

HEAnet's Vision to Implement the European Open Science Cloud (EOSC) in Ireland

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Executive Summary

This paper, authored by HEAnet's Research Engagement Team, presents strategic actions for Ireland to develop its research landscape through participation in the European Open Science Cloud (EOSC), as the supporting infrastructure for Open Science, envisioned to become the “new normal” for conducting publicly funded research. The EOSC initiative offers Ireland an opportunity to advance Open Science participation, foster collaboration and as a result enhance research competitiveness at international level, by increasing research outputs and attracting talent.

Embracing EOSC provides Irish researchers with access to a network of resources, data, and expertise across Europe, fostering collaboration and innovation and it ensures researchers in Ireland remain relevant and competitive in accessing future EU funds which have been increasingly tied to the adoption of Open Science principles. Furthermore, engaging with EOSC aligns with Ireland's commitment to the European Research Area (ERA) priorities and supports the goals outlined in the National Action Plan for Open Research 2022-2030. By investing in EOSC, Ireland can ensure its continued relevance in the global research landscape and attract talent and investment to propel research excellence, as identified as pillars of Impact 2030: Ireland's Research and Innovation Strategy.

To realise the full potential of EOSC, we encourage DFHERIS to take the outlined actions, including establishing a coordination entity, addressing service gaps, and connecting national research infrastructure to EOSC. By implementing these recommendations, Ireland can ensure a vibrant research ecosystem, driving societal impact, economic growth, and innovation.

Introduction

This paper presents to Department of Further and Higher Education, Research, Innovation and Science (DFHERIS) the actions to enable Ireland to participate in the European Open Science Cloud (EOSC) and thereby to ensure the continued success and competitiveness of Irish research in an Open Science¹ context. The paper has been developed by the Research Engagement Team at HEAnet, in consultation with the Irish Centre for High End Computing (ICHEC) and the consortium of Irish Research Libraries (IREL).

We believe Ireland should invest and participate in the EOSC initiative to strengthen the research outputs of Ireland, attract talent and thus contribute to Ireland's economy and international standing. This will be achieved by providing researchers in Ireland with enhanced access to European research infrastructure, including a network of research resources, datasets, and expertise across Europe. It will also ensure that data provided by researchers in Ireland will be accessible by researchers in other countries, thus providing for their work to be cited and contributing to the impact of Irish research. It will ensure researchers in Ireland remain competitive in accessing future EU funds which have been increasingly tied to the adoption of Open Science principles². Participation in EOSC facilitates collaboration with other European countries and institutions and enhances data sharing and interoperability, supporting research and innovation for Ireland's research community. This will allow Ireland to play an active role in shaping the future of European research and innovation policies and therefore attract talent and investment to Ireland.

Open Science is one of the European Research Area (ERA) priorities which Ireland has committed to support at a national level. Supporting an ERA priority requires significant national investment and development which in the case of Open Science in Ireland has been conducted through the activities of the National Forum for Open Research (NORF). This has resulted in the publication of the National Action Plan for Open Research 2022-2030³, prepared by NORF in support of Impact 2030, Ireland's Research and Innovation Strategy⁴. An Open Research Fund, provided through the Higher Education Authority (HEA) and administered by NORF has been in place since 2022, to implement priority actions of the National Action Plan for Open Research.

¹ Open Science is also referred to as Open Research or Open Scholarship. These terms can be used interchangeably.

² European Commission commitments to Open Science began with the Open Research Data Pilot in Horizon 2020 and expanded Open Science requirements in Horizon Europe. Mandatory Open Science practices in Horizon Europe include Open Access to publications and responsible management and sharing of research data in line with the FAIR Data principles.

³ NORF. (2022). National Action Plan for Open Research. <https://doi.org/10.7486/DRI.ff36jz222>

⁴ Impact 2030: Ireland's Research and Innovation Strategy <https://www.gov.ie/en/publication/27c78-impact-2030-irelands-new-research-and-innovation-strategy/>

The National Action Plan for Open Research also seeks to align with the ambitions of the European Commission (EC) in relation to Open Science and strengthening connections to international infrastructures supporting Open Science and research data, including EOSC. NORF promotes active engagement with EOSC by supporting the contribution of Irish infrastructures and datasets to the EOSC platform, promoting EOSC resources, and supporting Irish researchers and institutions to use EOSC's system of federated data and services (NORF (2022), p. 21). By responding to this recommendation, Ireland will ensure that its developments to support Open Science remain relevant at the international level and the continued competitiveness of Irish research.

