



The European Plate Observing System

EPOS: Integrated Services for solid Earth Science

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Solid Earth Science

- Different communities involved
- Multidisciplinary contributions
- Community building
- Services to society
- Geo-Hazards
- Geo-Resources
- Environmental hazards (including anthropogenic hazard)

EARTHQUAKES

VOLCANIC ERUPTIONS

TSUNAMIS

TECTONICS

GEODETTIC DATA

LABORATORIES



www.epos-eu.org

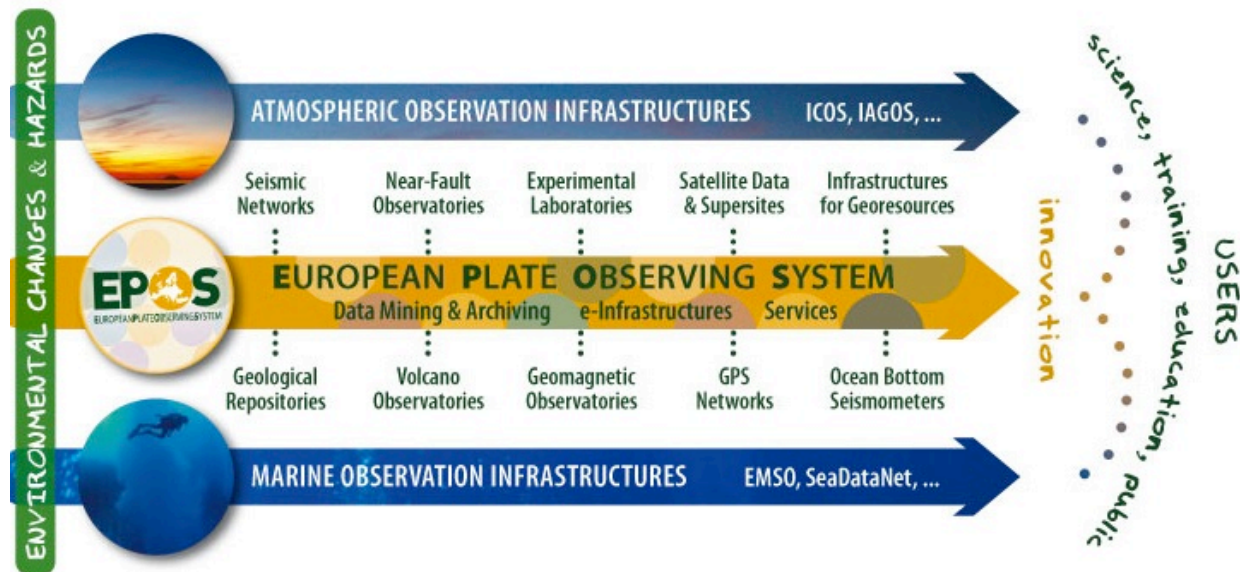


EPOS Mission



The European Plate Observing System (EPOS):

- represents a **scientific vision and approach** in which innovative **multidisciplinary research** is made possible for a better understanding of the physical processes controlling earthquakes, volcanic eruptions, unrest episodes and tsunamis as well as those driving tectonics and Earth surface dynamics.
- has a long-term plan to facilitate **integrated use** of data, models and facilities from mainly distributed existing, but also new research infrastructures, for solid Earth science.



Observing and monitoring volcanoes

to better understand the Dynamic Interplay of Magma Generation, Magma Chamber Processes, Magma Transport, and Eruptive Behaviour and what information it reveals for large-scale Geodynamic Processes and their Relevance for Society (Hazards, Energy, Natural Resources).

