

# EMSO e il suo Potenziamento nelle Regioni della Convergenza tramite il PON EMSO-MedIT

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# Outline

- **What is EMSO**
- **EMSO enhancement: EMSO-MedIT**
- **E-infrastructure in EMSO**



**EMSO**

## European Multidisciplinary Seafloor and Water-Column Observatory

ARCTIC

NORDIC SEA

NORWEGIAN  
MARGIN

CELTIC/  
PORCUPINE

BLACK SEA

LIGURIAN

MARMARA

IBERIAN  
MARGIN

WESTERN  
IONIAN SEA

HELLENIC

AZORES

PLOCAN



European Strategy Forum  
on Research Infrastructures

ESFRI

# EMSO ESFRI Research Infrastructure

**EMSO** is the European Research Infrastructure of  
***fixed seafloor and water column observatories***  
constituting a distributed infrastructure for long-term  
monitoring of marine environmental processes

**Multidisciplinary** infrastructure serving Research and Innovation in:  
Geosciences, Physical Oceanography, Biogeochemistry, Marine Ecology



# International dimension

Ocean Networks Canada

DONET Japan

emso

ECSSOS China

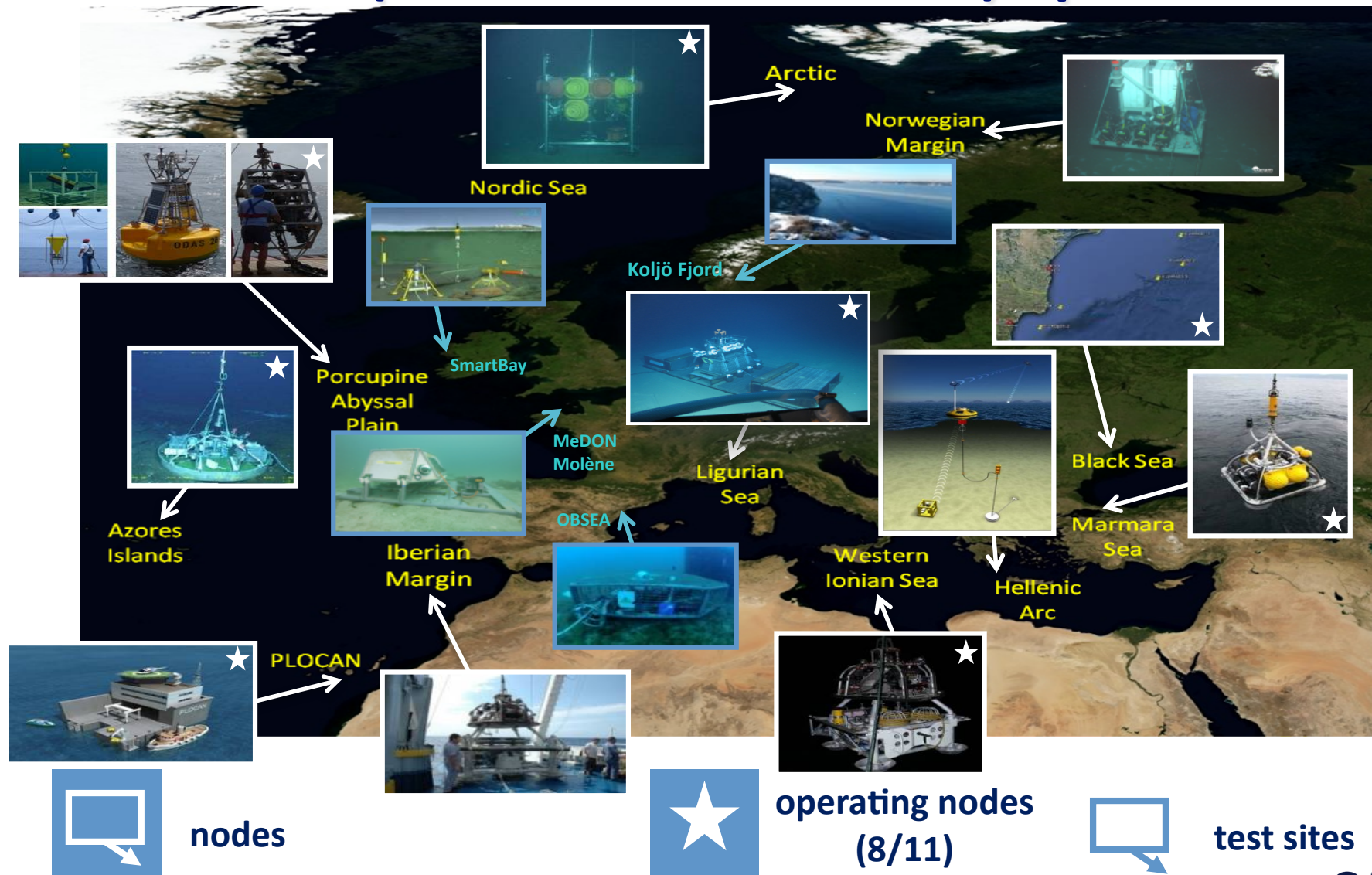
MACHO Taiwan

OOI United States

IMOS Australia

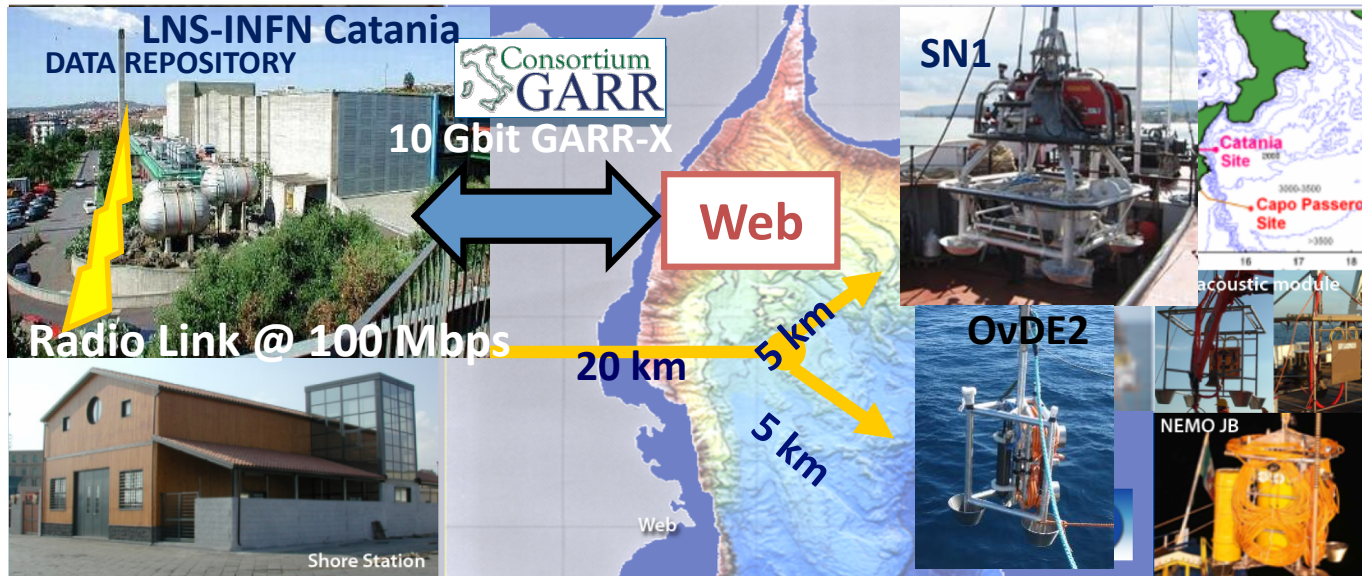


# EMSO nodes (11 sites & 4 test sites) - present status





# NEMO-SN1: an example of real-time node



**Geo-hazards**  
(earthquakes, tsunamis,  
volcanic activity)

**Bio-acoustics**  
(mammal tracking)

