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EU funding to integrate cutting-edge methodological and technological solutions, enabling the development of a next-generation network of Near Fault Observatories across Europe (project TRANSFORM²)

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A Near Fault Observatory (NFO) is a natural laboratory undergoing active, and complex geophysical processes at or in proximity to densely populated urban areas. NFOs bound relatively small areas and provide researchers from various disciplines (e.g. geophysics, geodesy, and geochemistry) the opportunity to access and (re-)use a vast wealth of data and derive scientific products. This allows a better understanding of the multi-scale, physical/chemical processes, responsible for earthquake generation. This can only be achieved by the acquisition of continuous, long-term, high-resolution multidisciplinary data and the application of consistent, reliable state-of-the-art data processing.

Six NFOs in Europe have been identified by the European Plate Observing System (EPOS) as long-term Research Infrastructures; three additional NFOs are in observer status. NFOs target the enhanced understanding of the mechanics of earthquakes to unravel the anatomy of complex seismogenic faults.
The TRANSFORM² project has the ambitious goal to improve and transform the existing NFOs, by

integrating cutting-edge methodological and technological solutions, paving the way for the next generation of NFOs across Europe. This will be achieved by:

- Conducting tests, horizon scanning and feasibility studies, performing gap-analysis and assessing user needs in order to gain knowledge of the available state-of-the-art sensor equipment, evaluating its appropriateness and applicability for their deployment in the NFOs.
- Accelerating sensor development and testing where possible.
- Creating, developing, and applying workflows that will revolutionize the capacity of NFOs to detect and characterize seismicity and ongoing seismic sequences in real-time, leveraging machine learning as well as the existing and next-generation instrumentation.
- Establishing new paradigms in Earthquake Early Warning (EEW) that are optimized for the dense NFO networks. Assessing the developed workflow's suitability on EEW applications targeting the decision-makers and, consequently, society.
- Transforming the interaction with stakeholders and decision-makers, underpinned by a deeper understanding of their needs and demands and ultimately the benefits that they can gain from the RIs.
- Assessing the capacity and opening of new pathways for the existing NFOs to function as powerful test-beds for the development, calibration, and testing of new measuring equipment and systems.
- Identifying possible funding mechanisms and sources and providing recommendations to national administration authorities and the European Commission on potential calls for the long-term sustainability of the RIs.

Finally, a 'white book' will be created to document how data, products and services from the next-generation Research Infrastructure (RI) can be exploited for the benefit of different target stakeholders, such as the research community, the local authorities, and the society, and propose ways for a sustainable funding of the RI in the future.

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