Ash & Gas chemistry
Hazards

Seismic activity
Geophysics
Geodesy

Experimental
Petrology

Mineralogy

Deep Mantle
processes

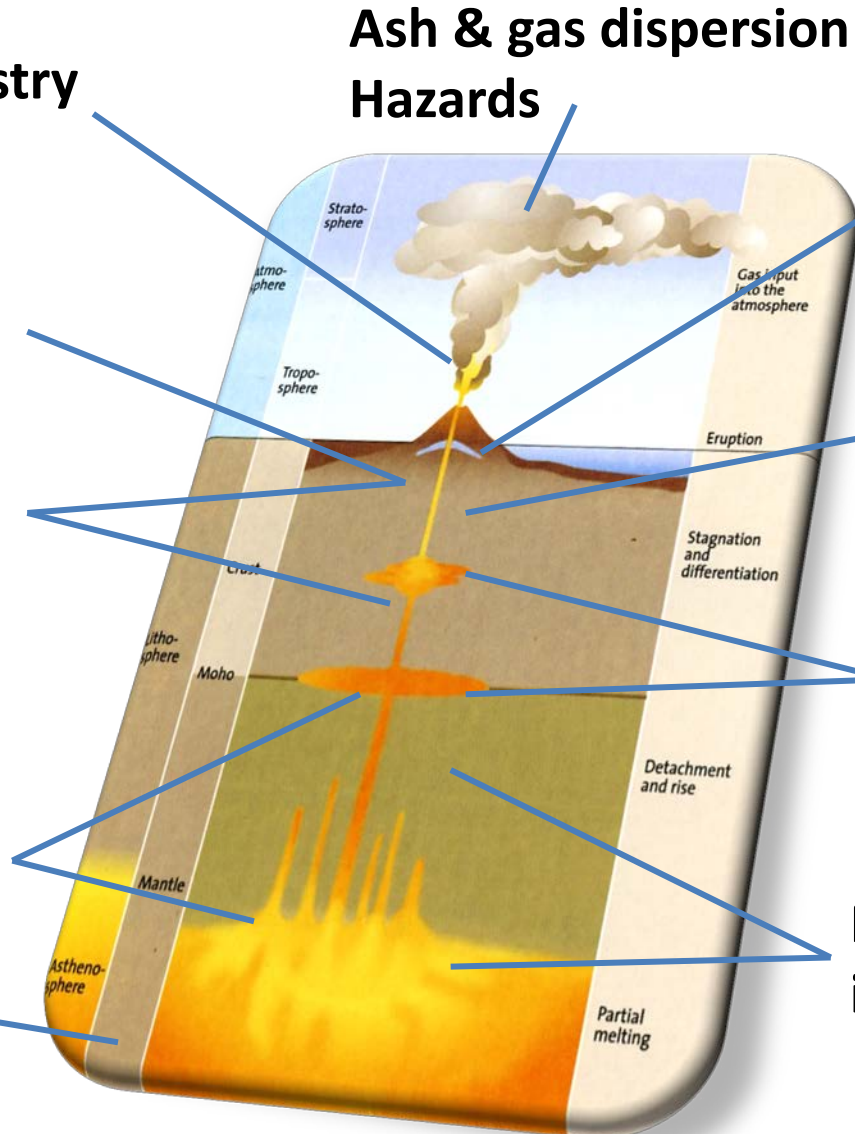
Ash & gas dispersion
Hazards

Ore-deposits &
hydrothermal energy

Volcano-tectonics

Igneous Petrology &
Isotope Geochemistry

Mantle mineral &
isotope geo-chemistry



Why do we need EPOS?

EPOS

Integrates national and transnational research infrastructures for solid Earth science

for

seamless access to pan-European data and services

