

Report on the governance and financial schemes for the European Open Science Cloud

Adopted by the Open Science Policy Platform- May 2017

Executive Summary

The European Open Science Cloud (EOSC) is a vision for a federated, globally accessible, multidisciplinary environment where researchers, innovators, companies and citizens can publish, find, use and reuse each other's data, tools, publications and other outputs for research, innovation and educational purposes. Making this vision a reality is essential to empower Europeans to tackle the global challenges ahead. The EOSC is one of five broad policy action lines of the European open science agenda endorsed also by the EC Communications¹ on the Digital Single Market (DSM) strategy².

In this context, during 2016, the Directorate-General for Research and Innovation of the EC set up the Open Science Policy Platform³ (OSPP), a high-level expert advisory group having the mandate to support the development and implementation of the open science policy in Europe. The selected 25 experts belonging to different stakeholder groups are called to tackle the following different dimensions of open science: reward system, measuring quality and impact (altmetrics), changing business models for publishing, FAIR open data, European Open Science Cloud, research integrity, citizen science, open education and skills.

The EOSC is expected to grow into a federated ecosystem of organisations and infrastructures from different countries and communities. As such, it poses a number of challenges in different areas. This report proposes 8 recommendations focusing specifically on the following areas: 1) Governance structure and principles: to identify the distribution of rights and responsibilities among the different entities in the EOSC ecosystem and rules for making decisions; 2) Financial schemes: to shape the best financial mechanisms that can enable the EOSC ecosystem to flourish and deliver value in an efficient way; 3) Other relevant areas: awareness, skills development and ethics.

1. The EOSC should rely on a multi-level and multi-stakeholder governance that ensures a representation for the main stakeholder categories and disciplines, integrating both the national and European levels of authority.
2. Facilitate access to the EOSC across borders and disciplines by carefully analysing all aspects of interoperability (technical, semantic, organisational, legal and policy) and translate them into a common model and rules of participation.
3. European countries and EC should ensure long-term funding of the services that are needed to enable the integration of and access to the resources that can be federated in the EOSC.
4. Different and innovative funding schemes should be investigated to support users to consume services from EOSC-certified providers that are approved based on a commonly-agreed European certification scheme.
5. Kick-off the EOSC ecosystem with enough coordinated financial support from a sufficiently large set of

¹ Communication: European Cloud Initiative - Building a competitive data and knowledge economy in Europe: http://europa.eu/rapid/press-release_IP-16-1408_en.htm

² Digital Single Market webpage: https://ec.europa.eu/commission/priorities/digital-single-market_en

³ OSPP webpage: <http://ec.europa.eu/research/openscience/index.cfm?pg=open-science-policy-platform>

European countries and the EC.

6. Raise awareness and communicate benefits of the EOSC among decision makers, research and education bodies, private sector, industrial and citizen organisations; share best practices and use-cases to highlight the potential and results of the EOSC.

7. Develop Open Science and data skills among all the key stakeholder categories.

8. Ensure to align and develop ethical rules in data management, storage and analytics that are recognized by all stakeholders in the EOSC.

Proposed recommendations

Governance

(1) The EOSC should rely on a multi-level and multi-stakeholder governance that ensures a representation for the main stakeholder categories and disciplines, integrating both the national and European levels of authority.

The EOSC is a set of interrelated systems based on open standards and best practices that supports the open creation and dissemination of scholarly knowledge and scientific data. It is expected to be formed by autonomous and decentralised resources from different organisations from both the public sector, private sector and civil society. These organisations can play different roles at the same time (e.g., participating organisations can represent both service providers, data providers, technology developers, users). In addition, many of the resources involved are of public interest and bring collective benefits, and so are better managed as a commons⁴. The governance should follow the commons design principles⁵ (e.g., ensuring that those affected by the rules can participate in modifying the rules; different institutions working at different scales are needed to coordinate stewardship and to cooperate with each other).