Background

EOSC is primarily concerned with developing the supporting infrastructure and services to enable Open Science as 'the new normal' by establishing and developing a web of FAIR research data; data that are Findable, Accessible, Interoperable and Reusable. The web of FAIR data will enable research data to be discoverable and usable by all researchers via the federation of national and international EOSC nodes. The web of FAIR data will be built through the federation of EOSC nodes leveraging existing investments in research infrastructure and enhancing them with the functionalities required to be part of the federation. Additional, new services may join the EOSC federation at any time.

EOSC nodes will be expected to adhere to standards and interface specifications set out by the broader EOSC initiatives funded by Horizon Europe.

The federation of EOSC nodes will consist of the following:

1. Thematic and discipline specific research data repositories, national, regional and international, such as the Digital Repository of Ireland (DRI) and the Irish Social Science Data Archive (ISSDA).
2. Multidisciplinary, generalist or institutional research data repositories
3. A centralised EOSC EU Node that will provide enabling services to support the federation of other EOSC nodes and research infrastructures such as IRLDAT⁵ and CASPIr⁶.

In November 2023⁷, the EC awarded contracts for the first EOSC node, called the EOSC EU node, to bootstrap the implementation of the web of FAIR data. The tender consisted of three lots:

Lot 1 – Core Federation Services for the EOSC EU node

Lot 2 – Exchange Infrastructure Services for the EOSC EU Node

Lot 3 – Exchange Application Services for the EOSC EU Node.

⁵ <https://www.heanet.ie/talk/irldat-shaping-the-future-of-research-data-designing-a-national-infrastructure-for-active-data-driven-research>

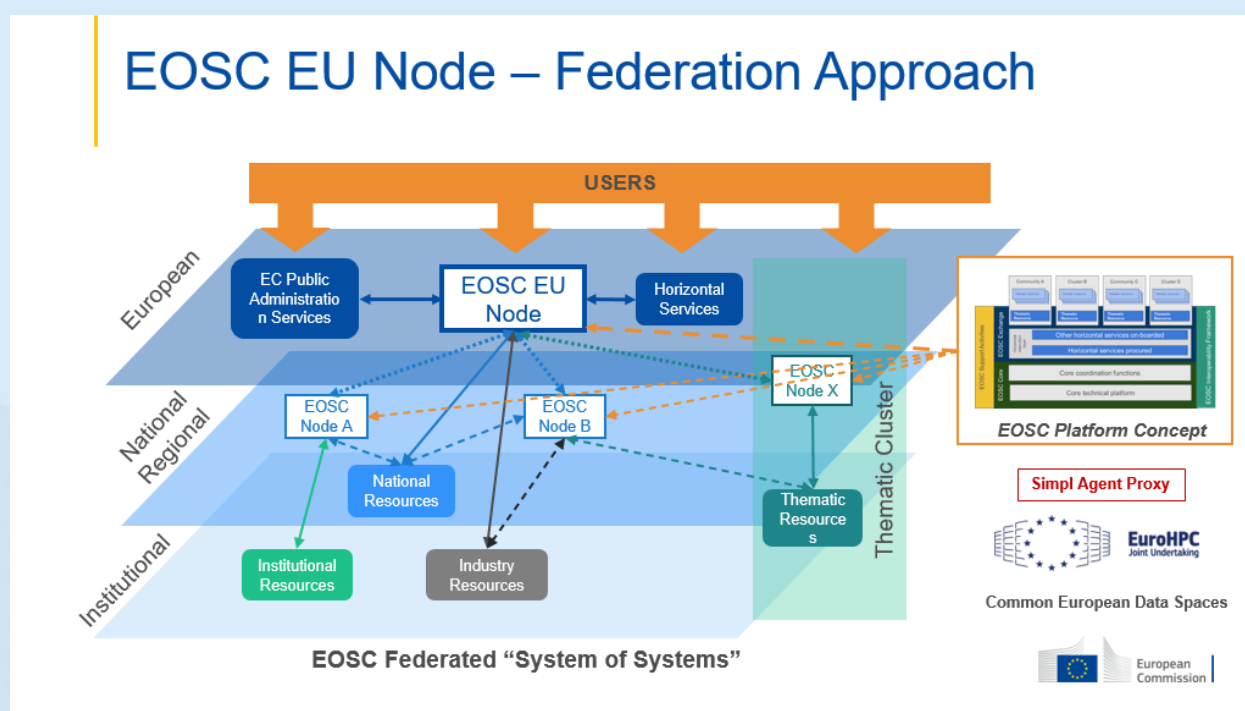
⁶ <https://www.siliconrepublic.com/machines/eu-supercomputer-nui-galway-ichec>