Guarantees open access to multidisciplinary Research Infrastructures

for

cross-disciplinary and transnational research

Creates novel e-infrastructure and integrated core services

for

a multidisciplinary community of users

Fosters scientific, technological and ICT innovation

for

successfully addressing global Grand Challenges in Earth science

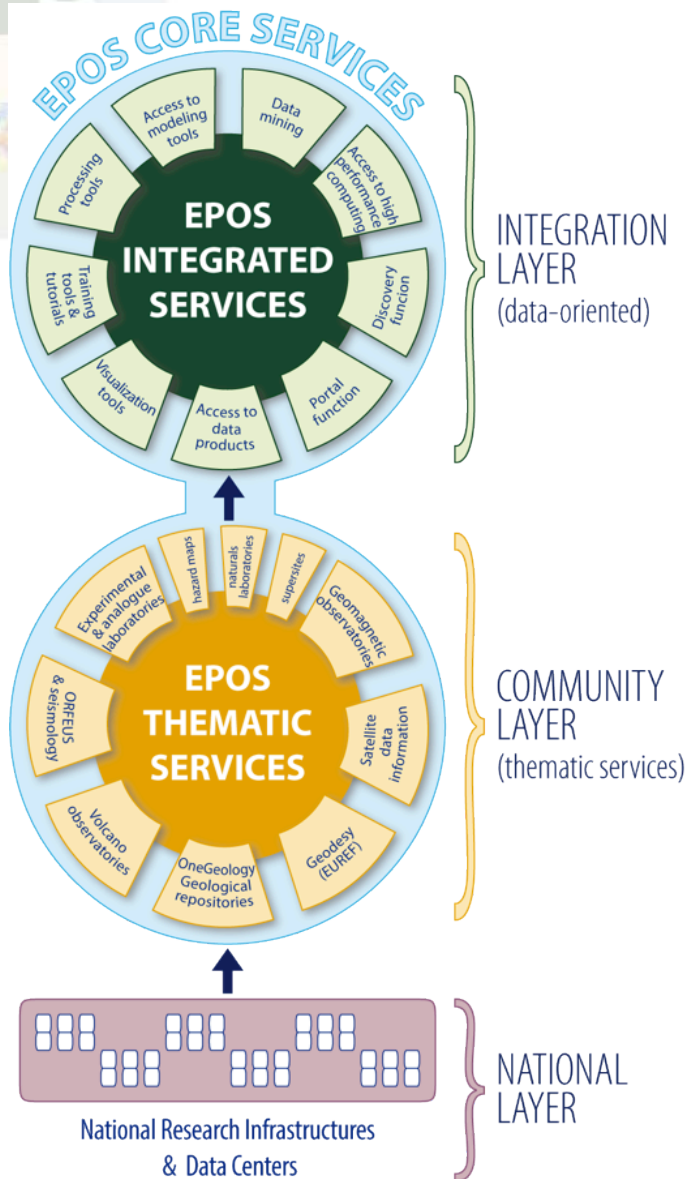
Improves geo-hazard assessment, risk mitigation, and sustainable management of georesources