Given the ways that Europe works together, it is natural that each European country would define an EOSC national governing board to align the national implementation strategy to the European one and vice versa. This board could be carefully crafted to be as inclusive as possible with representatives from horizontal e-infrastructures, research infrastructures, policy makers, research funders and researchers spanning different scientific disciplines, government bodies, SME/industry and citizen organisations. It could be designed with structures and rules that allow for a user-responsive steering of the initiative. It should be also sensitive to the fact that significant funding is required for facilities and services for all phases of the research lifecycle, some requiring significant costs and long term commitment.

At the European level, as a first step, the EC could create an independent EOSC Council. This board should ensure representation from different stakeholder groups having a relevance greater than national interests (e.g., pan-European e-Infrastructures, research infrastructures, intergovernmental organisations) and from the established national boards. This structure would later evolve into an EOSC governing board, eventually supported by a dedicated legal structure (possible solutions to be evaluated are ERIC⁶ or other similar

⁴ The Commons, Short and Sweet; D. Bollier: <http://bollier.org/commons-short-and-sweet>

⁵ Commons desing principles, D. Bollier: <http://bollier.org/blog/eight-points-reference-commoning>

⁶ https://ec.europa.eu/research/infrastructures/index_en.cfm?pg=eric

structures that have already proved to be suitable for pan-European initiatives). For initiatives that require considerable investments at national level, this board would need to seek support from the EOSC national governing boards. When designing the responsibilities of this board, best practices from the ESFRI way of working should be considered.

With regards to the development of the EOSC governance structure we recommend an incremental approach where solutions are tested before being consolidated for the long term. The governance structure must also ensure that needs from individual end-users can be captured. The initial work to create the EOSC ecosystem should start with a sufficiently large set of European countries and stakeholders, not waiting until all are on-board.

(2) Facilitate access to the EOSC across borders and disciplines by carefully analysing all aspects of interoperability (technical, semantic, organisational, legal and policy) and translate them into a common model and rules of participation.

To be successful, the EOSC must establish clear policies across borders and disciplines. The recommendations should consider aspects such as: operations (services, processes), information (concepts and data models), information systems and technology (standards and protocols) as well as usability and service design. The analysis could be structured according to the levels identified in the European Interoperability Framework (technical, semantic, organisational, legal, policy)⁷ and taking the principles of RDA into account.

Financial schemes

(3) European countries and EC should ensure long-term funding of the services that are needed to enable the integration of and access to the resources that can be federated in the EOSC.

In order to develop the EOSC ecosystem, it is essential to identify, implement and deliver for the long term the set of services and processes that are needed to integrate and enable access to the various resources federated in the EOSC. We refer to this set of services and processes as the “EOSC core”. Examples of such services are administration, coordination, governance support, federation and access management, providing help with standards and protocols. The funding should have adequate long-term perspective and not be linked to project lifecycle. The EOSC governance board should ensure that this core can be trusted for its quality. Its governance must take into consideration and align with existing pan-European organisations and their structures delivering digital services for research.

(4) Different and innovative funding schemes should be investigated to support users to consume services from EOSC-certified providers that are approved based on a commonly-agreed European certification

⁷ https://ec.europa.eu/isa2/isa2_en

scheme.

On top of the implementation of the EOSC core, there is the need to create sound business models that stimulate service providers to join the ecosystem and users to consume the services. This is an iterative process that starts from a pilot system and later evolves into a mature ecosystem. We recognise that there are different types of resources with different usage patterns (there are different aspects to consider, for instance “economy rivalry”⁸: computing, storage and networking are examples of rival resources whereas data, publications, standards and protocols are examples of non-rival resources). Different business models need to be explored and aligned to the different services (e.g., data analysis, data storage, data resources) coming from both generic and domain specific service providers within appropriate policy, legal and funding structures that will be put in place.

Currently, most of the publicly-funded infrastructures supporting science are funded by the European countries or by the EC to provide services free at point of use or accessible via a charging mechanism to support cost recovery. They typically have access policy limitations (e.g., restricted to specific disciplines or geographical area). Participation in the EOSC with its novel financing schemes means that such infrastructures have the capability to open up their services beyond their traditional scope where a demand is clearly identified.

