

Meeting Sponsors



Seismological Services within EPOS

106th OGC Technical Committee, GeoScienceDWG session Orléans, France - 22 March 2018 A. Dupont and the EPOS-Seismology Consortium epos-seismology@epos-ip.org



Plan



- EPOS-Seismology in the EPOS context
- EMSC data center activities, data collections and services
- Interoperability issues we face in EPOS-S / EMSC
- Dealing with interoperability issues

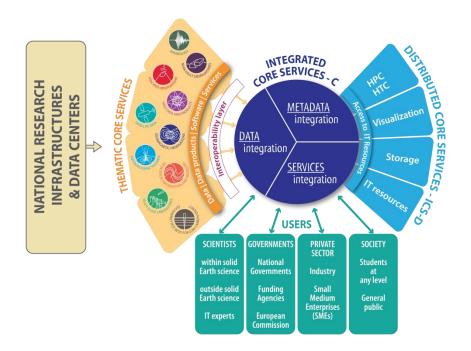


EPOS in a nutshell – what is EPOS?



- EPOS is the European Plate Observing System:
 a European Research Infrastructure for Solid Earth Sciences.
- EPOS-IP (Implementation Phase) aims at creating a pan-European infrastructure for Solid Earth Science.

EPOS builds upon data, products and services contributed by national infrastructures



EPOS provides integrated cross-disciplinary access to data, products, and services for all themes of solid earth science



What is EPOS-Seismology?



- EPOS-Seismology builds its internal organization on three pillars, representing the existing community-driven seismological institutions on European level: ORFEUS, EFEHR and EMSC.
- The EPOS-Seismology consortium provides overall governance and coordination.

ORFEUS is the European Infrastructure for seismic waveform data in EPOS



ORFEUS collects seismological waveforms from 63 national institutions. The distributed European Integrated Data Archive EIDA is operated jointly by participating.

ORFEUS: Observatories & Research Facilities for European Seismology

EFEHR is the European Infrastructure for hazard and risk services in EPOS



EFEHR was established during recent European projects addressing the provision and coordination of seismic hazard and risk data, products and services.

EFEHR: European Facilities for Earthquake Hazard and Risk

EMSC is the European Infrastructure for Seismological Products in EPOS



EMSC is the organisation for the rapid collect and dissemination of parametric earthquake information from its 76 member institutions.

EMSC: European-Mediterranean Seismological Centre



EPOS-Seismology Data Policy



EPOS has developed a **high level data policy**, including the following principles:

- Ownership and Intellectual Property:
 - Data and facilities are owned by the national research infrastructures (that contribute them)
 - EPOS products will be owned by EPOS
 - EPOS respects inherited intellectual property rights for all contributions
- Access and Licensing:
 - Open Access as a general principle
 - Data and Products available in a timely manner
 - metadata will always be available without restrictions (even for restricted data)
 - licensing of data and products available from EPOS under Creative Commons (preferably CC-BY, CC-BY-NC)
 - authenticated access for EPOS 'central access' services

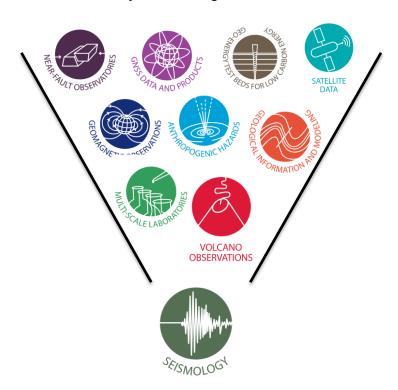
The EPOS data policy supports the **FAIR** data management principles: **F**indable, **A**ccessible, **I**nteroperable, **R**eusable



Seismological Services within EPOS

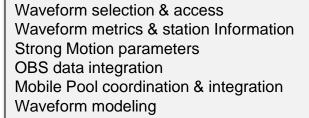


Community driven and governed services



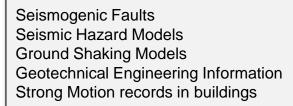
EPOS-Seismology is a TCS of EPOS which is composed of the following services:

Waveform Services





Hazard and Risk Services





Seismological Products

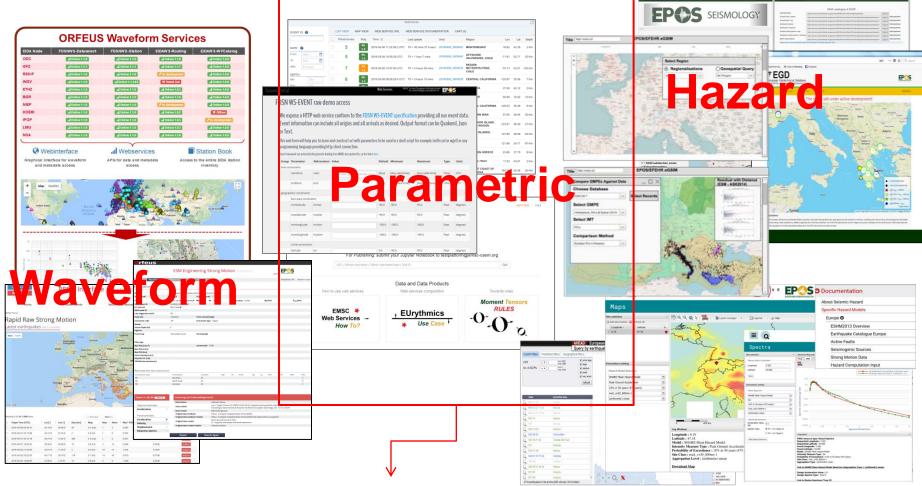
Earthquake Parameter Information Macroseismic & Historical Event data Moment Tensors / Velocity rupture models EventID / F-E-Region / SiteCharTool / ... Seismological Test platform





Concrete examples of the thematic core service « Seismology » provision:

- GUI
- data on demand through web services

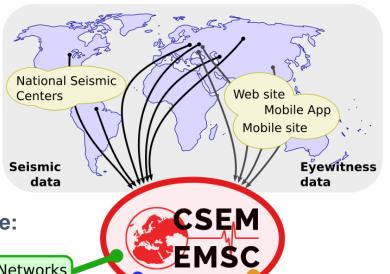




EMSC data centre collect / disseminate

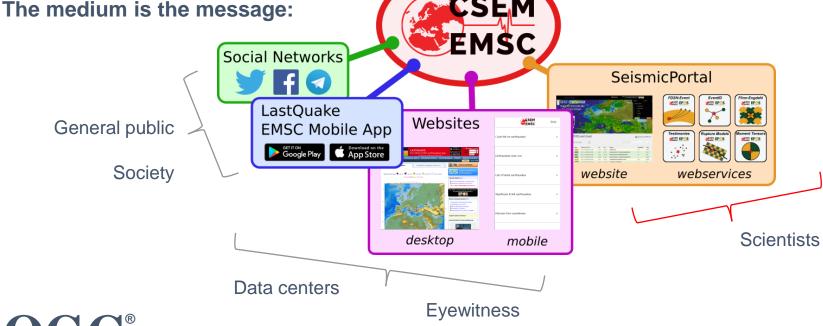


collect seismic information
(Origin parameters, Phase arrivals, Moment tensors, ...)
from international, regional and national data centers



use Citizen as a primary source of real time information:

- response from
 earthquake's eyewitness
 (Comments, Felt
 intensities, Pictures, ...)
- Internet traffic analysis of EMSC web sites is used as earthquake detectors

