The EPOS contribution to innovation and excellence in science

Massimo Cocco,
Carmela Freda,
Daniele Bailo,

INGV, Italy

As with every other European Research Infrastructure (RI), EPOS must demonstrate its scientific excellence and its impact on innovation. The latter is not limited to the development or adoption of cutting-edge technologies, but spans from the integrated provision of data, metadata and services for new e-science opportunities to the conception of robust sustainability plans. To undertake actions aimed at assessing excellence and unlocking innovation potential, it is necessary to understand the EPOS mission and its architecture.

EPOS has been designed with the vision of creating a single distributed pan-European infrastructure for the whole solid Earth science. Following this scientific vision, the EPOS mission aims at the construction of a multidisciplinary research platform to provide coordinated access to harmonized and quality controlled data from diverse Earth science disciplines, together with tools for their use in analysis and modelling. This novel research platform is the result of integrating the diverse and advanced European RIs for solid Earth relying on new opportunities and progress in e-science. In developing its integration plan, EPOS not only brings together the European nations and combines solid Earth science infrastructures (and their associated data, products and services), but also incorporates the scientific expertise and skills into this innovative integrated delivery system for Earth sciences.

The first EPOS contribution to innovation is represented by the wide pan-European perspective and ambitions of its integration and implementation plans. EPOS, by integrating existing and new RIs in the domain of solid Earth science, is including many different disciplines (e.g. geodesy, seismology, geophysics, volcanology, geology, geochemistry) in a holistic plan for delivering an innovative, ground-breaking data and service provision.

EPOS is integrating about 300 research institutions from 25 European countries and four international organizations. EPOS is networking nearly 100 laboratories for investigating the physical, chemical, magnetic and mechanical properties of magmas and rocks by harmonizing and synchronizing policies for providing transnational access to experimental, and natural laboratories (e.g.
Implementing this integrated research infrastructure and making it operational for environmental sciences represents a direct contribution to unlock the innovation potential for science and society. Indeed, providing integrated access to data and metadata through novel services represents a direct contribution to form the next generation of data scientists and to deliver new services and information to society. According to the EPOS mission and to its architecture, the EPOS innovation also consists in making the existing data infrastructures interoperable as well as in fostering the use and re-use of solid Earth data across national borders and scientific domain boundaries.

EPOS is tackling the “data deluge” challenge by making openly and easily accessible a huge, and rapidly increasing, amount of data that can be used by scientists from many diverse disciplines, in sustainable settings for research and for the society. By improving and facilitating the integration, access, use, and re-use of solid Earth science data, data-products, services and facilities, EPOS will certainly enhance the capability to monitor and unravel the dynamic and the complexity of the Earth system. The attractiveness for users beyond scientists (including the private sector) strongly depends on the provision of quality-controlled and standardized data relevant for developing new products and services for different stakeholders. Importantly, the use and re-use of data and the harmonized access to services will foster the creation of new scientific data products, which can be made accessible through the same EPOS research platform. The potential impact of this new scientific delivery system for environmental sciences and for the society is still unexplored.

It is important to emphasize that facing the challenge of demonstrating the EPOS innovation potential, its scientific excellence and its contribution to scientific excellence, implies several significant changes in behaviors and attitudes of stakeholders and decision makers.

First, the funding agencies (including the European Commission) should recognize the innovation potential linked to the progress in data science and not simply limiting the innovation to commercialization or market value for immediate industrial applications. RIs generating and/or integrating data and services can create new innovation drivers for science and society, also generating new market opportunities not yet envisioned.

Second, both the data providers and the scientists involved in implementing products and services provision need to work together to accelerate the progress in data science by making data open and re-usable through adequate metadata and by fostering ICT innovation on data registries, PID, storage in trustworthy repository. Data providers in solid Earth science, in particular, should undertake actions to make their data as usable as possible
because combining Earth science data coming from different disciplines and facilitating their re-usage can become the two key actions for innovation.

Third, the implementation of scientific data and services requires an effective collaboration/cooperation between the RIs, which have engaged domain scientists and communities, and the e-infrastructures (e-Is) that have engaged e-science experts for IT services implementation and provision. Therefore, the innovation potential of the novel European Data Infrastructure and the future European Open Science Cloud relies on the effective and harmonized contributions of RIs and e-Is.

Fourth, the RIs managers and developers should dedicate efforts for the effective engagement of different stakeholders and ensure a successful exploitation of results in terms of data and service provision. RIs developers should also commit the infrastructure to undertake training initiatives to form the next generation of scientists and an effective dissemination to foster the understanding of data and the scientific interpretations of data products. RIs can play an essential role in tackling the challenge of educating young people and society to data science and to look across the current narrow boundaries of pre-defined scientific disciplines.

In this context, EPOS aims at pursuing its ambitious mission by setting up a collaborative framework. We are creating the conditions to tackle the challenge of demonstrating the innovation potential of data, metadata and service integration when aiming at science for society.