for

a safe and prosperous society

EPOS services

European Plate Observing System |



The **EPOS Integrated Core Services** will provide access to multidisciplinary data, data products, synthetic data from simulations, processing and visualization tools, Not just data access but EPOS means to **integrate, analyze, compare, interpret** and **present** data and information about **Solid Earth**

Thematic Core Services are infrastructures to provide data services to specific communities (they can be international organizations, such as ORFEUS for seismology)

National Research Infrastructures and facilities provide services at national level and send data to the European thematic data infrastructures.



e-Infrastructure Metadata Model

Complete cohort of researchers, research managers, innovators, media

User Model

interaction with data, processing, persons

Processing Model

providing what the user requires

representing research

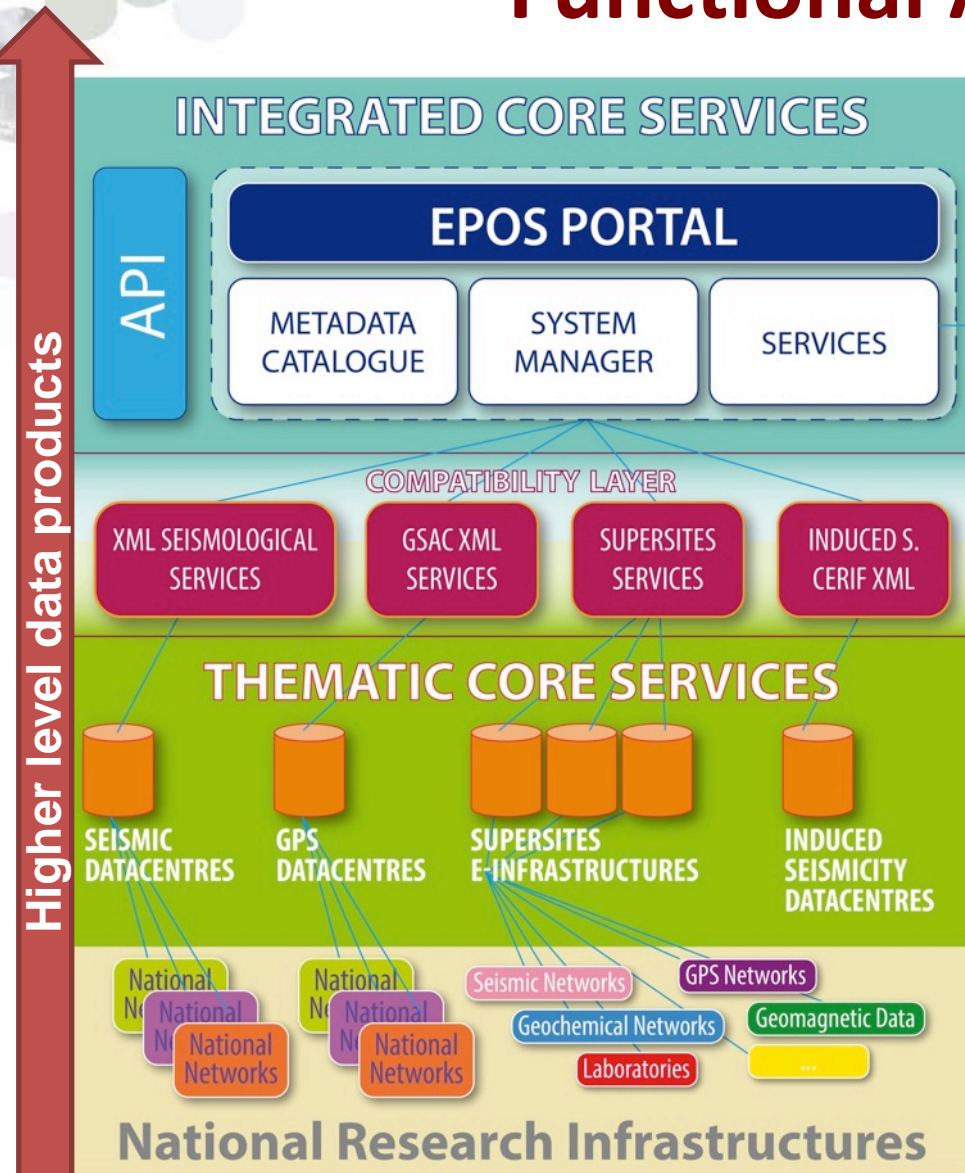
Data Model

representing ICT

Resource Model

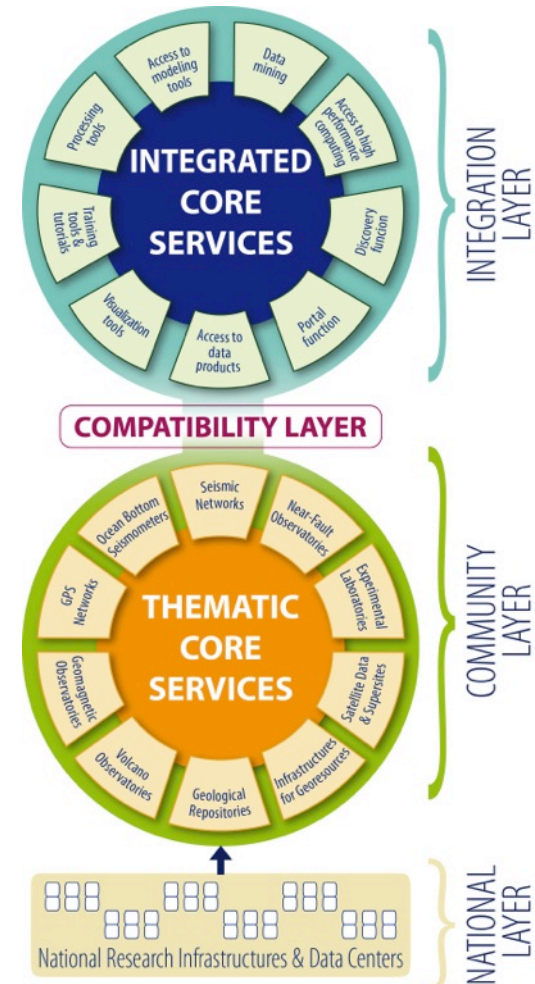
Complete ICT environment for research

Functional Architecture



Compatibility Layer:
the TCS-ICS Interface
guaranteeing integration
& interoperability