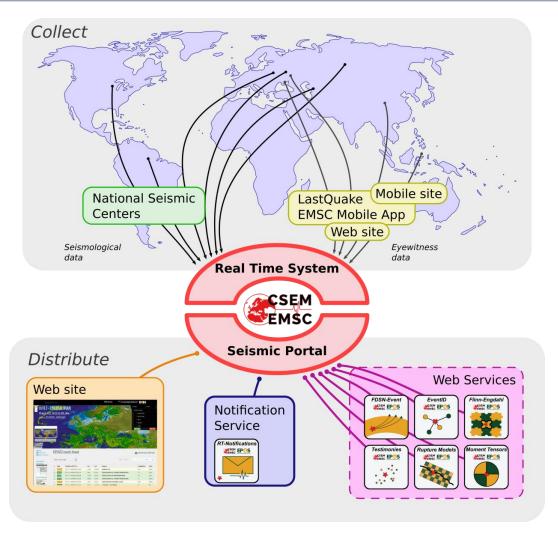




The Seismic Portal

www.seismicportal.eu

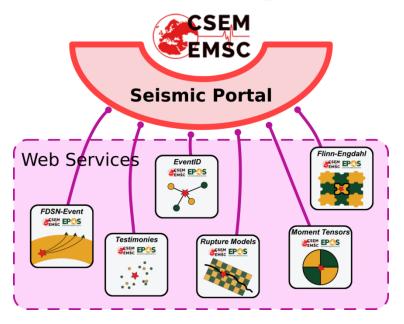




is the main interactive gateway to access scientific products



Web services are the Seismological Products developed for EPOS Integrated Core Services



- EMSC web services are currently up and running (www.seismicportal.eu/webservices.html)
 - o each web service has its own URL and specification documentation.
- Web services use existing standards
 - they are build mostly upon FDSN-Event specifications and QuakeML version 1.2 standard.
- If needed, standard are extended
 - this is the case for: Moment Tensors, Testimonies and Rupture Models web services where in total 20 parameters have been added to the FDSN-event standard.



Panorama of EPOS-Seismology data format



Parametric

QuakeML XML ascii

Hazard

GML SVG KML Waveform

miniSEED

StationXML



Which interoperabily issues we face on?



Epos-Seismology

 Dialog with EPOS Integrated Core Service in order to map and translate community metadata to the baseline of EPOS-DCAT-AP vocabulary data model.

EMSC

- Modernize exchange with Data centers in favor of a bus communication: data exchange through a standardized way (moving from the current ASCII to QuakeML version 1.2).
- Merge seismological and macroseismic data in the same data model: (QuakeML + JSON / GeoJSON to QuakeML version 2).



How we deal with them?



- · Extension of existing standards well recognized in the seismological community
 - E.g. in the framework of EPOS-Seismology, coexistence of different versions of a same standard: FDSN-Event for current seismic events (EMSC) / FDSN-Event for historical events (AHEAD)
 - workaround the problem (temporary solution before moving to the QuakeML version 2 standard)
- Build homemade solutions in order to make the bridge in between standards
 - E.g. writing ad hoc convertors
 - SC3ML to QuakeML
 - GeoJSON to QuakeML
- Build use cases (at various granularity scale) in order to understand common needs <u>and</u> potential interoperability issues:
 - E.g. EPOS-Seismology has developed several different Use Cases transverse to the Seismology Thematic Core Service.
 - E.g. EMSC has developed a Use Case with all its web services in order to identify potential new data models and/or best data conversions to operate.

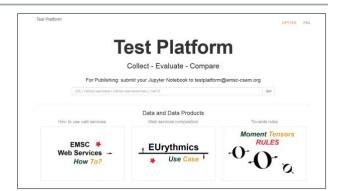


Seismological Test platform



Development of a Test Platform:

- o to gather the needs and,
- o to offer a collaborative development means.



The aims is also to provide a mechanism to make evolved standardization through an iterative process:

- Use the Seismological Test platform facilities to propose and test specific rules through specification documents (e.g. "towards moment tensor rules").
- Test the implemented rules in an operational context and expose it to the community (i.e build a test service).
- Subscribe to dedicated working groups in order to expose the tested services and to propose newest specifications:
 - Large audience (e.g. EMSC general assembly, EPOS-Seismology assembly, ESC, ...)
 - Specialist (e.g. IASPEI working group on Moment Tensor)





Conclusion: more standardisation needed



Discover what already exist in adjacent fields / communities:

EPOS-Seismology is engaged in various IT projects:

- DARE Delivering Agile Research Excellence on European e-Infrastructures H2020
- EUDAT European Data Infrastructure (various activities around utilizing EUDAT services within EPOS Seismology).