Allocating funding to users could be a way to stimulate competition among providers for selected types of services where this approach can be suitable and efficient. This funding could come from both EC or European countries and it should be used with certified providers in both the public and commercial sectors. The analysis of possible mechanisms for allocating this funding can include the voucher/credit mechanisms or evolution of the current trans-national or virtual access mechanisms of the Horizon 2020 framework program. The selected mechanism(s) should easily allow users from a country to access services delivered from a service provider wherever it is located. They should also cover the capital costs so to support the sustainability of service provision and thus, being a better incentive for providers to join.

Another aspect to explore is the EOSC as a vehicle to support trans-national, trans-discipline procurements of resources to reach economies of scale. Cross-border public procurement for resources to support science should be further explored. The needs of large public-to-public trans-national service provision should be investigated with care, as it may raise policy, organizational and legal issues across European countries.

The certification scheme for EOSC-conformant providers⁹ could refer to services or organisations, and it should build on top of open standards and open protocols to ensure interoperability and avoid lock-in. It should also foresee a piloting phase where the scheme is tested and the value for users assessed.

(5) Kick-off the EOSC ecosystem with enough coordinated financial support from a sufficiently large set of European countries and the EC.

⁸ In economics, a resource is said to be rivalrous or rival if its consumption by one consumer prevents simultaneous consumption by other consumers, [https://en.wikipedia.org/wiki/Rivalry_\(economics\)](https://en.wikipedia.org/wiki/Rivalry_(economics))

⁹ An example in the area of data repositories is the Data Seal of Approval: <https://www.datasealofapproval.org/en/>

All major infrastructures require an initial investment to create the foundations in terms of structures (technical, legal, organisational) before becoming core components for added-value activities. In the case of the EOSC, many relevant national infrastructures or bodies already exist. It is recommended that a combined effort from European countries and the EC would provide initial funding and in-kind contributions to enable the national and community infrastructures to participate in the EOSC.

Other relevant recommendations

(6) Raise awareness and communicate benefits of the EOSC among decision makers, research and education bodies, private sector, industrial and citizen organisations; share best practices and use-cases to highlight the potential and results of the EOSC.

The investment required in terms of resources and collaboration is not trivial. While national roadmaps for research infrastructures¹⁰ often exist, there is a lack of coordination in timing, scope and shared understanding of the societal benefits. Therefore, it is essential that the value of the EOSC and the opportunities arising from using it are clearly understood, shared and communicated by all stakeholders. Researchers should be incentivised to share, use or reuse research outputs in the EOSC¹¹. Also, the EOSC could become a platform for European countries to discuss needs, demand and align approaches to collect requirements for digital services that can support the development of national research infrastructure roadmaps.

(7) Develop Open Science and data skills among all the key stakeholder categories.

It is recognised that the move to digital science, growing data volumes and growing influence of scientific data on policy have created skill gaps among researchers, emerging professions such as data science, and also among policy makers and advisers. To reap the benefits of the EOSC in support of open science, skill development in the area of Information Technology (IT) and data literacy should be supported at all levels, from the primary school up to policy makers. Ministries of research and ministries of education should come together to discuss the evolution of the syllabus in order to include these aspects. The EU must take special action to support this process by shaping a common approach involving the relevant Directorate-Generals, especially DG-RTD (Research and Innovation), DG CNECT (Communications Networks, Content & Technology) and DG-EAC (Education and Culture). Primary schools could help develop basic understanding of data manipulation skills and raising awareness of the importance of privacy and accuracy. High-school curricula should be reformed to include the introduction to and application of appropriate data science/management education for the future generation of researchers. Advanced IT and data skills should be facilitated for researchers, librarians, IT-staff and citizen scientists, e.g. by financially supporting or organising appropriate advanced trainings and embedding expertise into their work and projects. This topic could be an element of the cohesive agenda for the EC.

(8) Ensure to align and develop ethical rules in data management, storage and analytics that are recognized

¹⁰ https://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri-national-roadmaps

¹¹ The approach to define the incentive mechanisms should be proposed by a possible OSPP Altmetrics Working Group or by the EC High Level Expert Group on Altmetrics

by all stakeholders in the EOSC.

