EPOS
A distributed Research Infrastructure for Solid Earth Science

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1 - EPOS IN A NUTSHELL
EPOS is a long-term plan for the integration of research infrastructures for solid Earth Science in Europe.

EPOS integrates the existing (and future) advanced European facilities and infrastructures into a single, distributed, sustainable research infrastructure taking full advantage of new e-science opportunities.
Create a **pan-European Research Infrastructure** for solid Earth science aimed at providing virtual access to data, products and services and physical access to facilities.

Foster **innovation in a multidisciplinary research framework** and communication with different stakeholders by utilizing human capital and infrastructures across different fields, technologies, and disciplines.

Ensure **sustainability**

Make possible a **better understanding** of the Earth surface and subsurface dynamics and use this progress in science for the assessment of geo-hazards and sustainable use and exploitation of geo-resources.
According to its vision, the EPOS mission is to create a single, distributed and sustainable, infrastructure that integrates the diverse and advanced European National RIs for solid Earth science under a common framework to provide open access to data and products for diverse user categories.
2 – KEY COMMITMENT FOR RIs: PROVIDE ACCESS TO DATA, PRODUCTS, FACILITIES, AND SERVICES
A Major Task of RIs

Data Life Cycle

- Data Collection/Creation
- Archiving/Curation
- Data Processing
- Data Analysis & Products
- Data Visualisation
- Tools
- Resources
- Integration
- Interoperability
- Data Policy
- Publication/Dissemination
- Data Management Plan
Key Message 1

• EPOS is committed to **preserve** scientific data and products as well as to **ensure** data and service provision

• This implies to:
  – elaborate and adopt **data management plans**
  – maintain **data** and **service life cycles**

• EPOS primary goal is to foster scientific innovation and progress

• **Data Value** = Utility + Warranty
  ▪ **Utility**: data is useful, harmonized, standardized ......
  ▪ **Warranty**: data is accessible and traceable
Real Time Services: an example from seismology

Waveform Services
- Waveform selection & access
- Waveform metrics & Station Information
- Strong Motion parameters
- OBS data integration
- Mobile Pool coordination & integration
- Waveform modeling

Seismological Products
- Earthquake Parameter Information
- Macroseismic & Historical Event data
- Seismological Products Platform
  - rupture models / SiteCharTool / MT
  - EventID / F-E-Region / …

Hazard and Risk Services
- Seismic Hazard Models
- Seismogenic Faults
- Ground Shaking Models
- Geotechnical Engineering Information
- Strong Motion records in buildings
- Earthquake Engineering & Risk Services
EPOS Seismology services today
Subsidence along the High Speed Railway

Displacement [cm]
Archeological sites monitoring: Pompei (Napoli)

388 CSK Images (July 2009 – July 2015)
SERVICES FOR INDUCED SEISMICITY AND ANTHROPOGENIC HAZARDS

- Data from private sector
- Restricted access to data
- Authorized access to services
- Hazard Assessment for industry
- Risk communication for society
- Scientific challenge to identify and interpret natural, triggered or induced seismicity
- Security of geo-energy exploitation
- Information to society
From data to products

Seismic waveforms from NRIs

Quality controlled and integrated in ORFEUS EIDA

Integrated at Global Level FDSN -> GEO

Access to Seismologists

New data & Services in TCS Seismology (Orfeus)

VA from other Stakeholders (scientists)

New products for Hazard Assessment (scientists)

Accessible to engineers, geophysicists, professionals, global organizations

Integrated new metadata in European Strong Motion database (ESM)

Used to calibrate Ground Motions Predictive Equations GMPE

Used to Seismic Hazard Assessment for policy makers and industry

Access to other Stakeholders: Private Sector Civil Protection
Key Message 2

• Services are primarily dedicated to facilitate **access to data and use (re-use) of data**, as well as to foster data **integration** (multidisciplinary use) and access to computational resources

• **Real time services** are operated by EPOS **without** interfering with the **institutional commitments** and **authoritative role** of research organizations toward stakeholders and society (emergency management, **alert** operation, post-disaster recovery, .....)

• **Education** and **training** as well as **dissemination** of scientific achievements and information is a direct contribution to create awareness and preparedness of society, which result in increasing the resilience to geo-hazards. This will be possible when the RI will be fully operational
3 – Ethical Issues & Trust
Data and Service provision to different stakeholders: Ethics Issues

OPEN SCIENCE COMMONS

ETHICS ISSUES

open access

risk communication

exploitation

RISK MITIGATION

PRIVATE SECTOR
The EPOS chain:

High gain/high- but manageable risk

Access

Use & Re-use of Data
Integrated use of data
Facilities

Understanding

Processing and modelling
Data massive applications

Discovery

Ideas & serendipity
Authoritative Services
Training and education

Trust

Industry & SMEs
Society
Key Message 3

• The development of **downstream services** to different stakeholders has to be **sustainable** with the operation and preservation of data and service life cycles.

• The **communication of information** concerning geo-hazard and risk by RIs involves ethical issues that must be taken into account.

• The **operation of downstream services** by RIs should imply impartiality for public goodness.

• Pan-European **harmonization** of downstream services has to be coherent with national security plans and existing operational services for Civil Protection Agencies and other institutional stakeholders.
EPOS: a single, pan-European distributed RI

Sharing Resources & Human capital to Build EPOS
Summing up

EPOS

Integrates national and transnational research infrastructures for solid Earth science

Guarantees open access to multidisciplinary Research Infrastructures

Creates novel e-infrastructure and integrated core services

Fosters scientific, technological and ICT innovation

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

for seamless access to pan-European data and services

for cross-disciplinary and transnational research

for a multidisciplinary community of users

for successfully addressing global Grand Challenges in Earth science

for a safe and prosperous society

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Access to data: a global challenge

- Grand Challenges facing the world demand open access to data & products making them:
  - Findable (discoverable)
  - Accessible (understandable)
  - Interoperable
  - Re-usable

- More value from reuse of data
- More and more researchers are seeing the value of sharing
- Many countries developing open research data policies
- Central Role of Research Infrastructures