⁷ <https://eosc.eu/news/2023/11/european-commission-announces-results-of-the-eosc-procurement/>

The EOSC EU node is expected to be operational by summer 2024. At that point, the web of FAIR data will consist of this unique node providing enabling services for the development of the web of FAIR data.

Expectations on Ireland

Once the EOSC EU node is operational, stakeholders are expected to contribute to the development of the EOSC web of FAIR data by connecting resources such as those listed in 1-2 above to the EOSC EU node and to develop a federation of nodes.



Source: Presentation by Peter Szegedi, Launching and operating the EOSC EU Node, 26 February 2024

The NORF National Action Plan for Open Research 2022-2030 recommends that in supporting Open Science, national and institutional services and resources, such as repositories, are made available through EOSC (p21). Though not, at present, a mandatory requirement, it is an important statement. For example, the 2022 Open Research Fund Action 6: Shared Data Storage Service Pilot, received early feedback from reviewers explicitly asking how the developments related to the IRLDAT⁸ project for active research data could be connected to EOSC. IRLDAT has developed a national shared data storage service for active data, starting with a pilot for a small number of research groups with the aim to grow the service into a national service.

⁸ <https://norf.ie/shared-data-storage-service-pilot/>

Relevant initiatives in Ireland

Considering the enabling services for the web of FAIR data in Ireland, we can make the following categorisation of initiatives in Ireland:

- Mature services and resources:
 - Networking, AAI, e.g. Edugate provided by HEAnet.
 - Data-centric HPC services, e.g. CASPIr provided by ICHEC.
 - Large-scale data publication and processing services for Climate and Earth Observation datasets.
 - Irish membership of European Research Infrastructure Consortiums (ERICs), for example the Irish Social Science Data Archive (ISSDA) as Irish Service Provider to Consortium of European Social Science Data Archives (CESSDA).
 - Persistent Identifiers (PIDs) such as unique identifiers for researcher identities (ORCID) and Digital Object Identifiers (DOIs) for research outputs. Both of these are at the early stages of adoption and integration and are managed by IReL.
- Services being developed or considered:
 - Storage for active research data, current IRLDAT pilot running to Oct 2024.
 - National Persistent Identifier (PID) Roadmap⁹ is being developed by NORF together with a PID Task Force of key stakeholder representatives.
 - European Distributed Research Infrastructure for Marine Renewable Energy.
 - National Open Access Monitor (IReL).
 - Co-ordination of the development of repositories.
- Service/resource gaps:
 - A national Irish EOSC node running all minimum and necessary supporting services to support a federation of nodes.¹⁰
 - Catalogues of Irish repositories and research infrastructure services
 - Metadata services
 - Monitoring services

Considering data services such as thematic or disciplinary data repositories and/or multidisciplinary, generalist or institutional repositories the situation is more fluid. There are several national initiatives in this space in Ireland and we believe that enhancing coordination is necessary to develop a coherent national data space. To this end, efforts towards mapping and shaping the national data spaces ecosystem is underway through collaboration between ICHEC and HEAnet in partnership with stakeholders composed of data providers, researchers and data

⁹ At the time of writing the NORF PID Taskforce is engaged in consultations with the Irish research community and will launch the national PID strategy and roadmap for Ireland in June 2024.