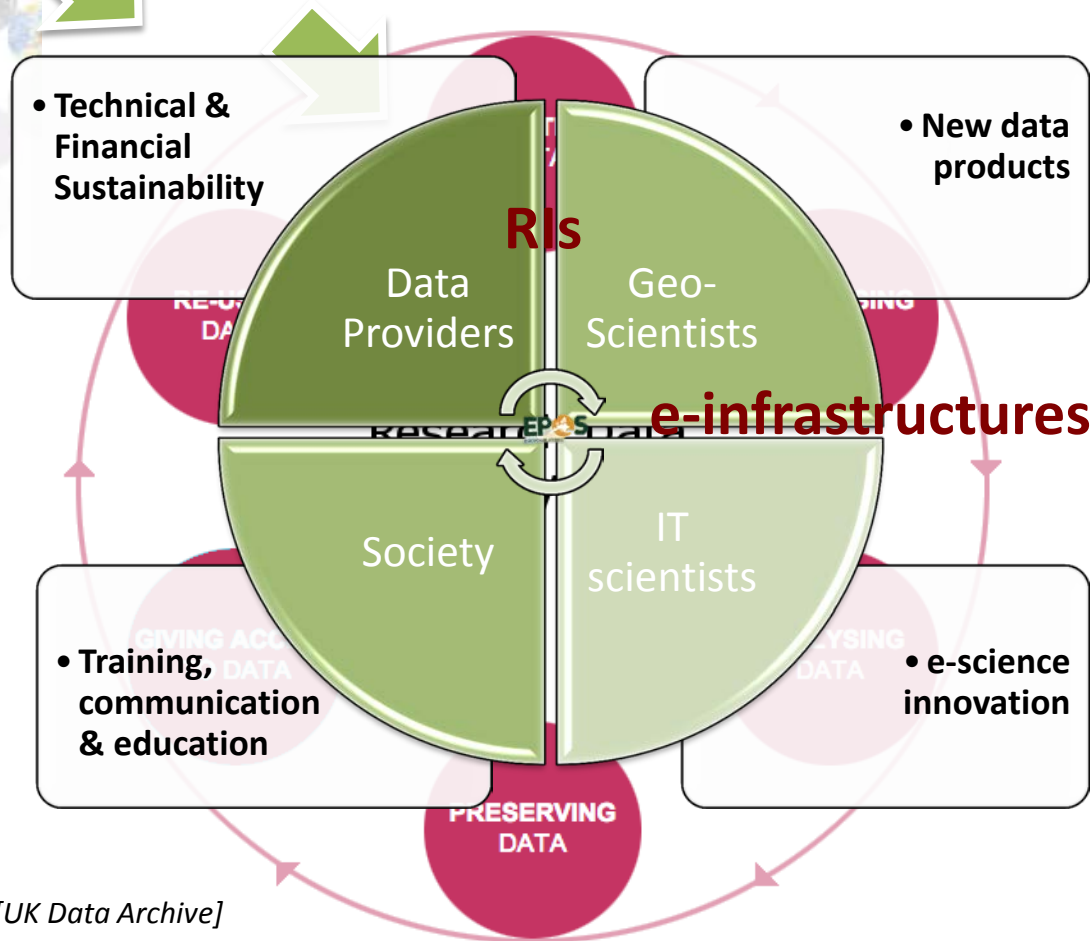
- ICS/TCS communication
- Metadata catalogue+APIs
- Web Services
- Open Access



What is original in EPOS?

EPOS innovation

Scientific Data Integration



[UK Data Archive]

- Access to **basic data** from observing systems (monitoring networks) and exp. facilities (laboratories, HPC centers)
- Access to **data products** generated by automated procedures/scientists
- **IT services** for data discovery, curation and preservation guaranteeing re-use of data
- Integration of new data products through a **common e-infrastructure**
- **Tracking** use of data and **accounting** users (**SEI**)

A novel research
platform for Earth
Sciences

"Research cannot flourish if data are not preserved and made accessible. All concerned must act accordingly" [in *Nature* 461, p. 145]

EPOS Timeline

EPOS-ERIC

2010

2014

2015



2019

2023



**Preparatory
Phase**

**Implementation
Phase**

**Start
Operational
Phase**

**Full
Operational
Phase**

EPOS Architecture designed
ICS design finalized
ICS prototype validated
TCS defined & designed

EPOS-ERIC hosted in Italy
Procedures for hosting ICS
ERIC statutes drafted
Data Policy agreed

Financial plan designed
Secure Natl funds for TCS:
started

Construct ICS central hub
Integrate Existing TCS
Implement new TCS
Design ICS distributed res.

Hosting ICS central hub
ERIC enters in force
ECO operational
ERIC-TCS Agreements

Operate EPOS-ERIC
TCS implementation

EPOS RI operational
Further TCS developed

Third parties
partnership agreements

Interaction with
industry & private
sector

Legend:
Technical
Legal
Financial

Concept screening &
feasibility study

Business case review &
delivery strategy

Conditions are in place
to construct and operate
the RI

“Numbers” of solid earth science

MAP OF:

- Seismic/GPS stations
- Laboratories
- etc....

