

D3.6: Final Policy Recommendations

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Status	Final
Version	V2.7
Date	20/05/2019

Abstract:

This deliverable presents a roadmap of practical policy actions to gradually establish the policy environment required for the effective operation of, access to and use of the European Open Science Cloud, creating an Ethical, Open, Secure and Cost-effective EOSC. The roadmap consists of an overall policy proposition and a set of nine high-level policy recommendations with 37 implementing actions, derived from the draft policy recommendations presented in deliverable D3.3 following stakeholder consultation. The proposed actions are categorised, discussed and set against a timeline. The proposals include suggestions for several EOSC governance subcommittees, and for some Policy Supporting Services to be included as EOSC core services.

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The European Open Science Cloud for Research pilot project (EOSCpilot) is funded by the European Commission, DG Research & Innovation under contract no. 739563

Document identifier: EOSCpilot -WP3-D3.6	
Deliverable lead	Jisc
Related work package	WP3
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Due date	31/01/2019
Actual submission date	20/05/2019 (revised version 2.7)
Reviewed by	Kevin Ashley (DCC), Pascal Kahlem (ELIXIR), Brian Matthews (UKRI-STFC) Peter Wittenburg (RDA – External Reviewer)
Approved by	Mark Thorley (UKRI)
Start date of Project	01/01/2017
Duration	28 months

Versioning and contribution history

Version	Date	Authors	Notes
0.1	20/11/2018	Dale Robertson, Jisc	Document template set up
1.0	18/12/2018	Dale Robertson, Serena Battaglia, Valentino Cavalli, Elly Dijk, Christian Ohmann, Paul Rouse	First draft compiled for WP3 internal review
1.3	04/01/2019	Dale Robertson, Valentino Cavalli, Laura Molloy, Elli Papadopoulou, David Reeve, Paul Rouse, Ameli Schenk	Further draft for internal review – chapters 1, 2, 3 (part), 5 (part), Annexes A, B, C, D, E, H

1.4	09/01/2019	Dale Robertson	Move chapter 2 into Annex A; merge chapter 3 into chapter 5; first draft of Executive Summary and Abstract
1.5	11/01/2019	Dale Robertson	Updates to chapter 3; first draft of Conclusions
2.0	14/01/2019	Dale Robertson, all	Add text of recommendations and implementing actions in chapter 2; add text for Annexes F-I.
2.1-2.4	14-22/01/2019	Dale Robertson, David Reeve, Scott Sammons, Neil Beagrie	Minor edits throughout; add Implementing Action 8.5; diagram, table and glossary updates
2.5	23/01/2019	Dale Robertson, Pro Tsiavos, all	Edits to Recommendation 4; edits to address reviewer feedback
2.6	25/01/2019	Dale Robertson, all	Final edits
2.7	20/05/2019	Dale Robertson	Revisions to incorporate comments from external reviewer.

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EXECUTIVE SUMMARY

This deliverable presents a roadmap of practical policy actions to establish the policy environment required for the effective operation of, access to and use of the European Open Science Cloud. Its strategic goal is to create an **Ethical, Open, Secure and Cost-effective** EOSC.

The final set of nine policy recommendations was produced by performing activities to validate and prioritise 43 draft policy recommendations previously produced by Work Package 3 of EOSCpilot, published in deliverable D3.3 in August 2018.

The nine final recommendations are:

- 1. Ethics:** Commit to a policy of maximal transparency and accountability, in the context of any activity that relates to EOSC data, data providers, services or users, including activities carried out with third parties.
- 2. Access:** EOSC resources must provide access to their facilities and be accessible themselves in an open, FAIR (Findable, Accessible, Interoperable, Reusable) and equitable manner for excellent Open Science and Open Scholarship to be performed, shared and exploited.
- 3. Open Science Conduct and Outputs:** Simplify, clarify and improve consistency to enable and encourage the practice of Open Science.
- 4. Intellectual Property Rights:** Encourage open access to and reutilisation of research outputs by providing a comprehensive and coherent IPR framework.
- 5. Awareness and Skills:** Help develop the necessary awareness and skills for the EOSC.
- 6. Incentives:** Provide incentives for practicing Open Science and embed open principles in recruitment, promotion and evaluation of researchers at all stages of their careers.
- 7. Policy Supporting Services:** Develop and operate Open Science Policy Supporting Services to assist policy adoption and promote best practices.
- 8. Data Protection and Information Security:** Ensure EOSC Open Access research data use and reuse permit the rights and obligations of Data Protection Legislation (most notably the EU General Data Protection Regulation) to be achieved in a fair, transparent and accountable manner.
- 9. Procurement:** Ensure that aggregated procurement is utilised by the EOSC where appropriate when making resources available to the EOSC marketplace.

Each recommendation is elaborated with practical, actionable implementing actions targeted at stakeholder groups including the Phase I EOSC governance, research funding organisations, research producing organisations and research infrastructures. The importance of inclusive and transparent debate is emphasised: stakeholder views and requirements should be incorporated throughout policy drafting, adoption and implementation. The implementing actions include proposals for EOSC governance substructures and expertise including a Policy Standing Committee, an Ethics and Legal Advisory Board, and IPR and Data Protection Working Groups; awareness-raising, skills and advocacy; operational frameworks and codes of conduct; and policy supporting services. A draft EOSC Data Protection framework is also provided.

Compliance with EOSC policies, once developed and adopted, is expected to be managed through the EOSC Rules of Participation. A minimal set of Rules of Participation was proposed in EOSCpilot deliverable D2.5¹. Updates to the Rules of Participation may be required in future to ensure alignment and consistency with EOSC policies as they are adopted and implemented. Several of the proposed actions are however aimed at stakeholder groups independently of their participation in the EOSC.

¹ <https://eoscipilot.eu/content/d25-recommendations-minimal-set-rules-participation>

1. INTRODUCTION

The EOSCpilot project supports the first phase in the development of the European Open Science Cloud. The overall objective of the Policy work package, WP3, of EOSCpilot is to establish the policy environment required for the effective operation of, access to and use of the EOSC. The work is in two strands: Task 3.1 concentrates on deriving and elaborating recommendations for policy actions and frameworks to remove barriers to and encourage participation in the EOSC; Task 3.2 develops specifications for policy supporting services which will complement the policy recommendations and provide the means to monitor and report on Open Science policy implementation.

This document sets out the final policy recommendations and their implementing actions arrived at by Task 3.1. These are intended to provide practical, actionable steps to support and progress the establishment of the EOSC and the eventual production of appropriately open, FAIR outputs from research conducted via the EOSC. This document is aimed primarily at the EOSC governance as a roadmap proposing a set of practical actions to gradually establish the necessary policy environment. The recommendations themselves are, however, aimed at research funding organisations (RFOs), research producing organisations (RPOs) and research infrastructures including e-infrastructures (RIs) as well as the EOSC governance, and it will be essential to ensure continued stakeholder input and support as policy measures are developed.

The recommendations address Open Science and Open Scholarship, Data Protection and Data Security, Procurement, and Ethics. They consider data, infrastructures and services, and skills. They also attempt to address two distinct objectives of the EOSC, namely (i) to support and encourage the sharing of resources and delivery of greater capacity in research infrastructures and services, and also (ii) to support the production, sharing and preservation of FAIR and appropriately open research outputs. The recommendations are focussed on the initial implementation of the EOSC to support research activity. Procurement relates closely to the architecture, service provisioning and business model of the EOSC and the WP3 experience showed that it was challenging to address procurement prior to these aspects being more clearly developed, however the groundwork established here will be built on in the EOSC-hub² and OCRE³ projects.

The final policy recommendations presented in chapter 2 were developed as the third stage of the work of Task 3.1. The first stage consisted of a high-level Policy Landscape Review, presented in Deliverable D3.1⁴ published in January 2018. The second stage produced a set of forty-three draft policy recommendations which were formulated following examination of drivers and constraints. These were presented in Deliverable D3.3⁵ and a set of four supporting White Papers⁶, published in August 2018. Twenty-six of the recommendations were in the area of Open Science and Open Scholarship, five related to Data Protection, two to Procurement and eight to Ethics. The reader is referred to the D3.3 White Papers for details of the drivers, constraints and argumentation which led to the draft policy recommendations.

The work to produce the final policy recommendations involved activities to validate the draft policy recommendations presented in D3.3. This work is described in the Annexes and the reader is referred to these and the D3.3 White Papers for information about how the recommendations and implementing actions were arrived at. The resulting set of nine high-level policy recommendations, each with suggested implementing actions, is presented in chapter 2. Chapter 3 presents an implementation roadmap including the overall policy vision represented by the recommendations, a timeline and categorisation of the

² <https://www.eosc-hub.eu>

³ <https://www.ocre-project.eu>

⁴ <https://eoscipilot.eu/content/d31-policy-landscape-review>

⁵ <https://www.eoscipilot.eu/content/d33-draft-policy-recommendations>

⁶ Ethics: <https://zenodo.org/record/2533184#.XDNurFwzaUk>

Open Science and Open Scholarship: <https://zenodo.org/record/2176076#.XBEr8tv7S02>

Data Protection: <https://zenodo.org/record/2533143#.XDNuq1wzaUk>

Procurement: <https://zenodo.org/record/2180426#.XBDgjt7S02>

implementing actions, and an introduction to the proposed Policy Standing Committee to assist the Executive with the work of policy formulation. Conclusions are drawn in chapter 4.

The Annexes contain a significant amount of supporting information. Annex A summarises the activities performed to validate the D3.3 draft recommendations, which are elaborated in more detail in Annexes B-E. Annexes F-H propose initial mandates, composition and task lists for the proposed Ethics and Legal Advisory Board, IPR and Data Protection Working Groups proposed in the recommendations. Annex I describes the proposed Policy Standing Committee, and Annex J contains a draft Data Protection Framework for possible use as a basis in the EOSC. Finally, a Glossary is provided in Annex K.

2. ELABORATED FINAL POLICY RECOMMENDATIONS

This chapter sets out the final set of nine high-level policy recommendations, each with implementing actions, which resulted from applying feedback to and prioritising the draft policy recommendations proposed in Deliverable D3.3. The actions are directed primarily at EOSC governance, research funding organisations, research producing organisations and research infrastructures. Suggested implementation steps are provided, and the importance of inclusive and transparent debate is emphasised: the actual and prospective EOSC participants are paramount and therefore stakeholder views and requirements should be incorporated throughout policy drafting, adoption and implementation.

The recommendations attempt to provide practical implementation suggestions whilst respecting the need for the EOSC governing bodies to determine their interoperation, structures and processes for conducting their work. Suggested timings are provided below, which allow for the Executive to begin its work and to define and recruit its chosen subcommittees. In general, it is proposed that policies are adopted by the end of Phase I of the EOSC in December 2020, but in several cases policy development and adoption is likely to take longer than this. The policy development work will require funding – likely to be provided mostly by various Horizon 2020 EOSC implementation projects. The allocation of this work to projects is understood to be an early task for the EOSC Executive and is not addressed in this document.

The EOSC Rules of Participation proposed in EOSCpilot deliverable D2.5 set low barriers to the EOSC, to encourage participation. The proposed policy measures will take time to be drafted, discussed, adopted and implemented. Whilst the present document includes suggested timescales for developing the proposed policies, it does not address details of compliance with or enforcement of them once they are implemented. It is likely that the Rules of Participation will be amended from time to time to reflect policies as they are implemented, for the EOSC to better support and encourage Open Science.

2.1. Recommendation 1 - Ethics

Commit to a policy of maximal transparency and accountability, in the context of any activity that relates to EOSC data, data providers, services or users, including activities carried out with third parties		
The fundamental principle is that EOSC must incorporate and exhibit ethical behavior, not only because of the intrinsic value of acting in an ethical and morally defensible fashion, but also because being seen to act ethically is a necessary part of developing and maintaining trust with users, stakeholders, funders and the wider European public		
Implementing Action 1.1	Include methods, mechanisms and practices, such as meaningful and open metadata schemas to ensure effective discovery of and access to resources and service	
	<u>Expected outcome</u>	Enhance research integrity and ensure fairness in making resources available to different users by improving discovery of and access to resources and services
	<u>Stakeholders/enactors</u>	EOSC governance, research funding organisations, research producing organisations, research infrastructures
	<u>Implementation</u>	EOSC Executive board: Providing recommendations for methods, mechanisms and practices to ensure effective discovery of and access to resources and services with the input from RFOs, RPOs, RIs; monitoring implementation of methods, mechanisms and practices RFOs, RPOs, RIs: Implementing recommendations in their organisations
	<u>Timing</u>	Start: July 2019 Suggested Duration: ongoing

Implementing Action 1.2	Foster openness with respect to funding/financing EOSC and transparency with respect to negotiations with third parties (including commercial partners)	
	<u>Expected outcome</u>	Full transparency and accountability of activities related to the EOSC
	<u>Stakeholders/enactors</u>	EOSC governance
	<u>Implementation</u>	EOSC Executive: - developing and implementing operational frameworks and codes of conduct assuring full transparency and accountability of any activity that relates to EOSC data, data providers, services or users, including activities carried out with third parties, particularly contracts with commercial partners; monitoring provenance of EOSC activities and financial dealings - providing input into operational frameworks and codes of conduct to be developed, periodically reviewing the actions of EOSC from an ethical / legal/policy perspective
	<u>Timing</u>	Start: March 2019; develop and implement operational frameworks and codes of conduct by Sep 2019; thereafter, review and monitor Suggested Duration: ongoing

Implementing Action 1.3	Set up task-specific and time-limited groups that bring together domain, ethical and legal expertise to consider a particular concern and to make concrete recommendations for policy and processes. In cases when specific issues persist, such as data protection, a group might be permanent, but generally they would have a limited lifetime, and be set up with clear terms of reference	
	<u>Expected outcome</u>	Ethical issues or problems requiring policy decisions can be taken up and dealt with by a specific task group of experts. The task group should report back to the EOSC Executive, which is responsible for further actions (e.g. formulating recommendations, implementing rules, setting up standards)
	<u>Stakeholders/enactors</u>	EOSC Executive Board; EOSC Stakeholder Forum; Ethics and Legal Advisory Board (ELAB – see 1.4)
	<u>Implementation</u>	EOSC Stakeholder forum: making proposals for members of task- specific and time- limited groups ELAB: Establish task- specific working groups to consider ethical, legal and policy issues Task- specific and time- limited groups: Report and provide recommendations to the ELAB
	<u>Timing</u>	Start: Mar-Sep 2019: develop Terms of Reference; from October 2019: formation of groups according to demand Suggested Duration: ongoing

Implementing Action 1.4	Set up of a standing Ethics and Legal Advisory Board (ELAB), drawn from the EOSC stakeholder community and acting independently from the Executive Board. Its mandate would be to i) identify ethical, legal and policy issues, ii) establish task-specific working groups to consider the issues and provide recommendations and iii) negotiate the adoption and implementation of the recommendations by the EOSC Executive Board. ELAB could also periodically review the actions of EOSC from an ethical and legal perspective, as well as acting as the source of further ethical and legal initiatives within the organisation	
	<u>Expected outcome</u>	Ethical and legal issues of relevance to the EOSC are taken up by the ELAB, considered with the support of task-specific and time- limited groups, and recommendations formulated
	<u>Stakeholders/enactors</u>	EOSC Executive Board, EOSC Stakeholder Forum representing RFOs, RPOs, RIs
	<u>Implementation</u>	EOSC Stakeholder forum: Making proposals for ELAB members, suggesting ethical, legal and policy issues to be considered by the ELAB EOSC Executive board: Implementing terms of reference and nominating members for the ELAB. ELAB: Identifying ethical, legal and policy issues to be dealt with. Making proposals for formation of task- specific and time- limited groups and members of these groups. Providing recommendations to the EOSC Executive board EOSC Executive board: Adoption and implementation of the recommendations by the ELAB
	<u>Timing</u>	Start: Mar 2019: terms of reference developed and members recruited by June 2019 Suggested Duration: ongoing

2.2. Recommendation 2 – Access

Recommendation: EOSC resources must provide access to their facilities and be accessible themselves in an open, FAIR and equitable manner for excellent Open Science and Open Scholarship to be performed, shared and exploited		
Explanatory Statement: Provide flexible solutions and easily implemented, adopted and updated technical specifications to all core components of the EOSC to ensure effective and secure operations supporting the whole research lifecycle, contributing to ensuring EOSC components are FAIR (e.g. FAIR machine actionable DMPs, FAIR training etc) and enabling FAIRness of data		
Implementing Action 2.1	Encourage openness and ease of use of resources accessed through the EOSC by developing a Charter for Access to EOSC Infrastructures, Services and Other Resources	
	<u>Expected outcome</u>	A charter including ground rules, key principles and basic self-commitments would allow different stakeholders taking part in the EOSC to have a clear understanding of their rights and obligations with respect to access and help encourage access to be granted equitably. Access is seen here as the core principle of the Open Access movement, including electronic, digital and semantic access, in line with the FAIR principles, but also IPR, data protection, Public Sector Information and other legal and ethical aspects
	<u>Stakeholders/enactors</u>	EOSC governance, Research Infrastructures
	<u>Implementation</u>	EOSC Executive: in consultation with research infrastructures, service providers and other expected resource providers in the EOSC Stakeholder Forum, and mindful of the opportunities presented by aggregated procurement (see 2.9), to draft a Charter for Access to EOSC Infrastructures, Services and Other Resources. Define access modes required for the full range of resources expected to be accessed through the EOSC – with a preference for openness and excellence: for infrastructures and services, principles and guidelines similar to the European Charter for Access to Research Infrastructures ⁷ ; for research outputs, which Open Access Routes are available and/or supported by EU funding programmes and how to follow them. This activity could form the basis of a taxonomy for EOSC access issues. Attention should be given to relations with commercial actors, e.g. open patents or other means of collaboration, and citizens, e.g. ensuring accessibility through interfaces Research Infrastructures: adopt and implement the EOSC Charter for Access
	<u>Timing</u>	Start: July 2019 Suggested Duration: by end of 2020 if possible

⁷ See https://ec.europa.eu/research/infrastructures/pdf/2016_charterforaccessto-ris.pdf

Implementing Action 2.2	Adopt the AARC ⁸ blueprint architecture for enabling services in an interoperable AAI (authentication and authorisation) infrastructure	
	<u>Expected outcome</u>	This would support the usability and security of resources, including those made available through the EOSC, through integrated sign-on authentication systems and federated identity provision
	<u>Stakeholders/enactors</u>	Research Infrastructures, Research Producing Organisations, Research Funding Organisations, EOSC governance
	<u>Implementation</u>	RIs and RPOs: adopt the AARC blueprint architecture RFOs: make funding conditional on adoption of the AARC blueprint architecture EOSC governance: request EOSC providers to adopt the AARC blueprint architecture for their services; consider updates to the Rules of Participation, to ensure consistency, and monitor compliance
	<u>Timing</u>	Start: March 2019 Suggested duration: 1 year

⁸ See <https://aarc-project.eu/>

Implementing Action 2.3	Adopt a minimum metadata schema and define a set of APIs (application programming interfaces), including the use of community-accepted standards and conventions, to be considered as standard for services, infrastructures and other resources in the EOSC Service Catalogue	
	<u>Expected outcome</u>	This would support and boost interoperability of infrastructures and services, easing information exchange and data sharing in a FAIR manner and across all disciplines and virtual environments, and ultimately improving access to resources and research outputs. It would also provide the basis for advertising a set of APIs or smartAPIs ⁹ of EOSC resources and collections, which would support industry participation and innovation
	<u>Stakeholders/enactors</u>	EOSC governance, Research Infrastructures
	<u>Implementation</u>	EOSC Executive: propose a minimum set of standards for data/metadata and exchange protocols in the EOSC (for example considering the EOSCpilot EDM¹⁰ proposals, and also perhaps other initiatives such as those ongoing within RDA¹¹ and ESFRI¹²) and consult and reach agreement in the EOSC Stakeholder Forum (in particular with RIs) before adoption; consider updates to the Rules of Participation, and monitor compliance Funders: encourage beneficiary services, infrastructures etc to adopt the EOSC-approved sets of metadata and APIs RIs: make efforts to adopt the approved set of minimum metadata and APIs for greater interoperability of RIs and services, for services participating in the EOSC. RIs should also consider assigning open source licenses to the software comprising the core of the open infrastructure they are developing
	<u>Timing</u>	Start: July 2019 suggested duration: by December 2020 if possible

⁹ See <https://smart-api.info>

¹⁰ See EOSCpilot deliverable D6.3 First Report on Data Interoperability: Findability and Interoperability for description of the EDM¹⁰ (EOSC Dataset Minimum Information) <https://www.eosc-pilot.eu/content/d63-1st-report-data-interoperability-findability-and-interoperability>

¹¹ Research Data Alliance. See <https://rd-alliance.org>

¹² European Strategy Forum on Research Infrastructures. See <https://www.esfri.eu/forum>

2.3. Recommendation 3 – Open Science Conduct and Outputs

Recommendation: Simplify, clarify and improve consistency to enable and encourage the practice of Open Science		
Explanatory Statement: Support and encourage the practice of Open Science by providing clarity about expected standards and practices for all those involved		
Implementing Action 3.1	Provide clarity for all participants in Open Science around expected behaviour and standards by developing and adopting a European Open Science Code of Conduct	
	<u>Expected outcome</u>	Provide leadership and clarity around openness-by-default by jointly detailing a European Open Science code of conduct, or concordat, defining behavioural standards for every stakeholder involved in the research process, from funders to authors to data stewards to repository managers and other infrastructures, including ethical and privacy aspects found in the research and publishing lifecycle. The Code of Conduct should apply to Open Science generally, and not specifically to the EOSC, but the EOSC governance structures are proposed to support drafting and adoption of the Code. It should generally be in line with implementing action 3.2 about openness and FAIRness of research outputs and other resources, which should form the basis for its development, as well as supporting Implementing Actions 2.1 and 2.4. All affected beneficiary groups should be involved in its development by contributing principles and expectations around openness and expecting compliance to stated standards of openness
	<u>Stakeholders/enactors</u>	RFOs, RPOs and RIs via the EOSC governance structures
	<u>Implementation</u>	EOSC Executive: draft a European Open Science Code of Conduct and consult and reach agreement with stakeholders before adoption; communicate the code, including via the EOSC Board and Stakeholder Forum, to RFOs, RPOs and RIs so they can implement any necessary updates to their relevant policies and procedures to reflect the Code of Conduct; consider updating the EOSC Rules of Participation to ensure consistency; develop mechanisms to monitor adoption of the code by EOSC users and service providers
	<u>Timing</u>	Start: July 2019 Suggested duration: adoption of policy by the EOSC by end of 2020