¹⁰ Currently being defined by a joint Working Group of European Commission, EOSC-Steering Board and EOSC-Association

users. That is a separate, parallel development in Ireland, which will benefit from the recommended actions set out in this paper to enable the connection of data spaces to EOSC.

Further, there is at present no strategic nor operational co-ordination between the initiatives to bring them all together in a coherent manner.

Initiatives in other countries

Although in general many countries invest considerably more than Ireland in supporting research infrastructures and services such as storage for active research data, most European countries are in a similar position to Ireland in terms of planning for national infrastructure to support EOSC.

There are some notable leaders:

- In Croatia the University of Zagreb Computing Centre (SRCE) in cooperation with CARnet (HEAnet equivalent), have provided centralised national AAI services, compute, storage and services to support and co-ordinate Open Science¹¹.
- The Centre for Science in Finland (CSC), similarly to SRCE in Croatia, has for many years offered national services and is currently developing its national strategy to support EOSC.
- In Czechia, eInfra CZ¹² has recently been established to co-ordinate national EOSC activities and their connection to EOSC, in a similar way as is being proposed in this paper.
- Czechia (through eInfra CZ), Germany (through NFDI – the National Research Data Infrastructure) and countries in South-East Europe are involved in the **EOSC-Beyond**¹³ EU funded project (04/2024-03/2027), whose goals include the development of the federation of EOSC nodes at national, regional and thematic level.

¹¹ [Open science support | University Computing Centre - SRCE \(unizg.hr\)](#)

¹² [EOSC-in-Czechia.pptx \(live.com\)](#)

¹³ <https://cordis.europa.eu/project/id/101131875>

Recommended actions



Continue to support EOSC as a national ERA priority



Establish and fund a co-ordination entity tasked with governing and co-ordinating the implementation and operation of all necessary enabling services for EOSC in Ireland.



Fund the development and operation of the identified service gaps: catalogue, metadata, monitoring.



Establish an “EOSC-Ireland” node, providing all the enabling services to establish a web of FAIR data in Ireland. It will be governed and operated by the co-ordination entity described above.



Identify two additional use cases of data repositories (thematic/ disciplinary, multidisciplinary/ generalist, institutional) to be connected to EOSC, either directly to the EOSC EU node or to the proposed EOSC-Ireland node, and support/fund the development required for them to be connected. This will result in having a national blueprint for connecting such services to EOSC including funding requirements.



Ensure the recommendations resulting from the national PID strategy and roadmap for Ireland are funded and implemented.



