc Service Catalogue](#)

A minimum metadata schema for services (e.g. as defined by eInfraCentral) and a limited number of APIs will allow to have a concise and manageable set of services and thus encourage the development of linked services to those of the EOsc Service Catalogue.

##### 4. [Adopt and measure user acknowledgement of use of or contribution to research results of EOsc services, infrastructures and other resources](#)

Acknowledgement of use of or contribution to research results will provide incentives to researchers and at the same time provide a solid metric on which RPOs may build additional metrics, services and incentives schemes.

##### 5. [Develop an Evaluation and Ranking of Openness Maturity of EOsc services, infrastructures and other resources](#)

The development of a maturity capability-like model for ranking and evaluating openness of EOsc services will provide a quick and easy-to-use way of assessing the openness of the EOsc ecosystem both for the individual researcher and a research performing organisation. Such system of evaluation and ranking could operate as a signal of openness for the researcher and as an incentive for the RPO, especially if different forms of funding are attached to such an evaluation system.

#### 3.3.2. Policy Recommendations for Open Science Research Outputs in the EOsc

##### 6. [Adopt a minimal set of standards for data/metadata and exchange protocols](#)

Such standards should be based, where possible, on existing global and widely adopted standards. For example, these could be standards for interoperability (e.g. protocols), for metadata exchange (machine readability), for vocabularies, for file formats etc.

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#### 7. Reduce regulatory complexity for researchers

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In the course of their research activities researchers are frequently obliged to take into consideration an increasingly wide range of regulations (from copyright and data protection, to special data regimes, ethics rules etc). In this context, it is necessary that the regulatory complexity is reduced either through the codification and simplification of the relevant legislation or through the use of tools and toolkits (including guides and training) to support them in their compliance work.

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#### 8. Develop and adopt a European Open Science Concordat

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Provide leadership and clarity around openness-by-default by jointly detailing an Open Science code of conduct for every beneficiary involved in the research process, from authors to data stewards to repository managers, including the requirement for all research outputs to be appropriately open (as open as possible, as closed as necessary), FAIR and citable.

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#### 9. Encourage the development of an EOSC TDM (Text and Data mining) Policy Framework

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TDM is becoming the basis for an increasing number of types of research activities, however the regulatory and policy framework surrounding its use remain unclear so we should create a comprehensive policy framework for TDM -based research output, covering commercial and non-commercial use and re-use.

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#### 10. Develop principles for long-term data stewardship enabling curation, provenance and quality

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Long term stewardship is a composite and complex activity including a number of more specific activities, such as curation, provenance and quality assurance. It is necessary that best practices are developed, documented and then presented in a comprehensive form as a code of conduct including the most important principles and practices.

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#### 11. Use community accepted standards and conventions.

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Best practices as developed and accepted by the relevant scientific communities are necessary to achieve the objectives of the EOSC. Hence it is necessary to describe, codify and disseminate such practices to reduce transaction costs and ensure EOSC is used by all involved communities.

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#### 12. Standardise costs types of Open Science (OA, RDM, Preservation, etc) at all levels

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There is immediate need to standardize all types of costs ranging from subscriptions (eg big deals) and costs related to OA and RDM e.g., APCs (peer review process and data stewardship), to storage and services capabilities requirements (e.g., storage costs per Giga- or Tera- Bytes of datasets). Such standardisation will allow a better understanding of their operation (e.g. through meaningful comparisons), to the benefit of the individual researcher and the RPO.

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#### 13. Make DMPs a requirement and develop consistent (i.e. aligned) requirements for DMPs

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Include machine-readability, versioning, linking to infrastructures and registries. Mandate DMP deposition in a certified repository or CRIS system, link with the research data to which they relate, and update during the lifetime of the research project so they are “live” documents.

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#### 14. Encourage the use of unique and persistent digital identifiers

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Unique and persistent digital identifiers based on global, sustainable and community-governed solutions are necessary to support openness, FAIRness and citability of all research outputs and to provide the basis for mechanisms to assess compliance with Open Science policies.

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#### 15. Ensure that infrastructures, services and other resources supplied through the EOSC provide assurance, for example by developing accreditation or certification schemes

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Such assurance is necessary to increase trust in the EOSC and encourage the open release of content by all involved stakeholders. Provide assurance:

- to users, that their research outputs are open, FAIR and citable;
- to the EOSC for the purposes of FAIR data governance and compliance monitoring.

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#### 16. Develop, support and promote an EOSC Skills and Capability Framework as a common reference point

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Provision of the necessary skills to support and further advance open science is a necessary condition for the further development of the EOSC ecosystem. The description of the necessary competencies and skills for RDM is a good first step in this direction and may be further complemented by additional specification of the skills necessary for ensuring that research outputs are appropriately open, FAIR and citable

#### 3.3.3. Policy Recommendations for Intellectual Property Rights

This section provides an outline of the main policy themes and recommendations falling under the IPR umbrella. It aims at a comprehensive, yet concise, approach addressing the main challenges related to IPR that are identified in previous sections. The recommendations concern different types of IPR policies, that follow the life-cycle of an intangible asset (identification, clearance, sharing, management, dissemination). In the core of our approach is the reduction of any unnecessary transaction costs throughout the life cycle of the research process in a way that supports the vision and practice of open science.

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#### 17. Coordinate Open Access and IPR reutilisation in a comprehensive and coherent IPR framework

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The issue of IPR and open science, particularly open access, are often presented as antithetical or incompatible. There is limited merit in such an approach. Different forms of IPR exploitation relate to open licensing in a limited fashion only and, mostly, have to do with the choice of time when the protected material is to be released, especially in relation to patents. In addition, IPR exploitation policies are closely related to questions of rights registration and enforcement.

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#### 18. Have proper IPR documentation when releasing or accessing a research resource

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Rights documentation is a crucial part of any IPR policy, as it allows all involved stakeholders to have an accurate understanding of the rights status of different assets in different stages of their life-cycle (registration, sharing, licensing). Documentation should cover at least the (a) type of IPR, (b) ownership of rights, and (c) licensing of resources.

Such documentation should normally exist on the resource itself (e.g. ownership and copyright notices on a document), in the meta-data of the resource file (e.g. in the meta-data of .doc file), and in the repository metadata.

Where resources are offered through a web service (e.g. an API), the API documentation should also include the terms and conditions (TCs) or Terms of Service (ToS) under which they are offered.

Both licences and ToS/ TCs have to be stored in a permanent URI. They also have to follow a clear versioning system and contain a versioning history (versions/date). To the extent possible, a change of version shall be communicated to the recipients of the service (e.g. registered users) or made visible through a public website.

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#### 19. Clear IPRs before sharing them over e-Infrastructures/ Research Infrastructures

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Rights clearance is a precondition for sharing any research output or resource and ensuring this happens before the introduction of the resource in a shared environment will substantially reduce research transaction costs and risks.

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#### 20. Provide coherent and consistent IPR ownership policies

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One of the greatest challenges in comprehensive IPR policies for all types of organisations is the introduction of clear ownership and rights registration policies. Such policies allow all levels and types of participants in a research process to have a clear understanding of their rights regarding their contribution in a specific creative process.

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#### 21. Have a clear access and rights management regime

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Rights management within a research environment, by and large, relates to the access rights that different levels and types of staff have on research results and services. This needs to be in accordance with all the aforementioned points and provide a coherent framework both for reducing potential risks and for ensuring no unnecessary exclusion of persons or institutes requiring access to resources is in place.

## 22. Ensure that licensing policies accommodate different types of value production

Licensing schemes are necessary both in relation to the establishment of any type of collaboration related to resources and services and in relation to exploitation of resources in a broader value chain including such resources. The relevant stakeholders should make provision to have in place policies both for collaboration and the exploitation/dissemination of resources.

## 23. Introduce Open Access enforcement policies and mechanisms

Enforcement policies should address three issues: first, how the organisation is to monitor the implementation/application of the licence agreements it grants in relation to its own assets; second, how it is to respond to infringements of its licences and/ or IPR in general; and third, how it is going to respond to infringements that take place through the services/assets it provides to third parties.

## 24. Devise and deploy open patent systems along the existing patent systems and support the use of open data for assessing the state of the art in a patent ecosystem.

Piloting open patents in specific industry sectors with high R&D costs, a high regulatory burden or high equipment costs could substantially contribute to the support of open science. In addition, the use of open data to improve state of the art searches and position research in the patent landscape will substantially increase the value return for RPOs and SMEs. Finally, collaboration between EOsc and the European Patent Academy to find and facilitate links between Open Science and increase access to the state of the art, could reduce patent costs allowing SMEs to take part in the innovation ecosystem on equal terms to bigger organisations.

### 3.3.4. Policy Recommendations for Research Impact Assessment and Open Science Monitoring in the EOsc

## 25. Adopt the recommendation of the OSPP Working Group on Rewards and embed Open Science in the evaluation of researchers at all stages of their career

- Open Science must become part of recruitment criteria, career progression and grant assessment procedures for researchers
- ERA policies and roadmaps, as well as relevant national policies need a revision through the lens of Open Science and to be appropriately adapted to support Open Science
- Mechanisms should be put in place at the European level to encourage and incentivise researchers' participation in Open Science, primarily by funders
- Assessment of researchers should be structured to encompass all aspects of their achievements including Open Science. The OS-CAM multi-dimensional approach can be instrumental in this more structured evaluation of researchers.

## 26. Promote and support Open Next Generation Metrics infrastructure

As with the recommendation of the EC HLEG on Next Generation Metrics, «*Next generation metrics should be underpinned by an open, transparent and linked data infrastructure*» to address the collection and processing of underlying data. Develop and promote unique, unambiguous, persistent, verified, open, global identifiers; agreed standard data formats; and agreed standard data semantics.