Implementing Action 3.2	Support openness and FAIRness of research outputs and other resources produced in or provided through the EOSC	
	<u>Expected outcome</u>	This will stimulate development of, or strengthen existing, OA (Open Access) and RDM (Research Data Management) policies at all levels. It will highlight best practices in publishing in Open Access and in preparing and sharing data(sets) in accordance to the FAIR guiding principles by ensuring compatibility with the EOSC technical and semantic infrastructure. It will also provide the basis for mechanisms to monitor compliance with those aspects of Open Science policies. These include, but are not limited to: - the requirement for all research outputs to be appropriately open (as open as possible, as closed as necessary), FAIR and citable - the requirement to use unique and persistent digital identifiers for all inputs, resources and outputs used in or produced by the research process including for individuals and organisations involved in performing this research. This will support data citation, Open Science, and academic recognition for the full range of research outputs and support long-term access to curated resources - the requirement to use Data Management Plans (DMPs) and provision of consistent (i.e. aligned) requirements for DMPs, to ensure research data management is considered before, during and after research. DMPs can support planning for Open Science, data provenance and the reproducibility of research outputs - commitments by funders to support principles for long-term data stewardship enabling curation, provenance and quality – not just storage – for all types of research outputs to ensure their availability over time and maximise the return from effort and investment in originally creating them - commitments by Funders, Governments and other bodies to support training needs relating to Open Science
	<u>Stakeholders/enactors</u>	EOSC governance, RPOs, RFOs, RIs
	<u>Implementation</u>	EOSC Stakeholder Forum: elaborate principles around RDM in the EOSC, to include machine-readability, versioning and linking of DMPs to infrastructures and registries. Mandate DMP deposition in a repository or CRIS (Current Research Information System), link with the research data to which they relate, and update during the lifetime of the research project. Support unique and persistent digital identifiers based on global, sustainable and community-governed solutions for all outputs, organisations and individuals; consult with members to gather input on further developing long-term stewardship principles, to be provided to the EOSC Executive EOSC Executive: to develop the input gathered into a proposed update to the European OS (Open Science) Code of Conduct proposed in Implementing Action 3.1; consult and agree final proposal for incorporation into European OS Code of Conduct

		Funders: suggest or mandate the standardisation process for openness and FAIRness of research outputs (e.g. consistency in DMP requirements across and beyond EOSC) RPOs: standardise requirements for DMPs and develop consistent processes to support implementation of standardisation within research process RIs: support the principles and expectations around openness and FAIR RDM for users by developing and deploying standardisation tools and testing processes
	<u>Timing</u>	Start: July 2019 Suggested duration: adoption and implementation of update to the Code of Conduct by end of 2020

Implementing Action 3.3	Facilitate EOSC and Open Science uptake by contributing to standardising cost types for Open Science and Open Access, including publishing costs, preservation (not simply storage), and research data management for active and archived datasets	
	<u>Expected outcome</u>	Contributes to sustainability and overcoming barriers to open access and data sharing. It also provides incentives in choosing EOSC for practising Open Science and maximises EOSC resource uptake. Ensures all activities in EOSC can be budgeted for and sustained reasonably and to the benefit of researchers, avoiding excess workload and monetisation of research or double-dipping in the event of use of Gold Open Access. Stimulates data re-use and enables clear data management activities throughout the project lifecycle, supporting long-term data stewardship principles and practice. Ensures transparency and equitable treatment of researchers performing research in EOSC while at the same time supporting publicly funded services and infrastructures.
	<u>Stakeholders/enactors</u>	Research Infrastructures: for storage capabilities but also for utilisation of services and control over processing of data, ensuring for example data security through encryption Research Producing Organisations: for Gold OA costs and RDM activities throughout the entire research lifecycle (e.g. APCs (peer review process and data stewardship)); standardisation of costs around subscriptions (e.g. big deals) Research Funding Organisations: for the whole research process, so that funding is adequate also for long-term actions
	<u>Implementation</u>	Utilise existing information on activity costs of research infrastructure data processing and storage operations (4C project ¹³ , Keeping Research Data Safe ¹⁴ , etc), Article Processing Charges (OpenAPC initiative ¹⁵) for publications and Research Data Management also involving professionals such as data stewards. Agree standardised cost types, implement, monitor, and revise over time. Commission new work on costings for any identified knowledge gaps
	<u>Timing</u>	Start: February 2019 Suggested duration: to December 2020 (and beyond)

¹³ See <http://www.4cproject.eu/>

¹⁴ Beagrie, N., Chruszcz, J. and Lavoie, B., 2008, Keeping Research Data Safe: a cost model and guidance for UK Universities, (Joint Information Systems Committee 2008)

¹⁵ See <https://www.intact-project.org/openapc/>

Implementing Action 3.4	Adopt user acknowledgement of use of or contribution to research results of EOSC services, infrastructures and other resources	
	<u>Expected outcome</u>	Encourages and supports citations of services and infrastructures and strengthens monitoring of research components, complementing information contextualisation; ensures attribution is compliant with the most common open licences
	<u>Stakeholders/enactors</u>	EOSC governance, Research Funding Organisations, Research Producing Organisations, Researchers
	<u>Implementation</u>	EOSC Executive: propose an acknowledgement/citation policy including prototype methods for referencing and citing EOSC infrastructures, services and other resources; consult and agree with research infrastructures, service providers and other expected resource providers in the EOSC Stakeholder Forum before adoption; consider updates to the Rules of Participation, to ensure consistency; develop monitoring of acknowledgements and citations of EOSC services etc, providing a metric for their “usability” (see Recommendation 7) Funders: make funding conditional upon adherence to the EOSC acknowledgement/citation policy RPOs: require researchers to adopt the practice of citing EOSC services, infrastructures and other resources used in their research Researchers: adopt the practice of citing EOSC services, infrastructures and other resources used in their research
	<u>Timing</u>	Start: July 2019 Suggested duration: adoption and implementation of policy by June 2020

2.4. Recommendation 4 – Intellectual Property Rights

Recommendation: Encourage open access to and reutilisation of research outputs by providing a comprehensive and coherent IPR (Intellectual Property Rights) framework		
Explanatory statement: The greatest impediments in openly reusing content in terms of Intellectual Property rights are (1) the lack of high quality information regarding the IPR status of the resources used or produced by scientists; (2) the absence of comprehensive and consistent policies and protocols in relation to clearance and acquisition of IPR on research resources; (3) the lack of a consistent set of IPR policies that support the open use of research resources across the research life-cycle. The existence of a consistent and comprehensive set of IPR policies removes these barriers and is a driver for the release of research results at times and under terms that support the optimum value models both for research performing organisations and for researchers themselves. The intended effect of the recommendation is primarily the reduction of legal costs in the reuse of research resources as a result of legal clarity and consistent use of resources both for research and exploitation purposes		
Implementing Action 4.1	Ensure that research resources have IPR clearance and are fully and clearly documented in terms of IPR before being shared over EOSC	
	<u>Expected outcome</u>	The minimum requirement is documentation of the IPR status of the research resources, so researchers and research institutions have a clear understanding of the range of IP (Intellectual Property) rights and IP owners of the resources they are using or producing. This ensures the ability to comply with the law and avoids the costs of trying to identify the owner or, worse, being unable to identify the owner of a resource and hence operating on an uncertain legal basis. It is also highly desirable to actively clear all IPR of research resources before using them and document their legal status, ensuring all rights/licences have been obtained when a resource is included in the EOSC ecosystem. The researcher is then able to use the resource at will and release it openly
	<u>Stakeholders/enactors</u>	RPOs should implement the action, funders and policy makers should mandate it. Infrastructures could both mandate and implement the action. There is need for the establishment of a monitoring and compliance mechanism at the EOSC level, which should be developed by the EOSC working groups and implemented through the EOSC governance system.
	<u>Implementation</u>	- establish rights documentation schemas for different types of research resources - provide model steps for IPR clearance - develop model licence- obtaining agreements and model IPR request letters - provide support and training both for documentation and clearance of IPRs

		- establish an IPR-related working group within EOSC with subgroups of different types of stakeholders (researchers, RPOs, Research Infrastructures, Funders etc) - the EOSC Executive should introduce consistent IPR rules for the EOSC Board to approve and mandate the EOSC Executive to monitor its implementation
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing, operating in six-month progress cycles

Implementing Action 4.2	Each organisation participating in the EOSC should develop and require adherence to a set of explicit, coherent, consistent and machine-readable IPR ownership and licensing policies	
	<u>Expected outcome</u>	IPR and licensing policies covering the entirety of the research life-cycle are needed for open science, including the ways in which IPR is acquired in different circumstances in the research process, and also the ways in which it is licensed to third parties. The policies need to be standardised, modularised and machine-readable so as to be easily read and compared and the EOSC provides an opportunity to achieve this. They also need to be consistent, across both commercial and pure research usage. Consistency needs to be assessed in relation to the overall institutional policies regarding IPR exploitation and open scholarly communication. Such policies are essential for researchers to know how rights are allocated at the time of their creation, and also to know when and how they should release their research results in an open fashion. Consistency will be assessed mostly at the institutional level by each organisation on its own, but could also be part of a broader national and European IPR policy
	<u>Stakeholders/enactors</u>	- RPOs for their own policies - Funders, policy-makers and infrastructure should mandate the existence of such policies, each one in their institutional context and within the scope of its activities, e.g. RPOs for students and staff, funders as a condition for funding, policy makers as part of the policy frameworks they produce - EOSC governance to implement and monitor within EOSC
	<u>Implementation</u>	- take stock of existing policies within an institution (for an RPO) or a broader group of RPOs (infrastructure, funder, policy maker) - identify the legalities and administrative processes for passing the relevant policies - identify modules or elements of a policy and describe them in a standard fashion developing, thus, model IPR policies - produce machine- readable representations of the policy modules - produce model policies. These policies need to be standardised and modular. EOSC (through the IPR working group) could provide a model modular policy to be then adopted by individual stakeholders - have members of the ecosystem (e.g. RPOs, funders and policymakers) coordinate through the IPR WG and agree and adopt relevant harmonised policies

		- EOSC Executive to set up IPR Working Group for the development and adoption of standard, modular model IPR policies
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing, operating in six-month progress cycles

Implementing Action 4.3	Ensure that licensing policies accommodate different types of value production (e.g. commercial, social, ethical)	
	<u>Expected outcome</u>	The licensing policies followed by RPOs, funders or infrastructures should support and promote open science, but also allow for other types of value to be supported. Open licences should not be the only option. An alternative is open licensing schemes, which could be combined with other types of licensing, allowing e.g. publication of different stages of a paper under different types of licences, or allowing the patenting of research results before any publication under an open licensing scheme. Such policies would ensure that researchers are able both to license their content and results under an open licences scheme and to exploit results or retain an embargo on research for the necessary period for the kind of value they wish to produce
	<u>Stakeholders/enactors</u>	Mostly RPOs, but funders and policy makers could also suggest model licences and model licensing policies
	<u>Implementation</u>	- identify different types of value per stakeholder (e.g. access to research results, increase in citations, need to patent, need to establish start-ups etc) - identify possible licensing strategies and describe them in the form of case studies - produce model licensing schemes or identify different types of open licences - produce tutorials and other material explaining the operation of different types of licences to produce different types of value - work with the relevant stakeholders in IPR working groups to further develop the aforementioned resources.
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing, operating in six-month progress cycles

Implementing Action 4.4	Introduce mechanisms for consistent enforcement of Open Access policies, rights and licences across EOSC	
	<u>Expected outcome</u>	This will increase legal certainty and trust among researchers and other users of services and infrastructures through the EOSC. It will also make the release of works under an open licences in such an environment even more attractive compared to the release of research results by individual RPOs through their repositories or other e-Infrastructures. The key difference from the classic release of content through open licences is that this policy will focus on ensuring that the terms of the open licences, particularly attribution or share-alike terms are enforced and hence respected
	<u>Stakeholders/enactors</u>	Mostly RPOs and infrastructures. Funders and policy makers may only encourage such measures
	<u>Implementation</u>	- identify enforcement needs (e.g. need to enforce attribution or copyleft elements of open licences) - create easy to report mechanisms for licensing violations - create alternative dispute resolution mechanisms for EOSC members - explore the possibility of collective legal representation of EOSC researchers against third parties
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing, operating in six-month progress cycles

Implementing Action 4.5	Devise and deploy open patent systems alongside the existing national/international patent systems, and support the use of open data for assessing the state of the art in a patent ecosystem (open patent data)	
	<u>Expected outcome</u>	The EOSC aims to support the openness of research results as a means of producing better research. In this context it is necessary to have the widest and most open access possible to patent data since they constitute the most comprehensive resource for the industrial state of the art and should be the basis of any applied research. This Implementing Action (a) supports open patents, and (b) encourages the comprehensive release of state of the art data as linked open data. Open patents can help keep research results simultaneously open and patentable. Open patent data will also support open data in relation to the state of the art of existing patents, and support mapping of research and patenting classification systems. This would stimulate applied research and innovation, leading to more and better-quality patents and increasing the value of open research results for the patenting and research communities
	<u>Stakeholders/enactors</u>	Mostly RPOs and RIs. Funders and policy makers may only encourage such measures The European Patent Office (EPO) and the European Patent Academy in particular in collaboration with the EOSC could also be involved in the process of opening state of the art data and producing open patent data
	<u>Implementation</u>	- establish processes (e.g. model decision trees) for taking a decision to go for an open patent - collaborate with RPOs already using the open patents system in order to explain its operation and value - map the Frascati and the International Patent Classification (IPC)¹⁶ and the Cooperative Patent Classification (CPC)¹⁷ systems - develop common working groups with the European Patent Office to increase the release of patent state of the art as open data (open patent data)
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing, operating in six-month progress cycles

¹⁶ <https://www.wipo.int/classifications/ipc/en/>

¹⁷ <https://www.epo.org/searching-for-patents/helpful-resources/first-time-here/classification/cpc.html>

Implementing Action 4.6	Encourage the development of an EOSC Text and Data Mining Policy Framework	
	<u>Expected outcome</u>	Text and data mining-related technologies are key enabling technologies with a wider variety of applications, however the legal status of the resources to which they are applied is often ambiguous, particularly in terms of copyright limitations and exceptions. While the EOSC cannot rectify the inefficiencies of the European or international copyright system, it could support the use of best practices, such as clear, standardised and explicit licensing terms or clearance services that could allow the wider development and use of TDM technologies for the resources available through the EOSC and, hence, increase their use in an open science context
	<u>Stakeholders/enactors</u>	Mostly policy makers and funders. RPOs could only share best practices and Research Infrastructures collectively adopt them. EOSC governance to adopt best practices and enforce
	<u>Implementation</u>	- identify best practices in TDM at the legislative level and support legal reform - identify best practices of research results releasing (licensing, technical specifications) - introduce such best practices as mandatory, even at a basic level, in EOSC
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing, operating in six-month progress cycles

2.5. Recommendation 5 – Awareness and Skills

Recommendation: Help develop the necessary awareness and skills for the EOSC		
Explanatory Statement: Provision of the necessary awareness and skills to support and further advance open science is a priority and a necessary condition for the further development of the EOSC		
Implementing Action 5.1	Develop, support and promote an EOSC Skills and Capability Framework as a common reference point	
	<u>Expected outcome</u>	The EOSC Skills and Capability Framework identifies the skills necessary for ensuring that research is performed to high ethical standards and that research outputs are appropriately open, FAIR and citable. The description of the necessary competencies and skills for data stewardship developed by the Skills Work Package of the EOSCpilot project ¹⁸ is a good first step. It is location- and context-neutral and has a degree of international acceptance. It could be complemented by specification of technical, management and leadership skills
	<u>Stakeholders/enactors</u>	EOSC governance
	<u>Implementation</u>	EOSC Executive: raise awareness of the EOSCpilot Skills and Capability Framework through activities such as promoting it on the EOSC Portal; propose commitments within the OS Code of Conduct for its signatories to develop the skills and capabilities proposed in the EOSCpilot Skills and Capability Framework; in consultation with the EOSC Board and Stakeholder Forum, develop proposals for further development of the Framework to address a wider range of aspects of the EOSC, including technical, legal and ethical aspects
	<u>Timing</u>	Start: July 2019 Suggested duration: Commitments in the Code of Conduct and widening of scope by end of 2020

¹⁸ See deliverable D7.3: <https://eoscipilot.eu/content/d73-skills-and-capability-framework>

Implementing Action 5.2	Support EOSC utilisation, Open Science uptake and proper research conduct, and the EOSC Skills and Capability Framework, with awareness-raising and skills development for users	
	<u>Expected outcome</u>	Academic and research libraries and other training and skills providers to provide instruction sessions for EOSC services utilisation and collaborate with European initiatives and networks (e.g. FOSTER¹⁹, OpenAIRE²⁰) to strengthen support provided to users on Open Science, RDM, FAIR, GDPR (General Data Protection Regulation)²¹ and ethics. The widespread cultural and practical changes required to realise Open Science need to be stimulated and supported by awareness-raising and training activities in the form of induction. Libraries are knowledge exchange facilitators, liaisons who provide the first level of training, i.e. the basics, including familiarisation with Open Access and Open Science concepts, practical demonstration of certain OS services for how to use them, guidance on how to search for articles and how to write bibliographies etc. They are the ones to introduce EOSC to students, early careers and post-docs and show them its capabilities and how to best use it, in complement with introducing them to principles of Open Access, Open Science, ethical research conduct, data protection, IPR and research data management. In addition, civil servants, journalists and others involved in interpreting scientific results should have greater awareness and understanding of Open Science, the EOSC and the FAIR principles. Other training and skills providers can also contribute to these activities, which will ensure quality of Open Science knowledge in the EU and therefore of research conducted in the EOSC. They will also stimulate cultural change in research conduct, positively affecting RPOs' rewarding systems in the long run
	<u>Stakeholders/enactors</u>	EOSC governance; academic and research libraries; Research Infrastructures; Research Producing Organisations; Research Funding Organisations; training and skills providers
	<u>Implementation</u>	Academic and research libraries and other training and skills providers: in collaboration with other initiatives, develop and roll out activities, including: - awareness-raising and improved understanding of Open Science, the EOSC and the FAIR principles, and about roles and responsibilities in Open Science practices and procedures - training to increase understanding in a wide range of relevant topics including ethics, legal aspects including data protection and IPR, and research data management

¹⁹ <https://www.fosteropenscience.eu/>

²⁰ <https://www.openaire.eu/>

²¹ EU Regulation 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data
<https://eur-lex.europa.eu/eli/reg/2016/679/oj>

		- EOSC Executive to provide coordination support for libraries' and others' awareness-raising and training activities RFOs: provide funding support for activities, particularly to academic and research libraries RPOs and RIs: engage in and support activities
	<u>Timing</u>	Start: July 2019 Suggested duration: until Dec 2020

Implementing Action 5.3	Provide information and training materials in EOSC services and relevant ethical, legal, FAIR and RDM, GDPR and Open Science issues related to EOSC for research staff (including library staff) and data subjects (including data donors)	
	<u>Expected outcome</u>	Information about EOSC services and Open Science needs to be widely spread across Europe through all possible channels so the value of EOSC is well-communicated and understood by all, including citizens. This will ensure legal support in Open Science, with a focus on ethics and ethical behaviour in the EOSC, users' literacy on a number of EOSC policy issues and introduce practical solutions on a number of EOSC policy issues, with most prominent being Open Science, FAIR, RDM, data protection (specifically GDPR) and IPR. It will provide clarity of the EOSC requirements and application of Open Science, it will spread awareness and stimulate best practices in data handling, documentation, sharing and communication across EOSC and beyond, and it will also help to promote research ethics in the more general sense in the EOSC
	<u>Stakeholders/enactors</u>	EOSC governance, academic and research libraries, Research Infrastructures, Research Producing Organisations, Research Funding Organisations
	<u>Implementation</u>	EOSC Stakeholder Forum to request input from academic and research libraries and EOSC implementation projects for best practices and FAQs on all relevant matters and provide the necessary guiding and/or training materials. They will then communicate this material in their working environment and assess uptake and usefulness EOSC Executive to promote GDPR training through dissemination activities reaching every beneficiary and other interested party EOSC Executive to consult with EOSC Board to decide on the training to include in its strategic planning and prioritise actions
	<u>Timing</u>	Start: March 2019 Suggested duration: ongoing

Implementing Action 5.4	Provide and promote skills development for the staff of Research Producing Organisations and Research Infrastructures in Open Access publishing, RDM and FAIR practices, GDPR, as well as ethical and legal issues (also for data subjects) related to EOSC and research performance in the EOSC	
	<u>Expected outcome</u>	Further and ongoing training should be given to organisations' staff (including the libraries) as expertise for professional development of EOSC stakeholders. This will ensure that: - support in Open Science, with a focus on RDM and FAIR practices, is effectively provided for EOSC best utilisation - make sure data privacy and GDPR compliance is effectively supported in EOSC and service integration is well understood and easily implementable
	<u>Stakeholders/enactors</u>	EOSC governance
	<u>Implementation</u>	EOSC Board and Executive should include provisions for skills development of staff of EOSC Stakeholders in their strategic planning and actions. This will ensure quality of Open Science support in the EOSC and compliance to EU General Data Protection Regulation
	<u>Timing</u>	Start: March 2019 Suggested duration: ongoing

