

Conference paper

Implementation of the European Plate Observing System (EPOS) Infrastructure

Introduction

Earth science monitoring systems are distributed across Europe and the globe and measure the physicochemical characteristics of the planet under different geological regimes. The European Plate Observing System (EPOS) aims at creating a multidisciplinary pan-European data infrastructure for solid earth science to support a safe and sustainable society.

In accordance with this scientific vision, the mission of EPOS is to integrate the diverse and advanced European Research Infrastructures for solid earth science relying on new e-science opportunities to monitor and unravel the dynamic and complex earth system. EPOS aims to enable innovative multidisciplinary research for a better understanding of the earth's physical and chemical processes that control earthquakes, volcanic eruptions, ground instability and tsunamis as well as the processes driving tectonics and earth's surface dynamics. EPOS will improve our ability to better manage the use of the subsurface of the Earth. Through integration of data, models and facilities EPOS will allow the earth science community to make a step change in developing new concepts and tools for key answers to scientific and socio-economic questions concerning geo-hazards and geo-resources as well as earth sciences applications to the environment and to human welfare.

EPOS brings together 24 European nations and combines national earth science facilities, the associated data and models together with the scientific expertise into a single e-infrastructure covering the whole geoscience domain and connects ten classes of geo-infrastructures, which have until now been handled separately, thus enabling an unprecedented level of scientific integration. This infrastructure will allow the earth sciences to achieve a step change in our understanding of the planet; it aims to enable us to prepare for geo-hazards and to responsibly manage the subsurface for infrastructure development, waste storage and the use of earth's resources.

With a European Research Infrastructure Consortium (ERIC) to be located in Rome (Italy), EPOS will provide an opportunity to maintain world-leading European earth sciences and represent a model for pan-European federated infrastructure currently being developed as 'FAIR Principles' for research data: Data should be Findable, Accessible, Interoperable and Re-usable (FORCE11, Wilkinson et al. 2016).

The EPOS architecture

The EPOS architecture is composed of three connected technical and organizational elements (**Figure 1**):

- National Research Infrastructures (NRI)
- Thematic Core Services (TCS)
- Integrated Core Services (ICS)

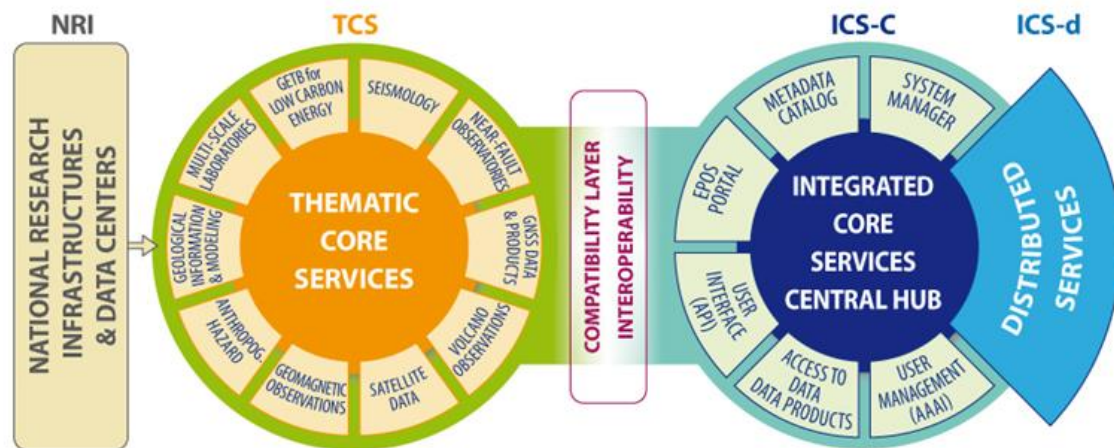


Figure 1: Key elements of the EPOS Functional Architecture

The National Research Infrastructures (NRI) for solid earth sciences in Europe generate data and information and are responsible for the operation of instrumentation in each country. As such they represent the starting point of the EPOS integration plan and have a significant economic value both in terms of construction and yearly operational costs, which are typically covered by national sources that will continue during EPOS construction and operation.

The Thematic Core Services (TCS) constitute the community-specific integration (e.g., in seismology, volcanology or geodesy). They represent a governance framework where data and services are provided to answer scientific questions and where each community discusses their specific implementation, best practices and sustainability strategies as well as legal and ethical issues.

The Integrated Core Services (ICS) represent the novel e-infrastructure consisting of services that will allow access to multidisciplinary data, products (including synthetic data from simulations, processing and visualization tools) to different stakeholders, including but not limited to the scientific community (i.e. users). The key element of the ICS in EPOS will be a central hub (ICS-C) where users can discover and access data and data products available in the TCS and NRIs as well as access a set of service for integrating and analyzing multidisciplinary data. The technical interface between TCS and ICS is the compatibility layer, which guarantees communication and interoperability. The ICS-C single-sited e-infrastructure will include the EPOS portal and its key functions: the Access Programming Interface (API), the metadata catalogue, the system manager and the services that will allow the data discovery, the interactions with users as well as the access, download and integration of data. The ICS-C will also provide access to distributed resources which form the distributed ICS (ICS-d) and include access to supercomputing facilities as well as to visualization, processing and modelling tools that need not to be centralized.

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Competing Interests

The authors declare that they have no competing interests.

References

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