

Inspired

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news from the EGI community



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Welcome to issue 35! #backtoschool

This edition of the newsletter is focused on news about projects, use cases and collaborations.

Your feedback and suggestions are always welcome!

Send an email to the EGI communications team at: press@egi.eu



How EGI contributes to the European Open Science Cloud

Tiziana Ferrari gives an overview of EGI's participation to EOSC

The idea of a European Open Science Cloud (EOSC) took shape in 2015, when the European Commission announced their vision for a “trusted environment for hosting & processing research data to support EU science in its global leading role.”

The EOSC is now becoming a reality as Europe's virtual environment for all researchers to store, analyse and re-use data for research, innovation and educational purposes.

A brief history of EGI & EOSC

The notion of a distributed infrastructure offering advanced resources and services for data-intensive processing in research and innovation has been part of the EGI mission & vision since the EGI design and implementation that started with the DataGrid project back in 2000 under the leadership of CERN.

Distributed processing of data supported by a pan-European broadband network infrastructure, solutions for trust and identity management & the Grid middleware, have been the enablers of two Nobel prizes in Physics (2013 & 2017), and many more data-driven scientific discoveries in

high energy physics, astronomy and astrophysics, health and medicine, and earth sciences resulting in over 3,000 open access scientific publications enabled each year.

After 15 years of operational activities and more than 71,000 users, the EGI Federation is facing a growing demand of data-centric distributed computing solutions for exabyte scale data analytics. **Utilisation is growing at the annual rate of +20%, with more than 5 Billion CPU hours consumed in the last 12 months.** Bioinformatics, neuroinformatics, and computational structural biology account for 34% of the EGI users.

The Photon & Neutron community with the support of the PaNOSC project, is piloting Jupyter Notebooks integrated with federated Cloud and data management services. Earth sciences is the most active scientific community in the EGI Federated Cloud, benefiting from the co-location of large data holdings and IaaS, PaaS and SaaS Cloud services accessible through Check-in.

LifeWatch, EMSO & the Agrifood communities are examples of

initiatives that are embracing the distributed Cloud paradigm.

EGI has been supporting open science by enabling sharing of data, by federating peer digital infrastructures in North & South America, Africa and Arabia, and the Asia Pacific regions with Europe, and by supporting open access to a rich portfolio of scientific data analytics tools.

With this legacy, EGI contributed to the position paper **European Open Science Cloud for Research** with EUDAT, LIBER, OpenAIRE and GÉANT, making the case for the eight critical elements of EOSC success: open, publicly funded & governed, research-centric, comprehensive, diverse & distributed, interoperable, service-oriented and social.

In 2017, EGI endorsed the EOSC Declaration and signed up to the principles of openness and FAIRness that underline the EOSC vision. Specifically, the EGI participants committed to support the EOSC implementation, contributing to best practices & offering advanced compute services for research & innovation.

In 2018, the EOSC-hub project took off the ground as a joint

effort of EGI, EUDAT, Indigo-DataCloud and major European research infrastructures to create the Hub: the federating infrastructure, processes & policies to integrate data, research outputs and services in EOSC. That same year, the EOSC was officially launched and the EOSC Portal was inaugurated, with the EOSC-hub Marketplace as a core functionality offering European researchers & innovators to discover, access, use and reuse a broad spectrum of resources for advanced data-driven research.

EGI, EOSC-hub & the EOSC Portal

The services provided by the EGI Federation are at the heart of the EOSC-hub project.

EGI's providers contribute to the delivery of the compute & data analytics tiers of EOSC which provide the hosting environment for a portfolio of data analytics services that address the specific needs of scientific communities. For example, EGI's Cloud Compute, High-Throughput Compute and Data Transfer services support the EPOS-ORFEOS CC in their mission to facilitate Earth Science in Europe. The Radio-Astronomy CC uses EGI's Cloud Compute and Check-in services to support LOFAR, a large radio telescope network. The Marine Competence Centre and ICOS RI both use Cloud Compute and Notebooks services in their activities.

EGI also supports thematic services in EOSC-hub - the DARIAH Science Gateway, ENES Climate Analytics & OPENCoastS Portal.

The EOSC Digital Innovation Hub (DIH) in its mission to bring private companies & SMEs into the EOSC has been boosting the EGI business programme demon-

strating how innovative companies can benefit from EOSC and e-Infrastructure technical support & services. Six DIH business pilots stand as success stories & use EGI Cloud Compute services. The EGI service catalogue is fully available through the EOSC Marketplace, serving an even wider user base.