## 27. Develop and operate Open Science Monitoring as an integral core service of EOsc

Develop an OS monitoring framework, indicators for measuring all aspects of OS, data to use, how to collect data, etc. This framework must meet the consensus of national infrastructures, RIs, EU as well as international bodies, who will have local monitoring instances. Moreover, the framework must be:

- **Open, Accessible and Interoperable.** Develop open, web-accessible and distributed instances with well-defined APIs and exchange formats for raw data, indicators and results
- **Reproducible.** Use of open data sources/resources to ensure transparency and reproducibility
- **Secure.** Provide appropriate security measures by defining and employing appropriate security policies around authorisation and authentication of research administrator actions, data protection and safeguarding of the integrity of the data
- **Reliable.** Exhibit a reliable online presence, without down-time or undocumented changes
- **Extensible.** Account for dynamically changing application contexts, i.e., new types of data, new indicators
- **Scalable.** Handle very large amounts of requests, as well as simultaneous execution of tasks and processes such as monitoring, visualizing, exporting and so on.

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## 28. Develop and maintain a machine-readable Open Science Registry for EOsc

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Develop a set of OS policy models and accompanying structures.

### 3.4. Conclusions

The consideration of Open Science in the context of the EOsc goes beyond Open Access to publications and data sharing to also address the needs of issues around openness and interoperability of infrastructures and services which support Open Science OS practices throughout the whole research lifecycle. Responsible monitoring of performance and uptake of Open Science in the EOsc is addressed for its potential to encourage and improve Open Science practices, to support the development of a sustainable and well-operated open research environment in Europe. The proposed policy recommendations are expected to assist stakeholders in coherent Open Science policy making in the context of the EOsc, contributing to the digital economy and achieving growth through opening research.

The next phase of work will consider recent Open Science policy proposals of relevance as well as reaching out to stakeholders and related initiatives such as the EC's Expert Groups and other EOsc projects as part of the exercise to validate the draft policy recommendations proposed here.

## 4. DATA PROTECTION, ASSURANCE AND SPECIAL REGIMES

### 4.1. Introduction

This section presents a summary of policy recommendations for data protection. The Data Protection regime in Europe has two objectives: on the one hand to protect the individual from the unlawful processing of her data and on the other hand to encourage free flow of data across the EU. Similarly, while EOSC aims to foster open science, it still needs to ensure that the rights of individual data subjects be respected, resulting in constraints on all areas of research in which personal data is processed. The General Data Protection Regulation (GDPR) is the most important piece of data protection legislation for EOSCpilot as it is directly binding for all member states<sup>10</sup> of the European Union and aims to harmonise differing national legal systems.

GDPR is a new piece of legislation and its overall impact will need to be continuously assessed as individual member states proceed with its implementation. GDPR both places constraints on scientific research and offers solutions for alleviating those constraints, and as such should be closely examined to determine the actions necessary for greater harmonisation of data protection at the EU level. The recommendations in this section are therefore naturally of a more legal character than those in other sections of the document.

The section starts with a brief outline of the provisions of the GDPR that are relevant to the field of science and research and then presents draft policy recommendations.

For a more in-depth analysis please refer to the White Paper on Data Protection<sup>11</sup>.

### 4.2. The General Data Protection Regulation: Applicability, Accountability and Constraints

Put simply, GDPR requires researchers to first define what type of data is processed as well as the identity of the data controller/processor, then identify the legal basis for processing and ensure that personal data protection principles are observed throughout data processing.

The scope of GDPR is limited to personal data. Art. 9 introduces special categories of “personal data” including the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person or data concerning health.

According to recital 26 the GDPR does not apply to anonymous data. It is however important to mention that anonymisation is not possible in some research areas, as for example genetic data is inherently assignable to individuals.

Art. 4 VII, VIII GDPR introduces the definitions of data controller and data processor. This distinction is crucial for compliance: The data controller is the principal party for responsibilities such as collecting consent, managing consent revocation and enabling data subjects’ rights such as the right to access. A data subject who wishes to revoke consent for their personal data will therefore contact the data controller even if the respective data is stored on servers belonging to the data processor. Against this background, the EOSC’s exact role in implementing data subjects’ rights during data processing is still unclear.

The processing of personal data needs a legal basis, with Art. 6 GDPR providing an exhaustive list of such bases. Most relevant for scientific research are Art. 6 I (e) GDPR and Art. 6 I (a) GDPR. Art. 6 I f GDPR states that the controller’s legitimate interest forms a basis for the processing of personal data. It is contestable if and what kind of research counts as a “legitimate interest” of the controller as research is not explicitly mentioned in Art. 6 I f GDPR or in the referring recital 47. Therefore, the focus should be on Art. 6 I (e) GDPR

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<sup>10</sup> Paul de Hert, Vagelis Papakonstantinou, The new General Data Protection Regulation: Still a sound system for the protection of individuals? Computer law & security review 32 (2016) 179–194, available at: [https://ac.els-cdn.com/S0267364916300346/1-s2.0-S0267364916300346-main.pdf?\\_tid=8befb4aa-8d95-4644-9af7-91fcd7fdc4fd&acdnat=1523440358\\_b5d75862fb87a40a3378e8f478e82fee](https://ac.els-cdn.com/S0267364916300346/1-s2.0-S0267364916300346-main.pdf?_tid=8befb4aa-8d95-4644-9af7-91fcd7fdc4fd&acdnat=1523440358_b5d75862fb87a40a3378e8f478e82fee)

<sup>11</sup> Available at <https://eoscipilot.eu/content/d33-Draft-Policy-Recommendations-White-Paper-2-Data-Protection>.

and Art. 6 I 8 (a) GDPR. Furthermore Art. 9 II (j) GDPR in conjunction with Art. 89 GDPR constitutes a legal ground for processing special categories of personal data.

Art. 5 GDPR provides a list of principles relating to processing of personal data that need to be fulfilled regardless of the legal basis for said data processing.

Chapter III (Art. 12-22) of GDPR lists the rights of data subjects: the right of access, rectification, erasure (right to be forgotten) and right to restriction of processing. Furthermore, it requires the controller to inform the data subject of any change in the purpose of the data processing or in case of rectification, erasure or restriction of the data.

Opening clauses setting out processing requirements can be found in Art. 32, 35-37, 43 GDPR.

Moreover, Art. 89 GDPR remains a most crucial provision in identifying possible differences among member states with regard to processing of personal data for scientific research, as this norm applies when relying on the research exemption in Art. 9 2 (j) GDPR, as well as providing member states with their ability to derogate from certain rights granted under the GDPR where processing is for scientific purposes.

However, taking into account that the scope of action granted by Art. 89 GDPR to the member states is relatively large, scientific research is the area of GDPR implementation where harmonisation is most likely to be compromised. As some member states' implementing laws are still at the legislation stage, it is difficult to estimate what level of harmonisation will be achieved. Member states may also use the opening clauses later at any time when adopting special legislation. Consequently, the EOSC needs to find a way to deal with different levels of harmonisation and be adaptable and informed. Further questions arise from the unknown legal status of the EOSC itself, which might later influence its data protection policies.

Altogether, it is therefore a difficult challenge to strike a balance between open science, data reuse and cross-disciplinary research and an appropriate level of GDPR-compliant data protection. The policy recommendations for the EOSC aim to provide a basis for this balancing act.

### 4.3. Draft Policy Recommendations

DP1. Legal basis for data protection: consent and legitimate interest of controller

- i. Explain the purpose of all data recording and processing
- ii. Apply a concept of tiered consent (in compliance with "broad consent" of the GDPR)
- iii. Adapt privacy-by-design and privacy-by-default solutions (providing data subjects with a technological solution for consent withdrawal)

DP2. Opening clause of Art. 89 GDPR

- i. The EOSC should constantly monitor EU and member state legislation to:
  - examine relevant changes in said legislation influencing data processing;
  - raise awareness regarding potential difficulties arising from individual member state implementation of the GDPR based on its opening clauses as well as further emerging EU regulations.
- ii. Analyse how differing member-state data protection legislation arising from opening clauses may affect data processing for scientific research purposes;
- iii. Analyse whether there is room for further harmonisation in the context of the respective legislations;
- iv. Encourage harmonisation taking into account specific legal bases for data processing.

DP3. Developing a user-friendly EOSC data protection policy

The following policy recommendations aim to make the EOSC more user-friendly:

- i. Introduction of a special tag for the processing of data in the EOSC (as already done by some stakeholders). We recommend at least a differentiation between

- personal data
  - special categories of personal data
  - data to be processed under special conditions (e.g. the data of minors)
- ii. Introduction of special regimes to classify data according to the level of data protection constraints.

DP4. Education / consultation:

- i. GDPR training for the staff of research providing organisations and research infrastructures, with emphasis on communication of legal knowledge
- ii. GDPR training for data subjects (including data donors), with special focus on the rights of data subjects
- iii. Establishment of one single point of contact for data subjects (in case the EOsc has its own data protection officer, they may take up this role).

DP5. Assurance:

We recommend a personal policy catalogue that could work in the following way: users would log in with their special profile and declare formally how personal data will be processed. The policy catalogue would then return individually applicable policy rights and obligations that are updated whenever a relevant change arises from new legislation or legal precedent. This should function as a protocol, fulfilling the documentation obligation and keeping users informed about all relevant legal changes.