2.6. Recommendation 6 – Incentives and Rewards

Recommendation: Provide incentives for practicing Open Science and embed open principles in recruitment, promotion and evaluation of researchers at all stages of their careers		
Explanatory Statement: The EC aims to make Open Science the modus operandi of research conduct. Open practices are increasingly well understood and are becoming mainstream in research communities and ecosystems. Their inclusion in Human Resources selection criteria and in tenure and promotion bylaws is not only inevitable but it is also a priority for achieving Open Science.		
Implementing Action 6.1	Develop and implement an EOSC Rewarding Mechanism which structures incentivisation, assessment and rewarding of researchers and other relevant stakeholder staff to encompass all aspects of their achievements, including Open Science	
	<u>Expected outcome</u>	The EOSC should provide encouragement to all stakeholders to include Open Science in their incentivisation, evaluation and rewarding practices. The EOSC is not expected to <i>directly</i> employ or fund researchers or staff of RIs or RPOs but it can develop and implement an EOSC Rewarding Mechanism, using the Career Assessment Matrix (OS-CAM) proposed by the EC's Working Group on Rewards ²² as a basis, defining incentives for all who practice Open Science through the EOSC, in particular researchers, and mapping them to possible rewards including promotion and tenure. This action goes hand in hand with Recommendation 3 about Open Science conduct and outputs, strengthening best practices through the definition and promotion of appropriate incentives that eliminate misuse of impact metrics (e.g. Journal Impact Factor) and reflecting greater recognition for open practices such as Open Peer Review
	<u>Stakeholders/enactors</u>	EOSC governance, Research Producing Organisations, Research Funding Organisations, Research Infrastructures
	<u>Implementation</u>	EOSC Executive to: - in consultation with member states in the EOSC Board and with funders, RIs, RPOs and other stakeholders in the EOSC Stakeholder Forum, propose and agree an EOSC Rewarding Mechanism based on the OS-CAM - require EOSC stakeholders to adopt the EOSC Rewarding Mechanism - ensure any necessary updates are made to the Rules of Participation, to ensure consistency and implementation - develop mechanisms to monitor compliance by EOSC stakeholders (see Recommendation 7)

²² See: https://ec.europa.eu/research/openscience/index.cfm?pg=rewards_wg

		- explore the establishment of EOSC Open Science Championships and other relevant initiatives promoting OS practices uptake (this could be done in collaboration with awareness raising activities with libraries; see Recommendation 5) Funders to include implementation of the EOSC Rewarding Mechanism in their funding conditions RPOs and RIs to adopt the EOSC Rewarding Mechanism
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing

Implementing Action 6.2	Relevant European Research Area (ERA) and national policies and roadmaps relating to rewards and incentives should be appropriately revised to support practice of Open Science	
	<u>Expected outcome</u>	The EU is currently investing to encourage and support Open Science in European research and innovation. A review and alignment of policies relating to evaluation systems, rewards and incentives for scientific career progression would accelerate desired changes in the way research is performed and evaluated and support implementation of the EOSC Rewarding Mechanism proposed in Supporting Action 6.1
	<u>Stakeholders/enactors</u>	EOSC governance, RFOs, RPOs
	<u>Implementation</u>	EOSC Executive to propose, in consultation with EOSC Board and Stakeholder Forum, overall guiding principles for policies relating to evaluation, rewards and incentives Stakeholder Forum to collect evaluation, rewards and incentives policies and practices from stakeholders (RFOs, RPOs, RIs), identify gaps and push for policy adequacy as per the proposed guiding principles EOSC Board to liaise with Member States about national level OS strategies and policies RPOs and RIs to revise their policies to align with the proposed principles RFOs to support the proposed shift with appropriate conditions on funding awards EOSC Executive to monitor and assess implementation
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing

Implementing Action 6.3	Ensure that infrastructures, services and other resources supplied through the EOSC provide assurance, for example by developing accreditation or certification schemes • to users, that their research outputs are open, FAIR and citable • to the EOSC for the purposes of FAIR data governance and compliance monitoring	
	<u>Expected outcome</u>	Such assurance is necessary to increase trust in the EOSC and encourage the open release of content by all involved stakeholders
	<u>Stakeholders/enactors</u>	EOSC governance, research infrastructures
	<u>Implementation</u>	EOSC Executive to develop and introduce, after consultation and agreement with the EOSC Board and Stakeholder Forum, a badging system for all aspects of open science (e.g., OA publications and data, stewardship for FAIR data, links to 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 RIs to consider innovative ways of promoting the use of services, e.g. by rewarding researchers with the free provision of different services, for instance free storage space for sharing big datasets
	<u>Timing</u>	Start: July 2019 Suggested duration: by December 2020

2.7. Recommendation 7 – Policy Supporting Services

Recommendation: Develop and operate Open Science Policy Supporting Services to assist policy adoption and promote best practices		
Explanatory Statement: The EOSC should provide services and tools to effectively support policy adoption and implementation. Policy Supporting Services provide an important opportunity for the EOSC to add value and encourage Open Science practices		
Implementing Action 7.1	Develop and operate an Open Science Monitor as a key core service of EOSC	
	<u>Expected outcome</u>	Develop an Open Science Monitor (OSM) for the EOSC, providing a framework of indicators for measuring all appropriate aspects of Open Science, such as service usage data, use of open science practices (e.g. DMPs) and openness of research outputs. This framework must meet the needs of national and European infrastructures, RPOs, funders and policymakers including the EU and international bodies, who will have local instantiations. The OSM will promote and support open next generation metrics in line with the recommendation of the EC HLEG, « <i>Next generation metrics should be underpinned by an open, transparent and linked data infrastructure</i> » ²³ . This is a great opportunity for the EOSC to pioneer in providing an open science monitoring mechanism that uses unique, unambiguous, persistent, verified, open, global identifiers, agreed standard data formats and agreed standard data semantics
	<u>Stakeholders/enactors</u>	EOSC governance, research infrastructures, research producing organisations, research funding organisations
	<u>Implementation</u>	EOSC Executive to develop and implement an Open Science monitoring framework and Open Science Monitor based on the specification provided in EOSCpilot deliverable D3.2 ²⁴ and updated in D3.7 ²⁵ , in consultation with EOSC Board and Stakeholder Forum and ensuring global collaboration on the specifications, including through the RDA - RPOs and RIs to put in place monitoring mechanisms and services based on the agreed framework alongside those required by funders or specific domain communities - Funders, RPOs and RIs to provide the metrics specified by the OS Monitor for measuring Open Science

²³ <https://ec.europa.eu/research/openscience/pdf/report.pdf>

²⁴ <https://www.eoscipilot.eu/content/d32-eosc-open-science-monitor-specifications>

²⁵ Publication February 2019

		- Funders to embed the monitoring framework into national infrastructures and services and adjust grant policies accordingly, prioritising support for EOSC infrastructure including repositories
	<u>Timing</u>	Start: March 2019 Suggested duration: first tests by September 2019

Implementing Action 7.2	Develop and maintain a machine-readable Open Science Policy Registry for the EOSC to record and archive EOSC and EOSC stakeholders' Open Science policies	
	<u>Expected outcome</u>	The Open Science Policy Registry will provide a database of EOSC and EOSC stakeholders' policies of relevance to Open Science and assist in evaluating compliance with them. Policy records stored in the Registry should be FAIR, to be understandable by both humans and machines. The Registry will inform the EOSC OS Monitor, serve as a primary assessor of OS policy maturity and provide a tool for researchers to compare policies of organisations, infrastructures and services
	<u>Stakeholders/enactors</u>	EOSC governance, research producing organisations, research infrastructures, research funding organisations
	<u>Implementation</u>	EOSC Executive to develop and implement an OS Policy Registry based on the specification provided in EOSCpilot deliverable D3.4 ²⁶ , updated in D3.7 ²⁷ , in consultation with the EOSC Board and Stakeholder Forum RFOs, RPOs, RIs to record European, national and institutional OS policies in the OS Policy Registry
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing

²⁶ <https://eoscipilot.eu/content/d34-open-science-policy-registry>

²⁷ Publication February 2019

Implementing Action 7.3	Develop an Open Science Policy Toolkit, including a set of OS policy models and checklists to assist EOSC stakeholders in developing and implementing OS policies	
	<u>Expected outcome</u>	The Toolkit will increase awareness of tools which can assist the practice of Open Science. Model policies in particular will help stakeholders with policy development. Policy implementation checklists similar to those developed by PASTEUR4OA ²⁸ and RECODE ²⁹ have proven to boost policy adoption and their well-structured format could contribute to development of the OS Policy Registry (meta)data model
	<u>Stakeholders/enactors</u>	EOSC governance
	<u>Implementation</u>	EOSC Executive to implement and advertise an Open Science Policy Toolkit based on the Toolkit proposed in EOSCpilot deliverable D3.5 ³⁰ , updated in D3.7 ³¹ , and drawing on input from the Stakeholder Forum and other relevant work such as that of OpenAIRE.
	<u>Timing</u>	Start: July 2019 Suggested duration: implement toolkit by December 2020; ongoing updates thereafter

²⁸ <http://pasteur4oa.eu/home>

²⁹ See <https://ec.europa.eu/digital-single-market/en/news/recode-project-recommendations-open-access-research-data-are-now-available>

³⁰ <https://www.eoscipilot.eu/content/d35-open-science-policy-toolkit>

³¹ Publication February 2019

Implementing Action 7.4	Develop an Evaluation and Ranking of Openness Maturity of EOSC services, infrastructures and other resources	
	<u>Expected outcome</u>	An evaluation and ranking of openness maturity would allow researchers, RPOs and funders to rapidly determine the openness of services, infrastructures and other resources provided through the EOSC and provide impetus and guidance for service providers to improve their openness
	<u>Stakeholders/enactors</u>	EOSC governance, research infrastructures
	<u>Implementation</u>	EOSC Executive to develop and implement a proposal for a maturity model, using the examples of similar models from the ISA2 IMAPS (Interoperability Maturity Assessment of a Public Service)³² action and the Finnish Open Science Initiative³³ as a basis, and in consultation with the EOSC Board and Stakeholder Forum. This measure is regarded as one of the more advanced activities the EOSC could undertake, perhaps to be undertaken once the many more immediate policy initiatives have been put in place and the development of Open Science policies and practices are at a more advanced stage in the EOSC and its stakeholder organisations
	<u>Timing</u>	Start: June 2020 Suggested duration: ongoing

³² https://ec.europa.eu/isa2/actions/imaps_en

³³ Finnish Open Science and Research Roadmap 2014-2017 <http://julkaisut.valtioneuvosto.fi/handle/10024/75210>

2.8. Recommendation 8 - Data Protection and Information Security

Recommendation: Ensure EOSC Open Access research data use and reuse permit the rights and obligations of Data Protection Legislation (most notably the EU General Data Protection Regulation) to be achieved in a fair, transparent and accountable manner		
Explanatory Statement: The EOSC needs to be in compliance with the European Data Protection regime and national legislation. Of most importance is the General Data Protection Regulation 2016/679 (GDPR), which is binding law in all European member states. It requires the EOSC to put in place appropriate technical and organisational measures to implement the data protection and information security principles and to safeguard individual rights. Where personal data is processed through the EOSC it is important that compliance with EU data protection requirements is established in order to encourage trust in and reliance on it		
Implementing Action 8.1	The EOSC should have a Data Protection Officer (DPO) to help define, implement and maintain the EOSC's data protection and data security standards and processes and ensure its obligations under the GDPR are met	
	<u>Expected outcome</u>	Whether or not the EOSC adopts a formal legal status, it is expected that data, including personal data and even specific categories of personal data will be processed through the EOSC. Implementation of robust and sustainable data protection and data security practices and compliance with the General Data Protection Regulation (2016/679) needs to be ensured by the supervision of a dedicated EOSC DPO. The appointment could be made on a fixed-term contract basis in the first instance whilst remaining uncertainty around the status of the EOSC is resolved. The exact role of the DPO will be determined once this uncertainty is resolved
	<u>Stakeholders/enactors</u>	EOSC governance (Data Protection Officer)
	<u>Implementation</u>	As soon as possible, the EOSC Executive should recruit and appoint an EOSC Data Protection Officer It is suggested that the DPO report to the EOSC Executive
	<u>Timing</u>	Start: February 2019 Suggested duration: 3 months to complete recruitment process and appoint DPO

Implementing Action 8.2	Create an EOSC Data Protection and Information Security Framework and Action Plan to develop, manage and monitor compliance with Data Protection and information security regulation, frameworks and requirements	
	<u>Expected outcome</u>	Such a Framework and Action Plan, including controls such as policies, procedures, technical setup, governance and key roles, would ensure the EOSC processes personal data in accordance with the law. They would help deliver transparency and build trust around the EOSC's data handling. Many large, complex organisations adopt such an approach
	<u>Stakeholders/enactors</u>	EOSC governance
	<u>Implementation</u>	EOSC Executive (DPO): - draft an EOSC Data Protection and Information Security Framework for consultation and agreement with the EOSC Board and Stakeholder Forum. A template Framework is proposed in Annex H for consideration as a basis - agree the Framework with the Stakeholder Forum before adoption by the Executive - produce an Action Plan for implementation based on the agreed framework, and consider updating the Rules of Participation to ensure consistency with the Framework
	<u>Timing</u>	Start: May 2019 Suggested duration: 6 months (to the point of producing, but not implementing, the action plan); implementation thereafter

Implementing Action 8.3	The EOSC, RPOs and RIs should monitor Member State implementing laws under GDPR (2006/679) to ensure they comply with their GDPR obligations	
	<u>Expected outcome</u>	The GDPR includes a number of opening clauses allowing member states to make derogations from provisions in the GDPR. Some of these relate to research data so will have implications for the EOSC. Only a handful of member states have defined or finalised their implementing laws so continued monitoring is needed to ensure the EOSC complies with its GDPR obligations
	<u>Stakeholders/enactors</u>	EOSC governance, RPOs, RIs
	<u>Implementation</u>	EOSC Executive (may delegate to DPO): coordinate with RPOs and RIs to perform a monthly or quarterly monitoring review of data protection legislation within EU member states EOSC Executive (with DPO), RPOs and RIs: implement any necessary updates to their Data Protection Frameworks or processes. In the case of the EOSC, this should be in consultation with the Stakeholder Forum DPO: communicate updates to the EOSC Data Protection and Data Security Framework to EOSC stakeholders
	<u>Timing</u>	Start: July 2019 Suggested duration: ongoing (quarterly)

Implementing Action 8.4	Ensure metadata tagging includes differentiation between non-personal data, sensitive non-personal data, personal data and special categories of personal data, producing a consistent metadata taxonomy that could be applied to all data across the EOSC research infrastructures (see also Implementing Actions 1.1 and 2.3)	
	<u>Expected outcome</u>	Metadata tagging to identify and manage datasets supports access control and compilation of records of processing. The latter is a requirement of the EU GDPR (2016/679)
	<u>Stakeholders/enactors</u>	EOSC Governance, Research Producing Organisations, Research Infrastructures
	<u>Implementation</u>	EOSC Executive, working with DPO once recruited: elaborate metadata tagging proposals to meet Data Protection requirements Discuss proposals with the Stakeholder Forum to ensure stakeholder support and agreement of RPOs and RIs to implement the proposals Include metadata tagging implementation plan in Data Protection Action Plan proposed in action 8.2 above
	<u>Timing</u>	Start: July 2019 Suggested duration: 6 months (to implementation by EOSC participants)

Implementing Action 8.5	Set up of a standing Data Protection Working Group (DPWG), drawn from the EOSC stakeholder community and reporting directly to the Executive Board. Its mandate would be to i) lead the formulation and review of data protection policies, standards and guidance ii) develop and maintain an effective governance framework iii) monitor and develop data protection compliance across the EOSC iv) identify, validate and assess the impact of information assurance risks and escalate to the Executive Board with recommendations for treatments v) analyse the impact to data protection of changes across the EOSC vi) implement recommendations delegated by the Executive to the group. For further details about the proposed group including an action plan see Annex H	
	<u>Expected outcome</u>	Data Protection issues of relevance to the EOSC are reported to the Executive Board as directed by the GDPR ("the data protection officer shall directly report to the highest management level," (Art. 38(3)))
	<u>Stakeholders/enactors</u>	EOSC Executive Board, EOSC Stakeholder Forum representing RFOs, RPOs, RIs
	<u>Implementation</u>	EOSC Executive board: Implementing terms of reference and nominating members for the DPWG DPWG: Implementing data protection best practice so the EOSC complies with its data protection obligations. Identifying data protection issues to be dealt with and seeking approval from the Executive Board EOSC Executive: Adoption and implementation of the recommendations by the Ethics and Legal Advisory Board (ELAB – see Action 1.4) EOSC Stakeholder Forum to nominate data protection members from the RFOs, RPOs, RIs to support the work of the DPWG through a data protection forum
	<u>Timing</u>	Start: March 2019: terms of reference developed and members recruited by June 2019 Suggested duration: ongoing

2.9. Recommendation 9 - Procurement

Recommendation: Ensure that aggregated procurement is utilised by the EOSC where appropriate when making resources available to the EOSC marketplace		
Explanatory Statement: Many EOSC users will be subject to the EC Procurement Directive (2014/24/EU) as enacted in their respective Member State. By implementing aggregated procurement the benefits for EOSC marketplace users will include procedural efficiencies in the buying process and economies of scale with access to quality suppliers. For example, Irish institute Quality and Qualifications worked with the Irish NREN, HEAnet, to transfer their Microsoft Azure workloads to the GÉANT framework agreement delivering a 33% cost reduction		
Implementing Action 9.1	Advocate for an exemption for the EOSC to the requirement in the EC Procurement Directive (2014/24/EC) that the OJEU (Official Journal of the EU) notice requires users who wish to benefit from an aggregated procurement must be identified	
	<u>Expected outcome</u>	EOSC marketplace users who are not named in an OJEU notice are prevented from accessing contracts that result from that OJEU. An aggregated procurement may typically result in a framework contract that will last four years. This would prevent use by an EOSC marketplace user for this period until a successor procurement is run. This would hinder adoption and is unlikely to be capable of being solved by identifying all users in advance as this is difficult to do
	<u>Stakeholders/enactors</u>	EOSC governance
	<u>Implementation</u>	EOSC Executive to discuss possibility of amendment with the European Commission Draft and agree proposed amendment to text of Directive 2014/24/EC with the EOSC Stakeholder Forum Discuss process and timescale with the European Commission
	<u>Timing</u>	Start: June 2020 to be ready to input to consultation around the next iteration of the EC Directive, which is assumed to be refreshed every 10 years. Earlier soft petitioning work could be undertaken Suggested duration: 4 years

Implementing Action 9.2	Development of an EOSC Catalogue Workplan. Considering complementary programmes (e.g. EOSC-Hub³⁴, OCRE³⁵, and outcomes from Supporting Action 9.4) identify those resources for which aggregated procurement holds the greatest potential opportunities for providing value to EOSC users and what minimum standards shall apply before being allowed into the EOSC catalogue	
	<u>Expected outcome</u>	Begins, as early as possible, the process of delivering the greatest added value for users from use of aggregated procurement
	<u>Stakeholders/enactors</u>	EOSC governance
	<u>Implementation</u>	1. EOSC Executive to consider workplans of EOSC-Hub, OCRE etc 2. EOSC Executive to determine if resources represented in the EOSC catalogue are to meet any minimum standards 3. Where EOSC is to initiate aggregated procurements acts as the final governance to ensure these are delivered to any EOSC standards that are established from time to time 4. Where EOSC identifies the aggregated procurement is delivered outside of its governance to liaise with those projects to make them aware of any EOSC standards required for resources to be made available through the EOSC catalogue
	<u>Timing</u>	Start: June 2019 (EOSC-Hub report due to be delivered April 2019; also allow time for development of minimum acceptable standards for resources in the EOSC catalogue) Suggested duration: Ongoing

³⁴ <https://www.eosc-hub.eu/>

³⁵ Project website to be established. See http://earsc.org/file_download/494/OCRE++-Einfracinfo+session.pdf

Implementing Action 9.3	Ensure that an adequate level of specialist resource is provided to successfully plan, organise and run aggregated procurements, whether the procurement is coordinated by the EOSC or by a participating organisation	
	<u>Expected outcome</u>	Aggregated procurements are efficiently managed by qualified experts and legal requirements are adhered to
	<u>Stakeholders/enactors</u>	EOSC governance, research infrastructures, research funding organisations and/or research producing organisations
	<u>Implementation</u>	Agree the organisation to coordinate an aggregated procurement on behalf of participants Assess the scale of the procurement exercise(s) to be undertaken Recruit appropriately experienced procurement specialists
	<u>Timing</u>	Start: June 2019 (to coincide with the start of implementing action 9.2) Suggested duration: ongoing
Implementing Action 9.4	Develop the EOSC portal to include information about resources available as a result of procurement frameworks for EOSC participants to benefit from and allow for users to register interest (“wish list”) for resources where a framework doesn’t exist	
	<u>Expected outcome</u>	Contributes to maximising take-up of resources
	<u>Stakeholders/enactors</u>	EOSC governance
	<u>Implementation</u>	Ensure the catalogues resulting from aggregated procurements are included in the EOSC catalogue, indicating clearly who is eligible to access them and the process for doing so Ensure wish list functionality is included in the portal for expressing interest in aggregated procurement to record which entity, the resource of interest, likely volume and timescales
	<u>Timing</u>	Start: June 2019 Suggested duration: 3 months for initial development/implementation; ongoing thereafter

3. IMPLEMENTATION ROADMAP

This chapter presents a roadmap for the implementing actions elaborated in chapter 2. The strategic goal is described in the form of an overall policy proposition. A timeline and a simple categorisation of the implementing actions are then presented, followed by some suggestions which may assist with the implementation activity.

3.1. Overall Policy Proposition

The policy recommendations aim to help establish the policy environment required for the effective operation of, access to and use of the EOSC, addressing the need to support and encourage the sharing of resources and delivery of greater capacity in research infrastructures and services, and the production of FAIR and appropriately open research outputs.

The final set of recommendations and their implementing actions represent an overall policy proposition for an EOSC which is **Ethical**, **Open**, **Secure** and **Cost-effective**. These four main principles, elaborated below, represent the desired strategic outcome for the EOSC.