The EOSC federating core will leverage the experience and knowhow of EGI's partners in providing solutions and activities like federated AAI, accounting & monitoring, security policies & coordinated cross-infrastructure incident management.

EGI is also contributing to the Rules of Participation & technical interoperability guidelines with harmonized cross-infrastructure security policies & interoperability guidelines for federated Compute, Data Management and AAI.

More EOSC-related projects and collaborations

In 2018, EOSC-hub signed collaboration agreements with GÉANT and OpenAIRE-Advance to reinforce common ambitions for Europe as a leader in digital & open science via its e-Infrastructures.

EGI is actively supporting the PANOSC and the ExPaNDS projects aiming to contribute to the realisation of a data commons for neutron & photon science in the EOSC landscape, offering technical support and service provisioning via the EGI Federated Cloud, the Notebooks and the Data Transfer services, as well as coordinated user support. EOSC-Synergy successfully kicked off its activities – under the coordination of IBERGRID and the active participation of the NGLs from Czech Republic,

Germany, Poland, Slovakia, the Netherlands and UK. The EOSC-Nordic, EOSC-Pillar, NI4OS-Europe and ExPaNDS projects represent other national opportunities for consolidation in the EOSC landscape.

What's in store for the future?

In the last 15 years, EGI demonstrated the key role of scientific computing & its role as necessary instrument of scientific excellence and open science in Europe.

EOSC will push the evolution of EGI from a HTC infrastructure, to exabyte scale hybrid HTC & HPC infrastructure supporting cloud IaaS, PaaS, SaaS access, increasingly integrated with the capabilities of EUDAT, GEANT and OpenAIRE, and the data and applications from research infrastructures of pan-European relevance.

The provisioning of increasingly integrated and interoperable services will be a key milestone for the implementation of EOSC and the support of European excellence in science.

More information

Tiziana Ferrari is the Technical Director of the EGI Foundation and the Project Coordinator of EOSC-hub.

EOSC-synergy: expanding capacities and building capabilities

Isabel Campos and Jorge Gomes explain how the project will add value to the European Open Science Cloud



The **EOSC-synergy project** was selected for funding on the Horizon 2020 EINFRA-EOSC-5(b) call. The main objective is to extend the EOSC coordination in the project's nine participating countries by harmonising policies and federating national research e-Infrastructures, scientific data and thematic services, bridging the gap between national initiatives and the EOSC.

The team is composed of experts from leading research organisations, infrastructure providers, NRENs and user communities from Spain, Portugal, Germany, Poland, Czech Republic, Slovakia, Netherlands, United Kingdom and France.

The consortium is fully committed to the EOSC vision and already involved in related activities at national and international level. And, equally important, the team has a track-record of joint work in previous initiatives, dating back to pioneer reference e-Infrastructure distributed computing projects, that consolidated as the EGI Foundation.

What will we do?

EOSC-synergy will add new capabilities to EOSC by opening national thematic services to European access, expanding the EOSC offer in the Environment, Climate Change, Earth Observation and Life Sciences. This will be supported by an expansion of the capacity through the federation of compute, storage and data resources aligned with the EOSC and FAIR practices.

Examples include services for:

- the detection of the coastlines changes, coastal inundation areas and inland waterbodies.
- modelling dust transport in the environment.
- for analysis of water network distribution for on-line analysis of toxics in drinking water supply.
- new analysis tools that access Climate Data Archives.

And also, more data repositories, such as:

- the repository of the Latin American Giant Observatory (LAGO).
- the United States Geological Survey (USGS) LANDSAT data repository.
- the Polish AMU Nature Collections with two million records on animals, plants and fungi.
- datasets about seismic activity in the Iberian Peninsula.

EOSC-synergy will also actively build the EOSC compute and storage capacity with the integration of national resources from the participating countries to the scale of:

- thousands of cloud compute cores, and -
- dozens of petabytes for storage.

Software Quality and Training

The consortium has as solid background in software development, built over many years of development, deployment and support to a wide range of scientific communities.

The core consortium partners are part of the INDIGO-Datacloud Software Collaboration Agreement, and thus share a long history of cooperation in developing production-level software to support science needs.