Ethical data practices are a means of gaining trust, demonstrating organizational integrity, and reducing risks. For any service providers, there should be an ethical obligation to keep the security and integrity of data, in whatever database or platform they are stored. Ethics is an organization-wide issue that requires the involvement of all employees in any institution or company. The EC should raise awareness on this issue, create or refine ethical guidelines, promote education and training.

Research involving the processing of personal data and its derivatives should receive specific attention in EOSC. This domain, which is relevant for e.g. biomedical research and social sciences, suffers from fragmentation of regulations, which substantially slows down research progress.

Ethics are also part of research integrity. National and European policies on research integrity should be aligned in order to facilitate a shared vision of what science can and should deliver. The EOSC is a fundamental building block of new infrastructures for science, and it needs to be supported by a shared vision over policy development and ethical practices.

Related work

The OSPP EOSC WG recognises that there are other initiatives and activities addressing the aspects covered by this document. A reference to the most relevant work of which the group is aware is provided in this section.

EC High Level Expert Group on the EOSC: in late 2016, the High Level Expert Group on the EOSC published a report¹² addressing topics of policy, governance and implementation for the EOSC. The relevant recommendations referring to governance and financial schemes have been considered. The working group is expected to restart activities from May 2017 under a new mandate and with a new composition.

EOSCPilot Project: the EOSCPilot¹³ project is funded by the EC H2020 Framework Program to support the first phase in the development of the European Open Science Cloud (EOSC). The project started in January 2017 and will run for 30 months. Among the various activities, it foresees to develop proposals and recommendations for the policies and rules of engagement for the difference stakeholders, governance and business models for the EOSC.

The GO-FAIR Initiative: the GO-FAIR is an initiative¹⁴ focusing on the practical implementation of the recommendations of the EC High Level Expert Group on the EOSC.

e-IRG Roadmap 2016: e-IRG is a strategic body to facilitate integration in the area of European e-Infrastructures and connected services, within and between member states, at the European level and globally. The roadmap document¹⁵ issued at the end of 2016 provides a number of recommendations

¹² Realising the European open science cloud: <https://dx.doi.org/10.2777/940154>

¹³ EOSCPilot project website: <https://eoscipilot.eu/>

¹⁴ GO-FAIR initiative website: <https://www.dtls.nl/go-fair/>

¹⁵ <http://e-irg.eu/documents/10920/12353/Roadmap+2016.pdf>

for different stakeholder categories to stimulate the evolution of the European e-Infrastructure system towards the realisation of the e-Infrastructure Commons vision by 2020.

European Parliament Report on the European Cloud Initiative¹⁶: the European Parliament has recently published a report with a number of recommendations addressing specifically a number of EC Communications linked to the European Cloud Initiative.

Some relevant papers

- The paper “European Open Science Cloud for Research”¹⁷ details eight elements for the success of the EOSC: open, publicly funded and governed, research-centric, comprehensive, diverse & distributed, interoperable, service-oriented and social;
- The paper “The Federated Scientific Data Hub”¹⁸ proposes to establish a hub to deliver trusted data-intensive services in a federated environment where data complies with the “FAIR” principles. The paper addresses various aspects including funding and governance;
- The paper “Cross-border procurement of e-Infrastructure services: Opportunities, Barriers, Use cases, Best Practices”¹⁹ is a study from the EC-funded project EGI-Engage analysing barriers that inhibit procurement of digital services for research, identify a set of case studies and proposes best practices that can overcome such procurement barriers.

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¹⁶ European Parliament Report on the European Cloud Initiative (2016/2145(INI):

<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A8-2017-0006+0+DOC+PDF+V0/EN>

¹⁷ European Open Science Cloud for Research, position paper, 30 Oct 2015, <https://doi.org/10.5281/zenodo.32915>

¹⁸ The Federated Scientific Data Hub, position paper, 16 Feb 2017 <https://doi.org/10.5281/zenodo.292627>

¹⁹ Cross-border procurement of e-Infrastructure services: Opportunities, Barriers, Use cases, Best Practices, EGI-Engage deliverable, 6 March 2017 <https://documents.egi.eu/document/3013>