During the four years of the EPOS IP project, the Thematic Core Services (TCS) Multi-scale laboratories (MSL) has successfully created a network of European solid earth science laboratories and scientists, which promotes and supports the exchange of valuable research data on the basis of Findable, Accessible, Interoperable, and Reusable (FAIR) data principles. The TCS MSL started out as a new community that did not exist at the onset of EPOS. The TCS MSL mission is to create a unique entry point for collaboration and exchange through the organization of a coherent and collaborative network, the implementation of dedicated data services and a data publication chain for laboratory-based research data, and for developing and providing a Trans-national (TNA) program. In order to transform the mission into a fully operational network, the TCS MSL has created and incorporated a number of necessary services, which are; a) TCS Governance, b) TCS Portal/Catalogue, c) GFZ data repository, and d) TNA coordination.

The research infrastructures and, as a consequence, the data that they produce, are currently grouped into four main subdomains; a) Analogue modelling of geologic processes, b) Rock and melt physical properties, c) Paleomagnetic and magnetic data, and d) Analytical and Microscopy data. All data that is being exposed through the MSL community is shared as a data publication with metadata from the applicable subdomain using a dedicated metadata editor and data repositories. The data is made accessible through two data services; 1) the GFZ Data Service, for getting data into the TCS catalog, and 2) the UU TCS Catalog Service, for the discovery of data. An important additional service is available for the management of infrastructure related information and the coordination of TNA. In the near future these services will be expanded with, for instance, a) the provision of direct download links to the ICS, b) the extension of the TCS Catalogue with services for the provision of facility information, c) additional Data Repositories, and d) the TNA portal and TNA brokering service (in collaboration with EPOS ICS (Integrated Core Services) and EPOS Thematic Core Services (TCS) Near-Fault Observatories, Volcano Observations, and Geo-Energy Test Beds for Low Carbon Energy).
The TCS MSL is organized in a Consortium composed of 11 members from 10 countries. Four are Service providers, while the remaining seven are Data provides. The TCS MSL Consortium structure has been tested since October 2017, prior to setting up and signing the Consortium Agreements (CA). This allowed the evaluation and refining of the decision-making and executive structure of the MSL Consortium. The governance and legal framework of the TCS MSL enables it to set up procedures and infrastructures that support its mission. These include; 1) Data Publication Chain, 2) Ingestion procedure for new laboratories within the TCS MSL network, 3) Facility information and the TNA/Infrastructure Portal, and 4) TNA coordination and provision.

Over the course of the Implementation Phase, the TCS MSL has been able to create an ecosystem of trans-national access (TNA) and data publications in the EPOS context. Researchers are able to perform short term TNA projects in world-class laboratories with state-of-the-art equipment, with the generated data being published through the EPOS MSL data publication chain. As such, the TCS MSL has created a ‘circular economy’ of research and data. This full circle has already been completed by researchers that took part in the first TNA pilot call in 2017, who have now published their results in journals and as data publications through the MSL Data Publication Chain.

The TCS MSL employs Key Performance Indicators (KPIs) to document the usage of its procedures and infrastructures, with statistics collected in an anonymous manner to ensure compliance with European GDPR regulations. Statistics on the use of MSL services clearly show the impact the TCS MSL ecosystem has on research, and the desire of scientists to exploit the available services. The newly created Infrastructure portal is enabling researchers to better choose facilities with which they can collaborate, as well as providing a direct overview of the European solid earth science laboratory landscape. The main structures to support scientists in their endeavors to publish and reuse data, and to commence in short-term transnational collaborations, are now firmly in place. As such, from the start of the EPOS Sustainability Phase, the TCS MSL is open for business.