EOSC-synergy will also increase the quality standards of the scientific applications integrated in EOSC. This will be done by implementing a quality-driven approach to service integration that will promote the convergence and alignment towards EOSC standards and best practices. This will be complemented by the expansion of the EOSC training and education capabilities through the introduction of an on-line platform aimed at boosting the development of EOSC skills and competences.

EOSC-synergy complements ongoing activities in EOSC-hub and other related projects liaising national bodies and infrastructures with other upcoming governance, data and national projects.

Isabel Campos and Jorge Gomes are the project coordinators of EOSC-synergy.

www.eosc-synergy.eu

Feedback on the integration of the UNIV-LILLE resources into the EGI Federated Cloud

Cyrille Toulet shares his experiences



The High-Performance Computing Center of the University of Lille, registered in the EGI GOCDB as UNIV-LILLE, provides researchers several services, such as a cloud computing facility based on OpenStack. UNIV-LILLE is a member of the FG-Cloud, the federated cloud operated by France Grilles (French NGI), together with the several other sites such as CC-IN2P3, GRIF or IN2P3-IRES.

We have recently completed the integration of UNIV-LILLE resources into the EGI Federated Cloud, becoming the second French site to join this federation.

From 2010 to 2014, the UNIV-LILLE site was certified as a grid resource provider and member of the EGI High-Throughput Computing service. Those nodes were decommissioned following the departure of the engineer in charge of operations. As a consequence, the UNIV-LILLE site was decommissioned, and we were required to restart the certification process to integrate the EGI cloud federation.

The registration of the resource center was an easy step, but the certification of our EGI-enabled services was more complicated.

The process started in October 2018 and took about 5 months.

The main barriers that we faced during the integration process were:

- some losses in new documentation (we had to search back into the history of the EGI wiki to find the missing parts)
- broken synchronization procedures between EGI core services like GOCDB and ARGO-MON
- prohibited access to the image list service (AppDB)
- monitoring probes version mismatch between different ARGO-MON instances.

From this experience, we can recommend the following to anyone considering integration:

- **Contact your NGI** at the first day to discuss about integration procedure and get help or feedback from other certified resource centers. Even if their integration is a little outdated, their experience can get you out of several blocking situations.

- **Participate in a training on the basics of EGI Operations** in order to fully understand all the steps of integration. Having an overview of how the services are linked will allow you to solve any configuration problems.

- **Follow the manual integration procedure at least one time** instead of directly use the Federated Cloud Appliance. Installing and configuring each service manually will allow you to maintain these services.

- **Don't wait too long before asking for help** by submitting a

ticket to GGUS when you encounter an issue. Whether you are a beginner or an experienced system administrator, there may be technical issues unrelated to your actions. So don't spend too much time to find for a fix on your site, the solution may be elsewhere.

During the certification process, 8 GGUS tickets have been opened, all of them concerning different issues. Thanks to the EGI team, most of them were quickly solved. Our integration helped to highlight some gaps in documentation and improve the overall process.

Despite these difficulties, the integration to the Federated Cloud remains an easy and well thought operation and we hope to see more resource centers joining the federation.

More information

Cyrille Toulet is the UNIV-LILLE System and Network Administrator.

UNIV-LILLE website:

hpc.univ-lille.fr

The pay-for-use model within EGI

Sy Holsinger updates us on the process

Back in 2013, the EGI Council endorsed a thought experiment on how a pay-for-use model could be implemented and users could be billed for their usage of EGI resources.

Since then, evolution has gone from running a proof of concept involving 30 providers from 12 countries, investigating legal and policies issues & defining pricing to adapting tools such as the accounting portal & drafting agreements and relevant documentation. One of the biggest questions at the time was that, even if we were able to define and implement such as system, were there use cases within the research community?

Over the last several years, there has been a shift in the way the physical resources are being funded that has presented some challenges for the federation.

At the same time, this has led to opportunities from a pay-for-use perspective, as providers have needed to change what they need from the federation from "bringing users" to "bringing funding".

For the last two years, EGI has been maturing its processes via an EC H2020 project, NextGEOSS, where a dedicated budget was allocated to the EGI Foundation to ensure support for a number of pilots with yet unknown technical requirements. This meant that the EGI Foundation would need to serve as a broker, identifying the relevant

providers during the project and managing all finance and administration aspects. This model also had a positive impact on the providers as they would need to be able to associate costs of those services (and be able to invoice EGI Foundation).

