



## **EPOS: a FAIR Research Infrastructure for data, data products, software and service integration in the solid Earth domain**

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Integration of distributed and scattered resources made available by regional, national or international data centers and research infrastructures has become, in the last decade, a necessary step for carrying out multidisciplinary research in an efficient way.

Clustering of heterogeneous resources requires on one hand transparent access to knowledge and data shared by openly accessible providers – which is one of the definition of “Open Science” [1] – on the other hand it requires data provider to steward resources through infrastructures built according to FAIR principles [2].

EPOS, European Plate Observing System, is a pan-European, large scale research infrastructure within the ESFRI (European Strategic Forum on Research Infrastructures) roadmap that was recently granted the ERIC status; EPOS aims at integrating the diverse and advanced European research infrastructures for solid Earth science in a FAIR way. The technical architecture to achieve this integration, consists of two main layers: one ICS (Integrated Core Services) representing the integrating ICT (Information and Communication Technology) and many TCS (Thematic Core Services) representing the scientific domains.

The ICS system, in order to be FAIR, easily maintainable and scalable, adopts a microservice approach, and is hence made up of several modular, atomic, interoperable services: an AAAI (Authentication Authorization and Accounting Infrastructure) module to guarantee secure and trusted access to the system, a Web API layer for accessing the system programmatically, a metadata component to store rich metadata information about assets managed by ICS, built on a metadata schema recommended by EU, i.e. CERIF [3]. Microservices approach was implemented using up-to-date technologies as RabbitMQ [4] for enabling communication among microservices, and Docker for virtualisation in the framework of a DevOps deployment method, actually enacted with GitLab CI/CD11 [5].

In this contribution we will present the main technical aspects of the EPOS ICS architecture, the overall data management approach, how FAIR principles were implemented and a multidisciplinary use-case demonstrating data, data products integration through EPOS Graphic User Interface (GUI).

[1] R. Vicente-Saez, C. Martinez-Fuentes, Open Science now: A systematic literature review for an integrated definition, *J. Bus. Res.* 88 (2018) 428–436. doi:10.1016/j.jbusres.2017.12.043

[2] <https://www.force11.org/group/fairgroup/fairprinciples>

[3] CERIF – the Common European Research Information Format – is a conceptual model describing the Research domain [https://www.eurocris.org/eurocris\\_archive/cerifsupport.org/cerif-in-brief/index.html](https://www.eurocris.org/eurocris_archive/cerifsupport.org/cerif-in-brief/index.html)

[4] <https://www.rabbitmq.com/>

[5] Bailo D. et al., (2018). Integration of heterogeneous data, software and services in Solid Earth Sciences: the EPOS system design and roadmap for the building of Integrated Core Services. *Rapp. Tec. INGV*, 393: 1- 22, ISSN 2039-7941.