The EPOS - ORFEUS Competence Centre in EOSC-hub

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EPOS contributes to the realisation of the European Open Science Cloud also by participating in the EOSC-hub project. EOSC-hub brings together multiple service providers to create the Hub - an integration and management system of the future European Open Science Cloud. The Hub can be seen as an access and delivery channel for services, software and data provided by e-Infrastructures and research communities across Europe. The Hub will be grounded on mature processes, policies and federated tools.

For researchers, the Hub will offer the possibility to discover, compare, order, request access to and support for services and products. Those functionalities will be enabled in a secure environment accessible by using their own institutional credentials. This will include compute capabilities (e.g. High-Throughput Compute and Cloud) and mechanisms and tools to store, access and manage data. The Hub will also provide access to a broad spectrum of analytic tools (Thematic Services) covering a wide range of scientific domains: Humanities, Engineering, Medical and Health Sciences and Natural Sciences. Sponsored access will be offered thanks to EC project funding and in-kind contributions of the participating providers.

For example: A team from Italy is pioneering a way to produce high-quality, carbon-neutral methane gas using industrial waste carbon dioxide with High-Throughput Compute resources provided by the EGI Federation. (Case study: Clean methane from recycled carbon dioxide).

For the research communities driving the scientific progress in Europe (e.g. Research Infrastructures and large research collaborations), the Hub will be a mean for them to expose their service catalogues to their user communities. This will also give them the opportunity to expand their user base and build a stronger case for their sustainability.

For example: The European Network for Earth System Modelling, or ENES, is promoting the ENES Climate Analytics Service (ECAS) and a related user-oriented virtual research environment called “ECAS
Lab” as a Thematic Service of EOSC-hub. The service enables scientific end-users to perform data analysis experiments on large volumes of research data from multiple disciplines.

EOSC-hub also supports established research communities with demanding computational challenges as Competence Centres. For example, the EPOS-ORFEUS Competence Centre will improve EIDA’s service offering with components from the EOSC-hub catalogue (www.eosc-hub.eu/catalogue).

The EPOS-ORFEUS CC empowers users by establishing an enhanced service platform for seismological research. Data centres can define and share data management policies. Secure access to data and compute resources underpins users’ services. Researchers can discover data and initiate staging onto computational platforms, they can encode analysis methods into components, deploy and execute them close to data. The platform integrates services from the EOSC-hub catalogue (www.eosc-hub.eu/catalogue) with community services.

Four partners of the seismological community (ORFEUS-EIDA), are actively engaged in the EOSC-hub project, namely KNMI, GFZ, INGV and NOA. They contribute EPOS’ requirements and are in charge to develop and establish the EPOS-ORFEUS Competence Centre (CC).

The EPOS-ORFEUS CC focuses on four main use cases (see Figure 1*) and aims to:

- Establish a federated AAI system – this activity has already produced a system to manage authorisation and authentication of ORFEUS-EIDA users and it will be soon integrated in the operational data services (e.g. FDSN Dataselect, Station WS).
- Offer effective ways to stage data and make them available for computation – it relies on persistent identifiers (PIDs) and domain specific metadata catalogues.
- Enable user defined analysis in the cloud – it exploits container technology to encapsulate analysis methods and transform them into components deployable close to data.
- Promote and support shared policies for data management – it provides mechanisms to define and share best practices to manage data.

By leveraging the experiences and the results acquired in the EUDAT projects the EPOS-ORFEUS CC will investigate the technical and organisation feasibility of the solutions offered by EOSC. It will pioneer processes and agreements for service provisioning by contributing the requirements of the EPOS community.

The final goals can be summarised as follows: to offer enhanced services to the users by integrating well-established community developments with advanced components and resources of EOSC; to promote knowledge and expertise sharing; and to support the use...
of FAIR principles for data and software.

In this way the EPOS-ORFEUS-CC will provide a valuable contribution to build the distributed part of the EPOS Integrated Core Services (EPOS ICS-D), that is to say external services that can be used and managed by the main EPOS integration node, i.e. Integrated Core Services. EPOS-ICS-D.

The EPOS-ORFEUS CC represents a first programmatic solution to allow EPOS sharing services with EOSC-hub, jointly feeding the service portfolio, and it will certainly foster interoperability between the EPOS infrastructure and EOSC.

*Caption Figure 1 - The EPOS-ORFEUS CC. Use cases in EOSC-hub

The EPOS-ORFEUS CC empowers users by establishing an enhanced service platform for seismological research. The EPOS-ORFEUS CC focuses on four main use cases:

- **Policies**: data centres can define and share data management policies.
- **Discover & Stage**: researchers can discover data and initiate staging onto computational platforms.
- **Define & Generate**: they can encode analysis methods into components, deploy and execute them close to data.
- **Authenticate, Authorise and Identify**: secure access to data and compute resources underpins users’ services.

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