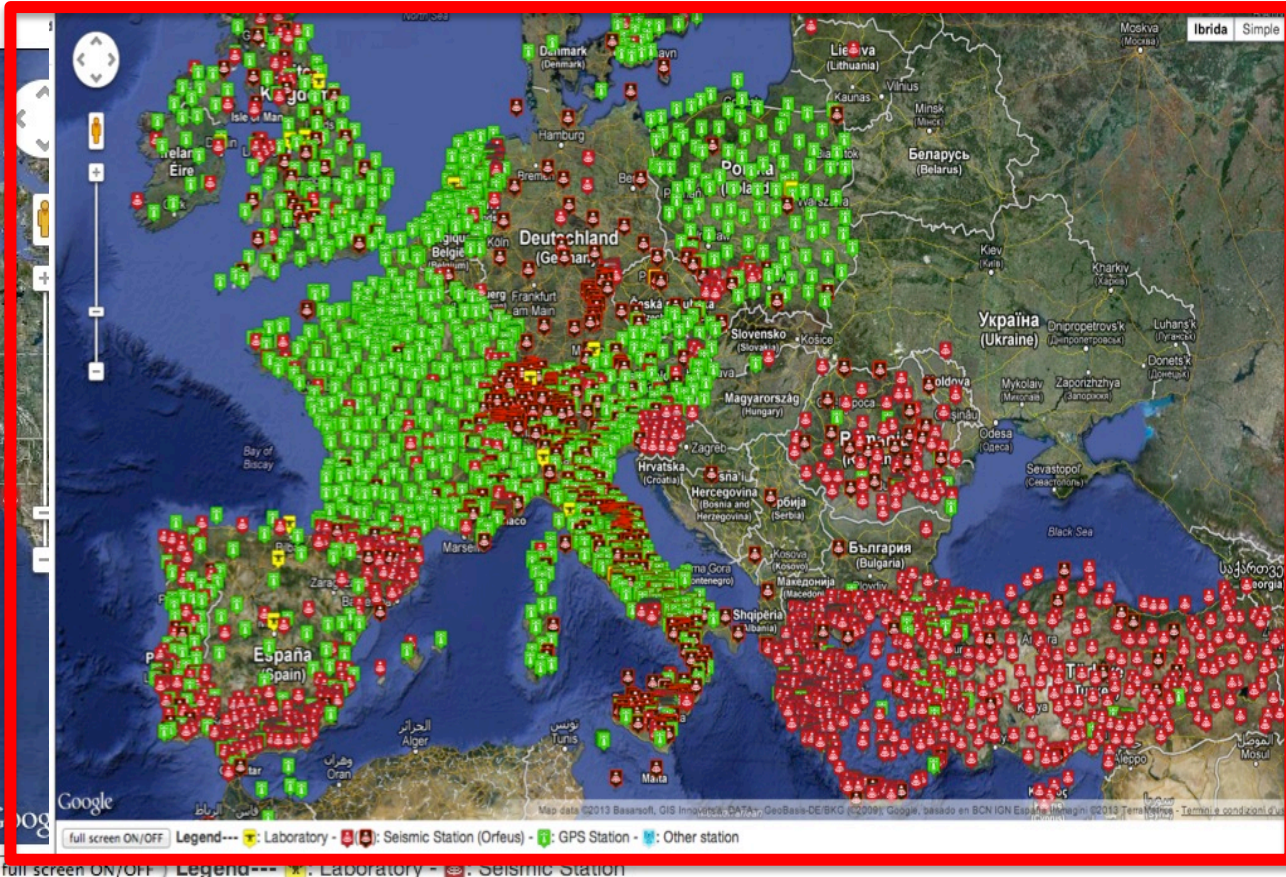
Diversity in data type and formats

<http://www.epos-eu.org/ride/>



Research Infrastructure List

- 244 Research Infrastructures
- 138 Institutions
- 23 countries
- 2272 GPS receivers
- 4939 seismic stations
- 464 TB Seismic data
- 1.095 PB Storage capacity (seismology)
- 1,240 PB Storage capacity (GNSS DC)
- 828 instruments in 118 Laboratories



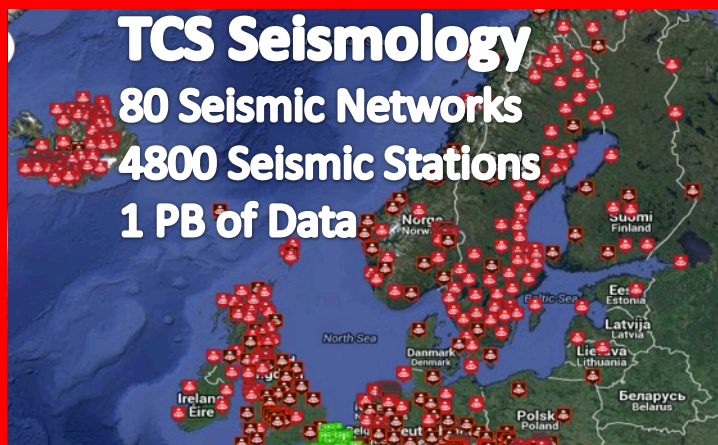
EPOS: a single, pan-European distributed RI

