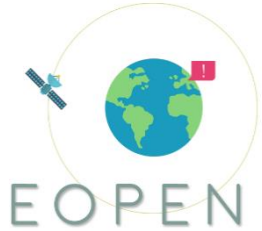




European Commission



EOPEN AND DIGITAL TWIN EARTH

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The EOPEN project is co-funded by the EC under the Grant H2020-776019

EOPEN side event for ESA EO Φ -WEEK 2020
28 September - 02 October 2020



Digital Twin Earth and Green Deal

EC has proposed the **Green Deal** as the new growth strategy for Europe, to position itself as global leader*

- Quantum leap in our capacity to observe, understand and predict complex and inter-connected natural and anthropogenic processes
- **Destination Earth** initiative to bring together European scientific and industrial excellence to develop a very high precision digital model of the Earth

ESA's **Digital Twin Earth** activity*

- Bring together different expertise and emerging capabilities to establish a solid scientific and technical basis to realize the Destination Earth vision and make a firm first step towards Digital Twin Earth

*TEXT RETRIEVED FROM DIGITAL TWIN EARTH PRECURSORS EXPRO+ ([HTTP://WWW2.ROSA.RO/INDEX.PHP/EN/ESA/OFERTE-FURNIZORI/4308-DIGITAL-TWIN-EARTH-PRECURSORS-EXPRO](http://www2.rosa.ro/index.php/en/esa/oferte-furnizori/4308-digital-twin-earth-precursors-expro))

Digital Twin Earth

First steps

- Build upon existing capabilities and emerging developments towards Green Deal priorities
- Engage the user community, citizens and policy makers to ensure a user driven approach
- Elaborating a community roadmap proposing both
 1. A plan with realistic options for developing and implementing DTE and
 2. A Scientific and Technical Agenda covering all the relevant RD



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Europe towards Digital Twin Earth

Excellent observation capabilities and data assets

- Copernicus services, Sentinel missions (250 TB per day)
- Scouts, Earth Explorers , Φ -sat
- Third party mission data, contributing missions data, heritage data

Lag in big data processing capabilities

- Users often prefer U.S. infrastructure over European assets for research and applications
- Europe needs sophisticated infrastructure to match its excellent EO space assets.

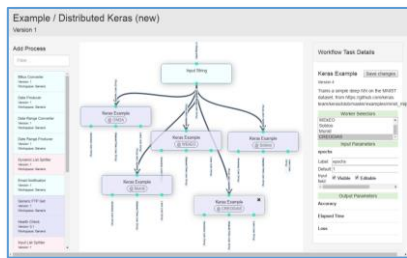
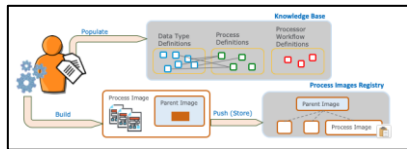
*Digital Europe Towards Digital Twin Earth, European Commission Workshop, 27-Nov-2019 Convergent use of EU HPC, Cloud, Data & AI Resources for Earth System Modelling & EU Sustainability Policy Support

EOPEN and the EO Big Data Shift

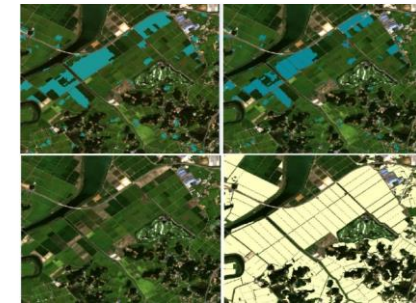
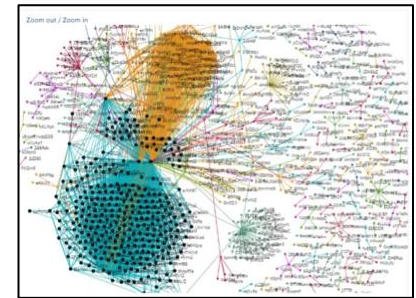
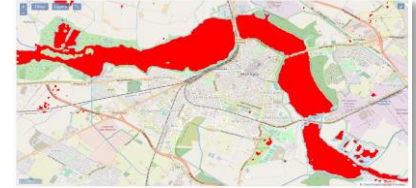
- Adaptation of big data technologies to Copernicus user scenarios and should concentrate on the intermediate layers
- Enable Copernicus services, public and intermediate commercial users to engage with higher value services
- Tools that allow for the chaining of different value adding activities increasing incrementally the information and knowledge content of EO and non EO data
- Big Data: bridge the gap between Earth observation and information technology sectors taking into account the user needs for EO Big Data



EOPEN



- ▷ A convenient and comprehensive environment for data analysis.
- ▷ Combines mature ICT solutions, data management and scalable processing techniques and state of the art algorithms.
- ▷ Demonstrates Big Data and data fusion techniques, through real use-case scenarios in flood risk management, food security and climate change.



EOPEN addresses challenges of interoperability, reducing the reliance on experts to use EO data and build services and infrastructure to effectively produce and disseminate Copernicus-related information to the wider user community

EOPEN towards DTE

Digital Twin Earth is based on many diverse and dynamic data sources, computational models and services that need to be combined, visualized and understood. Therefore technical and semantic interoperability is a major challenge, which requires simplified standards and common building blocks

EOPEN

- ▷ Data and Semantic Interoperability - **optimize cooperation in the data exploitation; modular, reusable and common tools and services, standard interfaces that allow access via an “interoperability layer”**
- ▷ Transparent use of Big Data infrastructure for non-expert users – **exponentially increase the volume of users, enable non-ICT expert scientists, foster multi-disciplinary and collaborative science**
- ▷ Rapid prototyping of ICT technologies and AI algorithms under a Use Case driven approach – **targeting real user needs, mapping the current operating model of users, devising the target operating model within the context of the EOPEN solution**



Questions

EOPEN can be viewed as a precursor of the DTE activities

- What should change now that the DTE concept emerges strongly from this joint effort by ESA and EC?
- Are there any technological or other disruptions in store? And if yes in which stages of the value chain?
- How should we bridge the gap between science and the industry? i.e. rapid prototyping? User-driven instead of science-driven design of assets?
- What is the importance and role of interoperability in this journey towards DTE?
- Can interoperable platforms, like EOPEN, facilitate the very much needed collaborative science towards DTE?