There are pros and cons to such a model as from the provider perspective - being formally included as a project consortium member offers more visibility and recognition from local authorities, however, is not always favoured by coordinators that by needing the EGI Federation services, it comes with a list of multiple providers that increases administration overhead.

By having a formal redistribution method of funding, providers can be reimbursed for the services they offer, with the flexibility for project coordination.

This approach has since been reused with the EOSC-hub project as a mechanism to reimburse service providers for supporting additional use case requests that come during the project i.e. industry pilots via the EOSC Digital Innovation Hub.

What has not changed is that any pay-for-use model will still only complement the current practice of researchers accessing resources that are free at point of use (sponsored access), which were paid upfront by funding agencies. Resource providers have the flexibility to 'opt-in' for those who are able



and willing to participate in the pay-for-use model.

Future activities are planned to expand the provider pool beyond only the handful of providers that are taking advantage and better understand any blocking issues; reduce overhead between initial contact and service delivery; increase transparency through clear price listings, better defined procedures, guidelines and selection criteria; evolve accounting systems; and conduct a study on the potential of setting up a commercial arm of EGI.

If you are interested in participating in the EGI Pay-for-Use Working Group or have any questions, please contact: business@egi.eu

More information

Sy Holsinger is Senior Strategy and Policy Officer at the EGI Foundation.

Serverless computing for data-processing applications in EGI

Germán Moltó introduces the new OSCAR platform

The problem: event-driven scientific computing

Serverless computing, in the shape of Functions as a Service (FaaS) platforms, has paved the way for event-driven computing as a computational mechanism to process short-lived functions in response to events (such as HTTP requests or file uploads to a storage back-end).

Main open-source serverless platforms such as OpenFaaS, OpenWhisk and KNative are focused on processing bursts of short-lived HTTP requests via functions coded in certain programming languages, providing elasticity in terms of the number of containers started to simultaneously process the requests.

However, scientific applications are commonly more resource intensive, require longer execution times and can benefit from the auto-scaling of the underlying computational infrastructure in order to better cope with increased workloads.

The solution: OSCAR serverless computing platform

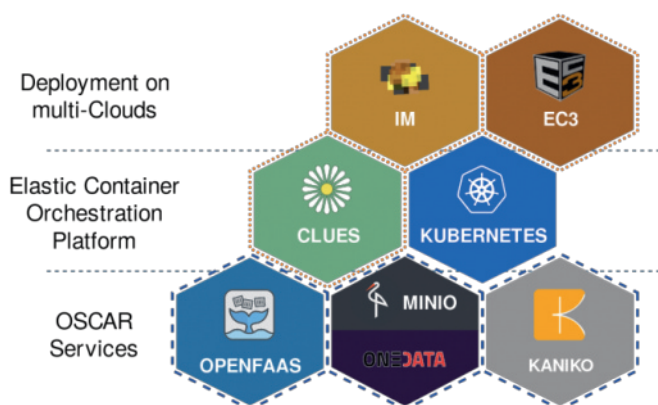
To this aim we developed OSCAR, an open serverless computing platform for data-processing applications. OSCAR consists of several services that are deployed on an elastic Kubernetes cluster.

The cluster is then deployed via EC3, which uses the Infrastructure Manager to provision the cluster on multi-clouds.

OSCAR uses MINIO as the storage back-end so that files uploaded trigger events that are

captured by the OpenFaaS serverless platform responsible to execute the user-defined functions. Requests are transformed into Kubernetes jobs to accommodate long-running executions. This allows scientists to easily couple their file-processing applications to a storage area so that whenever files are uploaded, a function is invoked to simultaneously process the files. Output data results automatically appear in the same storage area.

OSCAR has been integrated with several EGI services. First, the EGI Applications on Demand, in particular the EC3 portal, can be used to perform the provision of the elastic Kubernetes cluster on the EGI Federated Cloud. Second, the EGI Data Hub can be employed to use Onedata as the source of events to trigger the execution of the OSCAR functions in response to file uploads. This means that users with an EGI account can self-deploy an elastic OSCAR cluster and create their file-processing applications in response to file uploads to their EGI DataHub Onedata space.



Components of the OSCAR serverless platform.