TCS Seismology

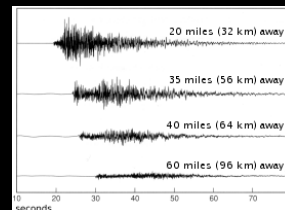
80 Seismic Networks

4800 Seismic Stations

1 PB of Data



Seismograms



Geological Maps



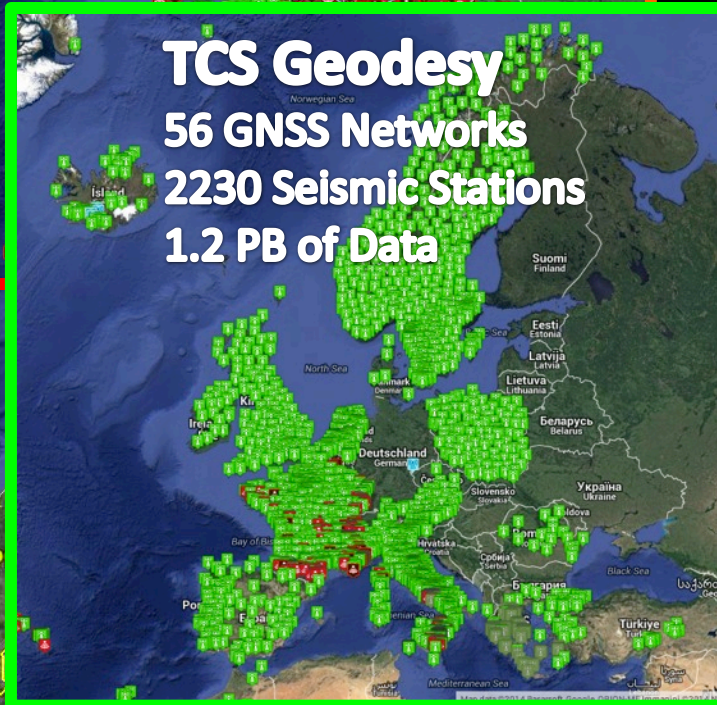
_ Diverse Data _

TCS Geodesy

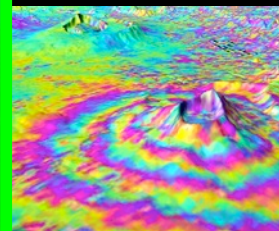
56 GNSS Networks

2230 Seismic Stations

1.2 PB of Data



SAR Interferograms

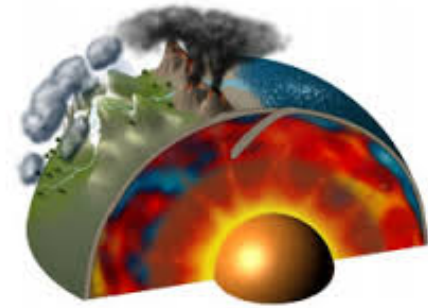


Hazard Maps



1 Contributions for discussion

- Solid Earth Science in one RI: a choice
- Community building through a co-design approach (IT- & geo-scientists)
- Managing a pan-European distributed RI require appropriate & innovative solutions
- Evaluating its impact also requires appropriate tools and approaches
- A Sustainable Architecture relies on technical, governance, legal and financial challenges



2 Contributions for discussion

- EPOS proposes a federated approach to RIs
- EPOS relies on a federated approach to IT solutions
- Procurement of IT resources from:
 - European organizations
 - European initiatives & projects
 - National technological providers
 - Private sector or PPP
- Implementation & Harmonization with national priorities is our present challenge



Thank you for attention

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Thank you

WebSite



www.epos-eu.org

R.I.D.E. & Demonstrator



www.epos-eu.org/ride
epos.cineca.it

Newsletter



www.epos-eu.org/newsletter

Epos Social



[facebook](https://www.facebook.com/EPoS)

[youtube](https://www.youtube.com/EPoS)

[twitter](https://twitter.com/EPoS)



EPOS PP Achievements

Legal

- **ERIC** has been identified as the legal model for EPOS
- **Legal working group** has delivered a first version of Statutes
- **Data policy & Access rules** approved by IAPC

Legal & Governance

- Lol signed by the countries interested in participating in the ERIC (**16 received**)
- Procedures for hosting ECO - **2 EoI received (Italy & France) - decisions 1st Oct 2014**
- **Governance** model approved by IAPC

Financial

- Previous National investments and **cost assessment for ECO and ICS**
- **Funding** model discussed and approved by IAPC
- **Cost assessment for TCS** in progress

Financial plan

Technical

- **Existing RIs** (national & international) engaged for integration (RIDE)
- **Data infrastructures and services in TCS** identified (implementation in progress)
- IT solutions for **interoperability** identified: Metadata catalogue & ICS design

Architecture

Strategic

- **Communication policy** and **stakeholders' interaction strategies** elaborated
- Links to **global** initiatives established (GEO, GEM, COOPEUS, Intermagnet, WovoDat, ...)
- Assessment of **socio-economic impact** in progress