#### 4.4. Next Steps

Many questions related to data protection issues are connected to the as-yet unclarified legal status of the EOsc itself. Once this is clarified it will be possible to make further definite recommendations on how the EOsc should function against the backdrop of balancing the free flow of information and data protection. In addition, the EOscpilot Science Demonstrator pilots are still ongoing and may provide further input which shapes the recommendations, based on their experience.

Until then, the next steps will be to regularly examine the legislative process of GDPR-implementation laws in member states and their relevance for the EOsc. Based on this, efforts will be taken to define and concretise the legal basis for data processing under EOscpilot. Accordingly, controllers and processors should be given concrete advice, particularly about their responsibilities as laid down in Arts. 24, 26 and 28 GDPR. Specifically, recommendations on how (joint/dual) controller and processor responsibilities might be realised in large multinational projects will have to be developed. The differentiation between funders and ministries, research infrastructures, and research providing organisations as already developed will be of significant relevance here.

Moreover, Art. 89 GDPR remains a most crucial provision in identifying possible differences among member states with regard to processing of personal data for scientific research purposes. Said article, for example, must be drawn on where the derogation for scientific research as a legal basis applies (Art. 9 2 (j) GDPR). It also allows member states to derogate from certain rights granted under the GDPR where processing is for scientific research – so this might be where harmonisation is compromised. From this follows the need to further discuss Arts. 6 1 (a), (e) and (f) as well as Art. 9 2 (j) GDPR, taking Art. 89 (1) safeguards and Art. 89 (2) derogations into account as well, in order to expose further harmonisation issues.

The EOsc should be open to the world, as processing to third countries will be crucial for open and globalised science. The EU Commission is revising the current adequacy decisions, and relevant work promoting further legal bases for data transfers such as codes of conduct is on its way. However, data transfers to international organisations also count as third country transfers under the GDPR. As relevant international organisations are involved in the EOsc as RPOs, their data policy regimes will need to be integrated into EOsc policies.

Throughout these next steps, the EOSC should take advantage of the principles in Art. 5 GDPR to aid implementation. This way, policies developed by the EOSC will be well equipped to give guidance on the gradual set-up of a European research platform with special and harmonised data protection rules.

## 5. PROCUREMENT

### 5.1. Introduction

Policy requirements have been gathered and reviewed to provide guidelines for the procurement of European Open Science Cloud Resources from the perspective of users, Research Producing Organisations, Research Infrastructures and e-Infrastructures. This section considers how Resources can be made available to the users whether they are from another user or a commercial company or indeed an arrangement of a “commons” in which services are maintained and sustained by collective actions of EOsc participants.

“Resources” in the context of the EOsc encompass a wide range of goods and services that could be considered within the EOsc service catalogue, including but not limited to cloud services - software or infrastructure, professional services and possibly other forms of intellectual property, eg data-sets.

In producing this Chapter, the findings from the Science Demonstrators in the EOsc Pilot project have been considered and input was gathered from attendees at the Policy Workshop held as part of the EOscpilot Plenary event in Pisa in February 2018<sup>12</sup>. For more details please refer to the Procurement White Paper<sup>13</sup>.

### 5.2. Drivers and Constraints

The main drivers to performing procurement activity in the EOsc are the likely need to procure services, infrastructures or resources for a broader set of users than has been the case previously, because of the envisaged federated nature of the EOsc. Associated with this are the requirements to procure services or resources at great scale to meet the needs of some of the EOsc use cases (big data experiments in particular), and also economies of scale which could potentially be realised by procurement activity in the EOsc.

A particular driver is the desire of the research community to make use of cloud storage and compute facilities, many of which are provided by commercial suppliers.

The main constraint acting on the provision of services, infrastructures and resources in the EOsc is expected to be the terms of the EC Procurement Directive (2014/24/EC), discussed in detail below.

### 5.3. The EOsc Model and Procurement

The form, character and style for EOsc is developing to deliver on the EC’s initial stated vision in April 2016 in its European Cloud Initiative Communication<sup>14</sup>. Some key characteristics that are emerging are:

- “1.7 million European researchers and 70 million professionals in science and technology a virtual environment with free at point of use, open and seamless services for...” (ECI Communication)
- “benefit from a EOsc that federates existing research data infrastructures”<sup>15</sup> (EOsc Implementation Roadmap)
- “the consultation clearly and conclusively ruled out a centralised model of implementation as a valid option for the implementation of EOsc” (EOsc Implementation Roadmap)

The EC’s Implementation Roadmap for the European Open Science Cloud proposes a possible model for EOsc:

“a pan-European federation of data infrastructures built around a federating core and providing access to a wide range of publicly funded services supplied at national, regional and institutional levels, and to complementary commercial services”.

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<sup>12</sup> The report of the workshop’s Mentimeter survey results is in the WP3 Repository

<sup>13</sup> Available at <https://eosc-pilot.eu/content/d33-Draft-Policy-Recommendations-White-Paper-3-Procurement>

<sup>14</sup> COM(2016)178 final

<sup>15</sup> Implementation Roadmap for the European Open Science Cloud SWD(2018) 83 final



To deliver an effective EOsc, access to such services will require procurement activity to establish the right contractual arrangements for users. The Procurement White Paper reports on the legislative constraints that will need to be satisfied when acquiring services in the EOsc. Suggestions are provided here as to how procurement can increase the value of the resources being offered and reduce the administrative overhead of accessing them.

#### 5.4. Draft Policy Recommendations

Whilst the actors involved in EOsc may come from both public and private organisations it is a fact that EC Directive 2014/24/EC will be relevant as it obligates those from publicly funded bodies who wish to procure or provide services within the EOsc.

The Directive contains provisions which can be used to aid in the realisation of the stated aims of EOsc, namely framework agreements established on behalf of the EOsc user community to provide access to a range of complementary commercial services. Furthermore, there are mechanisms that allow for federations to occur and services to be shared amongst those federations.

Two main considerations, at this Pilot phase of EOsc, are highlighted for further consideration:

##### 1. Funding

The Directive becomes relevant when contracts come into existence in EOsc - i.e. charges are to be levied by service providers - and there are no proprietary reasons why only one service provider could be selected, (this removing obligations to follow the Directive). The funding models for EOsc will determine if a contract exists for which procurement activity would be required. It is foreseeable that in instances where the services are not EC- or state-funded, and require payments from users, then procurement activity will be required. This may limit participation from some actors if they cannot respond to a public procurement due to their internal governance restrictions.

##### 2. Private organisations

The involvement of private organisations adds an extra dimension to the characteristics of EOsc. It may be that there will be different service offerings, notably from private organisations, to EOsc users. The most significant consideration from Article 12 of The Directive is that co-operations in the public interest can only exist between public bodies. A private organisation will typically not have a statutory obligation/public-interest task entrusted to it. Further analysis will be required of EOsc service providers, such as e-Infrastructure providers, to establish their character; if they wish to

- a. Recover fees for their services from users and
- b. do not have a proprietary service offering and
- c. are judged to be private organisations without a public interest obligation entrusted to them,

then they will be unable to provide services to the EOsc users without responding to a formal procurement exercise.

In summary, compliance with EC Directive 2014/24/EC on procurement is likely to be material to EOsc. In order to meet the objectives and aspirations at this date, two recommendations are proposed:

P1. The EOsc governance, RPOs and RIs should consider exploiting aggregated procurement in the EOsc. This should be undertaken in accordance with EC Directive 2014/14 (Procurement). The aggregated procurements could be carried out by organisations participating in EOsc or by EOsc itself if it has legal form and is a Contracting Authority.

P2. EOsc governance, funders/ministries, RPOs and RIs should be aware that in the context of the EOsc, organisations' governance arrangements should be recognised as a possible mechanism to allow for sharing resources where it makes sense to do so (e.g. forming a special-purpose vehicle). It may not be possible for

one public entity to buy services from another public entity without a procurement in accordance with Directive 2014/24 (Procurement) unless certain governance conditions can be met.

*NB This is not relevant where the resources/services being provided/procured are unique, i.e. intellectual property*

## 5.5. Next Steps

These recommendations will be discussed further with EOSC stakeholders to gather further input on their suitability. Further work is also required to examine the situation of entities which have limitations on their ability to respond to public procurements exercises, and also to determine whether some potential EOSC service suppliers will only be able to provide services in response to a public call for competition.

In the next phase of work, Subtask 3.1.3 will collect further information from EOSCpilot WP5 (Services), from the Business Model subtask of WP2 and from other relevant activities in EOSCpilot about the emerging EOSC operational model, and also from experts about the character of likely EOSC service providers such as e-Infrastructures. This is to understand more clearly the likely purchasing needs of the EOSC programme, considering the full range of services and resources likely to be provided within it. Further consultation with stakeholders and experts including HelixNebula will also be performed to gather more input on requirements and to understand potential solutions for service provision and consumption in the EOSC.

## 6. ETHICS

### 6.1. Introduction

This section presents proposals for ensuring that an appropriate ethical dimension is included within the policies, structures and services of the developing European Open Science Cloud (EOSC), for the benefit of EOSC itself, its scientific user communities, and the wider European public.

It is based on a separate white paper<sup>16</sup>, developed by the authors and a group of external ethics experts, that provides a more detailed explanation and justification for the proposals made, linking the discussion as appropriate to the existing literature. The resulting policy recommendations have been summarised in this document simply to make it easier to review them.