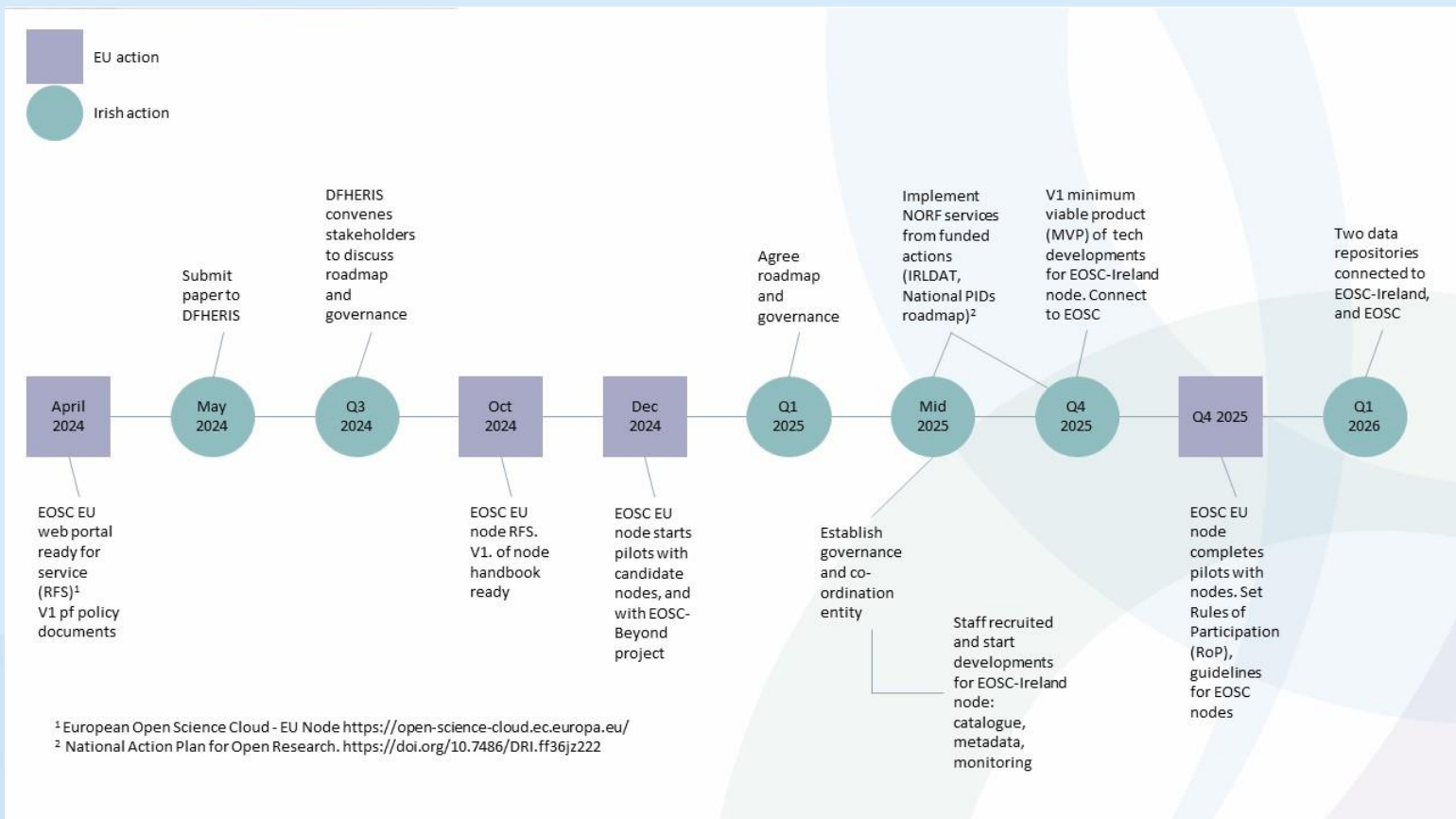
Support the NORF National Action Plan projects, such as, but not limited to, IRLDAT transition from pilot service to national production service.



Follow closely the developments of the EOSC-Beyond project to inform national developments.

Ensure alignment and linkage of existing/upcoming national research data and compute infrastructure, particularly, CASPIr, with the EOSC-Ireland node.

To achieve the above, the very first step will be for DFHERIS to convene the stakeholders in a series of workshops, seminars, and direct consultations in 2024, to socialise and agree on a roadmap for the development of EOSC in Ireland and commit the funds to address recommendations above. This stakeholder engagement plan should include a strategy for engaging with industry partners, considering their growing role in research and development.



The funding level required for the above recommendations is largely to support the personnel costs of coordinating stakeholder engagement and design of the initial deployments, as well as the technical implementation work involved in deploying the required software services. A smaller component will be required to pay for limited central computing services. It is important to note that no significant capital or operational expenditure is required for centralised data storage for the proposed national co-ordination functions.



A more precise budget will be prepared in due course but as an initial estimate, at a minimum 1 full-time equivalent (FTE) for project management and stakeholder engagement as well as 2 FTEs for technical implementation would be required to get the project off the ground for the first 2 years. These human resources will be hosted by the identified co-ordination body or as otherwise defined by the stakeholder engagement process.

This funding will enable a minimal viable service to support EOSC in Ireland, and will need to be complemented by funding to support the recommendations above for which specific funding proposals are under development as per the NORF planning.

Conclusion

The development of the European Open Science Cloud presents Ireland with an opportunity to strengthen its research landscape within the framework of open science. Through collaboration and strategic investment, Ireland can position itself at the forefront of research and innovation, leveraging the wealth of resources and expertise offered by EOSC. As outlined in this paper, the actions proposed by HEAnet, in consultation with key stakeholders such as ICHEC and IREL, signify a proactive approach towards realising the full potential of EOSC in Ireland.