EPOS-Seismology dispose of:

- Harmonization working group (identify neighboring developments)
 Contact Point: epos-ip.org / Alberto Michelini
- EPOS Vocabulary task force (identify common needs)
 Contact Point: <u>epos-seismology@epos-ip.org</u> / Otto Lange

Key Message: YES, we have common objectives and are ready to collaborate!





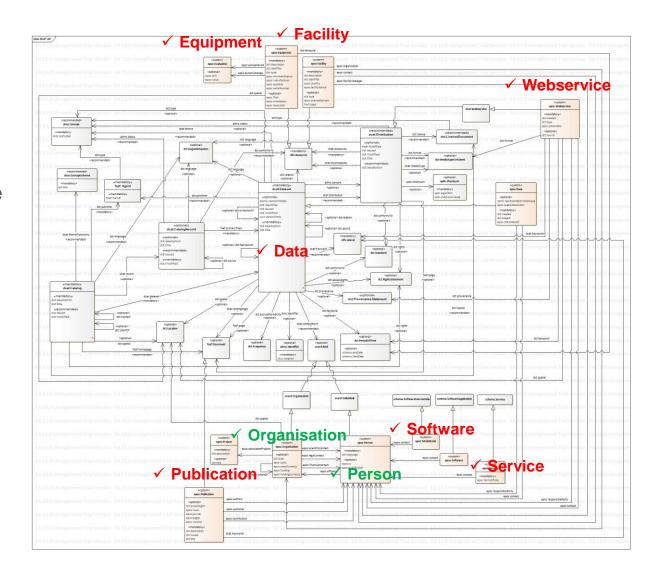
EPOS-DCAT-AP



Mapper: Translate community metadata to the baseline

Mapping priorities:

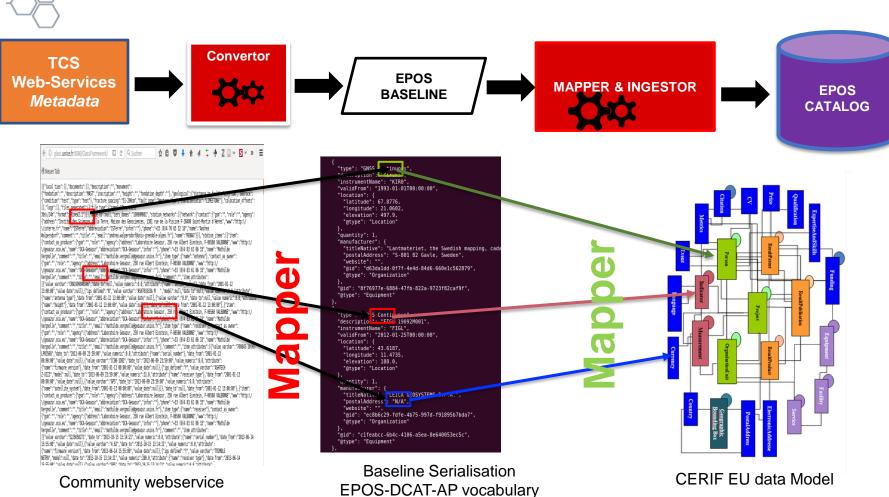
- ✓ Web services
- ✓ Dataset
- ✓ Organisation
- ✓ Person





