The successful EPOS Implementation Phase

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The European Plate Observing System Research Infrastructure (EPOS RI) has just successfully concluded its implementation phase (2015-2019). This has been a fundamental stage in the lifecycle of the EPOS RI that moved on the way opened during the preparatory phase in which the functional architecture, the governance, and the financial models were designed. The vision of creating a pan-European infrastructure for solid Earth science aimed at providing virtual access to data, products and services and physical access to facilities has been pursued to integrate national and international RIs through a sustainable federated approach. Indeed, the EPOS Implementation Phase has been designed to accomplish the mission of creating a unique, sustainable, distributed infrastructure that integrates diverse European Research Infrastructures for solid Earth science under a common framework and provides data, products and services for users.

The EPOS Implementation Phase had two main goals: the technical implementation of data and service provision by developing the functional architecture (see Figure 1) through the EPOS IP project, and the establishment of EPOS ERIC through a sustainable framework dealing with governance, legal, and financial issues. Both these goals have been fully achieved. EPOS ERIC is a reality. It has been granted by the European Commission on October 30th 2018. The legal seat is hosted in Italy and, thirteen countries have joined the ERIC and a few others are in the process of joining in 2020. The technical implementation has also been successful. The EPOS IP project ended on September 30th 2019 with all the objectives achieved and results ready to be exploited by EPOS ERIC. The central hub of the Integrated Core Services (ICS-C), the novel e-infrastructure to provide access to integrated data, products and services from the ten different scientific communities federated through the Thematic Core Services (TCS), has been built and the prototype has been validated and tested. The ICS-C is hosted in United Kingdom (UKRI-BGS) and France (BRGM), with technical support from Denmark (GEUS).

The EPOS RI is unique among the environmental research
infrastructures because it integrates data and scientific products for the whole solid Earth science domain. The choice of engaging many diverse solid Earth science communities under the same umbrella has been strategically made since the Conception Phase of the EPOS RI. Indeed, EPOS is a distributed RI and its governance model relies on a federated approach to engage scientific communities, committed to ensure the data and service provision through different TCS, into the ICS-C, the new e-infrastructure guaranteeing data interoperability and access to multi-disciplinary data, scientific products, software and services. The TCS and ICS together compose the EPOS Delivery Framework (see Figure 1) governed by EPOS ERIC.

At the end of the Implementation Phase, nine out of the ten engaged communities reached the status of being formally established as Thematic Core Service and federated in EPOS (namely, Seismology, Near-Fault Observatories, GNSS Data and Products, Volcanoes Observations, Satellite Data Products, Geomagnetic Observations, Anthropogenic Hazards, Geological Data and Modeling, Multi-Scale Laboratories). Two further communities are going to enter with the status of “Candidate TCS” with the goal of being federated in EPOS in the near future, namely the Geo-Energy Test Beds and the Tsunami Data and Modeling. The latter is a new community that approached EPOS during the Implementation Phase. The EPOS IP project created the conditions to tackle the sustainability challenge from a technical, governance and legal, and financial point of view.

The TCS are in charge of coordinating the data and service provision through a shared legal and governance framework which implies the adoption of the EPOS Data Policy and Access Rules, the sharing of supplier letters to endorse data redistribution and the signature of collaboration agreements to formally establish the TCS governance. The number and the relevance of the scientific communities participating in the EPOS integration plan and federated in the EPOS Delivery Framework through the TCS demonstrate the EPOS multidisciplinary breadth.

The EPOS IP project succeeded in creating best practices for the integration of scientific data and products and a federated governance model for the EPOS Delivery Framework while dealing with significant levels of diversities among communities. Indeed, some TCS (e.g., Seismology and Geomagnetic Observations) have integrated in EPOS services that were already operational when the Implementation Phase started, while some others (e.g., Anthropogenic Hazards, GNSS Data and Products, Near-Fault Observatories) have implemented services that would not exist without EPOS. EPOS is also allowing to generate new data products from data generated outside its communities (e.g., Satellite Data Products) and it is providing access to data that would not be yet accessible otherwise (e.g., Volcanoes Observations). EPOS is sharing its mission with well-structured communities such as national...
Geological Surveys through the TCS Geological Data and Modeling and created a new framework for pan-European Trans-National Access (TNA) to facilities (experimental laboratories) and observatories (volcanoes and near-fault observatories). The ICS-C represents a novel e-infrastructure corroborating the robustness of the IT solutions adopted by EPOS to tackle data interoperability and FAIRness, thus contributing to open science.

The EPOS pan-European dimension is corroborated by 25 countries, 5 international organizations, 149 national research organizations and 256 research infrastructures involved in the data and service provision. Therefore, the legal and governance framework designed during the Preparatory Phase and developed during the Implementation Phase has now to be consolidated and formally established to enable the EPOS ERIC governance of the EPOS Delivery Framework.

The achievements of the EPOS Implementation Phase pave the way to a new stage in the lifecycle of the EPOS RI: the EPOS Operational Phase that incorporates both the construction of the EPOS Delivery Framework and the accomplishment of its sustainability. The EPOS IP project created the conditions for the financial viability of the EPOS Operational Phase kickoff. The financial viability for operating the EPOS Delivery Framework is the forthcoming challenge to be tackled, while the long-term sustainability is still the horizon where to steer the EPOS journey.

*Figure 1 Main elements of the EPOS Architecture: National Research Infrastructures (NRIs), TCS and ICS (ICS-C and ICS-D) form the EPOS functional architecture, coordinated by EPOS ERIC and designed to ensure the EPOS data and service provision. The Integrated Core Services Central Hub (ICS-C) and the Executive Coordination Office (ECO) constitute the European Consortium EPOS ERIC.