Benefits for scientists: integration with EGI

Use case: plants classification

A use case arising from the DEEP Hybrid DataCloud project that involves plants classification using deep learning techniques has been integrated with the OSCAR platform. This application uses a neural network optimised for plant identification using images. This use case can be followed step-by-step (see video), – an OSCAR cluster is deployed and a function is created to process the plants images whenever uploaded to a Onedata space. Then, the Kubernetes cluster is scaled in the EGI Federated Cloud to simultaneously execute multiple plants recognition. Additional use cases are available in the GitHub repository.

More information

Germán Moltó is Associate Professor at the Universitat Politècnica de València (UPV).

How EGI and the Helix Nebula Science Cloud project collaborate for science

Massimo Rizzi explains how EGI and the voucher scheme introduced by the HNSciCloud project supported his research work

Currently, there are no drugs which can be used for preventing the development of epilepsy in patients exposed to risk factors such as brain injuries or infections of the central nervous system. In order to foster the development of new treatments, it is important to identify indicators (biomarkers) of the time window during which uncovered mechanisms lead the brain to develop epilepsy – a period called epileptogenesis. These biomarkers refer to one or more measurable events that: 1) are early factors predictive of the emergence of epilepsy and 2) vary depending on the severity of the illness.

These biomarkers could be exploited for the development of disease-modifying therapies in individuals exposed to risk factors. The success of such therapies would reduce the incidence of epilepsy.

The main goal of our investigation is to identify a marker of epileptogenesis in the brain electrical activity, as measured by the Electroencephalogram (EEG) – an assessment tool used for epilepsy investigations. We have recently shown that the brain electrical activity following the exposure to a risk factor is characterised by the emergence of specific patterns of behavior. This aspect may be exploited to identify one or more markers of epileptogenesis and we are investigating such possibilities.

To this aim, EEG tracings are

analysed by the Recurrence Quantification Analysis (RQA) tool – a mathematical tool suitable for detecting and quantifying specific behaviors of brain electrical activity embedded in noisy time-series, such as the EEG. Several steps are involved in the implementation of the RQA, some of which are computational intensive.

A contribution to support this activity is the recent integration of the Elastic Cloud Computing Cluster (EC3), operated by the Polytechnic University of Valencia (UPV), with the HNSciCloud vouchers to access commercial cloud providers provided by Exoscale. The voucher scheme was proposed by Exoscale, the IaaS computing resources for the RHEA Cloud platform, as a result of the collaboration with the HNSciCloud Pre-Commercial Procurement (PCP) project. Thanks to this integration, users of the Mario Negri Institute in Milan were able to allocate the resources needed to configure the cluster to analyse the EEG with the RQA mathematical tool. Fully-dedicated high-performing CPUs strongly contribute to reduce the calculation times in implementing the RQA of EEG tracings, so that long-running jobs that normally take months to complete can be accomplished in a matter of days. This allows researchers to get results much quicker and to increase the amount of information gained by the analyses.

Thanks to EGI, the voucher scheme offered by the HNSciCloud PCP project and the EC3 framework, we already planned to enrich our investigation by using further analytical tools. In the future, we hope to significantly improve our understanding of mechanisms leading to the development of epilepsy and to discover new approaches of prevention.

Do you want to use a HNSciCloud voucher for your own research?

HNSciCloud has made a number of Exoscale vouchers available to EGI to support the work of researchers.

- Access the EOSC Marketplace - marketplace.eosc-portal.eu.
- Select Elastic Cloud Compute Cluster from the list of services.
- Place an order requesting access to the service using one of the available HNSciCloud vouchers.
- When the service request is approved you will be notified by email.
- Service orders are usually processed in three working days.

More information

Massimo Rizzi is a researcher of the Department of Neuroscience at the Mario Negri Institute for Pharmacological Research.

The new AARC Blueprint Architecture

Elis Bertazzon on a new AARC functionality for research collaborations

EGI was one of the major contributors of the AARC project, the EU-funded initiative that answered the increasing need among research collaborations and e-infrastructures for authentication and authorisation mechanisms and for federated access to their online services.

After 4 years, the project has come to an end but its main outputs are already having a positive impact on the research community, and some AARC-based solutions have been adopted by EGI, EUDAT, GEANT and the EOSC.

The Blueprint Architecture: a “community-first” approach

AARC Blueprint Architecture (BPA) is a reference architecture that provides “building blocks” for an AAI that supports federated access. Research and e-infrastructures adopting the BPA can take advantage of the identity federations & eduGAIN and enable federated access to resources in a way that was not possible before.