TCS and ICS dialog





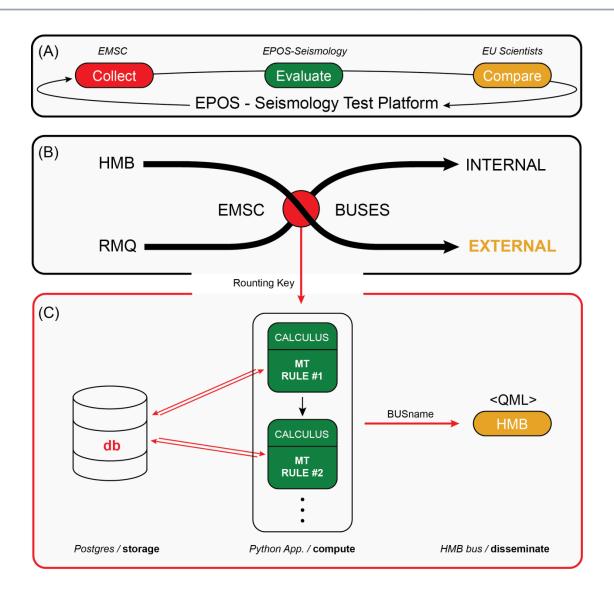
Stage I: TCS metadata ingestion into ICS

Stage II: EPAS-DCAT-AP ingestion into CERIF



Towards rules on EPOS Test Platform

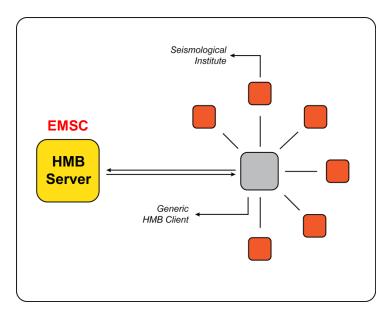




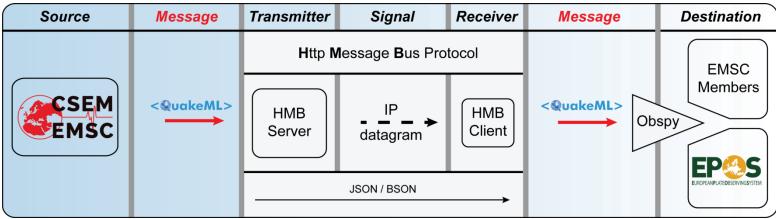


Schematic diagrams of HMB bus communication system





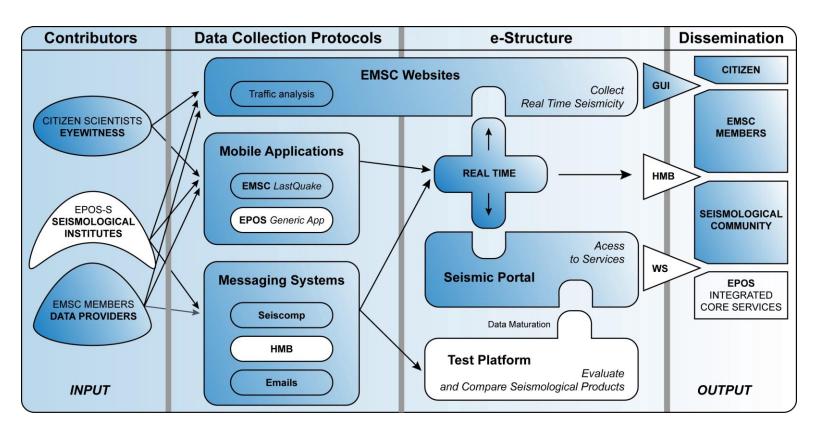
- Seismic information is disseminates at the same rhythm as EMSC is digesting it:
- a QuakeML is automatically published on an HMB bus when an event is processed or updated.
- Transparency, rapidity and robustness as well as standardization are the four goals envisioned to foster the synergy between Seismological Institutes in Europe and to enhance their interoperability thanks to HMB messaging system.