By embracing EOSC, Ireland can foster greater collaboration both domestically and internationally, enhance data accessibility and interoperability, and contribute to shaping the future of European research and innovation policies. Moreover, aligning with the objectives of the ERA priorities underscores Ireland's commitment to Open Science and its dedication to driving research excellence.

Moving forward, it is imperative for Ireland to implement the recommended actions, establish necessary coordination mechanisms, and commit the requisite funding to ensure the successful integration of EOSC into the national research infrastructure. Open Science is envisioned to become the “new normal”, supported by EOSC infrastructure, hence Ireland’s commitment to support EOSC nationally will ensure that researchers in Ireland will remain relevant and competitive in accessing EU funds. Through concerted efforts and strategic foresight, Ireland can harness the transformative power of EOSC to propel its research ecosystem towards greater competitiveness, relevance, and impact on the global stage.

Glossary of terms

AAI	Authentication and Authorisation Infrastructure. Edugate is an implementation of AAI, HEAnet's federated single sign-on (SSO) service.
CASPIr	Ireland’s new Supercomputer hosted by ICHEC
CESSDA	CESSDA - the Consortium of European Social Science Data Archives - provides large-scale, integrated and sustainable data services to the social sciences.
Data Space	A distributed system defined by a governance framework, that enables trustworthy data transactions between participants while supporting trust and data sovereignty [https://dataspace.supportcentre.refined.site/space/Glossary/176554052/2.+Core+Concepts]
DOI	A Digital Object Identifier (DOI) is a type of persistent identifier (PID). They are commonly used for research publications, data and other research outputs.

DRI	The Digital Repository of Ireland (DRI) is a certified trusted digital repository that provides long-term preservation and access to Ireland's humanities, cultural heritage, and social sciences data.
EOSC	European Open Science Cloud
ERA	The European Research Area is the ambition to create a single, borderless market for research, innovation and technology across the EU.
ERIC	European Research Infrastructure Consortium
FAIR	FAIR data are data which meet the FAIR data principles of Findable, Accessible, Interoperable and Reusable. These principles have been widely adopted by researchers, research performing organisations and research funding organisations, including the European Commission.
FTE	Full Time Employee
HEAnet	HEAnet is Ireland's National Research and Education Network, delivering high-speed internet connectivity and ICT shared services to all levels of the Irish education sector.
ICHEC	The Irish Centre for High-End Computing (ICHEC) at the University of Galway is Ireland's national centre for High-Performance Computing (HPC) providing e-infrastructure, services and expertise to academia, industry and the public sector supported by the Department of Further and Higher Education, Research, Innovation and Skills and the Higher Education Authority.
IReL	IReL is a consortium of Irish research libraries, providing access to licensed e-resources, OA publishing agreements, and open science infrastructure.
IRLDAT	IRLDAT is a project funded under the 2022 Open Research Fund to develop a national shared data storage service for active data, starting with a pilot for a small number of research groups with the aim to grow the service into a national service
ISSDA	The Irish Social Science Data Archive (ISSDA) is Ireland's leading centre for quantitative data acquisition, preservation, and dissemination. Based at UCD Library, its mission is to ensure access to quantitative datasets in the social sciences, and to advance the promotion of international comparative studies of the Irish economy and Irish society.
National Open Access Monitor	A National Open Access Monitoring action of the NORF 2022 Open Research Fund to develop a monitor for open access at the national level, initially through pilot reports and a national dashboard to publish, analyse and track progress towards 100% open access, led by IReL.
NORF	The National Open Research Forum was established in 2017 to drive the Irish agenda for Open Research and is funded by the Department of Further and Higher Education, Research and Innovation and Science through the Higher Education Authority (HEA).
ORCID	An ORCID is a type of persistent identifier (PID). They are commonly used for researchers and contributors to research.
PID	Persistent identifiers (PIDs) are long-lasting, globally unique identifiers for people (researchers), places (research organisations), and things (research outputs and grants).
RI	Research Infrastructure. In general, RI refers to equipment, services, human resources researchers avail of to conduct and support their research. In the context of EOSC, RI refers primarily to digital infrastructure and services complemented by human resources.

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