EPOS Data, Access, and IPR policy

**Guiding principle: open
access**

**licensing
no charge**

Protect EPOS legally

Unrestricted use & access

Trace EPOS use & users

Balance: **Legal risk** : **Openness** : **Traceability**

Respect: **domain customs & standards** **national & EU legislation & policies**

Data & Data Products
Level 0, 1, 2, 3

Tools & Software

Open : **Restricted** : **Embargoed**

mix and match as required

Anonymous : Registered : Authorized

Users

Licensing
IPR

Data & Service
Providers

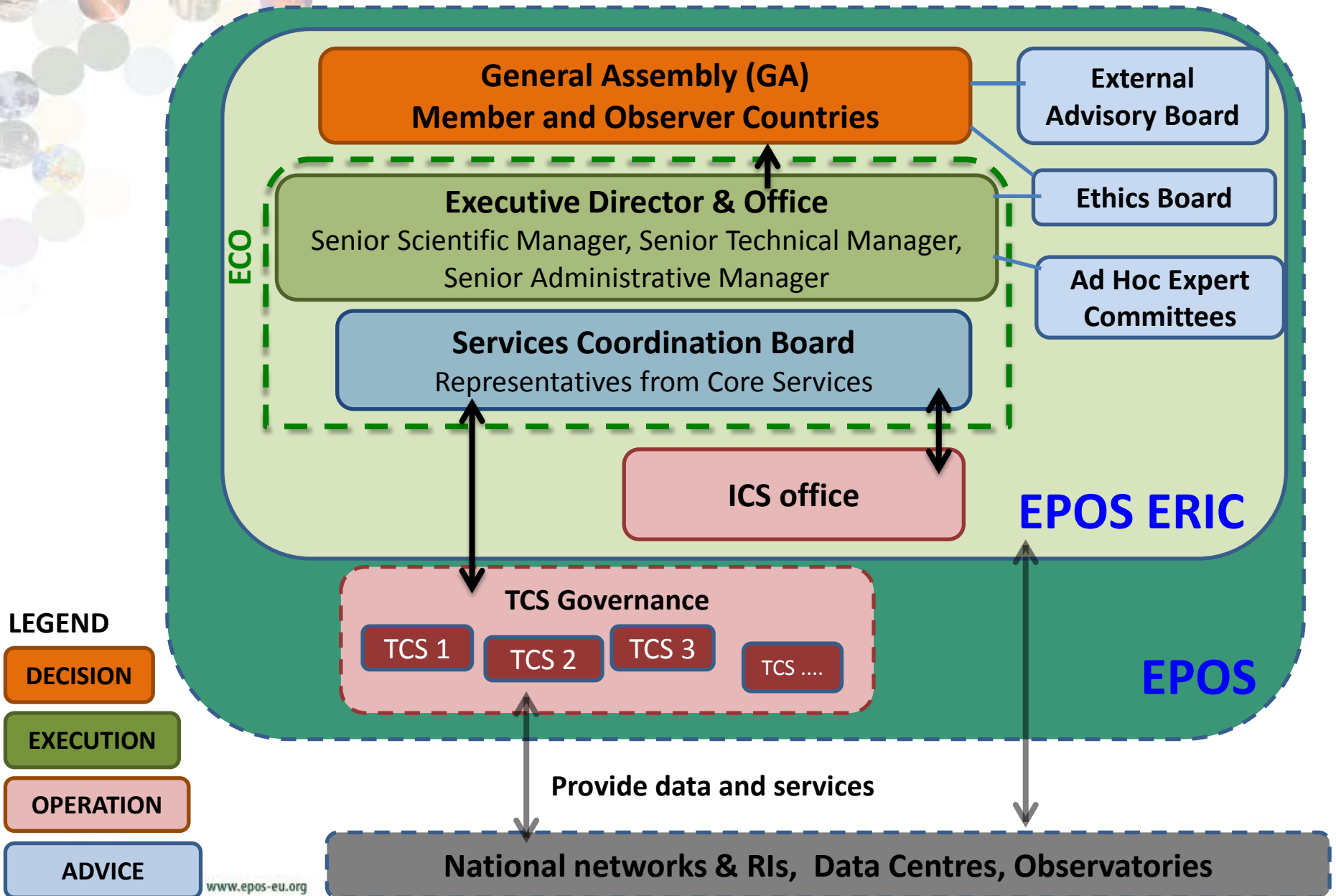
Open Access
deposit terms

EPOS

Open Access
license

Data & Service
Users

3- EPOS Governance Model



4- EPOS Architecture

EPOS, a distributed infrastructure

Implemented in phase 1

Built in phase 1

Designed in phase 1