Integration of EPOS developments in the EMSC's Infrastructure





- in blue, the backbone of EMSC's data pipeline
- in white, the ongoing EPOS developpement



FDSN-Event Web Service

FDSN-Event



Web service

Data	EMSC event data
Status	Operational since 2014
Spec.	Builds on the FDSN-Event specifications
Url	http://www.seismicportal.eu/fdsn-wsevent.html





Moment Tensor Web Service



Web Service

Url

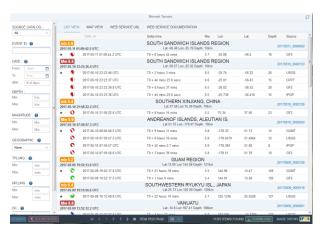
Data All moment tensors received at EMSC

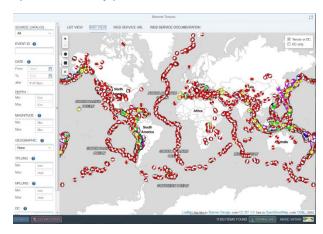
Status Operational since 2017

http://www.seismicportal.eu/mtws/



Interactive Search (GUI + map)





Web service parameters

- FDSN-event parameters for filtering
- + 7 specific parameters for the selection of Moment Tensor:
 mintplung, maxtplung, minnplung, maxnplung, mindc, maxdc, preferedonly



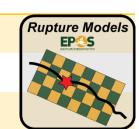
Rupture Model Web Service



Web Service

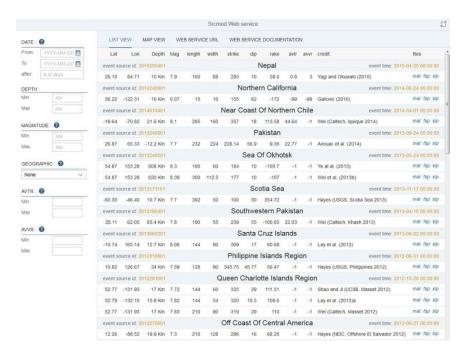
Data	Rupture models of SRCMOD database (Martin Mai)
Status	Operational since 2017
Collaboration	Dynamic mapping of existing event identifiers

Url http://www.seismicportal.eu/srcmodws/



Web Service Parameters

- Inspired from FDSN-standard for event selection: time, spatial and magnitude filtering
- Additional parameters for rupture models: slipratemin, slipratemax, displacement, ...





Testimonies Web Service



Web Service

Url

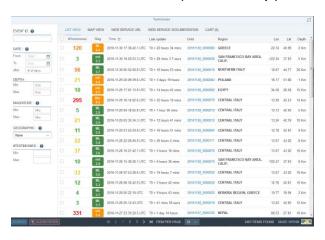
Data All testimonies collected by the EMSC

Status Operational since 2017

http://www.seismicportal.eu/testimonies-ws/



Interactive Search (GUI + map)



Web service parameters

- FDSN-event parameters for filtering
- + 2 specific parameters: minvalues and maxvalues





EventID Web Service

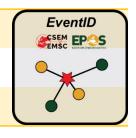


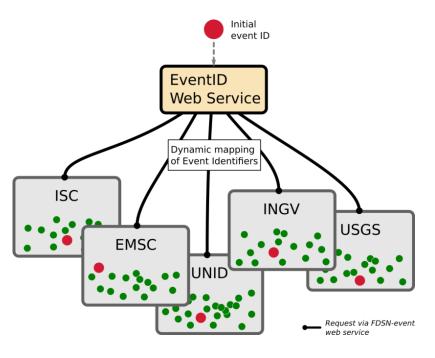
Web Service

Goal Dynamic mapping of existing event identifiers

Status Operational since 2017

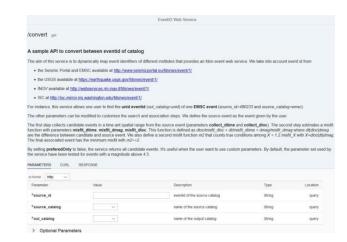
Url http://www.seismicportal.eu/eventid/





Web Service Parameters (11 parameters)

 source_id, source_catalog, out_catalog collect_dloc, collect_dtime misfit_dloc, misfit_dtime, misfit_dmag preferedonly, includeinfo





Flinn-Engdhal Web Service



Web Service

Data Identifies the FE region from a geolocalisation entry point

Status Operational since 2014

Spec. 3 parameters (latitude, longitude, data format: json, xml, ...)

Url http://www.seismicportal.eu/feregions.html





