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Open access to geological information and 3D modelling data sets in the European Plate Observing System platform (EPOS)

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The European Plate Observing System (EPOS, www.epos-ip.org) is a multidisciplinary pan-European research infrastructure for solid Earth science. It integrates a series of domain-specific service hubs such as the Geological Information and Modelling Technical Core Service (TCS GIM) dedicated to access data, data products and services on European boreholes, geological and geohazards maps, mineral resources as well as a catalogue of 3D models. These are hosted by European Geological Surveys and national research organisations.

Even though interoperability implementation frameworks are well described and used (ISO, OGC, IUGS/CGI, INSPIRE ...), it proved to be difficult for several data providers to deploy in the first place the required OGC services supporting the full semantic definition (OGC Complex Feature) to discover and view millions of geological entities. Instead, data are collected and exposed using a simpler yet standardised description (GeoSciML Lite & EarthResourceML Lite). Subsequently, the more complex data flows are deployed with the corresponding semantics.

This approach was applied to design and implement the European Borehole Index and associated web services (View-WMS and Discovery-WFS) and extended to 3D Models. TCS GIM exposes to EPOS Central Integrated Core Services infrastructure a metadata catalogue service, a series of "index services", a codeList registry and a Linked Data resolver. These allow EPOS end users to search and locate boreholes, geological maps and features, 3D models, etc., based on the information held by the index services.

In addition to these services, TCS GIM focussed particularly on sharing European geological data using the Linked Data approach. Each instance is associated with a URI and points to other information resources also using URIs. The Linked Data principles ensure the best semantic description (e.g. URIs to shared codeList registries entries) and also enrich an initial "information seed" (e.g. a set of Borehole entries matching a search) with more contents (e.g. URIs to more Features or a more complex description). As a result, this pattern including Simple Feature and Linked Data has a positive effect on the IT architecture: interoperable services are simpler and faster to deploy and there is no need to harvest a full OGC Complex Feature dataset. This architecture is also more scalable and sustainable.

The European Geological Services codeList registries have been enriched with new vocabularies as

part of the European Geoscience Registry. In compliance with the relevant European INSPIRE rules, this registry is now part of the INSPIRE Register Federation, the central access point to the repository for vocabulary and resources. European Geoscience Registry is available for reuse and extension by other geoscientific projects.

During the EPOS project, this approach has been developed and implemented for the Borehole and Model data services. TCS GIM team provided feedback on INSPIRE through the Earth Science Cluster, contributed to the creation of the OGC GeoScience Domain Working Group in 2017, the launch of the OGC Borehole Interoperability Experiment in 2018, and proposed evolutions to the OGC GeoSciML and IUGS/CGI EarthResourceML standards.