3.1.1. An Ethical EOSC

The inclusion of ethical principles and policies is of fundamental importance to the EOSC. It is difficult to anticipate all the ethical issues that may emerge as the scientific, technical, social and political landscape evolves. It is therefore crucial to have governance mechanisms in place that can ensure ethical issues are appropriately dealt with in the future, irrespective of how and when they occur, as well as identifying and proposing responses to current issues. There is clearly an interrelationship of governance, trust and ethics and if trust or trustworthiness is seen as a definite need for the EOSC, it has to be specified how trust can be generated and maintained in the EOSC and how the ethics recommendations can support this process.

3.1.2. An Open EOSC

By “an Open EOSC” we mean an EOSC which is inclusive and transparent and which supports Open Science, in line with the initial vision for the EOSC set out by the European Commission³⁶ and elaborated by the first High Level Expert Group on the EOSC³⁷. In line with the EC’s motto “as open as possible, as closed as necessary”, the final policy recommendations all aim to support and encourage “openness” and FAIRness in the way research is conducted and research outputs are created, managed and preserved. They focus on research outputs – the final products of research effort – and the infrastructures and services used to derive the outputs. This includes the recommendations concerned with intellectual property rights, data protection and data security, which aim to achieve clarity around use of data and other outputs and ultimately enhance overall openness.

3.1.3. A Secure EOSC

Those who use the EOSC need to be able to do so with confidence that the infrastructures, services and other resources they use will be secure, so that the data and other research artefacts which they access or produce are secure. This includes cybersecurity, IPR, data protection and data integrity considerations.

3.1.4. A Cost-effective EOSC

Cost-effectiveness is an important driver in developing a federated service environment to increase the capacity of services and other resources for research and must be an important factor in any initiative involving use of public funding. In consideration of the cost-effectiveness of the EOSC, the policy work examined the specific area of public procurement. This is a specialist area which tends not to be included in the interests and expertise of many stakeholder representatives, and hence is less discussed in debates about

³⁶ European Cloud Initiative Communication, COM/2016/0178 final:

<https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52016DC0178>

³⁷ Realising the European Open Science Cloud

https://ec.europa.eu/research/openscience/pdf/realising_the_european_open_science_cloud_2016.pdf#view=fit&pagemode=none

the EOSC but it could potentially realise significant cost-savings for a wide range of services and other resources from conducting procurement at scale. Equipping EOSC users and service providers with the appropriate skills and knowledge through training and policy supporting services (such as monitoring) contributes to cost-effectiveness by encouraging policy-compliant and efficient usage; clarity and openness around IPR helps maximise the potential of research resources, and appropriate data protection measures protects against infringement costs and inappropriate access to data.

3.2. Mapping of Policy Recommendations to Principles

The final set of nine high-level recommendations is listed in Table 1, showing how each recommendation contributes to the four policy principles. It can be seen that all nine recommendations contribute to openness, and there is broad contribution to the other three principles.

Table 1 – Final Policy Recommendations’ Contribution to the Four Policy Principles

Policy Principles	Support for Policy Principles
1: Ethics: Commit to a policy of maximal transparency and accountability, in the context of any activity that relates to EOSC data, data providers, services or users, including activities carried out with third parties.	
Ethical	Ethical considerations should be an integral part of EOSC decisions and processes from the outset, to build stakeholders’ trust
Open	Transparency is an essential component of open science
Secure	It is essential to identify the possible ethical issues within EOSC and ensure that those issues are considered and managed in the most appropriate way
2. Access: EOSC resources must provide access to their facilities and be accessible themselves in an open, FAIR and equitable manner for excellent Open Science and Open Scholarship to be performed, shared and exploited	
Ethical	Respecting one's research behaviour by paying equal attention to moral aspects of FAIR principles and of access conditions to infrastructures, services and other resources.
Open	Taking into consideration basic principles of the Open Access movement for research outputs to be openly available and follow the FAIR principles with a focus on their open aspects, while provisioning an infrastructure to support them
Secure	Ensuring access to EOSC data and collections is in line both with national laws for security and defence (for infrastructures) and with the proposed Data Protection Framework (for data(sets) and other content).

Policy Principles	Support for Policy Principles
3. Open Science Conduct and Outputs: Simplify, clarify and improve consistency to enable and encourage the practice of Open Science	
Ethical	Respecting all research efforts and ensuring data sharing and research conduct falls under an ethical framework that takes into consideration international and national laws
Open	Making OS practice inclusive to all; ensuring open workflows and that best practices in the EOSC are highlighted and consistently followed
4. Intellectual Property Rights: Encourage open access to and reutilisation of research outputs by providing a comprehensive and coherent IPR framework	
Ethical	Respecting third parties' Intellectual Property Rights, particularly moral rights, ensuring an ethical way of allocating ownership and attribution regarding research process and results, and that everyone gets fair compensation for the exploitation or opening of research results
Open	Maintaining the minimum frictions and conditions in the re-use of licensed material; respecting public domain where it exists.
Secure	Ensuring that all materials used through the EOSC are sound in terms of IPR (e.g. no third party infringing material); ensuring all types of value are respected; maintaining a clear documentation of rights and licences
Cost-effective	Making the best use of the IP assets for all types of value; reducing transaction costs for the reuse of IP
5. Awareness and Skills: Help develop the necessary awareness and skills for the EOSC	
Ethical	Contributing to a respectful research communication and valid research
Open	Making researchers Open Science-literate
Secure	Highlighting best practices and services for data privacy and security at all stages of RDM; assisting in common understanding in implementation of GDPR
Cost-effective	Encouraging best practice and use of the EOSC

Policy Principles	Support for Policy Principles
6. Incentives: Provide incentives for practicing Open Science and embed open principles in recruitment, promotion and evaluation of researchers at all stages of their careers	
Ethical	Ensuring that misuse of metrics, similar to the Journal Impact Factor (JIF), is avoided and that researchers are evaluated equitably both when practicing Open Science and when following traditional paths of research conduct
Open	Focusing on the open aspects of research conduct and providing incentives to all stakeholders
7. Policy Supporting Services: Develop and operate Open Science Policy Supporting Services to assist policy adoption and promote best practices	
Ethical	Respecting moral aspects in access and research behaviour
Open	Supporting all aspects/characteristics of Open Science and all stakeholders when practicing Open Science
Secure	Ensuring data and information security of the proposed services is in line with the proposed Data Protection Framework
Cost-effective	Requiring the minimum resource allocation for policy supporting services' development, operation and maintenance
8: Data Protection and Information Security: Ensure EOSC Open Access research data use and reuse permit the rights and obligations of Data Protection Legislation (most notably the EU General Data Protection Regulation) to be achieved in a fair, transparent and accountable manner	
Ethical	Personal data of individuals must be used, stored and re-used in a fair, legal and ethical way to promote trust in its use, and its protection
Open	Data within the EOSC should be available for use and re-use where practical and ethical to do so
Secure	Personal and sensitive data within the EOSC should be adequately protected so that both data subjects and users of the EOSC have trust in it.
Cost-effective	Controls put in place to protect and manage data should be appropriate to the level of risk concerned and the threats posed to that data, balancing the need to access against the need to protect

Policy Principles	Support for Policy Principles
9: Procurement: Ensure that aggregated procurement is utilised by the EOSC where appropriate when making resources available to the EOSC marketplace	
Open	Making resources more widely available through aggregated procurement
Cost-effective	Aggregating demand to get the best prices from commercial suppliers

Table 2 below summarises the mapping of the final recommendations to the four policy principles.

Table 2 – Mapping of Final Recommendations to Principles

	Ethics	Access	Open Science Conduct	IPR	Skills	Incentives	Policy Supporting Services	Data Protection and Information Security	Procurement
Ethical	✓	✓	✓	✓	✓	✓	✓	✓	
Open	✓	✓	✓	✓	✓	✓	✓	✓	✓
Secure	✓	✓		✓	✓		✓	✓	
Cost-effective				✓	✓		✓	✓	✓

3.3. Roadmap

Figure 1 below provides a basic timeline for the implementing actions, up to the end of Phase I of the EOSC governance in December 2020. Allowance has been made in the implementing actions that time will be required for the newly-created EOSC Executive to establish itself and set up substructures such as the proposed Ethics and Legal Advisory Board, Data Protection Working Group, and Policy Standing Committee. Many of the actions are likely to continue beyond 2020 but details are not included here.

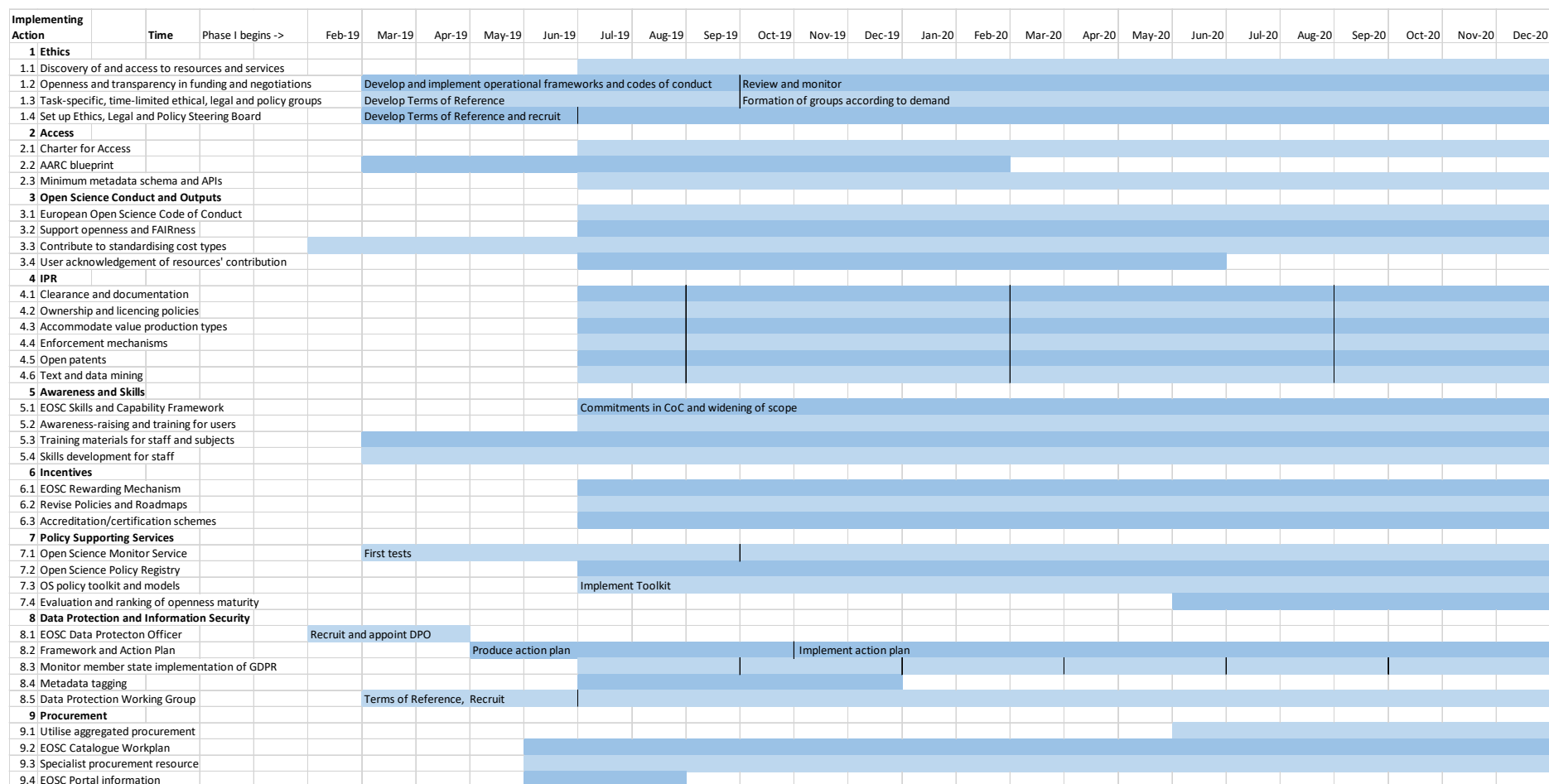


Figure 1 – Implementing Actions Timeline

3.4. Implementing Actions

The thirty-seven implementing actions elaborated in chapter 2 can be grouped into four categories:

- Governance substructures and expertise: time-limited or standing working groups or committees of the EOSC governance; specialist human resource and expertise.
- Outreach – skills, awareness, advocacy: activities relating to training and skills for the EOSC, plus awareness-raising and advocacy.
- Operational Frameworks and Codes of Conduct: organisational, individual and technical standards and best practices.
- Policy Supporting Services: services and tools to support EOSC policy and Open Science Policy.

These are illustrated in Figure 2.



Figure 2 – Categories of Implementing Actions

The categories are not exclusive or independent. Examples of this are that many of the actions in the Operational Frameworks and Codes of Conduct category require drafting and implementation within the EOSC’s governance structures, and skills and awareness activity contributes to implementation of operational frameworks and codes of conduct. Table 3 lists the implementing actions according to the main category to which they belong.

Table 3 – Mapping of Implementing Actions to Action Categories

Action Category	Implementing Actions
Governance Substructures & Expertise	1.3, 1.4, Ethics and Legal Advisory Board and subgroups 8.1 Data Protection Officer 8.5 Data Protection Working Group 9.3 Specialist procurement expertise
Outreach - Training/Skills Actions; Advocacy	5.1 EOSC Skills and Capability Framework 5.2 awareness-raising and training activities for users 5.3 Provide information and training materials 5.4 staff training in Open Access publishing, RDM and FAIR practices, GDPR, ethical and legal issues 9.1 amend EC Procurement Directive
Operational Frameworks and Codes of Conduct	1.1 discovery and access 1.2 openness and transparency in funding and negotiations 2.1 Charter for Access 2.2 AARC blueprint architecture 2.3 minimum metadata schema, defined set of APIs 3.1 European Open Science Code of Conduct 3.2 openness and FAIRness of research outputs and other resources 3.3 standardise cost types 3.4 acknowledgement of use or contribution 4.1 cleared, documented IPR 4.2 machine-readable IPR ownership and licensing policies 4.3 licensing policies accommodating different value production 4.4 consistent enforcement of Open Access policies, rights and licences 4.5 open patent systems 4.6 EOSC Text and Data Mining Policy Framework 6.1 EOSC rewarding mechanism 6.2 revise ERA and national rewards policies 6.3 accreditation or certification schemes 8.2 Data Protection and Information Security Framework and Action Plan 8.3 monitoring for GDPR obligations 9.2 identify and prioritise procurement opportunities

Action Category	Implementing Actions
Policy supporting services	7.1 Open Science Policy Monitor 7.2 OS Policy Registry 7.3 OS policy toolkit including policy models and checklists 7.4 openness maturity evaluation 8.4 metadata identification tagging 9.4 procurement info in EOsc Portal

3.5. Support for Implementation – Policy Standing Committee

The policy actions include a proposal for an Ethics and Legal Advisory Board acting independently of the EOsc Executive, to address ethical and legal issues, included in support of the high-level recommendation for Ethics (transparency and accountability) because it received strong support from experts during consultation. The actions also include proposals for an IPR Working Group and a Data Protection Working Group, both reporting to the EOsc Executive, to help ensure the EOsc meets its obligations under Intellectual Property and Data Protection regulations respectively. These groups are all proposed for Phase I of the EOsc, until the end of 2020 but it is likely that there will be a continued need for all three of them in Phase II as issues relating to Ethics, IPR and Data Protection are likely to continue to arise on an ongoing basis.

With the EOsc still at a very early stage of its implementation, it is important to respect the need for the governing bodies to be more fully defined and established, to develop their roles and responsibilities and to decide how they will work with one another. Also, to be mindful of the cost in terms of both money and time, of proposals for actions, particularly further committees. The implementing actions were elaborated with this in mind and therefore, overall, attempt to avoid being overly prescriptive about how implementation should take place. The proposals in this deliverable represent a significant amount of activity for stakeholder groups and particularly for the EOsc governance during Phase I of the EOsc. Therefore, the EOsc Executive may also wish to consider creating a Policy Standing Committee to support and encourage the practice of Open Science in the EOsc by undertaking several of the EOsc policy activities proposed here. A draft mandate, composition and initial task list for a Policy Standing Committee in Phase I of the EOsc, are proposed in Annex I for consideration by the Executive. Such a committee maps well to the Policy Alignment Steering Committee proposed for Phase II in EOscpilot Deliverable D2.6. It is left to the EOsc Executive to consider how further EOsc policy work from 2019 onwards may be distributed across the various EOsc support projects, including the EOsc-secretariat, which are underway or envisaged, and the possible relationships between those projects and the proposed Policy Standing Committee, or any other governance subcommittees established in Phase I.

The Procurement Recommendation does not include specific proposals for which EOsc governance subcommittees should be involved. Procurement would need to be included in the remit of EOsc governance structures as appropriate to ensure it is considered in the context of the overall EOsc strategy considering demand, priorities and budget.

The reader is referred to D2.6 for further details of the proposed Phase II EOsc governance, including substructures.

4. CONCLUSIONS

This deliverable has presented a roadmap for establishing the policy environment required for the effective operation of, access to and use of the EOSC through a series of practical, actionable policy proposals.

A proposal is also made for an EOSC Policy Standing Committee and working groups dedicated to Intellectual Property Rights and Data Protection to assist the Executive with development of some of the numerous policy actions proposed and help ensure strong stakeholder representation in policy definition. An independent Ethics and Legal Advisory Board is also proposed. It is left to the EOSC Executive to consider the final overall balance of benefits and costs of such structures, however, the Ethics and Legal Advisory Board in particular received strong support from experts during consultation.

Activity around several of the actions could be continued within other ongoing EOSC projects, including data protection and perhaps some other activities within the EOSC-Hub project, procurement activity in the OCRE and EOSC-hub projects and activities relating to development of the FAIR principles in the FAIRsFAIR project. Skills development and training are obvious candidates for possible inclusion in EOSC projects. OpenAIRE and the RDA could provide further relevant input to the Policy Supporting Services in particular, but also to other aspects of Open Science policy and practice.

The importance of policy supporting services – including the Open Science Policy Register and Monitor, policy templates and checklists – should be noted for the support they can provide to the policy proposals presented in this deliverable, and for their potential to significantly enhance the value of the EOSC to users and stakeholders by providing information about policies and their implementation, compliance and utilisation of EOSC services. Some of the implementing actions in this deliverable are also derived from other EOSCpilot Work Packages in support of their proposals.

This roadmap could be further developed by the EOSC Executive by defining Key Performance Indicators against which to measure progress and achievement towards the vision for an Ethical, Open, Secure and Cost-effective EOSC which this deliverable has described.

ANNEX A. FORMULATION OF FINAL POLICY RECOMMENDATIONS

The final policy recommendations presented in this document were developed as the third stage of the work of Task 3.1. The first stage consisted of a high-level Policy Landscape Review, presented in Deliverable D3.1 published in January 2018, which performed a review of EU legislation and policies of relevance to Open Science in the context of the knowledge economy and the global data value chain. This included policies supporting the sharing of infrastructures and services, policies supporting the free flow of data, policies to improve skills and support data-related education, and public procurement policies.

The second stage of the work produced a set of forty-three draft policy recommendations which were formulated following examination of drivers and constraints in the areas of Open Science and Open Scholarship, Data Protection, Procurement and Ethics. These were presented in Deliverable D3.3³⁸ and a set of four supporting White Papers³⁹, published in August 2018. Twenty-eight of the recommendations were in the area of Open Science and Open Scholarship, 5 related to Data Protection, 2 to Procurement and 8 to Ethics. The reader is referred to the D3.3 White Papers for details of the drivers, constraints and argumentation which led to the draft policy recommendations.

The work to produce the final policy recommendations involved activities to validate the draft policy recommendations presented in D3.3. This involved discussing the recommendations or relevant subsets of them at workshops and events, and running four online surveys to gather stakeholder input. A comparison was performed of the D3.3 draft recommendations with those of relevant EC Expert Groups, and EOSCpilot Science Demonstrator reports were reviewed for relevant comments. The work of the other Work Packages of EOSCpilot was also taken into account, and in addition several other factors were considered. A summary of these activities is provided in this Annex, with further details in Annexes B-E.

The work to validate the draft policy recommendations published in deliverable D3.3 showed support for all but one of the draft recommendations, which were duly included in the set of final policy recommendations and their implementing actions. The exception was the D3.3 recommendation OS7 “Reduce regulatory complexity for researchers” which received little attention, probably due to its very general nature. Some recommendations are perhaps viewed as relatively ambitious at the current time – open patents, text and data mining, evaluation and ranking of openness maturity of infrastructures, services and resources for example – but could still add value and so have been included. Others showed some evidence of being recognised for the value they would add to the EOSC, but being less likely to be implemented by stakeholder groups perhaps due to the effort, cost and culture change they entail. This applies to recommendations such as accreditation/certification of services and perhaps to some extent to the Open Science Code of Conduct and the Charter for Access.

A comparison of the draft Open Science policy recommendations with those of three EC expert groups showed correlation (i.e. echoed support) for between a third and a half of them, with no overt contradictions. The main reason for the level of correlation not being higher is likely to be the specific focus of the EOSCpilot policy work on the implementation of the EOSC.

The information gathered was used to amend and prioritise the D3.3 draft policy recommendations. The WP3 team held a workshop at which the prioritised set of policy recommendations and their suggested implementing actions, and the overall policy proposition, were agreed. Further refinements continued thereafter to produce the final set of recommendations and implementing actions presented in the following Chapters.

³⁸ <https://www.eosc-pilot.eu/content/d33-draft-policy-recommendations>

³⁹ Open Science: <https://zenodo.org/record/2176076#.XBEr8tv7S02>,

Data Protection: <https://zenodo.org/record/2533143#.XDNuq1wzaUk>,

Procurement: <https://zenodo.org/record/2180426#.ZBDgjt7S02>,

Ethics: <https://zenodo.org/record/2533184#.XDNurFwzaUk>

A.1. Workshops

Meetings and events at which the draft policy recommendations were presented and discussed with stakeholders included:

- EOSCpilot WPs 5 (Architecture) and 6 (Interoperability) workshop in Amsterdam on 23 May
- Workshop on Research Institutions and Libraries and the Role of Funders in the European Open Science Cloud held in Lille on 4 July⁴⁰, including contributing to the report A Vision for Open Science⁴¹ which provided input towards the recommendations on rewards and incentives
- DI4R World Café session “Policies in the EOSC Through the Lens of Research Infrastructures: the EOSCpilot Policy Recommendations” in Lisbon on 9 October⁴²
- WP3 Ethics workshop in Paris on 9 November
- EOSCpilot Second Stakeholder Forum session “Policies for an Open, Ethical, Secure and Cost-effective EOSC” in Vienna on 22 November⁴³.