The recommendations are based on the following assumptions and beliefs, which are discussed at greater length in the white paper:

- Ethical considerations should be an integral part of EOSC decisions and processes from the outset, and not seen as somehow additional or peripheral to the core scientific endeavour.
- ‘Ethics’ in EOSC will cover a much wider area than the management of sensitive personal data, extremely important though that is. Debates about ethics need to include all scientific disciplines, and not just those that collect and process personal data.
- In particular, we discuss in the white paper ethical issues relating to organisational conduct and policies, research conduct, research decision making, the use of data, especially ‘big data’ and sensitive personal data, and the interaction between science and society.
- Many of the potential ethical issues would more normally be seen as the responsibility of the individual researcher, (or their employer or funder), but this does not prevent EOSC from supporting and promoting ethical behaviours from other actors.
- The degree with which EOSC will act as a single organisation in terms of ethics related policies, rather than a federation of separate organisations each with their own ethical policies, is currently not clear but we have assumed convergence within EOSC around ethics policies because we believe that consistency in this area is itself of ethical value and is necessary for an EOSC-wide policy.
- It is difficult to anticipate all the ethical issues that may emerge as the scientific, technical, social and political landscape evolves.

It is therefore seen as crucially important to have strategy and governance mechanisms in place that can ensure ethical issues are appropriately dealt with in the future, however and whenever they are presented, as well as identifying and proposing responses to current issues.

### 6.2. Policy Recommendations

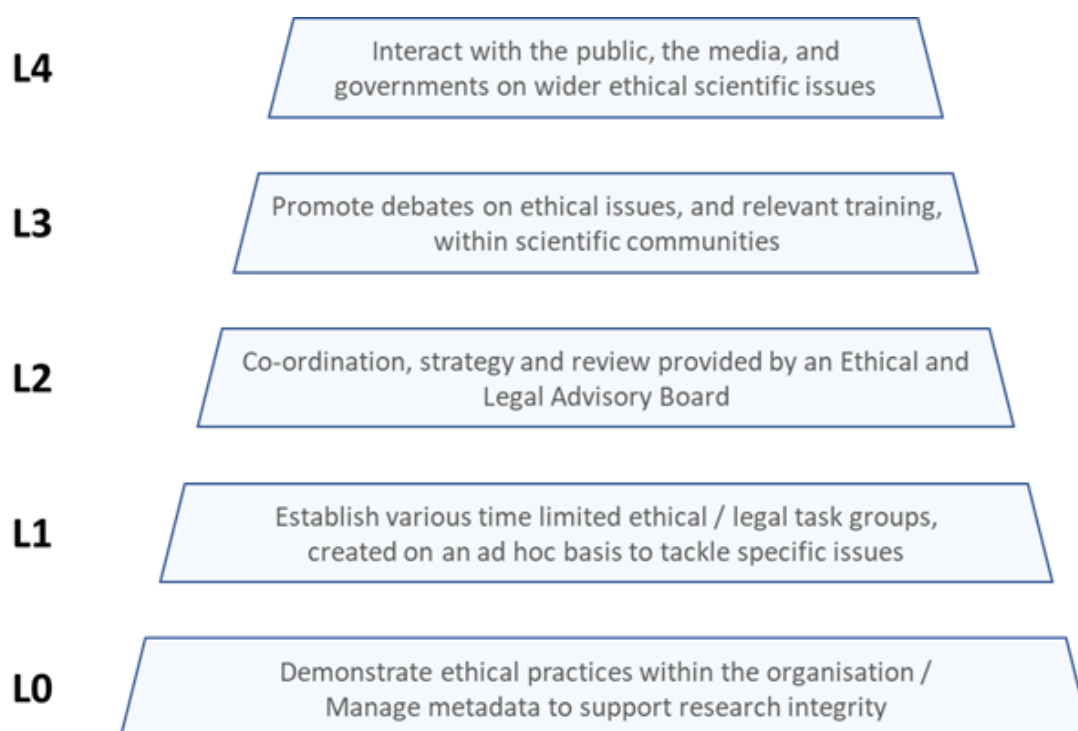
Because of the range of possible issues, and the need to retain flexibility, the paper proposes that ethical issues can be managed at a variety of different ‘layers’ of involvement and commitment, and identifies 5 such layers (see figure 1). An initial ‘layer’ of policies are seen as fundamental and inevitable. Above them are sets of policies that almost certainly will be useful and should be implemented, and then come policies that would be ‘nice to have’ but are probably not immediately essential, and that could be developed in later years.

*Layer 0:* These are seen as meeting the fundamental ethical, or ethics related, requirements that EOSC must implement. They fall into two groups:

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<sup>16</sup> Canham S, Ohmann C, Matei M, et al White Paper: Ethics - Supporting Document to D3.3 Draft Policy Recommendations. EOSC Pilot. 2018. Available at <https://eoscpilot.eu/content/d33-Draft-Policy-Recommendations-White-Paper-4-Ethics>

- Organisational policies that demonstrate that EOsc itself, as an organisation, both recognises and implements the principles of ethically sound practice, to ensure its own actions are always defensible, and to maintain the trust of its users and the wider community. This would include a commitment to transparency, of financial dealings as well as of decision making, demonstrating independence from commercial interests or pressure groups, building in appropriate appeals mechanisms for some types of decisions, fairness in the management and allocation of services, and selection and treatment of staff according to modern best practices.
- Data management practices that support and enable research integrity. These include the clear identification of provenance of all materials, including company affiliations where applicable, and the clear signalling of problems identified with data or other materials, including retracted material. It also includes developing mechanisms to ensure that re-used material is properly cited, so that credit can be given to the original data generators. It implies a co-ordinated, comprehensive approach to metadata management within the science cloud.



**Figure 1 – Different Levels of Commitment to Ethical (and Legal) Issues Possible Within EOsc**

*Layer 1:* This layer consists of a variety of theme or discipline specific, time limited, expert task groups, created to consider specific issues and responses – examples include the use of AI in analysing data, the use of consent for sharing personal data, the accessibility of potentially dangerous microbiological data, or intellectual property rights with reference to the pharmaceutical industry.

In general, however, these groups are likely to be reactive, in the sense that an ethical issue or problem will arise and be recognised as requiring a policy decision, and a task group will then be formed to consider it and report back. This approach fits in well with the proposed EOsc governance model, with the groups being a natural part of the diverse ‘stakeholder forum’ that will make up the organisation’s ‘steering layer’.

In most cases legal expertise will be required as well as subject specialist knowledge and ethical input, as applicable legislation will always need to be considered when proposing policies and processes. In fact, some groups may be largely ‘legal’, and some largely ‘ethical’, but most will require a mix of the two types of input.

*Layer 2:* As a natural extension of Layer 1, this layer introduces central co-ordination of the specific task groups described above, by establishing a standing, general EOsc ethics advisory board. As above, it probably makes more sense to make this a combined ethics and legal board, so an EOsc Ethics and Legal Advisory Board or ELAB. Such a committee should be independent of the EOsc executive, but it forms a natural part of the envisaged ‘strategic layer’, in effect setting and co-ordinating the ethical agenda for the organisation. Establishing this group would also make an important public statement about the importance of ethical and legal considerations to EOsc. An ELAB can provide several key functions:

- It can coordinate the work of the specific task groups described in layer 1 by anticipating as well as identifying issues and then seeking input from the relevant specialists. Rather than appearing reactive, EOsc becomes an organisation that is actively trying to advance open science, and support scientific communities, by clarification of the best and most ethical practices within the current legislative framework.
- It can provide the focal point that any specialist ethics / legal task group can report to, freeing such groups from any pressures (real or perceived) from the EOsc executive.
- It can provide a periodic report (perhaps every one or two years) to the EOsc strategy forums about the ethical and legal issues facing the organisation and the current ‘performance’ of EOsc’s executive in ethical terms. A public version of that report should be published.
- It can identify and coordinate possible initiatives, such as those listed in layers 3 and 4 below, to help EOsc take the lead in selected ethical and legal issues surrounding science and its interactions with society.

**We believe that developing an ethical / legal infrastructure up to this level is the minimum required of EOsc if it is to have, and be seen to have, a serious commitment to ethical scientific research.**

In one sense establishing an ELAB is like setting up a Security Management System within an ISO 27001 certification process. The key requirement of ISO 27001 is not specific security measures but a mechanism for keeping security under review, and thus identifying the measures required on an ongoing basis. The EOsc ELAB would have the same function – keeping the organisation informed of the issues that need to be addressed and overseeing the process by which they are tackled and implemented.

*Layer 3:* Once a basic ethical and legal infrastructure is in place it becomes possible to build on that. One way would be by providing training and training materials for research staff in relevant ethical and legal issues, raising awareness and helping to promote research ethics in the more general sense. The focus here is on scientific practitioners and organisations, and other activities could therefore include promoting debates on ethical / legal issues within scientific meetings, collecting the views of researchers about these issues, and helping to organise the production of ethical / legal guidelines.

*Layer 4:* This final layer considers how EOsc could play a part and influence the wider debates concerned with the interface between science and society. This could include expanding the training programs described above, but this time providing input and materials to non-scientists, especially journalists. It could include examining how social media could be used to actively fight misleading interpretations, or even denial, of scientific data and results. It could also include working with government agencies to see how policies can best be informed by the data being generated and stored within EOsc. At this time these activities are hard to define exactly, but they represent an important opportunity for EOsc, to raise its own profile, to advance the cause of science and scientists, and to increase the ‘return-on-investment’ provided by EOsc at a societal level.

### 6.3. Conclusion

The promotion of ethical behaviour within the EOsc needs to consider a very wide range of issues, but awareness of ethical issues, and appropriate policy responses to them, needs to be integrated into the ‘core’ of EOsc from the outset. At the same time, there is a recognition that it is difficult to predict the precise

nature and priority of the ethical challenges that the organisation will face in the future. Because of that we have proposed a highly flexible ‘layered’ approach, that stresses the need for responsive systems, targeted expert input and periodic review.