The new version of the BPA focuses on allowing the AAI of different research and e-infrastructures to inter-operate. This functionality is needed by research communities requiring access to resources that are offered by other infrastructure providers. The new BPA promotes a “community-first” approach, introducing the Community AAI. This element streamlines how researchers can access services via their Community AAI using their institutional credentials from the

National Identity Federations in eduGAIN, but also from other sources as needed by the community, such as social media or other community-managed identity providers.

The new version of the AARC BPA focuses on the cross-AAI interoperability aspects and provides a broader view for addressing an increasing number of use cases from research communities requiring access to federated resources offered by different infrastructure providers.

The BPA is proving to be a success and it has been adopted by EGI, EUDAT and GEANT, and provides a cornerstone AAI in the European Open Science Cloud. Also, several research infrastructures are adopting BPA-based solutions, including DARIAH, the pan-European infrastructure for arts and humanities scholars working with computational tools.

EGI and DARIAH: interoperable thanks to AARC

The challenge for DARIAH was to make their AAI interoperable with other e-Infrastructure services to allow, for example, a DARIAH researcher to access the Cloud Compute service offered by the EGI Federation without a new set of log in details and with the necessary authorization attributes managed by DARIAH. The BPA provided a set of software building blocks that allowed DARIAH to connect Identity Providers (IdPs) and Service Providers (SPs) through a centralized proxy. AARC also provided guidelines for interoperability between multiple



infrastructures, in this case the community AAI of DARIAH and the e-Infrastructure of EGI.

A legacy for years to come

Find out more and
#StartWithAARC:
bit.ly/startwithaarc

The AARC Blueprint Architecture, Policy Development Kit (a toolbox of information, template documents, training materials and guidelines) and ‘AARC in Action’ collection of case studies give a head start to anyone who is seeking an Authentication and Authorisation Infrastructure (AAI) solution for their research collaboration.

More information

Elis Bertazzon is part of the AARC project communications team.

EGI signs MoU with Shanghai Science and Technology Innovation Resources Center

We are pleased to announce that the EGI Foundation and Shanghai Science and Technology Innovation Resources Center (SSTIR) signed a Memorandum of Understanding.

Shanghai Science and Technology Innovation Resources Center (SSTIR), is based in Shanghai and supports a platform promoting technologic resources and research data sharing.

Through this MoU, the EGI Foundation will support SSTIR in the design and construction of the Yangtze River Delta United Cloud Platform. The support envisaged includes consultancy on building a cloud federation and management platform, as well as provisioning of tools and services for the users (SaaS).

The mutual interest in building and operating cloud federations for science and research brought together the two parties.



The request for help reached EGI via the EOSC Portal, demonstrating the visibility and power of the EOSC Portal connecting communities even across continents.

Gergely Sipos, Customer and Technical Outreach Manager at the EGI Foundation, says: "This collaboration is a great opportunity to further demonstrate EGI's expertise in connecting cloud resources from multiple institutes, and to enable access to distributed communities for big data analysis. We believe that the technologies and components

that enable the EGI Cloud Compute service and higher level services on top - such as EGI Notebooks - will prove their usefulness among the communities in the Shanghai region. The MoU also enables EGI to strengthen its ties and visibility in China and in Asia in general."

Zhu Yue, head of SSTIR, says: "EGI will help us to strengthen our capability of serving the research institutions and innovative companies in their own transformations."

The 2nd call for the EOSC Early Adopter Programme is open!

The EOSC-hub project invites researchers and research communities that require the combined use of multiple services and resources to apply to the 2nd call of the EOSC Early Adopter Programme.

The deadline for applications is 15 October 2019, 18:00 CEST.

The services and resources in scope for the programme are those currently provided by the EOSC-hub project and its partners OCRE, OpenAIRE, GÉANT.

Why the EOSC Early Adopter Programme?

- To train and support researchers on the usage of the resources and services made available by EOSC-hub and partners via the EOSC marketplace and the OCRE project;
- To get insight into digital needs of researchers & their use cases;
- To foster a culture of collaboration between researchers and EOSC service service providers (EOSC-hub, Open-AIRE, OCRE, GÉANT).

- To foster confidence in the capability and capacity that will be provided via the EOSC.

How to apply

Interested parties are requested to fill an online application form on the EOSC-hub website:

www.eosc-hub.eu/early-adopter-programme-application-form