In summary, the main findings gathered from these workshops were

- Emphasis of the urgent need to shift the incentives on researchers to encourage Open Science, requiring employers and research funders to recognise and reward the open science approach
- The importance of the role of funders in achieving open science by setting clear policy expectations, providing the funding required to support the research community in adopting open science practices, and developing and sustaining key underpinning infrastructures and resources
- Desire for a strong ethical basis for the EOSC based on transparency and accountability and support for an Ethics working group of the EOSC governance
- The need for awareness raising (including use of best practice examples) and advocacy amongst stakeholders to help change research culture, including about the *benefits* of EOSC, open science and FAIR practices, and also about the *needs and solutions*
- The importance and widespread need for skills development in the areas of data (and code and software) management and data science including research integrity, but also in understanding roles and responsibilities and legal obligations
- The importance of the EOSC governance ensuring users are involved and feel listened to
- Support for adopting and disseminating an infrastructures and services Access Charter and for an Open Science Code of Conduct including minimal conditions on DMPs and standards for Research Data Management within and across disciplines
- Support for automated solutions to support policies, such as an Open Science policy registry, machine-actionable DMPs and technological solutions to support compliance with data protection requirements
- Support for an interoperable AAI infrastructure and minimum sets of metadata and APIs
- Recognition of the importance and potential of a clear and comprehensive IPR framework
- Recognition of the importance of compliance with Data Protection requirements and support for a Legal/Data Protection working group of the EOSC governance and a forum of Data Protection Officers of organisations participating in EOSC
- Recognition of the potential benefit of framework procurement for participants in the EOSC

At the Stakeholder Forum Policy Session, the recommendation was made that the policy recommendations should be presented to the EOSC governance in the form of a roadmap for implementation, to which they could assign KPIs for monitoring progress and outcomes.

Further details of each workshop are included in Annex B.

⁴⁰ See <https://www.eoscipilot.eu/events/eoscipilot-workshop-research-institutions-and-libraries-and-role-funders-european-open-science>

⁴¹ <https://www.eoscipilot.eu/content/report-vision-open-science>

⁴² <https://www.eoscipilot.eu/events/policies-eosc-through-lens-research-infrastructures-eoscipilot-policy-recommendations>

⁴³ <https://www.eoscipilot.eu/events/second-eosc-stakeholders-forum>

A.2. Surveys

The main activity performed to validate the D3.3 draft policy recommendations was conducted in the form of four separate online surveys which collected stakeholders' views on the draft recommendations relating to, respectively, Open Science and Open Scholarship, Data Protection, Procurement and Ethics.

The surveys were hosted on the EU Survey tool⁴⁴. They were conducted separately but coordinated by a survey "landing page" on the EOSCpilot project website⁴⁵. Invitations for each survey were sent to lists of selected respondents but it was also possible to participate in the survey via the landing page without a specific invitation. Further details of the surveys are included below and in Annex C.

A.2.1 Ethics Survey

The survey covered different questions relevant for ethics: supporting organisational ethics and research integrity, use of data (including personal and sensitive data), the role of working groups and advisory board and other general aspects such as training, science and society, etc. The respondents (26 in total, fairly representing the main EOSC stakeholder categories, from 42 invited participants) globally agreed that supporting and promoting an ethical behaviour is of central importance to the EOSC and should be explicitly built into the organisation from the outset. Additional mechanisms to handle potential issues are necessary: uniform policies (i.e. codes of conduct / rules of participation) and an independent Ethical and Legal Advisory Board to ensure policy alignment.

A.2.2 Open Science and Open Scholarship Survey

The Open Science and Open Scholarship survey contained questions aimed at prioritising the recommendations proposed in D3.3 and improving understanding of the current state of openness in infrastructures and services, research outputs and metrics. It was difficult to deduce clear patterns from the responses received, but overall the survey responses most supported measures to **improve interoperability**, such as adoption of standardised procedures, to **improve openness and access**, with an EOSC Charter for Access to Infrastructures, Services and Other Resources, to **strengthen important aspects of Research Data Management**, through use of PIDs (Persistent Identifiers), DMPs and improved data stewardship, to move to **open career evaluation criteria**, and to **register and monitor Open Science policies and practices**.

A.2.3 Data Protection Survey

Nineteen respondents participated in the data protection survey from over 150 email invites sent. Only two participants considered themselves "experts" in data protection, but those with "advanced knowledge" and "intermediate knowledge" also provided valuable responses.

Privacy-by-design and privacy-by-default solutions had already been implemented by almost half of the participating institutions. Those which had not seem to use mostly non-personal data. Most of the participants also had knowledge on the GDPR implementation in their respective countries.

Training on data protection and a tag to identify special categories of data received more than 10 "yes" votes and can thus be considered the most supported recommendations. The introduction of special regimes, a data protection code of conduct and the idea of personalised policy catalogues were also rated positively, although against the backdrop of a great variety of Codes of Conduct that have been adapted to various fields of research, some doubts were expressed about the need for a special Code for the EOSC. The evaluation for the personalised policy catalogue shows that participants are particularly concerned about its practical implementation (keeping it updated, fulfilling documentation obligations, etc). The establishment of an Expert Working Group on Data protection was suggested.

A.2.4 Procurement Survey

Eight respondents engaged in the Procurement survey out of 28 invitees, presenting a view on behalf of government ministries, e-Infrastructures and research producing organisations. The compliance to EC

⁴⁴ <https://ec.europa.eu/eusurvey/home/about>

⁴⁵ <https://eoscipilot.eu/media/eoscipilot-policy-and-skills-frameworks-influence-draft-proposals>

Directive 2014/24/EU applied to the majority of respondents and thus must be considered in the EOSC marketplace. Some organisations are motivated to provide resources to others, but in limited ways. All showed an interest in aggregated procurement.

As a potential major provider of services, Microsoft indicated that they would be willing to respond with a proposal from a single procurement for a defined set of users. The implication is that the terms under which resources are made available in the EOSC marketplace are likely to vary between user groups.

A.3. EC Expert Group Recommendations Comparison

A comparison was performed between the WP3 draft recommendations on Open Science and Open Scholarship presented in D3.3 and those produced or in preparation by three EC Expert Groups: the second High Level Expert Group on the EOSC, the Expert Group on FAIR Data, and the Open Science Policy Platform. The exercise was performed primarily to identify whether any themes or contradictions emerged from the concurrent batches of recommendation sets.

Of the twenty-eight WP3 draft OS recommendations, 2 showed strong correlation:

- Rec 11: Use community accepted standards and conventions
- Rec 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 careers.

There was moderate correlation for eight other recommendations, and weak correlation for a further 6. Twelve of the WP3 OS draft recommendations did not appear to correlate with any recommendations from the other sets, perhaps due to the particular objective of the WP3 policy recommendations to support the development of the EOSC, although in several cases it could be seen that the topics were considered by the Expert Groups but they stopped short of formulating dedicated recommendations. No specific contradictions were identified but the approaches to a topic diverged markedly in two cases:

- Rec. 10: Develop principles for long-term data stewardship enabling curation, provenance and quality
- Rec. 16: Develop, support and promote an EOSC Skills and Capability Framework as a common reference point.

In both cases, these draft recommendations argue for the development of certain resources or principles. However, these resources or principles are considered by other projects to already exist, to be worthy of acknowledgement, and only in need of extension or repositioning.

For more information and detailed findings, please see Annex D below.

A.4. Other EOSCpilot Work Packages

Within EOSCpilot, work has been conducted to develop proposals for the EOSC governance, Rules of Participation and architecture, to advance interoperability and sharing of data and infrastructures, and to propose a skills framework to help motivate and develop the capabilities the EOSC will rely on. The project also ran a series of Science Demonstrator case studies trialling new distributed research activities of the type the EOSC needs to support. These activities are discussed briefly below in relation to the policy work.

A.4.1 Relationship to EOSC Governance Structures

The EOSC was formally launched by the European Commission on 23 November in Vienna⁴⁶, including the announcement of the EOSC Executive Committee. The Executive Committee represents part of the governance of Phase I of the EOSC, due to run until at least the end of 2020. An EOSC Board, consisting of member state and European Commission representatives, has also been formed. It is expected that a further

⁴⁶ <https://eosc-launch.eu/home/>

governance body, the EOSC Stakeholder Forum, will be set up in the first 6 months of 2019 in accordance with the proposals in the EC's March 2018 EOSC Implementation Roadmap⁴⁷.

The EOSCpilot policy recommendations include suggestions for an Advisory Board, independent of the EOSC Executive, for two working groups of the EOSC Executive, and in addition a proposal is made for a Standing Committee of the Executive. These are proposed to be set up during Phase I of the EOSC. Initial Terms of Reference and a task list for these are proposed in Annexes F-I. Efforts have been made to ensure these proposals are consistent not only with the Phase I governance structures but also, as far as possible, with the EOSCpilot proposals for the EOSC governance⁴⁸ which are targeted at Phase II of the EOSC due to be implemented after 2020.

A.4.2 Relation Between Policy Recommendations and Rules of Participation

A set of Rules of Participation is envisaged, applying to suppliers to and users of the EOSC. An initial set of Rules has been proposed by EOSCpilot in Deliverable D2.5⁴⁹, published in August 2018 and consisting of one main rule and 7 specific rules. These establish rules, or principles, which drive the participation of service providers and users in the EOSC. The policy recommendations support the Rules of Participation but also have a wider purview in their consideration of the behaviour of EOSC stakeholders: several of the actions proposed in the set of final policy recommendations are aimed at stakeholder groups independently of their participation in the EOSC. As EOSC Policies (using the definition in section A.5.1 below) are adopted in future, however, it is assumed that updates to the Rules of Participation will be made to ensure alignment and consistency with EOSC policies.

A.4.3 Relationship to EOSCpilot Architecture and Interoperability Proposals

In parallel with the Policy work in WP3, other EOSCpilot Work Packages were working to develop proposals for the EOSC architecture and for interoperability of data and services in the EOSC. Early architecture and interoperability proposals have been taken into account in the Policy work, and indeed the draft policy recommendations were discussed at a joint WP5 and WP6 workshop in Amsterdam in May to attempt to ensure consistency and coherence. At the Ethics Workshop in Paris (see Annex B.4) discussion took place about the links of the EOSCpilot policy work with that on interoperability and architecture. The key conclusions in relation to interoperability and policy were the need to

- ensure legal interoperability between EOSC stakeholders, particularly in the areas of IPR and data protection
- align the legal interoperability with technological and procedural/organisational interoperability through transparent use of DMPs, inclusion of IPR and data protection clearance rules as part of the Data Management Plan
- follow cross-disciplinary rules in relation to metadata, with a particular focus on personal and sensitive data.

In terms of architecture and policy, the key conclusions were

- EOSC architecture and services should cover the entirety of the research lifecycle and roles
- There is a need to focus on the Rules of Participation and ensure principles of Open Science and ethics are hardwired in the EOSC architecture.

A.4.4 Skills

The main contribution of the EOSCpilot project in relation to skills has been the development of a skills framework⁵⁰, which is based on pre-existing developments and frameworks, such as the EDISON⁵¹ one, but with a renewed focus on data stewardship and an attempt to relate the framework to the entire research

⁴⁷ https://ec.europa.eu/research/openscience/pdf/swd_2018_83_f1_staff_working_paper_en.pdf

⁴⁸ To be published shortly in EOSCpilot deliverable D2.6

⁴⁹ <https://eoscipilot.eu/content/d25-recommendations-minimal-set-rules-participation>

⁵⁰ D7.3: Skills and Capability Framework <https://www.eoscipilot.eu/sites/default/files/eoscipilot-d7.3.pdf> see also

https://www.eoscipilot.eu/sites/default/files/fair4s_eoscipilot_skills_framework.pdf

⁵¹ <http://edison-project.eu/>

lifecycle. The EOSCpilot emphasis is on skills rather than training. Training is only one of numerous ways to acquire skills and not necessarily the most appropriate for all skills which are relevant to the EOSC.

The policy recommendations reflect and support this work on skills and in addition reflect input gathered by the Skills Work Package about the importance of motivation (incentives) to change research practices and acquire the relevant skills for open science.

A.4.5 Science Demonstrators

In EOSCpilot fifteen Science Demonstrators (SDs)⁵² in different disciplines were developed. The contact persons of the SDs wrote at the end of their SD project a report about their project. In their report it was expected that they would indicate what policy recommendations regarding EOSC they would find useful. Out of 15 SDs, 8 answered this question (see Annex E).

The remarks of the SDs were mapped to the Policy recommendations for the EOSC. The conclusion is that the SDs support all the recommendations except for the Ethics recommendation which was not mentioned. However, the expected recommendations of the SDs were on a more specific level than the general policy recommendations, e.g. a recommendation to use a specific data and metadata exchange protocol. On the other hand, one SD supported the D3.3 draft recommendation “Reduce regulatory complexity for researchers” which doesn’t feature in the final recommendations.

Also, the policy issues mentioned in the draft Deliverable 4.4. “Consolidated Science Demonstrator evaluation report” (December 2018)⁵³ were able to be mapped to the final policy recommendations suggesting that the policy recommendations, broadly, address the issues and concerns of the Science Demonstrators.

A.5 Other Considerations

A number of other considerations which influenced the work are described here.

A.5.1 Policy Definition

A definition of “policy” was helpful to clarify the purpose of the work. Two definitions were agreed – EOSC Policy and Open Science Policy - because the policy actions under consideration included policies which could be adopted or implemented by the EOSC itself (i.e. by the EOSC governance) and also policies which could be implemented by wider stakeholder groups involved in the EOSC, but without necessarily involving coordination or involvement by the EOSC governance. The definitions are included here for information.

- EOSC Policy: An EOSC policy is a documented set of principles, rules, and requirements adopted by the EOSC governance to support and/or drive the activities and mission of the EOSC
- Open Science Policy: An Open Science policy is a documented set of principles, rules and requirements adopted by one or more public, private or third sector organisations or federations to advance the realisation of Open Science practices among target stakeholders.

A.5.2 Recommendations Targets

At the outset the policy recommendations were intended to be targeted at research funding organisations, research producing organisations and research infrastructures. Experience from producing the D3.3 draft policy recommendations showed that many of them were also targeted at the EOSC governance, either in addition to the original three stakeholder groups, or else instead of them.

Once the final policy recommendations and overall policy proposition had been produced, it was agreed to present the proposals to the EOSC governance, which has the authority to decide what further action to take in response to the recommendations, including progressing with the adoption of EOSC policies and suggesting to EOSC stakeholders that they develop Open Science policies based on some of the recommendations.

⁵² See for an overview the EOSCpilot website: <https://www.eoscipilot.eu/science-demonstrator-topics>

⁵³ The final version will be available from <https://eoscipilot.eu/media/deliverables>

A.5.3 EOSC Competencies and Legal Form

Throughout the work there was continuing uncertainty about the extent to which activities or competencies would belong to an EOSC “hub” entity, and to what extent the EOSC would perform only a coordinating function with competencies remaining with individual participating organisations – in other words what level of subsidiarity would apply to the EOSC. A related question was whether the EOSC would be a legal entity. The policy recommendations were formulated within this environment of uncertainty, which caused the work to take longer but overall did not in the end fundamentally alter the resulting recommendations.

A.6 Evolution of the Policy Recommendations from D3.3 to D3.6

The draft policy recommendations presented in Deliverable D3.3 have been considerably refined to arrive at the final set of policy recommendations presented in the present document. The recommendations presented in Deliverable D3.3 were numerous (43 in total) and varied in their level of detail from very high-level to very specific. In working to prioritise the draft recommendations and reduce their number to produce a smaller set of final recommendations, similar or related ones were grouped together and a single high-level recommendation was distilled from each group. In most cases the remaining draft recommendations from the group were formulated as implementing actions.

Nearly all of the draft policy recommendations presented in D3.3 received sufficient validation from stakeholder groups that they still feature in the final set of recommendations and implementing actions. The single exception is D3.3 recommendation OS7 “Reduce regulatory complexity for researchers”. Although there was some support for this recommendation, overall it received little attention during validation activities, perhaps due to its very general nature. It is clearly a commendable aim however, which stakeholder groups should bear in mind for opportunities to contribute towards achieving it.

As mentioned above, some proposed actions appeared to be regarded as relatively ambitious – open patents, text and data mining, evaluation and ranking of openness maturity of infrastructures, services and resources. Others - accreditation/certification of services and perhaps to some extent the Open Science Code of Conduct and the Charter for Access - were viewed as less likely to be implemented by stakeholder groups perhaps due to the effort, cost and culture change entailed. These proposals have all been retained in the final set of implementing actions however due to recognition of their potential to deliver benefit for the EOSC and for Open Science.

ANNEX B. POLICY WORKSHOP REPORTS AND RESULTS

B.1. EOSCpilot WP5 and 6 Joint Workshop

The EOSCpilot WP5 (Services and Architecture) and WP6 (Infrastructure and Data Interoperability) Work Packages held a joint workshop in Amsterdam on 23 May 2018. From WP3, Dale Robertson and Paul Rouse participated in the discussion and presented a high-level overview of the initial draft recommendations which had recently been elaborated for the D3.3 deliverable, and a more detailed summary of the procurement proposals. Useful comments were provided as part of this consultation, in particular on the procurement of resources offered via the EOSC service catalogue. Even though participants were unclear of whether the EOSC would be selling or brokering resources, there was recognition of the potential benefit of framework procurement and a cautious endorsement of the approach being considered in WP3. There was also a clear interest in ensuring consistency of terminology. Finally, participants were very interested in the policy supporting services and the possibility of incorporating the Open Science Registry and the Open Science Monitor into the EOSC core service offering.

B.2. Workshop on Research Institutions and Libraries and the Role of Funders in the European Open Science Cloud

The EOSCpilot WP8 work package held a successful workshop for “Research Institutions and Libraries and the Role of Funders in the European Open Science Cloud” in Lille on 4 July 2018. In the first session a panel of speakers from research institutes, libraries and funding bodies with progressive policies concerning Open Science presented their views on the need to establish suitable mandates and appropriate policy instruments in support of Open Science. From WP3, Dale Robertson participated in the panel and provided an overview of the EOSC policy development work. The second session was a highly interactive debate, chaired by Karen Vandeveld, University of Antwerp and one of the authors of the OSPP Career Matrix report⁵⁴, who engaged with all panellists and the audience in discussing a vision for Open Science in 2030.

After the workshop, a number of volunteers authored a document called “A Vision for Open Science”⁵⁵ which elaborates on the outcome of the discussion. The content of the document was used as an input towards the recommendations on rewards and incentives. The authors envision a situation in which open science and open scholarly communication are the norm and the EOSC supports them with an effectively implemented trusted environment for research within Europe and globally. In this vision, funding is properly driven towards the support of open science practices, researchers are fully equipped with the required skills and research institutions recognise and reward open science in their promotion and hiring criteria.

To change the *status quo*, in which evaluation of research and researchers’ careers is dominated by journal-based metrics, concerted activities must be undertaken at various level to develop alternative methods of evaluation and support for career progression.

Funders can lead the change by considering open science practices as criteria to allocate grants, by investing in the infrastructure that supports the implementation of open science, engaging in discussions to resolve misunderstandings about open science, supporting the implementation of FAIR principles in data and code management and investing in initiatives that increase reproducibility.

The role of institutions is key in ensuring that the right metrics are used and the right things are measured in research and researchers’ career evaluation, such as open, inter-sector, multi-disciplinary, research activities, and in offering incentives that focus on teams and groups of researchers rather than individual researchers.

⁵⁴ O’Carroll C., Rentier B., Cabello Valdes C., ...Vandeveld K., “Evaluation of Research Careers fully acknowledging Open Science Practices” http://ec.europa.eu/research/openscience/pdf/os_rewards_wgreport.pdf

⁵⁵ Michael Ball, Margreet Bloemers, David Carr, Valentino Cavalli, Maria Haglund, Vasso Kalaitzi, ... Karen Vandeveld. (2018, November 19). A Vision for Open Science. Zenodo. <http://doi.org/10.5281/zenodo.1491303>
<https://www.eoscipilot.eu/content/report-vision-open-science>

Research libraries should leverage and evolve their innovative work on scholarly communication, introducing alternative publishing channels in compliance with open science policies, focus on institutional repositories, standards and interoperability for research data management and data stewardship in all phases of the research cycle.

The transition to open science is happening, as it is driven by a need for more researchers to be more innovative, collaborative, and to advance faster. Today's technology and online infrastructures and tools offer the means for a huge leap in the development of knowledge, which however, will not be possible without an investment in addressing the appropriate skills. The report identifies two overarching sets of skills that need addressing: the specific skills relating to data management and science, and those required for a proper management of research in relation to the roles and responsibilities of the different stakeholders and the legal obligations inherent with the sharing and reuse of research outputs.

B.3. DI4R World Café Session

A World Café session called Policies in the EOSC Through the Lens of Research Infrastructures: the EOSCpilot Policy Recommendations was held in Lisbon on 9 October. This was a 90-minute session chaired by Natalia Manola (ARC) involving an introductory presentation by Dale Robertson, followed by a panel session and audience interaction using Mentimeter⁵⁶. Its aim was to gather input from research infrastructures and e-Infrastructures on the D3.3 draft policy recommendations. The panellists were Bob Jones from CERN, Pascal Kahlem from ELIXIR, Iryna Kuchma from EIFL and Alex Vermeulen from ICOS. There were around 40 audience members, mostly representing research infrastructures and e-infrastructures. The session discussed a subset of 23 of the draft policy recommendations, chosen as being those most likely to be of relevance to the audience of RIs and e-Inf, and/or for their potential to provoke lively discussion.