The ‘layers’ represent different levels of commitment to the active management of ethical issues in scientific research. The twin components of level 0 are seen as essential and inevitable. The activities and structures described as levels 1 and 2 are seen as reactive and proactive mechanisms, respectively, for the EOsc to manage specific ethical challenges. Level 3 takes this further by proposing that the science cloud works with scientific communities to promote understanding and involvement in ethical issues, whilst level 4 has EOsc taking a societal perspective, and working with governments and public opinion to promote the ethical understanding and application of science.

Key next steps include wide consultation on these proposals, with a variety of stakeholders, plus exploration of how the recommendations above can be integrated into the ‘policy supporting services’ that now need to be developed. The supporting white paper provides further details.

## 7. DRAFT POLICY RECOMMENDATIONS – IMPLICATIONS FOR STAKEHOLDERS

The tables presented on the following pages summarise possible implications of the recommendations for each of four key stakeholder groups

- EOOSC Governance structures and the Rules of Participation
- Funders and Ministries
- Research Producing Organisations
- Research Infrastructures

The Open Science and Open Scholarship table also includes consideration of policy-makers as an additional category for some of its recommendations, recognising that not all policy-making organisations are ministries.

Some of these implications are requirements – because some stakeholders will be involved in funding and organising the recommendations, others are impacts, and describe the beneficial consequences of implementing the recommendations.

## 7.1. Open Science and Open Scholarship

Draft Policy Recommendation	EOSC Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures	Policymakers
OS1. Develop a Charter for Access to EOsc Infrastructures, Services and Other Resources	<p>Encourages openness and greater consistency in access policies of research infrastructures, services and other resources supplied through the EOsc single login</p> <p>EOsc RoP should include requirements for EOsc providers to adhere to the approved set of APIs</p> <p>EOsc governance will need to monitor adherence to the approved set of minimum metadata and APIs</p> <p>Supports interoperability of services, infrastructures and other resources in the EOsc, based on widely recognised standards</p> <p>EOsc RoP should include requirement for users to acknowledge use/contribution of</p>	<p>Funders requirement for greater openness and consistency of research infrastructures' access policies encourages their use</p> <p>Beneficiaries would be required to adopt/apply the AARC2 recommendations which will result in improved accessibility of infrastructures, services etc</p> <p>Encourage beneficiary services, infrastructure etc to adopt the EOsc-approved set of minimum metadata and APIs supporting interoperability of services, infrastructures etc and the EOsc, to ensure they meet the EOsc RoPs</p>	<p>Researchers will need to adopt the practice of citing EOsc services, infrastructures and other resources used in their research</p>	<p>Charter development may be expected to apply pressure for greater openness and harmonisation of access policies</p> <p>Evaluation and Ranking of Openness Maturity will evaluate and rank RIs' openness and will recommend activities to encourage greater openness</p> <p>RIs should consider assigning open source licenses to the software comprising the core of the open infrastructure they are developing</p> <p>RIs will need to adopt the approved set of minimum metadata and APIs for greater interoperability of RIs and services, if they wish to participate in the EOsc</p> <p>- use of research infrastructures for</p>	
OS2. Adopt the AARC framework for enabling an interoperable AAI infrastructure					
OS3. Adopt a minimum metadata schema and limited number of APIs to be considered as standard for services, infrastructures and other resources in the EOsc Service Catalogue					
OS4. Adopt and measure user acknowledgement of use of or contribution to research results of EOsc services, infrastructures and other resources					
OS5. Develop an Evaluation and Ranking of Openness Maturity of EOsc services, infrastructures and other resources					



	<p>EOSC services, infrastructures and other resources</p> <p>- EOSC governance will need to develop monitoring of acknowledgements which will establish and develop practice of citation of EOSC services etc providing a metric for “usability” of services etc</p>			<p>research outputs is recognised and cited, however RIs may feel under pressure to increase their usage</p>	
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Draft Policy Recommendation	EOSC Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures	Policymakers
OS6. Adopt a minimal set of standards for data/metadata and exchange protocols	Accepts or modifies the standardisation process across EOsc entities	Suggests or mandates the standardisation process across and beyond EOsc	Implement and evaluate standardisation within the research process	Develop and deploy standardisation tools and testing processes	
OS7. Reduce regulatory complexity for researchers	European Open Science Concordat supports EOsc RoP by stating principles and expectations around openness reflecting to users the standards of openness they need to seek in their research and to providers the baseline of openness they should provide  Supports EOsc RoP by stating principles around data stewardship  Supports best practice in data management in the EOsc  Supports all research outputs produced through the EOsc to have unique and persistent digital identifiers as well as to	Requires cross-border coordination and cooperation between European states, RIs and RPOs and beyond	Requires collaboration cross-border and with funders/ministries and RIs	Requires collaboration cross-border and with funders/ministries and RPOs	
OS8. Develop and adopt a European Open Science Concordat		increased rates of regulatory compliance by researchers; simpler to implement and monitor	Collaborate with Industry to open up patents, for example piloting open patents in specific industry sectors with high R&D costs, a high regulatory burden or high equipment costs	RIs can support the principles and expectations around openness which RIs and users should meet	
OS9. Encourage the development of an EOsc TDM (Text and Data mining) Policy Framework		Ensures all affected beneficiary groups are involved in developing the Concordat by providing principles and expectations around openness for beneficiaries and expecting increased levels of compliance to stated standards of openness	Expect guidance on standards to result in wider adherence to approved data stewardship practices by those involved in the research process	RIs can support the data stewardship standards which RIs and users should meet	
OS10. Develop principles for long-term data stewardship enabling curation, provenance and quality			Require standardisation of costs around subscriptions (eg big deals)	Require tandardisation of costs around storage and services capabilities requirements (eg storage costs per Giga- or Tera- Bytes of datasets)	
OS11. Use community accepted standards and conventions				Support all usage applications of DMPs	
OS12. Standardise costs types of Open Science (OA, RDM, Preservation, etc) at all levels				Research outputs produced using RIs	
OS13. Make DMPs a requirement and develop consistent (i.e. aligned) requirements for DMPs					

<p>OS14. Encourage the use of unique and persistent digital identifiers</p>	<p>be open, FAIR and citable</p>	<p>involved in developing the principles for Data Stewardship</p>	<p>Standardise requirements for DMPs; consistent processes to support implementation can be developed</p>	<p>should be assigned unique and persistent digital identifiers</p>	
<p>OS15. Ensure that infrastructures, services and other resources supplied through the EOSC provide assurance, for example by developing accreditation or certification schemes</p>	<p>Provides the basis for mechanisms to monitor compliance with Open Science policies</p>	<p>Requires standardisation of costs around OA publishing and RDM eg APCs (peer review process and data stewardship)</p>	<p>Support research outputs to be open, FAIR and citable</p>	<p>Supports research outputs to be open, FAIR and citable</p>	
<p>OS16. Develop, support and promote an EOSC Skills and Capability Framework as a common reference point</p>	<p>Accreditation or certification schemes for research outputs to be developed by EOSC governance; - consider introduction of badging systems supporting specific rewards for data availability and for re-use</p> <p>Provides a Skills and Capability Framework to offer RI, RPOs, and other service providers and users a common reference point for describing the necessary skills and competences for RDM, to ensure research outputs are appropriately open, FAIR and citable</p>	<p>Supports research outputs to be open, FAIR and citable</p> <p>Provides basis for mechanisms to monitor compliance with Open Science policies</p> <p>- Lowering the gap between supply and demand for ICT jobs</p>	<p>Provide basis for mechanisms to monitor compliance with Open Science policies</p> <p>- Use of EOSC development skills framework to create job profiles, describing the necessary skills and competences for RDM</p>	<p>Provides basis for mechanisms to monitor compliance with Open Science policies</p> <p>- Mapping job profiles to EOSC services, validating the services with the feedback in the framework of skills &amp; training</p>	

Draft Policy Recommendation	EOSC Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures	Policymakers
OS17. Coordinate Open Access and IPR reutilisation in a comprehensive and coherent IPR framework	Create an IPR registry containing all IPR policies of participating organisations	Require the existence of comprehensive IPR policies as a precondition for institutional funding	Adopt a holistic IPR policy that covers all types of IPR, i.e. Copyright, Patents, Trademarks and Design Rights.	Condition RPOs participation to e-Infrastructures upon the existence of comprehensive IPR policies for the resources shared on the infrastructures	Encourage collaboration between National IPR offices and RPOs
OS18. Have proper IPR documentation when releasing or accessing a research resource	Express IPR policies in a standard and - ideally - machine readable format	Have IPR documentation of all research outcomes as a condition for funding a research project.	Collaborate with National IPR Offices to create custom IPR awareness campaigns with an emphasis on the interaction between IPR and open access	Only host research content that contains IPR documentation	Provide incentives for clear rules of ownership and the documentation of the ownership of research resources
OS19. Clear IPRs before sharing them over e-Infra/ Research Infrastructures	Introduce obligatory IPR documentation as a ground rule for RoP. This includes at least ownership and licensing information	Have clearance of rights as an eligible cost in their funding programmes	Increase the number and quality of IPR courses for non-lawyers focusing on interaction between open access and IPR utilisation	Provide tools and guidelines for clearing content	Provide rules specifying minimum embargo periods after which research results should become open
OS20. Provide coherent and consistent IPR ownership policies	Require rights clearance and documentation of the clearance process before any resource is uploaded on EOsc	Do not accept as deliverables any content/ research resources that remains uncleared	Adopt minimum IPR documentation policies as a condition for the inclusion of resources in their institutional repositories.	Ensure that IPR clearance takes place before any resource is shared through the infrastructure and only host IPR cleared material	Ensure that different access levels are based on predefined, rational and transparent parameters that may be monitored and enforced
OS21. Have a clear access and rights management regime	Create model collaboration agreements	Have clear allocation of IPR ownership as a funding condition	Ensure IPR documentation is standard and machine readable	Ensure there is clear ownership of all resources entering an e-infrastructure	Clearly relate public funding to open access and commercial exploitation to state aid or financing from private sources. By identifying a series of different types of value (e.g. monetary and non-monetary), policy makers should opt for open scholarly communication that
OS22. Ensure that licensing policies accommodate different types of value production	Record rights allocation rules in collaboration projects	Establish clear procedures with regards to allowed embargo periods and access limitations to maximise open access publications		Provide specific and clear rules for accessing research process and results	
OS23. Introduce Open Access enforcement policies and mechanisms	Record rights ownership in collaboration projects	Condition funding upon the release of the			
	Provide model access policies (modular,				

	<p>standard and machine readable)</p> <p>Ensure that all resource providers have an access policy in place</p> <p>Produce and EOSC wide modular and standardise model policy for scholarly communications and IPR</p> <p>Produce decision trees for the choice of open access policies in accordance to IPR policies</p> <p>Provide Licence compatibility charts, wizards and training</p> <p>Use standard and documented licences</p> <p>Create machine readable licensing policies</p> <p>Have an EOSC-wide enforcement policy</p> <p>Create SOPs for handling infringement of open</p>	<p>research output, at a certain stage or certain degree, as open and FAIR content</p> <p>Request a justification, on the basis of a comprehensive IPR exploitation plan of any decision not to openly release research output</p> <p>Require that individual researchers and RPOs have a clear exploitation plan along with an open scholarly communication plan. In case they fund consortia, they should provide model consortia agreements, and in all cases, make suggestions in relation to both open licences to be used (mostly those characterised as Free Cultural Work licences<sup>17</sup>), as well as model licensing frameworks<sup>18</sup></p>	<p>Introduce specific IPR ownership rules for the following instances:</p> <p>regular research activities of the staff</p> <p>research collaboration in the framework of projects funded by third parties</p> <p>research collaborations with commercial parties</p> <p>research conducted in collaboration with RPOs spin offs</p> <p>research collaborations with the government</p> <p>Specify in clear terms the division of ownership between the RPOs and the individual researcher</p> <p>Establish clear access procedures in accordance to their IPR policies and ensure that such policies do not</p>	<p>Have very clear rules as to the kind of content they host and how they support scholarly communication and commercial exploitation accordingly</p> <p>Follow a coherent licence policy encouraging Free Cultural Work Licences<sup>20</sup></p> <p>Follow a license compatibility framework, i.e. suggest a limited range of licences and ensure there are licence calculators in place to allow user to re-use and re-combine material<sup>21</sup></p> <p>Introduce Standard Operational Procedures (SOPs) for all kinds of infringements taking place over their network.</p>	<p>could be complemented with other types of protection, e.g. patent protection, especially if the disclosure obligations of a patent are fulfilled through the open access publication of the underpinning research</p> <p>Take all measures possible to reduce licence pollution by encouraging the use of standard and existing licences and also by linking funding and career development with the opening up of research results.</p> <p>Introduce policies linking the assessment of an RPO with the maturity of its enforcement mechanisms, particularly in relation to the violation of Open licences</p>
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<sup>17</sup> For the relevant definition, see <https://creativecommons.org/share-your-work/public-domain/freeworks/>

<sup>18</sup> E.g. the UK OpenGov Licensing Framework <http://www.nationalarchives.gov.uk/information-management/re-using-public-sector-information/uk-government-licensing-framework/>

<sup>20</sup> See <https://creativecommons.org/share-your-work/public-domain/freeworks/>

<sup>21</sup> E.g. <http://janelia-flyem.github.io/licenses.html>

	<p>licences and communicate it to the users</p>	<p>Require the existence of SOPs for the enforcement of open licences</p> <p>Undertake the funding of the whole or part of the litigation process, as well as encourage collaborations with civil society orgs (e.g. FSF).<sup>19</sup></p>	<p>preclude neither open access publication of results nor the utilisation and exploitation of research output.</p> <p>Provide clear decision paths for making choices in relation to releasing research results under open licences and the exploitation of research results</p> <p>Provide training and support in relation to the different value production models and set open licensing as the default choice for the publication of research output</p> <p>Introduce model licensing agreements for open innovation networks</p> <p>Establish IPR policies in relation to different forms of exploitation. Such policies should contain at least the following elements:</p> <p>have a patent or other industrial property</p>		<p>Provide guidance and training in relation to the types of liability related to different types of releasing research resources.</p>
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<sup>19</sup> E.g. <https://www.gnu.org/licenses/why-assign.html>

			<p>assessment of research results</p> <p>identify value in monetary and non-monetary terms -at least- in relation to core assets</p> <p>identify possible embargos and specify how the scholarly communication of research results affects the exploitation possibilities of research results</p> <p>specify a life-cycle or asset management plan for different assets contained in the research results</p> <p>introduce model dual/multiple-licence agreements</p> <p>Establish standard operational procedures (SOPs) for responding to infringement, reporting to affected owners and limiting damage, including notice and take down procedures.</p> <p>Establish risk mitigation strategies, particularly</p>		
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			<p>through comprehensive rights clearance at the source of the information entry with a focus on:</p> <ul style="list-style-type: none"> <li>violation of attribution terms</li> <li>violation of copyleft terms</li> <li>violation of the non-commercial clauses</li> </ul> <p>Introduce warning and mediation strategies before escalating legal action in case of infringement.</p>		
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Draft Policy Recommendation	EOSC Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures	Policymakers
OS24. Adopt the recommendation of the OSPP Working Group on Rewards and embed Open Science in the evaluation of researchers at all stages of their career	EOSC must consider Open Science Monitor as one of its key core services	Define Open science, Data Science and relevant services and adjust grant policies accordingly, by prioritising support for EOSC infrastructure and EOSC repositories	Provide the set of metrics specified by the OS Monitor for measuring Open Science	Put in place the appropriate monitoring mechanisms and services (based on the agreed framework) and provide the set of metrics specified by the OS Monitor for measuring Open Science	Conform to the OS Monitor specs and provide data and indicators accordingly  - Provide citation and usage data in the Open Metrics Infrastructure
OS25. Promote and support Open Next Generation Metrics infrastructure	All EOSC services must develop OS reporting mechanisms and exchange data with EOSC OSM	Provide consistent policies for domain-specific Data Management Plan, the application of FAIR principles and rewards	Introduce the use of combined metrics in researcher career assessment. Use Journal Impact Factor, h-index and usage metrics wisely and only for the purpose each individual metric was initially introduced for	Define mechanisms to require the use of a standardised metrics system in line with those proposed by funder or specific domain communities	
OS26. Develop and operate Open Science Monitoring as an integral core service of EOSC	EOSC must be part of a global an Open Metrics initiative where all types of next generation metrics are collected and processed. Use RDA as one of the venues for global collaboration on the specifications.	Provide financial incentives for researchers to make data openly available not only at the end of their project but also in other phases of the research process	Promote open peer review (including peer-review of DMPs and data) as a way of incentivising researchers and getting credit; include peer-review in recruitment and in promotion of researchers	Consider innovative ways of promoting the use of services, for instance by rewarding researchers with free storage space for sharing big datasets	
OS27. Develop and maintain a machine-readable Open Science Registry for EOSC	Ensure metrics are automatically collected from EOSC stakeholders who want to measure openness and FAIRness of their organization and research outputs  Develop and introduce a badging system for all aspects of open science (e.g., OA publications and data, stewardship for FAIR data, links to	Provide the set of metrics specified by the OS Monitor for measuring Open Science. Embed the framework into national infrastructures and services	Encourage the establishment of Open Science Championships and other relevant initiatives promoting OS practices uptake		

	<p>software and methods, assisting citizen science) to intrinsically motivate researchers, boost their active participation in open science, increase public recognition and foster self-guided OS training.</p> <p>Assist in the development of OS policy models to be used in EOSC and promote the use of machine-readable policy documents</p> <p>A federated EOSC should be supported by an Open Science registry</p>	<p>Adopt the OS policy model (preferably machine readable) and record OS policies at national level</p> <p>Establish and support national OS nodes to network with EU and global initiatives</p>			
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## 7.2. Data Protection, Assurance, Special Regimes and Property Rights

Draft Policy Recommendation	EOsc Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures
<p>DP1. Legal basis for data protection: consent and legitimate interest of controller. For data processed through the EOsc:</p> <p>i) Explain the purpose of all data recording and processing</p> <p>ii) Apply a concept of tiered consent (in compliance with “broad consent” of the GDPR)</p> <p>iii) Adapt privacy-by-design and privacy-by-default solutions (providing data subjects with a technological solution for consent withdrawal)</p>	<p>(a) Implication: EOsc governance should include a management system for personal data related to data recording and processing purposes.</p> <p>(b) Impact: essential to meet the requirements of the GDPR.</p> <p>(c) Impact: high, uniform, standard of data protection for the EOsc.</p>	<p>(d) Implication: funding of relevant actions by EOsc, RPOs and RIs.</p> <p>(e) Impact: essential to meet the requirements of the GDPR.</p> <p>(f) Impact: high, uniform, standard of data protection for the EOsc.</p>	<p>(g) Implication: tiered consent</p> <p>Careful documentation of consent to particular research areas.</p> <p>(h) Impact: essential to meet the requirements of the GDPR.</p>	<p>(i) Implication: RIs need to provide (and if necessary develop) privacy-by-design/privacy-by-default systems and processes.</p> <p>(j) Impact: essential to meet the requirements of the GDPR.</p>