Overall this was a good interactive session with strong engagement from the panellists and audience. There was good support for a universal AAI solution, the Open Science policy registry and for minimum sets of metadata and APIs. There was strong engagement in discussion about data protection, with support for technological solutions and also for a Legal/Data Protection working group of the EOSC governance. There was also recognition of the need for and importance of training in data protection, ethics and Open Science.

More generally, participants felt the user should be placed at the epicenter when formulating policies. They expressed the need for a concrete revenue model for the policy proposals, and a policy board in the EOSC governance to assess and approve policies, and felt that use cases or policy templates with concrete steps to follow would be helpful.

B.4. Ethics Workshop

A workshop on EOSC & Ethics was held in Paris on 9 November, 2018; the aim was to bring together the experts involved in the survey and outline the final recommendations to be integrated in the current Policy proposal. Seven experts attended together with contributing partners from EOSCpilot. Overall the multi-layered approach proposed in the white paper⁵⁷ to handle possible issues was well received from the community. Several questions related to the EOSC governance and architecture, as well as rules of participation for service providers and end users were discussed. In summary, all agreed that the fundamental principle is that EOSC must incorporate and exhibit ethical behaviour, not only because of the intrinsic value of acting in an ethical and morally defensible fashion, but also because being seen to act ethically is a necessary part of developing and maintaining trust with users, stakeholders, funders and the wider European public. Because the details of ethical issues and challenges faced by the organisation are very likely to change over time, however, it is difficult to develop an ethical policy now that will encompass all possible issues. Instead, a responsive system should be envisaged, making use of expertise as necessary to tackle specific issues.

⁵⁶ See www.mentimeter.com

⁵⁷ <https://zenodo.org/record/2533184#.XDN9xVX7SDJ>

B.5. Stakeholder Forum Policy Session

The Policy session at the EOSCpilot second Stakeholder Forum was called Policies for an Ethical, Open, Secure and Cost-effective EOSC, and took place in Vienna on 22 November. This was a one-hour session chaired by Prodromos Tsiavos (ARC) and involving an introductory presentation by Dale Robertson followed by a panel and audience interaction using Mentimeter. The panelists were Jean-Claude Burgelman from the European Commission (funder), Anca Hienola from ICOS (who contributed from the perspective of a researcher), Eva Mendez from the Universidad Carlos III de Madrid and OSPP Chair (who also contributed from the perspective of a researcher), and Astrid Verheusen from LIBER (research libraries). There were 80-100 audience members from a range of stakeholder groups. The session provided the opportunity for stakeholders to validate the draft list of nine policy recommendations which had by that time been produced WP3 and to offer guidance towards the development of specific and actionable policy recommendations.

A Mentimeter exercise conducted during the workshop showed that the top three recommendations for realisation of the EOSC were the development of the skills essential for the EOSC through an EOSC Skills and Capability Framework (18%), incentives for practicing Open Science by adopting the recommendation of the OSPP and embedding OS in the evaluation of researchers' careers (16%) and the encouragement of openness and ease of use of resources via a Charter for Access to EOSC Infrastructures, Services and Other Resources (12%).

The discussion provided useful input for turning the recommendations into practical implementation actions. For the top three recommendations, participants felt this would be feasible by communicating Open Science needs and solutions to policymakers, by developing relevant training materials, by enhancing alignment of policies and best practices between stakeholders, by easing identification and removal of services' gaps, and by incorporating OS in architecture models. Developing a roadmap based on the initial recommendation was the strongest message given by the panelists for the follow up elaboration of the final recommendations into Deliverable D3.6. Other aspects highlighted by the panelists and the audience included

- the development of Key Performance Indicators (KPIs) for the monitoring and implementation of Open Science policies, particularly in relation to the creation of a European roadmap for achieving the defined aims
- the need for active involvement of researchers in the governance and policymaking process of the EOSC and to implement strong mechanisms such as the stakeholder forum to give researchers access to the EOSC decision-making process
- the need to preserve open access to EOSC infrastructure and services as a common good (science commons) whilst avoiding passing the cost down to the individual researcher. There need to be mechanisms for covering the cost of the EOSC infrastructure and services, not necessarily through market-based mechanisms
- any policies implemented should reflect the EOSC's core mission to offer world-class services to the researcher, and ensure service development is research-oriented.

ANNEX C. SURVEY ANALYSIS SUMMARIES

C.1. Ethics Survey – Summary of Analysis

* The full report is available at <https://zenodo.org/record/1999132#.XAk9lmhKq2w>

C.1.1 Introduction

The EOSCpilot project has published draft policy recommendations (Deliverable D3.3) as a step towards establishing the required policy environment to support the European Open Science Cloud (EOSC). The inclusion of ethical principles and policies is of fundamental importance to the EOSC, but it is difficult to anticipate all the ethical issues that may emerge as the scientific, technical, social and political landscape evolves. Therefore, a survey was performed to collect feedback on the proposals made from the different key stakeholder groups, plus explore how the draft recommendations can be integrated into the ‘policy supporting services’ that now need to be developed.

C.1.2 Methods

An online questionnaire was developed, covering fourteen questions referring to the ethics section of the draft policy recommendations, and implemented with the EUSurvey tool. The questionnaire was sent to 42 invited participants, representing the main EOSC stakeholder categories and selected from two groups: ethics experts already involved in the project and persons registered at the EOSCpilot webpage, who indicated interest in ethical questions and willingness to contribute. The online survey was launched on 27 August 2018 and closed on 29 September 2018. During the last two weeks the survey was publicly accessible and the link sent out through mailing lists and published on the EOSCpilot website. Five additional answers were therefore collected, for a total of 26 answers.

C.1.3 Results

Twenty-one out of 42 invited experts participated in the survey (response rate 50%). The majority of participants were from research producing organisations, academic institutions or research libraries (n=12), the rest was distributed to the other stakeholder categories. From the participants, 5 were ethics experts, 13 had some associations with ethics and 7 were interested in ethical questions. 1 participant chose ‘other’ as an option.

The overwhelming majority (23/26) attested ‘strongly’ that supporting and promoting an ethical behaviour is of central importance to the EOSC and should be explicitly built into the organisation from the outset. With respect to supporting organisational ethics, the majority (19/26) did not have a ‘strong’ position and only 13/26 answered with ‘yes’. Taking all comments together, two thirds of the participants were, however, in favour of minimal standards or a common ethical framework for the EOSC and a small subgroup for ethical oversight.

There was a majority in favour of establishing additional mechanisms to support research integrity by the EOSC (n=20). Two approaches were discussed, a) developing high level agreements/minimum standards/framework/ethical principles within the EOSC and b) relying on existing mechanisms but extending or adapting if necessary. Despite strong agreement that the EOSC should work towards a uniform application of metadata standards (21/26), the answer pattern shows that the formulation of the question was not clear to all participants and challenges with respect to implementation were seen by several participants.

No clear answer pattern was observed with respect to monitoring and managing data aggregation to prevent unforeseen results: 18 participants agreed, 8 disagreed. Several participants were not happy with the formulation and direction of the question. The majority of participants (20/25) felt that the EOSC should try to introduce uniform policies with respect to the collection, storage, access and re-use of sensitive personal data; however, some criticism was raised, particularly by a substantial subgroup who suggested to work within the existing regulatory framework.

All participants (24/26) were in favour of time-limited expert working groups within the EOSC to consider specific legal and ethical issues and to propose relevant policies. Several proposals were made for the way

the work of these groups could be optimised. There was overwhelming agreement (24/26) with the concept of an independent EOSC Ethics and Legal Advisory Board. Practical issues were raised about the composition and mandate of the board and the relation between the board and the EOSC management structure. The majority of participants (23/26) agreed that a periodic assessment of EOSC activities from the viewpoint of legal and ethical compliance makes sense and that the report should be public; however, a substantial subgroup raised diverse concerns regarding among others time and resources needed.

A need for training material and programmes to ensure understanding of ethical issues within the EOSC was expressed by the majority of participants (20/26). Answers to whether the EOSC should play an active role in wider debates promoting the interpretation of accurate scientific knowledge in society, revealed no clear pattern (yes: 13/26). A considerable group (n=8) brought up additional ethical issues to be discussed.

C.2. Open Science and Open Scholarship – Summary of Analysis

C.2.1 Introduction

An Open Science and Open Scholarship survey was conducted from 5-26 October 2018. The survey targeted all relevant EOSC stakeholders, from Research Producing Organisations and Libraries, to Research Funding Organisations, Research Infrastructures and services, Funders and Ministries. Participation proved to be lower than hoped, as more than forty invitations were sent to targeted individuals and to various organisations' email lists, but only 14 responses were received.

Despite the low uptake of the survey, representation was satisfactory both in terms of stakeholder categories and of countries reached. The survey aimed at prioritising the recommendations proposed in D3.3 while at the same time posed questions which could provide a better understanding of the current state of openness in infrastructures and services, research outputs and metrics. Questions were also posed aimed at gaining insight into respondents' views of the priority actions required to realise the EOSC and also the likelihood of their actually implementing these actions. Unfortunately, it was difficult to deduce clear patterns from the responses received.

C.2.2 Infrastructures and Services

The recommendation considered by respondents to be most important for realising the EOSC, and also most likely to be adopted by respondents or their organisations, was the adoption of a minimum metadata schema and limited number of APIs for services, infrastructures and other resources. The recommendation about adoption and measurement of user acknowledgement of use of or contribution to research results of EOSC services, infrastructures and other resources scored second in terms of EOSC realisation, but respondents considered it less likely (fourth place) to be implemented by their organisation. The second and third most likely recommendations to be implemented by respondents were the Development a Charter for Access to EOSC Infrastructures, Services and Other Resources, followed by the adoption of the AARC framework for enabling an interoperable Authentication and Authorisation Infrastructure (AAI). The recommendation on the development of an evaluation and ranking of openness maturity of EOSC services, infrastructures and other resources received low support, being perhaps premature at the current time.

C.2.3 Research Outputs

The survey responses appeared to show that the recommendations considered to be of greatest importance for Open Science in Europe, and also most likely to be implemented by respondents, were those relating to reduction of regulatory complexity for researchers, adoption of standardised procedures (e.g. for information exchange, community standards or costs of OS-related activities), use of PIDs and strengthening data stewardship (use of DMPs and ensuring long-term data stewardship). On the other hand, the development and adoption of an Open Science Concordat (Code of Conduct), accreditation of EOSC resources used in research, standardisation of OS cost types and an EOSC Capability and Skills Framework gained less support. Text and Data Mining scored last and so could be perceived as something to be further examined in the future as the EOSC matures.

The results suggest that the recommendations most likely to be implemented are probably those which are more mature, having been proposed previously by others and perhaps already elaborated or partially implemented. The lack of support for an Open Science Code of Conduct may perhaps be explained by it being referred to in the survey as a “Concordat”, causing respondents to be uncertain of what was intended. The low level of support shown for an EOsc Capability and Skills Framework may perhaps be explained by a feeling that there is generally good capacity already – evidenced in responses mentioning Data Protection Officers, librarians and data stewards with expertise in self-archiving, DMPs and licensing and ownership issues – or else that such a Framework requires more funding. It is of no surprise that the more controversial issues of TDM and standardisation of costs are at the bottom of the EOsc policy implementation priorities chart. Costs standardisation was, nonetheless, a subject of high interest amongst the respondents, who expressed interest in incorporating cost monitoring into EOsc policy monitoring.

C.2.4 Metrics and Incentives

The survey showed that respondents produced or consumed, mostly, OA publications and research data but that their organisations appear not to have many, or well-developed, monitoring mechanisms or metrics for measuring these resources. Use of in-house metrics is generally supplemented by external tools such as Google Analytics and OpenAIRE.

There was interest in using the Open Science Policy Monitor to focus on the costs of Open Science and the measurement of impact from actual re-use. There was also interest in reporting statistics showing linkage of information between data and publications, and in incorporating bibliometrics and altmetrics.

Respondents expressed the importance of integrating not only Open Peer Review (OPR) but also other open practices in researchers’ career evaluation – also expressed in the top priority given to the need for the EOsc to adopt the OSPP recommendations on rewards and incentives - but OPR is not currently included in the recruitment and promotion criteria of respondents’ organisations. The next most important recommendations for the realisation of the EOsc were considered to be the development of an Open Science policy registry, an Open Science monitoring service and adoption of a next generation metrics infrastructure.

In terms of actual implementation, respondents felt that their organisations would be most likely to monitor Open Science, to adopt OS career evaluation criteria and to develop machine readable policies, leaving to last - although only just - the provision of open alternative metrics to the EOsc.

C.2.5 Conclusions

Overall the survey responses most supported measures to **improve interoperability**, such as adoption of standardised procedures, to **improve access and openness**, with an EOsc Charter for Access to Infrastructures, Services and Other Resources, to **strengthen important aspects of Research Data Management** through use of PIDs, DMPs and improved data stewardship, to move to **open career evaluation criteria**, and to **register and monitor Open Science policies and practices**.

C.3. Data Protection – Summary of Analysis

Altogether, the survey results are very satisfactory. A lot of the participants explained their answers even though this was not mandatory. A target audience was invited by email. It was composed of experts suggested by WP3 participants and also those who had expressed their interest in data protection when registering on the EOscpilot intranet site. Overall, 150 email invitations were sent. Nineteen responses were received. Only two participants are “Experts” in data protection, but those with “advanced knowledge” and “intermediate knowledge” have also provided valuable responses. It is positive that with 5 RPOs and 5 RIs participating two relevant target groups for the recommendations are adequately represented. Privacy-by-design and privacy-by-default solutions are already implemented by almost half of the participating institutions. Those that have voted for “no” seem to use mostly nonpersonal data. Most of the participants also have knowledge on the GDPR implementation in their respective countries.

Training on data protection and the identification tag have received more than 10 “yes” votes and can thus be considered the most supported recommendations. But the other recommendations were also rated positively with not a single one having more “no” or “partially no” votes than “yes” or “partially yes”.

The training on data protection is estimated as “imperative” since a lot of participants perceive that there is a lack of knowledge in this field. Considering the feedback on training on data protection the question is how the EOsc could best cooperate with the participating institutions and be integrated in already existing data protection training services and offers.

The identification tag has also been perceived as useful by most of the participants. The Point of Contact for data subjects has received a lot of votes “Don’t know”. This might also relate to the fact that the legal entity of EOsc is not yet completely clarified and it is not obvious, whether the EOsc will have its own DPO (although probably yes).

The introduction of special regimes, a code of conduct and the personalized policy catalogue have also been rated positively.

The introduction of special regimes was seen by some of the participants as a further complication to data processing. Probably the Survey was not precise enough to show how the introduction of such regimes could contribute to making processing easier and compatible.

According to the responses to the Code of Conduct two positions can be crystallized. On the one hand it would be good to have one code of conduct that unites EOsc, but on the other hand there is already great variety of Codes of Conduct that have been adapted to certain fields of research in certain countries.

The evaluation for the personalized policy catalogue shows that participants are particularly concerned about the practical implementation. They have doubts regarding the possibility to keep this catalogue updated. The question if it is necessary to fulfill the documentation obligation by EOsc was asked as each organization is by itself subject to the documentation obligation. The EOsc might also need to perform a protocol function but this does not necessarily have to be combined with a policy catalogue for each user. This would be an additional function that could help to keep the individual members informed about recent changes that might be relevant to them.

Under general points missing in the recommendations data processing to third countries has been mentioned. Furthermore, a review process to be introduced before publication has been suggested as well as the establishment of an Expert Working Group on Data protection. Respondents further expressed their wish for transparency and easily comprehensible recommendations that should be as automated as possible.

C.4. Procurement – Summary of Analysis

The procurement survey was sent to twenty-eight invitees and received 8 responses. Two were provided anonymously but the remaining 6 represented 5 countries. RPOs, e-Infrastructures, Research Infrastructures and Government Ministries were all represented in the responses. One response was from a commercial, profit-making entity; the remainder were all non-commercial, public organisations which, with the exception of one international organisation, were subject to the EC Procurement Directive 2014/24. Nearly all respondents expected to either consume resources through the EOsc or else both to provide and consume.

Organisations are considering providing resources through the EOsc in the spirit of promoting collaboration, serving users better, increasing choice, producing better science, making efficient use of public resources and realising economies of scale; one regards itself as having a role to play in linking the demand and supply sides, and hopes the EOsc can provide a mechanism to make services more widely available without a heavy financial burden falling on users. Respondents who envisage supplying services expect usage to be variously free up to a threshold, paid for in-kind, or (for heavy usage) paid for by a mechanism through EOsc. The

hoped-for benefits of providing or consuming resources through the EOSC include economies of scale and a one-stop-shop marketplace; the provision of centralised tendering, compliance (e.g. security and privacy), contract management and auditing; flexibility of resources to meet fluctuating demands; and standardised interfaces and federation of services. Potential service consumers remain unsure of how they will pay for their consumption but expectations include usage-based fees, aggregated procurement and acting as a broker for end users. Significantly, most respondents indicated their organisations' openness to considering federation or participation in a special purpose vehicle so as to be able to participate in aggregated procurement activities.

ANNEX D. EC EXPERT GROUPS' RECOMMENDATIONS COMPARISON – SUMMARY REPORT

* The full report is available at <https://doi.org/10.5281/zenodo.2536582>.

D.1 Introduction

The EOSCpilot policy work took place within a complex and fast-evolving landscape of the development of other, related sets of policy recommendations. It was felt that a comparison should be made between the WP3 draft recommendations for Open Science and Open Scholarship, and three other key sets of policy recommendations produced or in preparation by EC Expert Groups, namely those of the second High Level Expert Group on the EOSC⁵⁸, the Expert Group on FAIR Data⁵⁹, and the Open Science Policy Platform⁶⁰. Each of the D3.3 draft recommendations were examined in turn, and the other three recommendation sets were consulted to see whether they too contained a recommendation on the same topic. If there was a related recommendation in another set, its correlation was categorised as 'strong', 'moderate' or 'weak' depending on the strength of confluence with the WP3 recommendation. The comparison exercise was primarily to identify whether any themes emerged strongly from the concurrent batch of recommendation sets, and whether there were any contradictions between the EOSCpilot WP3 recommendations and any other sets. Any WP3 D3.3 recommendations that were not echoed in another recommendation set were also noted.

D.2 Findings

The analysis found that of the twenty-eight draft WP3 Open Science and Open Scholarship policy recommendations in D3.3, two were clearly echoed across all other recommendation sets (i.e. indicating strong correlation):

- Rec. 11, Use community accepted standards and conventions
- Rec. 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.

These demonstrate respectful support for community-supported standards, and meaningful recognition for researchers for their Open science activities including data sharing.

There was moderate support for eight WP3 recommendations, 'moderate' meaning at least one directly-related recommendation in another recommendation set and possibly some other recommendations that are potentially confluent. These were:

- Rec. 6: Adopt a minimal set of standards for data/metadata and exchange protocols
- Rec. 9: Encourage the development of an EOSC TDM (Text and Data mining) Policy Framework
- Rec. 12: Standardise costs types of Open Science (OA, RDM, Preservation, etc) at all levels
- Rec. 13: Make DMPs a requirement and develop consistent (i.e. aligned) requirements for DMPs
- Rec. 14: Encourage the use of unique and persistent digital identifiers

⁵⁸ "Prompting an EOSC in practice: Interim report and recommendations of the Commission 2nd High Level Expert Group [2017-2018] on the European Open Science Cloud (EOSC)": these draft recommendations from the second HLEG were published on pp. 36-37 of the larger document available at

https://eoscipilot.eu/sites/default/files/prompting_an_eosc_in_practice_eosc_hleg_interim_report.pdf. Subsequently, an unpublished revised version was circulated offline for comment whilst WP3 work was underway, which was incorporated in the mapping exercise

⁵⁹ "FAIR Data Action Plan: Interim recommendations and actions from the European Commission Expert Group on FAIR data": this is the interim version of the FDEG report, and is available at <https://zenodo.org/record/1285290>

⁶⁰ EC Open Science Policy Platform recommendations - otherwise known as the "integrated advice of the Open Science Policy Platform on 8 prioritised Open Science ambitions": these recommendations are available at https://ec.europa.eu/research/openscience/pdf/integrated_advice_opsppl_recommendations.pdf. These were published under the group's first mandate, earlier than all the other sets were formulated

- Rec. 15: Ensure that infrastructures, services and other resources supplied through the EOSC provide assurance, for example by developing accreditation or certification schemes
- Rec. 23: Introduce Open Access enforcement policies and mechanisms
- Rec. 26: Promote and support Open Next Generation Metrics infrastructure.

Six further WP3 recommendations were ‘weakly supported’ by the other recommendation sets, meaning the phrasing may possibly imply a connection. These were:

- Rec. 1: Develop a Charter for Access to EOSC Infrastructures, Services and Other Resources
- Rec. 4: Adopt and measure user acknowledgement of use of or contribution to research results of EOSC services, infrastructures and other resources
- Rec. 18: Have proper IPR documentation when releasing or accessing a research resource
- Rec. 19: Clear IPRs before sharing them over e-Infrastructures/ Research Infrastructures
- Rec. 20: Provide coherent and consistent IPR ownership policies
- Rec. 28: Develop and maintain a machine-readable Open Science Registry for EOSC.

Overall, sixteen of the twenty-eight draft OS recommendations proposed in D3.3 had some correlation – strong, moderate or weak - in the other three sets of policy recommendations examined. When considering the divergence of the remaining 12 WP3 draft recommendations from the other recommendation sets, it is worth noting that the WP3 work has a particular focus: namely to support development of the EOSC. This caused its draft recommendations to address some specific issues – for example, access, IPR, and some monitoring and evaluation mechanisms – with more emphasis on practical implementable detail than some of the other recommendation sets. Further, the uncorrelated topics in several cases are in fact included in the discussion sections of other recommendation sets, indicating that other initiatives have also considered the topic an appropriate part of the ecosystem they are examining or proposing, but that they have stopped short of declaring a dedicated recommendation on the topic.