Draft Policy Recommendation	EOSC Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures
<p>DP2. Opening clause of Art. 89 GDPR</p> <p>i) The EOSC should constantly monitor EU and member state legislation to</p> <ul style="list-style-type: none"> <li>- examine relevant changes in said legislation influencing data processing;</li> <li>- raise awareness regarding potential difficulties arising from individual member state implementation of the GDPR based on its opening clauses as well as further emerging EU regulations.</li> </ul> <p>ii) Analyse how differing member-state data protection legislation arising from opening clauses may affect data processing for scientific research purposes;</p> <p>iii) Analyse whether there is room for further harmonisation in the context of the respective legislations;</p> <p>iv) Encourage harmonisation taking into account specific legal bases for data processing.</p>	<p>(a) Implication: monitor relevant member state legislation and identify possible room for EOSC policies.</p> <p>(b) Impact: encourage further harmonisation.</p> <p>(c) Impact: essential for the lawful processing of data.</p> <p>(d) Impact: potential to achieve a high standard of data protection for the EOSC.</p>	<p>(e) Implication: funding of relevant actions by EOSC, RPOs and RIs.</p> <p>(f) Impact: essential for the lawful processing of data.</p> <p>(g) Impact: potential to achieve a high standard of data protection for the EOSC.</p>	<p>(h) Implication: encourage harmonisation taking into account legal bases for data processing.</p> <p>(i) Impact: essential for the lawful processing of data.</p>	<p>(j) Implication: raise awareness regarding potential difficulties arising from individual member state implementation of the GDPR.</p> <p>(k) Impact: essential for the lawful processing of data.</p>

Draft Policy Recommendation	EOsc Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures
<p>DP3. Developing a user-friendly EOsc data protection policy</p> <p>a) Introduction of a special tag for the processing of data in the EOsc (as already done by some stakeholders). We recommend at least a differentiation between</p> <ul style="list-style-type: none"> <li>- personal data</li> <li>- special categories of personal data</li> <li>- data to be processed under special conditions (e.g. the data of minors)</li> </ul> <p>b) Introduction of special regimes to classify data according to the level of data protection constraints.</p>	<p>(a) Implication: EOsc governance should introduce special regimes (-&gt; classified according to research area or level of protection).</p> <p>(b) Impact: support for users via identification of the respective regulations.</p>	<p>(c) Implication: funding of relevant actions, particularly by RIs.</p> <p>(d) Impact: support for users via identification of the respective regulations.</p>	<p>(e) Implication: adhere to the measures of the other actors.</p> <p>(f) Impact: Support for users via identification of the respective regulations.</p>	<p>(g) Implication: Introduction of a tag that (at a minimum) differentiates between</p> <ul style="list-style-type: none"> <li>i) Personal data</li> <li>ii) Special categories of personal data</li> <li>iii) Data to be processed under special conditions.</li> </ul> <p>(h) Impact: Support for users via identification of the respective regulations.</p>

Draft Policy Recommendation	EOsc Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures
<p>DP4. Education/Consultation</p> <p>i) GDPR training for the staff of research providing organisations and research infrastructures, with emphasis on communication of legal knowledge</p> <p>ii) GDPR training for data subjects (including data donors), with special focus on the rights of data subjects</p> <p>iii) Establishment of one single point of contact for data subjects (in case the EOsc has its own data protection officer, they may take up this role).</p>	<p>(a) Implication: establish one single point of contact for data subjects (potentially the EOsc's own data protection officer).</p> <p>(b) Impact: benefits due to better understanding of the GDPR among involved actors and data subjects and enhanced trust.</p>	<p>(c) Implication: funding of relevant actions by EOsc, RPOs and RIs.</p> <p>(d) Impact: benefits due to better understanding of the GDPR among involved actors and data subjects and enhanced trust.</p>	<p>(e) Implication: provide data protection training for staff &amp; inform them of legal issues.</p> <p>(f) Impact: benefits due to better understanding of the GDPR among involved actors and data subjects and enhanced trust.</p>	<p>(g) Implication: provide data protection training for staff &amp; inform them of legal issues.</p> <p>(h) Impact: benefits due to better understanding of the GDPR among involved actors and data subjects and enhanced trust.</p>
<p>DP5. Assurance: EOsc should develop a personalised policy catalogue for users</p>	<p>(a) Implication: EOsc governance should develop a personalised policy catalogue that works as a protocol to fulfil the documentation obligation and keeps users informed about relevant changes.</p> <p>(b) Impact: Meets the obligation for documentation under the GDPR and provides the EOsc with a mechanism to keep its users informed.</p>	<p>(c) Implication: funding of relevant actions by EOsc governance, RIs and RPOs.</p> <p>(d) Impact: meets the obligation for documentation under the GDPR and provides the EOsc with a mechanism to keep its users informed.</p>	<p>(e) Implication: Implement and monitor use of the personalised policy catalogue by users.</p> <p>(f) Impact: Meets the obligation for documentation under the GDPR and provides the EOsc with a mechanism to keep its users informed.</p>	<p>(g) Implication: cooperate with users to support their use of the personalised policy catalogue?</p> <p>(h) Impact: meets the obligation for documentation under the GDPR and provides the EOsc with a mechanism to keep its users informed.</p>

### 7.3. Procurement

Draft Policy Recommendation	EOSC Governance/RoP	Funders/Ministries	RPOs	RIs
<p>P1. The EOOSC governance, RPOs and RIs should consider exploiting aggregated procurement in the EOOSC. This should be undertaken in accordance with EC Directive 2014/14 (Procurement). The aggregated procurements could be carried out by organisations participating in EOOSC or by EOOSC itself if it has legal form and is a Contracting Authority</p>	<p>(a) Implication: If aggregated procurement is to be performed by the EOOSC itself, a function will be needed to manage the contracts/systems resulting from the aggregated procurement</p> <p>(b) Implication: the entity leading the procurement will need to be able to describe/represent with a mandate the entities within the EOOSC user community who wish to benefit from the aggregated procurement</p> <p>(c) Impact: potential to deliver choice of suppliers, meeting agreed terms and conditions suitable for the research community, to users</p> <p>(d) Impact: harnessing the market power of the European research community to deliver attractive prices for users</p>	<p>(e) Impact: framework contracts deliver cost savings for service consumers</p> <p>(f) Implication: funding conditions must allow for aggregated procurements let by a centralised purchasing body</p>	<p>(g) Implication: If aggregated procurement is to be performed by an RPO, a function will be needed to manage the contracts/systems resulting from the aggregated procurement</p> <p>(h) Implication: RPOs may need to establish a mandate for the entity carrying out the aggregated procurement to do so on their behalf</p> <p>(i) Impact: framework contracts deliver greater choice of suppliers of services, lower prices, without needing to undertake a lengthy procurement process independently</p>	<p>(j) Implication: If aggregated procurement is to be performed by an RI, a function will be needed to manage the contracts/systems resulting from the aggregated procurement</p> <p>(k) Implication: RIs may need to establish a mandate for the entity carrying out the aggregated procurement to do so on their behalf</p> <p>(l) Implication: funding conditions must allow for aggregated procurements let by a centralised purchasing body to be sufficient for the procurement obligations in any funding agreement</p> <p>(m) Impact: framework contracts deliver greater choice of suppliers of services, lower prices, without needing to undertake a lengthy procurement process independently</p>

Draft Policy Recommendation	EOSC Governance/RoP	Funders/Ministries	RPOs	RIs
<p>P2. EO SC governance, funders/ministries, RPOs and RIs should be aware that in the context of the EO SC, organisations' governance arrangements should be recognised as a possible mechanism to allow for sharing resources where it makes sense to do so (e.g. forming a special-purpose vehicle). It may not be possible for one public entity to buy services from another public entity without a procurement in accordance with Directive 2014/24 (Procurement) unless certain governance conditions can be met.</p> <p>NB This is not relevant where the resources/services being provided/procured are unique, i.e. intellectual property</p>	<p>(a) Implication: Where services are to be charged to EO SC users, having a governance arrangement which removes the need for a procurement would be beneficial</p>	<p>(b) Implication: Conditions of funding would have to allow for the recipients to participate in federations/special purpose vehicles if they expect to have to pay for services they wish to use</p>	<p>(c) Implication: Where RPO's wish to sell services to other Contracting Authorities they may need to respond to procurements issued by other Contracting Authorities</p> <p>(d) Impact: Where the correct governance arrangements are established RPO's can easily provide services to other Contracting Authorities in the EO SC</p>	<p>(e) Implication: Where RIs wish to sell services to other Contracting Authorities they may need to respond to procurements issued by other Contracting Authorities</p> <p>(f) Impact: Where the correct governance arrangements are established RI's can easily provide services to other Contracting Authorities in the EO SC</p>



## 7.4. Ethics

Numbering of the Ethics recommendations refers to the layered model as presented in Chapter 6.