Whilst the analysis did not identify any direct contradictions between the WP3 recommendations and those of other recommendation sets examined in this analysis, there are two examples where approaches to a topic are markedly - and importantly - divergent. These are

- Rec. 10: Develop principles for long-term data stewardship enabling curation, provenance and quality
- Rec. 16: Develop, support and promote an EOSC Skills and Capability Framework as a common reference point.

In both cases, these draft recommendations argue for the development of certain resources or principles. However, these resources or principles are considered by other projects to already exist, to be worthy of acknowledgement, and only in need of extension or repositioning. The relevant recommendations or implementing actions (IA3.2 and Rec 5) in D3.6 were reviewed in light of this and are now consistent with the other recommendation sets.

For more information and detailed findings, please refer to the full report.

ANNEX E. SCIENCE DEMONSTRATOR REPORTS – SUMMARY OF RELEVANT FINDINGS

In EOSCpilot fifteen Science Demonstrators (SDs)⁶¹ in different disciplines were developed. These SDs are early adopters of EOSC and will stimulate the engagement of science communities and stakeholders in Open Science. The purpose of the SDs is to show the relevance and usefulness of the EOSC services and how these services enable data reuse and drive the further development of the EOSC. They each received funding for one year.

There are SDs in the Social Sciences and Humanities (2), Generic Technology (1), Physical Sciences/Astronomy (2), Physics/Materials science (1), High Energy Physics (1), Energy Research (1), Life Sciences and health research (4), and Environmental and Earth Sciences (3).

For Deliverable 3.3, part of the information was collected by structured interviews, which were conducted with some SD representatives and policy experts from ministries and research infrastructures between November 2017 and January 2018. These interviews and other information gathered led to the draft policy recommendations.

The contact persons of the SDs wrote at the end of their SD project a report about their projects on the basis of a template. Because the SDs started at different times also the reports were published at different moments. Topics in the report included, apart from contact information, SDs' achievements, problems encountered, data management, outreach activities and technical challenges, but also issues related to other work packages such as services and service catalogue, interoperability, skills and - interesting for this deliverable - also policy issues related to WP3.

The question on policy issues was: "What areas should be addressed with priority with respect to this science area; comments on the policy document of WP3". Out of 15 SDs, 8 answered this question, but on a more specific level than the WP3 general policy recommendations. See for example the SD Frictionless Data which recommends ResourceSync as a default data and metadata exchange protocol for all repositories operating within the EOSC.

If we map these remarks to the Final Policy Recommendations for the EOSC, then we can see the following specific remarks relating to all Recommendations except for Recommendation 1 (Ethics).

On the other hand, the SD PROMINENCE remarked that the draft policy recommendation in Deliverable 3.3. *Draft policy recommendations*: "Reduce regulatory complexity for researchers" would encourage adoption by reducing paperwork for researchers, but that they must still adhere to overriding privacy or sensitivity issues. This draft recommendation is not included in the final policy recommendations (see Annex A.6).

Recommendation 2: EOSC resources must provide access to their facilities and be accessible themselves in an open, FAIR and equitable manner for excellent Open Science and Open Scholarship to be performed, shared and exploited

- **Photon & Neutron Science**
Services integration into EOSC and mirroring EOSC services should be addressed
- **LOFAR**
Facilitating open and accessible data
- **ENVRI**
Policies for infrastructure and services

Recommendation 3: Simplify, clarify and improve consistency to enable and encourage the practice of Open Science

- **PanCancer**

⁶¹ See for an overview the EOSCpilot website: <https://www.eoscipilot.eu/science-demonstrator-topics>

Specific policy to provide uniform data handling guidelines in the field of Genomic data

- **VisualMedia**
Some effort in encompassing the issues related to visual data types and standards
- **Frictionless Data Exchange Across Research Data, Software and Scientific Paper Repositories**
Recommend ResourceSync as a default data and metadata exchange protocol for all repositories operating within the EOSC

Recommendation 4: Encourage open access to and reutilisation of research outputs by providing a comprehensive and coherent IPR framework

- **LOFAR**
Ensuring IP through appropriate acknowledgments
- **VisualMedia**
IPR issues and policies related to visual data

Recommendation 5: Help develop the necessary awareness and skills for the EOSC

- **PROMINENCE**
Develop, support and promote an EOSC Skills and Capability Framework as a common reference point

Recommendation 6: Provide incentives for practicing Open Science and embed open principles in recruitment, promotion and evaluation of researchers at all stages of their careers

- **PROMINENCE**
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

Recommendation 7: Develop and operate Open Science Policy Supporting Services to assist policy adoption and promote best practice

- **PROMINENCE**
Develop an Evaluation and Ranking of Openness Maturity of EOSC services, infrastructures and other resources

Recommendation 8: Ensure EOSC Open Access research data use and reuse permit the rights and obligations of Data Protection Legislation (most notably the EU General Data Protection Regulation) to be achieved in a fair, transparent and accountable manner

- **LOFAR**
Guidelines and support for ensuring protection of personal data in accordance with law while maintaining openness and traceability of scientific provenance

Recommendation 9: Ensure that aggregated procurement is utilised by the EOSC where appropriate when making resources available to the EOSC marketplace

- **Cryo Electron Microscopy:**
Investment in hardware for a public repository of newly acquired metadata and processing workflows.

In December 2018 Deliverable D4.4. Consolidated Science Demonstrator evaluation report was published within EOSCpilot in draft form. This report contains some further information about policy issues brought forward by the Science Demonstrators:

“Management of sensitive and/or copyright data in a cloud environment is one area that needs to be addressed by EOSC and the user communities together. This is both an issue of services and *policies*:

Policies need to be defined which define how community services can be integrated into the EOSC and possibly advertised as EOSC fringe services. A clear procedure needs to be defined and a clear division of responsibilities is needed for services which are run by a community in the EOSC cloud environment.

In general communities have called for clarity and openness regarding EOSC policies.”

The management of sensitive and/or copyright data is captured in “**Recommendation 4:** Encourage open access to and reutilisation of research outputs by providing a comprehensive and coherent IPR framework”, and in “**Recommendation 8:** Ensure EOSC Open Access research data use and reuse permit the rights and obligations of Data Protection Legislation (most notably the EU General Data Protection Regulation) to be achieved in a fair, transparent and accountable manner”.

How community services can be integrated into the EOSC is part of “**Recommendation 2:** EOSC resources must provide access to their facilities and be accessible themselves in an open, FAIR and equitable manner for excellent Open Science and Open Scholarship to be performed, shared and exploited”.

ANNEX F. ETHICS AND LEGAL ADVISORY BOARD MANDATE, COMPOSITION AND TASK LIST

The policy recommendations propose that a standing committee, the Ethics and Legal Advisory Board (ELAB), is set up. The mandate, composition and initial task list for this Board to the end of Phase I of the EOSC (December 2020) are proposed below.

F.1 Mandate

The ELAB should act independently of the EOSC Executive to initiate and review ethical and legal actions and initiatives of the EOSC. It will:

- i. identify ethical and legal issues
- ii. establish task-specific working groups to consider the issues and provide recommendations
- iii. negotiate the adoption and implementation of the recommendations by the EOSC Executive Board
- iv. perform periodic review of the activity of the EOSC from an ethical and legal perspective, whose findings will be made public
- v. initiate new EOSC ethical and legal initiatives required from time to time
- vi. be available for consultation by the EOSC Executive on ethical and legal issues
- vii. consult and liaise with the Policy Standing Committee to ensure ELAB proposals support and comply with EOSC policies and vice versa.

F.2 Composition

ELAB members should be drawn from the EOSC stakeholder community, nominated by the EOSC Executive based on proposals from the EOSC Stakeholder Forum. An observer from each of the EOSC Board and EOSC Executive may also be nominated.

The total membership is recommended to be around 9-11 members, plus observers. An odd number of voting members is helpful to avoid ties in case of votes on particular issues. A Chair will be appointed from the membership.

F.3 Task List

1. review the transparency and accountability of the EOSC portal and all EOSC policies, and formulate related recommendations
2. collect, explore and prioritise ethical issues to be dealt with by the ELAB (this list has to be updated on demand and at fixed intervals)
3. initiate time-limited working groups dealing with specific ethical issues
4. review codes of conduct, policies and frameworks developed by the EOSC with respect to ethical aspects and make recommendations to the EOSC Executive
5. produce training materials and educate users in ethical aspects

ANNEX G. IPR WORKING GROUP MANDATE, COMPOSITION AND TASK LIST

The policy recommendations propose that an Intellectual Property Rights Working Group, the IPRWG, is set up. The mandate, composition and initial task list for this Working Group to the end of Phase I of the EOsc (December 2020) are proposed below.

G.1 Mandate

The IPRWG reports to the EOsc Executive to initiate, develop and review a range of actions that could foster a coherent and comprehensive IPR policy framework for the EOsc. It will:

- i. identify the range of IPR issues pertaining to the activities of the EOsc
- ii. establish task-specific sub-groups in relation to particular aspects of IPR, mainly copyright, patents and design rights and trade secrets, as well as the interaction of IPR regimes with other legal regimes, particularly the revised Public Sector Information Directive
- iii. focus on the interaction of different types of IPR in order to ensure different types of value are produced by all EOsc stakeholders, particularly RPOs and industry
- iv. develop model licencing schemes, procedures, agreements, Terms of Service and SLAs that could be used in order to facilitate open science as well as the collaboration between RPOs and industry
- v. develop and commission reports in relation to IPR and open science
- vi. perform periodic reviews of EOsc in terms of its IPR status and operation
- vii. support the development of mechanisms for the enforcement of open licences
- viii. initiate new IPR-related activities
- ix. facilitate collaboration of the EOsc with other European and international organisations, particularly the EPO, EUIPO and WIPO with emphasis on their respective academies
- x. consult and liaise with the Policy Standing Committee to ensure IPRWG proposals support and comply with EOsc policies and vice versa.

G.2 Composition

IPRWG members will be drawn from the EOsc stakeholder community, academia and international and European institutions, nominated by the EOsc executive. An observer from each of the EOsc Board and EOsc Executive may also be nominated.

The total membership is recommended to be around 9-11 members, plus observers, with an odd number helpful for voting purposes. A Chair will be appointed from the membership.

G.3 Task List

1. develop, with RPOs, model IPR policies and define best practice
2. produce or identify model open licensing schemes to accommodate different types of value production
3. produce training materials to educate users about licencing and IPR
4. explore the possibility of collective legal representation of EOsc researchers against third parties in IPR disputes
5. identify best practices for text and data mining for release of research results (licensing, technical specifications) and provide recommendations for mandatory adoption of best practices in the EOsc
6. advocate for legal reform of IPR legislation to support text and data mining

7. establish partnerships with EPO, EUIPO and WIPO on IPR and open science issues
8. Produce model IPR clearance schemes (licences, agreements, processes, forms) for EOSC
9. consolidate and update Public Domain Calculators focusing on specific research areas⁶²
10. produce decision trees for the choice of appropriate licencing schemes to combine openness requirements with requirements of commercial exploitation of results.

⁶² See e.g. <http://www.publicdomainsherpa.com/calculator.html> or <https://archive.outofcopyright.eu/calculator.html>

ANNEX H. DATA PROTECTION WORKING GROUP MANDATE, COMPOSITION AND TASK LIST

The policy recommendations propose that a Data Protection Working Group, DPWG, is set up. The mandate, composition and initial task list for this Working Group for 2019 are proposed below.

H.1 Mandate

The DPWG develops advice and makes recommendations to the EOSC Executive to manage data protection implications for the EOSC. It will:

- i. lead the formulation and review of data protection policies, standards and guidance ensuring adherence to appropriate statutory and governance frameworks
- ii. develop and maintain an effective governance framework for managing information
- iii. monitor and develop data protection compliance with external standards where required
- iv. identify, validate and assess the impact of information assurance risks and escalate to an appropriate board those classified as very high and/or high, with recommended treatment measures
- v. analyse the impact to data protection of change and proposed change across the EOSC with regard to issues and opportunities
- vi. implement recommendations delegated to the group from the EOSC Executive

H.2 Composition

DPWG members should be drawn from the EOSC stakeholder community, nominated by the EOSC Executive based on proposals from the EOSC Stakeholder Forum. A member from each of the EOSC Board and EOSC Executive may also be nominated.

The total membership is recommended to be around 9-11 members, with an odd number helpful for voting purposes. A Chair will be appointed from the membership.

H.3 Initial Task List for 2019

1. Draft business case to recruit a data protection officer (fixed term or permanent)
2. Work collaboratively with the Data Protection Officer, once appointed
3. Review the Data Protection and Information Security Framework (see Annex J)
4. Set up governance structure including data protection stakeholder group
5. Review legal status of the EOSC and controller processor arrangements
6. Identify policy and procedure documentation required and scope the work to deliver
7. Contribute to a risk framework
8. Review security controls and incident reporting and scope the work to deliver
9. Establish and monitor legal basis for processing personal data
10. Review the types of datasets so far used by the science demonstrator pilots and investigate expanding to include personal datasets to research the issues this raises
11. Design data protection training packages

12. Assess the agreed member state derogations: monitor member state implementing laws under GDPR (2006/679) and implement and communicate any necessary updates to the EOSC Data Protection Framework or processes in consultation with the Stakeholder Forum
13. Ensure proposed EOSC minimum metadata standards meet Data Protection requirements

ANNEX I. POLICY STANDING COMMITTEE MANDATE, COMPOSITION AND TASK LIST

The EOSC Executive may wish to consider setting up a Policy Standing Committee (PSC). A draft mandate, composition and initial task list for this Committee to the end of Phase I of the EOSC (December 2020) are proposed below for consideration and further elaboration.

I.1 Mandate

Reporting to the EOSC Executive, the PSC should initiate and review policy activities of the EOSC with the overall objective of supporting and encouraging the practice of Open Science in the EOSC. It will:

- i. identify and consider policy issues on its own initiative and on request of the EOSC Executive
- ii. establish task-specific working groups to consider the issues and provide recommendations, including draft EOSC policies and related updates to the EOSC Rules of Participation, to the EOSC Executive
- iii. consult with members of the EOSC Board, Executive and Stakeholder Forum and others to gather input towards its recommendations
- iv. negotiate the adoption and implementation of its recommendations by the EOSC Executive Board
- v. perform periodic review of the activity of the EOSC from a policy perspective, whose findings will be made public
- vi. consult and liaise with the EOSC Ethics and Legal Advisory Board to ensure PSC proposals support and comply with EOSC ethical and legal policies and vice versa.

I.2 Composition

PSC members should be drawn from the EOSC stakeholder community, nominated by the EOSC Executive. Members should have relevant experience and expertise in policy development. An observer from each of the EOSC Board and EOSC Stakeholder Forum may also be nominated.

The total membership is suggested to be around 9-11 members, plus observers. An odd number of voting members is helpful to avoid ties in case of votes on particular issues. A Chair will be appointed from the membership.

I.3 Task List

The initial task list of the PSC is suggested to include the following amongst others:

1. draft a Charter for Access to EOSC Infrastructures, Services and Other Resources and recommend it to the EOSC Executive
2. review the proposed sets of standards for data/metadata and exchange protocols in the EOSC, liaising with the DPWG to ensure they meet Data Protection requirements and provide recommendations to the EOSC Executive
3. draft a policy for acknowledgement/citation of use of or contribution to research results of EOSC services, infrastructures and other resources and recommend it to the EOSC Executive
4. draft a prototype referencing and citation format and recommend it to the EOSC Executive
5. draft a European Open Science Code of Conduct and recommend it to the EOSC Executive
6. draft policies to support openness and FAIRness of research outputs and other resources produced in or provided through the EOSC and related updates to the OS Code of Conduct, including but not limited to

- a) the requirement for all research outputs to be appropriately open (as open as possible, as closed as necessary), FAIR and citable
 - b) the requirement to use unique and persistent digital identifiers for all inputs, resources and outputs used in or produced by the research process including for individuals and organisations involved in performing this research
 - c) the requirement to use Data Management Plans (DMPs) and provision of consistent (i.e. aligned) requirements for DMPs
 - d) development of long-term data stewardship principles
7. draft proposals for further development of the EOSCpilot Skills and Capability Framework and recommend them to the EOSC Executive
8. draft plans for appropriate awareness-raising and/or skills development of EOSC stakeholders and their staff, data subjects, civil servants, journalists and others involved in interpreting scientific results
9. draft an EOSC Rewarding Mechanism based on the OS-CAM and recommend it to the EOSC Executive
10. draft overall guiding principles for policies relating to evaluation, rewards and incentives and recommend them to the EOSC Executive
11. develop a proposal for a badging or accreditation system for Open Science for infrastructures, services and other resources and recommend it to the EOSC Executive
12. develop a set of metrics for the Open Science Monitor using the specification proposed in EOSCpilot deliverables D3.2 and D3.7 as a basis and recommend it to the EOSC Executive for implementation as a core EOSC service
13. draft a proposal for which policies the Open Science Policy registry should contain using the specification proposed in EOSCpilot deliverables D3.4 and D3.7 and recommend it to the EOSC Executive for implementation as a core EOSC service
14. propose any required updates to the Open Science Policy Toolkit based on the Toolkit presented in EOSCpilot deliverable D3.5 and recommend the Toolkit to the EOSC Executive for implementation
15. develop a proposal for a maturity model to evaluate and rank openness maturity of EOSC services, infrastructures and other resources and recommend it to the EOSC Executive
16. develop a proposal for a consistent and coherent IPR policy for all members of the EOSC ecosystem, particularly RPOs and Funders, as well as checklists for policy decisions by national policy makers.

ANNEX J. DATA PROTECTION FRAMEWORK AND CASE STUDY

J.1 Summary and Context

This Data Protection Framework is designed for use by the European Open Science Cloud (EOSC) to manage its expected data protection obligations as a Data Processor. These obligations are grouped into the three key areas of governance, risk and compliance. It is intended to be used by the data protection officer and the Data Protection Working Group as a starting point for managing and delivering data protection within the EOSC.

While a large percentage of research data will not be considered ‘personal data’, and the ideal model is for no or little personal data to be processed by the EOSC, a fair proportion of the data at least transmitted through EOSC nonetheless will be. Many of the controls needed to protect personal data can also be used to protect intellectual property rights and other related information legal requirements.

The General Data Protection Regulation (GDPR) and subsequent national legislation of EU member states seeks to increase the level of transparency and accountability in the way personal data is processed by organisations. It also seeks to increase the level of control and rights that an individual has over their data. Overall these requirements are to be welcomed, but they pose some challenges for the EOSC.

The information below outlines the type of controls which need to be considered to ensure the EOSC can meet and manage its obligations in a cost-effective and proportionate way which is appropriate for the level of risk concerned.

J.2 Governance

J.2.1 Data Protection Officer

Regardless of the legal status of the EOSC it is unlikely that it will meet the definition of a ‘Data Controller’ under the GDPR, therefore it will most likely act as a ‘Data Processor’. As a Data Processor the EOSC meets the requirements in the GDPR for appointing a ‘Data Protection Officer’. This role will be crucial for coordinating all data protection matters including rights requests between Data Controllers, monitoring ongoing data protection law changes and acting as a key coordinator for any breaches and incidents involving personal data. The role has no power or responsibility to interfere with the decisions of the Data Controllers on whose behalf the EOSC processes data, however it will be crucial in coordinating with and supporting Data Controllers on matters to do with the EOSC.

The appointment of a DPO under the GDPR is only mandatory in three situations:

- i) When the organisation is a public authority or body.
- ii) When the organisation’s core activities consist of data processing operations that require regular and systematic monitoring of data subjects on a large scale.
- iii) When the organisation’s core activities consist of large-scale processing of special categories of data (sensitive data such as personal information on health, religion, race or sexual orientation) and/or personal data relating to criminal convictions and offences.

The EOSC may be defined as a public body/authority (this will need to be determined) however it is possible the EOSC itself will in future process large volumes of special category personal data given its nature so the contingency for this should be put in place. Research infrastructures such as the UK Data Centre⁶³ have governance in place to manage special category personal data.

The GDPR permits member states to specify other circumstances in which a DPO must be appointed. As an example, in Germany the Data Protection Law requires every organisation with ten or more employees that permanently process personal data to appoint a DPO.

⁶³ <https://www.datacentre-uk.com/>

Even where the GDPR does not specifically require a DPO to be appointed, it is highly encouraged by the European Data Protection Board⁶⁴ as a matter of good practice and to help demonstrate compliance with the GDPR.

One of the tasks of this DPO role for the EOsc will be to coordinate incident investigations and rights requests between the various Controllers that upload and download datasets containing personal data. As a Data Processor, the EOsc DPO will need to ensure he/she informs and works closely with the DPOs of Data Controlling organisations working through the EOsc, especially on sensitive matters like breaches and regulatory notifications.

Another control to assist the framework and EOsc DPO would be to establish a Data Protection Stakeholder group made up of the Data Protection Officers or Leads from entities that use the EOsc and will interreact/support the framework.

To implement a DPO the following should be determined

1. Exact legal structure and makeup of the EOsc entity: what functions are performed, and where in the structure personal data is processed
2. If the DPO can be 'in house' or outsourced, and if so outsourced to where and indeed to whom?
3. If in house, the exact job role/description, position within the organisation, suitable qualifications & experience etc that would be required.

J.2.2 Data Protection Working Group

To ensure the effective and inclusive management of Data Protection related matters, it is recommended that as part of any EOsc governance structure a Data Protection Working Group is established to support the EOsc DPO in raising any issues for investigation, monitoring any risks raised and suggesting improvements for investigation to improve Data Protection compliance for EOsc. This is outlined further in Annex H of D3.6 Final Policy Recommendations.

J.2.3 Policies and Procedures

A policies and procedures framework is key for the EOsc to demonstrate its compliance with various requirements.

Policies for key areas, including Data Protection, will need to be agreed, stored and maintained centrally. To ensure policies and procedures are relevant, up to date and communicated to staff the EOsc will need to agree and develop

- A standard format and approach to policy layouts and formats, including document control and approvals
- A central development and hosting system/repository where all policies and procedures can be stored, searched and archived when replaced/phased out.

It is recommended that the following policies and procedures are developed, produced and agreed as part of that framework.

Policies:

- Data Protection
- Information Security (information use)
- IT Security (including system development standards)
- Acceptable use
- Data Management
- Risk Management

Procedures:

⁶⁴ <https://edpb.europa.eu/>

- Managing security incidents
- Managing information rights
- Managing information complaints
- Managing information risks
- Managing data access requests (regarding access to EOsc, not Subject Access Requests)

J.2.4 Ethics and Codes of Conduct

Some research institutions aim to build GDPR into the processes they use for research ethics as part of the ethics approval process. Researchers will need to consider several factors when carrying out research that involves processing personal data. Most research undertaken will be subject to one of the GDPR exemptions - 'research purposes' or 'academic expression'. Consideration will also be needed depending on the type of research (this will be covered under principle 2 Special Regimes below) and whether it includes special category data.

Increasingly institutions are building GDPR into the processes they use for research ethics including ethical approval processes, with data protection impact assessments forming part of the assessment process.

Two exemptions to the GDPR may apply:

1. The 'Research Purposes' exemption provides partial exemption to data protection requirements where complying with these would seriously impair the research, there is no likelihood of substantial damage or distress to the data subject, and appropriate safeguards are in place to protect the personal data
2. The 'Academic Expression' exemption provides an exemption to most data protection requirements where complying with these would be incompatible with the academic purpose and the research will result in a publication for which there is a reasonable belief that it would be in the public interest.

In addition, organisations that process personal data for research purposes may avoid restrictions on secondary processing and processing sensitive categories of data (Art 6 (4); recital 50):

- **As long as they** implement appropriate safeguards, they may also override data subject rights to object to processing and to seek the erasure of personal data
- And, GDPR **may** permit organisations to process personal data for research purposes without the data subject's consent (Art 6 (1)(f); recitals 47, 157).

Data capture can be improved by an impact assessment, as outlined in 2.3 of this framework.

J.2.5 Controller vs Processor Arrangements

Under the General Data Protection Regulation (and subsequent member state laws) when processing personal data, you are either acting as a controller or processor. A controller determines the purposes and means of processing personal data while a processor is responsible for processing personal data on behalf of a controller and does not determine the purposes and means of processing. Discussion of how the EOsc will operate⁶⁵ suggests it is unlikely the EOsc will meet the definition of a 'Data Controller'. It will therefore be a Data Processor, and decisions around re-use and control will rest with data owners/originators would be Data Controllers; the EOsc will simply be providing the means for Data Controllers to share data with each other.

Each legal entity wishing to provide data to or access data through the EOsc will therefore need to agree to a Data Processing Agreement, outlining that the entity concerned is the Controller and retains responsibility over the data while EOsc is a processor and will demonstrate certain areas to the Controller as part of its obligations. These areas include (but are not limited to)

- The grounds for processing of the personal data and the purposes for which the EOsc processes it
- Procedure for actioning and passing on information rights requests

⁶⁵ For example the EC Implementation Roadmap for the EOsc

https://ec.europa.eu/research/openscience/pdf/swd_2018_83_f1_staff_working_paper_en.pdf

- Procedure for actioning and passing on information related complaints
- Summary of the relevant controls in place to protect the personal data
- Details of any sub-processing EOsc may be undertaking or may wish to undertake.

If the EOsc wishes to engage in any sort of ‘outsourcing’ where access to Personal Data is envisaged, then this processing agreement will either need to outline how permission of controllers will be obtained or will seek an explicit consent upfront (assuming it knows what sort of sub-processing it wishes to engage with).

J.2.6 Records of Processing Activities (ROPA)

Article 30 of the GDPR requires Controllers (and Processors to a lesser extent) to keep records of the personal data they process, why they process it and the controls in place to control that data.

This will require the EOsc to agree and deploy from the beginning a method to map out and control where personal data comes from, where it is stored, and where it is sent to. This will need to be reviewed and updated as new transfers are established and the EOsc grows in capacity and use.

It is highly recommended therefore that the Records of Processing Activities (ROPA) ‘database’ is tightly linked to any sort of data inventory that the EOsc may establish so that both datasets can feed from and to one another for the EOsc’s (and its Controllers’) benefit.

J.3 Risk

J.3.1 Risk Framework

There will be several areas, not just Data Protection, where the EOsc will face various risks to how it operates. There is no requirement to have a separate risk framework for Data Protection. Instead ‘information risk’ can form part of a wider Governance Risk Framework for all areas of risk (reputational, financial, regulatory etc).

The core elements of a Risk Framework (including information and regulatory risk) should include the following:

Risk Register(s). There should be at least one Risk Register for the EOsc that details all risks that are deemed medium or high risk. This should be owned by the EOsc Executive and should be reviewed at least every quarter.

Horizon Scanning. There are several areas of Data Protection (and other legislation) that, if changed by governments or technology, may cause operational issues (both good and bad) for the EOsc. To anticipate any risk that may materialise, as part of the agreed risk reporting framework there should be a section on monitoring for upcoming changes and what impact they have on the EOsc (and therefore what risks they pose).

Key Risk Indicators. Based on what risks the EOsc has key controls will be put in place to mitigate those risks where possible. As part of the agreed reporting period there should be key indicators to measure where risks are improving or getting worse based on how the controls are working and where controls have failed (otherwise known as a security incident). The EOsc Executive can then decide if any actions are needed to mitigate the risk further and protect the data within the EOsc.

Should the EOsc wish to adopt an international standard for risk management from the start, ISO 31000 would be a recommended framework to aim for. This gives a wide-ranging framework for risk management that can easily encompass the points above and wider information risk.

J.3.2 Data Protection Impact Assessment

Another method of mitigating and managing potential risks to the Personal Data within the EOsc is to establish a framework for completing Data Protection Impact Assessments (Privacy Impact Assessments) outlined in Article 35 of the GDPR. These form part of the Risk Framework outlined above and are a legal requirement under the GDPR. They can assist the EOsc in mitigating new risks or changes to existing risks.

Completing and publishing these DPIAs can increase transparency about how the EOSC handles Personal Data and trust with EOSC users and suppliers.

The EOSC will need to establish a supporting procedure for how DPIAs are completed (and when, by whom and reviewed/approved by whom) using a standard template.

J.4 Compliance

J.4.1 Information Security (Including Cybersecurity)

Robust controls will need to be in place to protect the large volume of information in the research infrastructures, matching (if not exceeding) those of a secure data centre today. This will be the responsibility of individual research infrastructure data centres. These controls would need to be documented for the benefit of new institutions wishing to store their data through the EOSC.

Effective information security controls outlined in standards like ISO27000 & 27001 and others can mitigate and/or reduce the risk of external cyber-attack, data misuse, data corruption as well as any incidents resulting from user error. These however need to be ongoing pieces of work as these controls require ongoing monitoring and oversight to ensure they remain effective.

J.4.1.1 Incident Management and Investigation

Where the above controls fail, or a risk materialises regardless of the controls in place and an incident occurs, there should be a structure and process in place to investigate the incident to determine its root cause and impact, mitigate any impact of the incident and recommend any changes to help prevent the incident from occurring again.

This structure should also include a process for reporting to appropriate regulators and coordinating with outside parties regarding the investigation of the incident.

Regardless of the EOSC's legal structure, some security incident structure will need to be put in place as the EOSC will process data to some degree and given the value and potential volume of the data (and its users) it is likely that an incident will occur at some point.

J.4.2 Terms and Conditions of Use

Before a Controller entity can gain access to the data within the EOSC, for regulatory and best practice reasons they should agree to a series of terms and conditions. These should include a Data Protection and Information Security section (or a separate set of terms depending on the approach) outlining what the EOSC requires of the controller entities to keep the EOSC and the information within it 'legal' and secure. The EOSC Rules of Participation may serve this purpose. The Rules of Participation proposed in EOSCpilot deliverable 2.6 include relevant references in section 2.7 and policy statement 4.

A full list of requirements and topics will need to be compiled once the EOSC structure is agreed however as a minimum the following areas should be outlined in any terms of use agreement:

1. Requirements for providing an adequate privacy notice to future data sets containing personal data to be used for the EOSC
2. Requirements for obtaining (or not) an adequate consent (or other ground for processing) for personal data to be reused by other controllers within the EOSC
3. Requirements for historic datasets to be uploaded to the EOSC for study and re-use
4. Requirements for accessing personal data sets within the EOSC
5. Requirements for reporting breaches of any datasets obtained through the EOSC
6. Requirements for passing on any information rights requests to the EOSC on any personal data within the EOSC (and how the EOSC will pass these on to controllers as well)
7. Rights of termination should any of the requirements not be met.

J.4.3 Establishment and Monitoring of Legal Basis for Processing for Use and Re-use of Personal Data

The GDPR requires organisations to justify their processing of Personal Data with a condition from Article 6, and where special personal data is being processed, a condition from article 9 as well. At face value many organisations have a ground from both Article 6 and Article 9 that they can use for scientific research. In some countries this is further emphasised with national legislation, for example the Data Protection Act 2018 for the UK. However, the EOsc must also consider a valid ground for re-use of Personal Data and valid grounds for processing for international data transfers. While the GDPR harmonises Data Protection across the EU there is still scope for differing requirements from each country, which poses a risk for the EOsc.

As new case law and supporting law emerges the EOsc will need to monitor developments to ensure its Data Protection Framework remains valid. This will require monitoring of member state legislation (as a minimum) and acting upon any risks where agreed. If the EOsc is to be global in scale or reach then other major Data Protection legal frameworks may affect the movement and use of Personal Data within the EOsc, and so these would also need to be monitored.

The EOsc will need a process to highlight, review and monitor legal changes per country within agreed countries on legal grounds for processing and impact on research and data sharing. The process should be overseen by the EOsc Executive.

J.4.4 International Data Transfers

Due to the nature of the EOsc, it is highly likely that Personal Data will be moved and accessed internationally. Within the EU, and within locations that the EU deems as 'safe' this does not present any major challenges. However, for countries that do not have suitable Data Protection safeguards (so called 'unsafe locations') challenges will need to be addressed to allow for the transfer of Personal Data from one physical location to another. One solution, for example, could be for any non-EU entity based in an unsafe location to sign and agree Standard Model Contract Clauses (SMCCs) as part of their joining terms and conditions. Each mechanism for permitting international data transfers should be explored and risk assessed to determine what is most appropriate and sustainable.

J.4.5 Rights Requests

Under Data Protection laws (plus some other information rights laws) individuals have some rights over their data (be that personal or intellectual property). This section does not outline how intellectual property rights should be managed however it is recommended that the two processes work in tandem where possible to avoid duplication of work and resources.

Although EOsc is envisaged to be a Data Processor it will need to support any requests that Data Controllers receive where personal data processed through the EOsc is in scope. Such requests would include:

- The right to access their data
- The right to correct their data
- The right to restrict their data to or from a purpose
- The right to object to their data being used for a purpose
- The right to delete their data
- The right to move their data to another provider

J.4.6 Training and Awareness

The EOsc, whatever legal form it takes, will rely on its staff and/or users to be aware of key components and requirements to keep the framework secure and 'legal', in Data Protection terms. Therefore, a training and awareness programme will be required. There are two main components: training for internal staff and training for external users.

The internal training programme will need to include all areas of legally required staff awareness training, including Data Protection. This can be achieved via online training however for staff working in key areas a skill assessment should be completed to determine if they should benefit from more in-depth training and ongoing professional development in those areas.

The external training programme will need to outline the conditions of use and be ongoing for any key updates to the framework or, for example, Data Protection law that affects the EOsc. The training on the terms of use / acceptance criteria could be made a mandatory requirement before a party is accepted into the EOsc. This training would outline what the EOsc requires of them before they gain access to datasets.

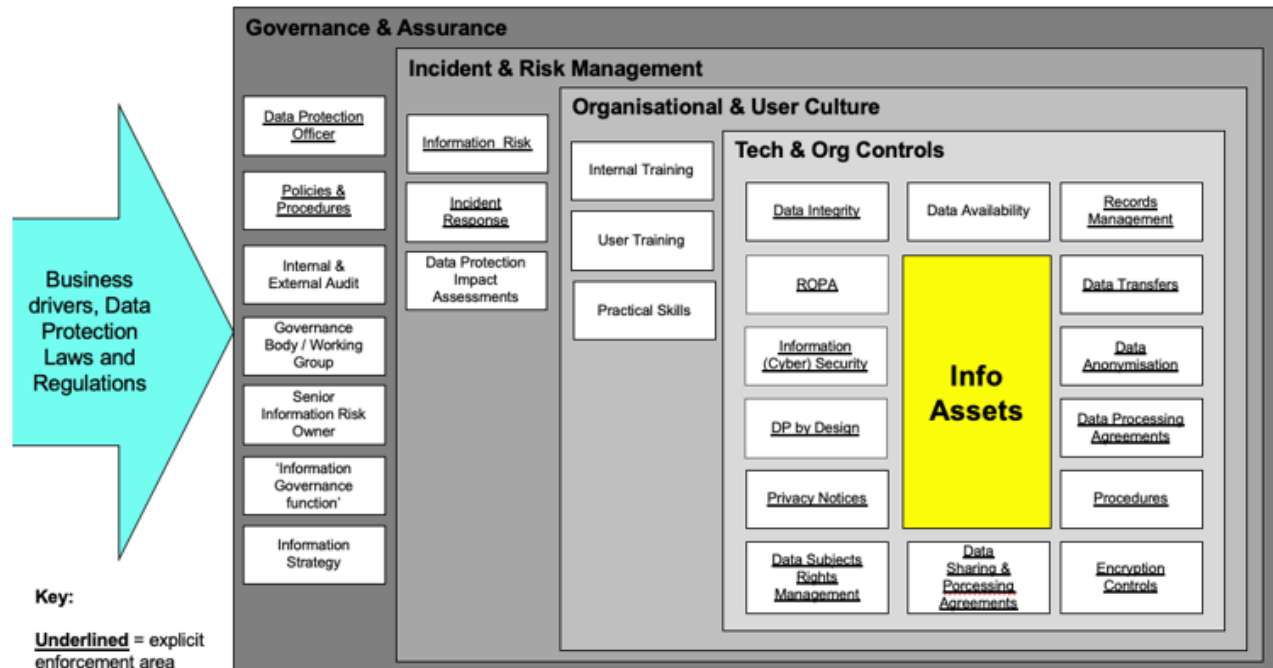


Figure 3 – Visual Representation of Data Protection Framework and Related Elements

J.5 Case Study: UK Data Centre

The UK Data Service Secure Lab provides secure access to data that are too detailed, sensitive or confidential to be made available under the standard End User Licence or Special Licence. Their specialised staff apply statistical control techniques to ensure the delivery of safe statistical results. Where possible it is better (and appropriate) to use/have anonymous data.

The UK Data Service Secure Lab is similar to how the EOsc is envisaged. Both are Data Processors as decisions around access to any Personal Datasets are made by the Data Controller/holder. The UK Data Centre has a Data Protection Officer with sets of documentation similar to those advocated in this framework. The only exception is that they hold a copy of the data in their repository.

Data accessed in this way cannot be downloaded. Once researchers and their projects are approved, they can analyse the data remotely from their organisational desktop, or by using a Safe Room. Access is provided to statistical and office software to make remote analysis and collaboration secure and convenient. Approvals are granted through the Data Owners/Controllers based on what the requesting organisation wants to achieve. All outputs are reviewed to ensure the risk of reidentification is negligible (e.g. no counts under 10).

Data within the service is tagged based on its sensitivity and flexibility to re-use and consent. Legal basis and use have already highlighted the issues where some can use public task and some might be using consent. Key is for the controllers in European projects to agree the processing grounds up front. There is a good summary and some of the key areas found at

https://www.ukdataservice.ac.uk/media/622230/2018-10-24_legal_ethical_considerations_open_access_final_-pdf.pdf.

The UK Data Centre's security philosophy is based upon training and trust, leading-edge technology, licensing and legal frameworks, and strict security policies and penalties. The licences include restrictions on use and explicit requirements to not use the data to reidentify individuals.

More information on the 5 safes can be viewed at

<https://www.youtube.com/watch?v=MIn9T52mwj0&feature=youtu.be>

or on the UK Data Centre website <https://www.ukdataservice.ac.uk/use-data/secure-lab>.

ANNEX K. GLOSSARY

Term	Explanation
AAI	Authentication and authorisation infrastructure
AARC	Authentication and Authorisation for Research and Collaboration, EC Horizon 2020 project aarc-project.eu
Anonymisation	Anonymisation is defined by recital 26 GDPR as '...information which does not relate to an identified or identifiable natural person or to personal data rendered anonymous in such a manner that the data subject is not or no longer identifiable'. The GDPR does not apply to anonymised information
APC	Acronym for Article Processing Charges, fees paid to journals to publish an article as open access
API	Application Programming Interface – a software intermediary which allows two applications (websites, or software) to communicate
CERN	European Organisation for Nuclear Research/Conseil Européen pour la Recherche Nucléaire https://home.cern
CoC	Code of Conduct
CRIS	Acronym for Current Research Information System, a system containing information about research being conducted at an institution
Data Controller	(GDPR) The natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data; where the purposes and means of such processing are determined by Union or Member State law, the controller or the specific criteria for its nomination may be provided for by Union or Member State law
Data Processor	(GDPR) A natural or legal person, public authority, agency or other body which processes personal data on behalf of the controller
DMP	Data management plan
DP	Data Protection
Data Protection Officer	A role within an organisation as required and defined by Articles 37-39 of the GDPR;
DPWG	EOSC Data Protection Working Group
ELAB	Ethics and Legal Advisory Board

ELIXIR	An intergovernmental organisation that brings together life science resources from across Europe, including databases, software tools, training materials, cloud storage and supercomputers www.elixir-europe.org
EIFL	Electronic Information for Libraries www.eifl.net
EOSC Architecture	The architecture of the EOSC System . (The EOSC System is the IT system implementing the EOSC)
EOSC-hub	An EC Horizon 2020-funded project to create a single contact point (the Hub) for European researchers and innovators to discover, access, use and reuse a broad spectrum of resources for advanced data-driven research www.eosc-hub.eu
EOSC Resource	Any asset made available (by means of the EOSC system and according to the EOSC Rules of Participation) to EOSC System Users to perform a process useful to deliver value in the context of the EOSC. EOSC Resources include services, datasets, software, support, training, consultancy or any other asset
ERA	Acronym for European Research Area, defined by the European Commission as a unified area open to the world, in which scientific knowledge, technology and researchers circulate freely http://ec.europa.eu/research/era/index_en.htm
FAIR	Acronym for the guiding principles (Findable, Accessible, Interoperable and Reusable) for research data management and stewardship ⁶⁶
GDPR	Acronym for General Data Protection Regulation, EU Regulation 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data https://eur-lex.europa.eu/eli/reg/2016/679/oj
Gold Open Access	Publishing an article in an online open access journal
ICOS	Integrated Carbon Observation System www.icos-ri.eu
International Data Transfers	(GDPR) Any transfers of personal data from one entity to another where the entities are in different countries
IP	Acronym for Intellectual Property, creations of the mind: inventions; literary and artistic works; and symbols, names and images used in commerce https://www.wipo.int/edocs/pubdocs/en/intproperty/450/wipo_pub_450.pdf

⁶⁶ Wilkinson et al., 2016, The FAIR Guiding Principles for scientific data management and stewardship, Sci Data 2016 Mar 15; 3:160018 doi: 10.1038/sdata.2016.18

IPR	Acronym for Intellectual Property Rights, the assignment of property rights through patents, copyrights and trademarks https://stats.oecd.org/glossary/detail.asp?ID=3236
IPRWG	EOSC IPR Working Group
LIBER	Ligue des Bibliothèques Européennes de Recherche/Association of European Research Libraries
Metadata	Data which describes other data
OA	Acronym for Open Access, which is about making the products of research freely accessible to all
OCRE	Acronym for Open Clouds for Research Environments, an EC Horizon 2020-funded project http://earsc.org/file_download/494/OCRE+-+Einfra+info+session.pdf
OJEU	Official Journal of the EU
Open	Anyone can freely access, use, modify, and share for any purpose, subject, at most, to measures that preserve provenance and openness http://opendefinition.org
Open Science	The practice of research in an open, and reproducible fashion where all components of research are open
OS	Acronym for Open Science
OS-CAM	Acronym for Open Science Career Assessment Matrix, proposed by the EC's Working Group on Rewards under Open Science https://ec.europa.eu/research/openscience/index.cfm?pg=rewards_wg
OSPP	Open Science Policy Platform. A group which advises the Commission on how to develop open science policy https://ec.europa.eu/research/openscience/index.cfm?pg=open-science-policy-platform
Personal Data	(GDPR) Any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person
PID	Acronym for Persistent Identifier, a long-lasting reference to a digital resource
Privacy Assessment	Impact An assessment of any processing of personal data for its impact and requirements to ensure Data Protection and Privacy matters are handled correctly as defined by Article 35 of the GDPR

PSC	EOSC Policy Standing Committee
Pseudonymisation	(GDPR) The processing of personal data in such a manner that the personal data can no longer be attributed to a specific data subject without the use of additional information, provided that such additional information is kept separately and is subject to technical and organisational measures to ensure that the personal data are not attributed to an identified or identifiable natural person
RFO	Research Funding Organisation
RDM	An acronym for Research Data Management, the care and maintenance of the data produced during the course of the research cycle https://libguides.depaul.edu/c.php?g=620925&p=4324498
Recipient	(GDPR) A natural or legal person, public authority, agency or another body, to which the personal data are disclosed, whether a third party or not. However, public authorities which may receive personal data in the framework of a particular inquiry in accordance with Union or Member State law shall not be regarded as recipients; the processing of those data by those public authorities shall follow the applicable data protection rules according to the purposes of the processing
RI	Research Infrastructure
RPO	Research Producing Organisation
Rules of Participation	The principles that drive the participation of service providers and users in EOSC
smartAPI	A metadata specification for FAIR Web APIs
Special Categories	(GDPR) Special Categories of Personal Data are a type of personal data that has additional sensitivities to it. This includes personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation
Third Country	(GDPR) A country outside of the European Union that does not have a 'safe location' status issued by the European Commission for the purposes of international data transfers