Draft Policy Recommendation	EOsc Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures
LOA: EOsc and its constituent organisations demonstrate ethical practices (transparency, independence, fair decision making etc.)	<p>(a) The details of the ‘ethical practices’ need to be defined and agreed.</p> <p>(b) A commitment to them needs to be built into the Rules of Participation.</p> <p>(c) EOsc should then be more defensible, against potential legal action or social criticism.</p>	<p>(d) The process of defining and agreeing ‘ethical practices’ (see a) needs to be funded.</p> <p>(e) Assurance is available that EOsc activities are justifiable and defensible.</p> <p>(f) A clear set of policies is available that EOsc can be monitored against – see L2B.</p>	<p>(g) A demonstrable commitment to the defined ethical practices will be required.</p> <p>(h) Benefit from a more consistent, clearer set of organisational policies and guidelines.</p> <p>(i) Benefit from a more settled and professional EOsc (core) organisation, with greater staff satisfaction and stability.</p>	<p>(j) A demonstrable commitment to the defined ethical practices will be required.</p> <p>(k) Benefit from a more consistent, clearer set of organisational policies and guidelines.</p> <p>(l) Benefit from a more settled and professional EOsc (core) organisation, with greater staff satisfaction and stability.</p>
LOB: Metadata is managed and monitored to support research integrity, (provenance, credit, status etc.)	<p>(a) Consistent policies for provenance and discovery metadata, that support research integrity, need to be defined.</p> <p>(b) A commitment to them needs to be built into the Rules of Participation.</p> <p>(c) Ongoing monitoring and support of metadata application (including this type of metadata) needs to be developed.</p>	<p>(d) The process of defining and agreeing the required metadata rules (see a) needs to be funded.</p> <p>(e) Assurance is available that research integrity is being actively supported within EOsc, thereby enhancing the quality of the available resources.</p>	<p>(f) Demonstrable, consistent application of the provenance and discovery metadata will be required.</p> <p>(g) Training and tools to support correct metadata application required, (and will need funding).</p> <p>(h) Research outputs and their provenance are more accurately described.</p> <p>(i) Individual researchers enjoy more accurate, fairer recognition (e.g. academic credit apportioned accurately).</p>	<p>(j) Support of consistent application of the provenance and discovery metadata will be required.</p> <p>(k) Tools to support correct metadata application will be required, will need development and funding.</p>

Draft Policy Recommendation	EOsc Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures
L1: Establish a variety of theme or discipline specific, time limited, expert task groups, created to consider specific issues and responses	(a) A framework needs to be developed for establishing such groups, their terms of reference and reporting, and their funding.	(b) Funds (relatively limited) need to be set aside for the support of these groups. (c) Funders would have the ability to request work on specific topics, if they had concerns about them.	(d) Problems are examined by the most appropriate experts with solutions arising within the relevant communities. (e) Problems are examined in response to perceived need, with flexibility about where effort is applied.	(f) Problems are examined by the most appropriate experts with solutions arising within the relevant communities. (g) Problems are examined in response to perceived need with flexibility about where effort is applied.
L2A: Co-ordinate specific groups using an EOsc Ethics and Legal Advisory Board (ELAB) – identifying issues, establish groups, etc.	(a) As L1, but the framework now co-ordinated by the Ethics and Legal Advisory Board (ELAB). (b) The terms of reference, reporting lines, membership selection (etc.) of the ELAB itself need to be agreed. (c) Rules of Participation need to include recognition of ELAB and a commitment to co-operate with it when necessary.	(d) As L1, but funds now also needed to pay for the ELAB standing group, though still relatively limited. (e) A 'go-to' group* is available with which funders can discuss ethical / legal issues of concern and co-ordinate activity. (f) Confidence that scientific communities are themselves addressing relevant ethical issues in a timely and pro-active way.	(g) As L1, but potential problems can now be identified and addressed by relevant research communities in a pro-active fashion. (h) A 'go-to' group* is available within the EOsc structure with which these issues can be discussed.	(i) As L1, but potential problems can now be identified and addressed by relevant RIs in a pro-active fashion. (j) A 'go-to' group* is available within the EOsc structure with which these issues can be discussed.

Draft Policy Recommendation	EOSC Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures
L2B: Periodic review of EOsc activity and related contextual issues by ELAB, feeding into executive structures	(a) Mechanism available for feedback to executive on ethical and legal issues and compliance with relevant policies. (b) Details of process (frequency, terms of reference, etc.) would need to be agreed.	(c) As L2A, but additional funding required for the periodic review activity (d) Increased confidence that the management of EOsc and scientific communities are monitoring themselves and holding themselves responsible.	(e) Provides greater assurance to researching organisations of appropriate ethical behaviour within EOsc. (f) Improves opportunity to identify new issues that need to be examined.	(g) Provides greater assurance to research infrastructures, of appropriate ethical behaviour within EOsc. (h) Improves opportunity to identify new issues that need to be examined.
L3: Providing training and training materials for research staff in relevant ethical and legal issues related to EOsc	(a) Some oversight required to record and monitor activity in this area (b) Co-ordination of occasional impact and cost / benefit studies on this type of activity	(c) Funding (relatively modest) required these training activities (d) Improved self-governance of scientific activity, with less governmental input	(e) Research staff become better prepared to identify and manage ethical issues, pro-actively.	(f) Research infrastructure staff become better prepared to identify and manage ethical issues, pro-actively.
L4A: Providing training and training materials for civil servants, journalists and others involved in interpreting scientific results	(a) As L3 (b) As L3	(c) Funding (relatively modest) required these training activities. (d) More extensive and considered application of scientific evidence within governmental planning policies.	(e) More accurate reporting of scientific investigations to the public. (f) Better liaison between government departments and research communities. (g) Greater recognition and status for EOsc scientific communities.	(h) Greater recognition and status for EOsc service providers.

Draft Policy Recommendation	EOSC Governance/Rules of Participation	Funders and Ministries	Research Producing Organisations	Research Infrastructures
L4B: Participating in debates over scientific data and results to try to ensure accurate interpretation (formal and informal media)	(a) As L3 (b) As L3	(c) Funding (relatively modest) required on ad hoc basis. (d) Better understanding and interpretation of scientific data (and its limitations) amongst both politicians and the public.	(e) Increased input from scientists and scientific data in public debates and decision making. (f) Increased appreciation of the importance of scientific evidence, increased role and influence for scientists and scientific groups.	

\*i.e. A recognised group, permanently available within the EOSC structure, with which these issues can be discussed and to which proposals can be made.

## 8. CONCLUSIONS

This Deliverable presents draft policy recommendations aimed at addressing strategic and operational challenges to the establishment of the EOSC. Based on a consideration of drivers and constraints in each policy area to identify issues and opportunities for the EOSC, the recommendations aim to help define and achieve good practice in the EOSC. The recommendations cover a broad scope of issues and policy areas, and have been drafted during a period in which the EOSC concept and model have been in the process of being defined. The work has drawn on EC policy documents relating to the EOSC, deliverables already published by the EOSCpilot project which form some of the most detailed studies available to date of aspects of the EOSC, the EOSCpilot Science Demonstrator projects, views and requirements expressed by stakeholders in workshops and interviews, and the knowledge and expertise of the T3.1 team. The surrounding policy environment itself has also been evolving, including ongoing member state implementation of aspects of the General Data Protection Regulation, publication by the EC of an updated Recommendation on Access to and Preservation of Scientific Data and a proposal to revise the Directive on Public Sector Information, and publication of reports and recommendations by the HLEG EOSC, the OSPP and the FAIR Data Expert Group.

The draft recommendations have been formed taking account, amongst other things, of the aim for the EOSC that it will provide a trusted, open environment for the scientific community for storing, sharing and reusing scientific data and results, the emerging models of EOSC governance, architecture and Rules of Participation, and the experience, evidence and views of the Science Demonstrators which are piloting EOSC activities and processes.

The work was conducted in four subtasks - **Open Science and Open Scholarship, Data Protection, Procurement** and **Ethics**. The draft recommendations recognise some of the opportunities the EOSC presents, to act proactively in several areas and achieve high standards for data sharing, ensure clear guidelines for ethical behaviour, and make GDPR and FAIR unique assets and components of a coherent OS policy framework for Europe which also facilitates EU member states in their policy-making role. The EOSC could achieve free flow and monitoring of data assisted by:

- the establishment of a **FAIR and Data Stewardship policy framework** for use also by EOSC stakeholders
- the establishment of an **EOSC OS Monitor**
- creating a coherent and open science-friendly **framework for IPR management**
- providing **procurement solutions** which cater for the scale of the EOSC and the demands of big data
- achieving good **ethical behaviour** during research practice going beyond the traditional area of sensitive personal data
- providing **GDPR** guidance and achieving **automated compliance**.

The next phase of work will consult widely on the draft recommendations presented here, with EOSC stakeholders, expert groups, other EOSC projects, EOSCpilot WPs 5 (Services) and 6 (Interoperability), and considering the EOSC governance and Rules of Participation proposals. The draft recommendations will be prioritised and consolidated to produce a proposal for a unified EOSCpilot Policy Framework in line with the general recommendations from Deliverable D3.1 which supports an open, ethical and secure European Open Science Cloud, with clear guidance and support for its adoption and implementation by all stakeholder groups.

Overall, the aim is to produce a final set of policy recommendations which will support and add value for the EOSC, helping to make the case for it as the proposed model for Open Science in Europe and supporting the European approach to harnessing the potential of data by coupling investment in digital innovation with strong data protection rules and high ethical standards.

# WHITE PAPER 1. OPEN SCIENCE AND OPEN SCHOLARSHIP

## **WHITE PAPER 2. DATA PROTECTION, ASSURANCE, SPECIAL REGIMES AND PROPERTY RIGHTS**

## WHITE PAPER 3. PROCUREMENT



## WHITE PAPER 4. ETHICS