**Oceanography**  
(e.g., deep water circulation,  
current intensity and  
direction, temperature,  
salinity)



**INFRASTRUCTURE** NEMO-SN1 seafloor observatory, cabled to laboratory in the harbour of Catania by electro-optical cable

**OPERATING IN REAL TIME SINCE 2005** Integrated with land-based networks by transmitting real-time data to National Seismological Service Centre in Rome; Test site for realisation of the underwater neutrino telescope

**RESEARCH** Geohazards, tsunami, climate change, bioacoustics and ambient noise.

**PREVIOUS/RECENT ACTIVITIES** LAMS and SIRENA FESR projects (national). GNDT-SN1 (national). PEGASO project (Structural funds). ESONET demo missions (LIDO, Listening to the Deep Ocean environment). GENESI-DEC, SCIDIP-ES (FP7 infrastructures), KM3NET, TRANSFER

**FUTURE ACTIVITIES** extension of the Catania 30-km cabled; Off Capo Passero 100-km cabling, it has been operating from 2011; Further implementation adding water column and data management from 2012



ROV (operative 4000 m)

**WESTERN IONIAN SEA**

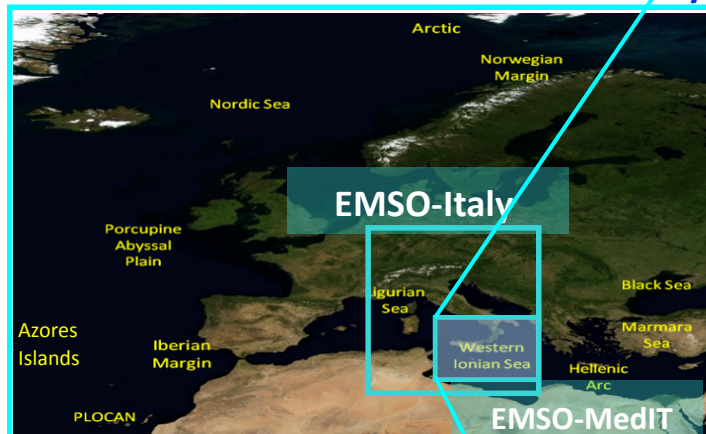
Stand-alone 2002-2003 - Cabled 2005-2008 & 2012-2013 real-time data



# EMSO-Medit

Enhancement of multidisciplinary marine infrastructures in Sicily, Campania and Apulia to contribute to ESFRI EMSO (PAC - Piano di Azione Coesione D.D.

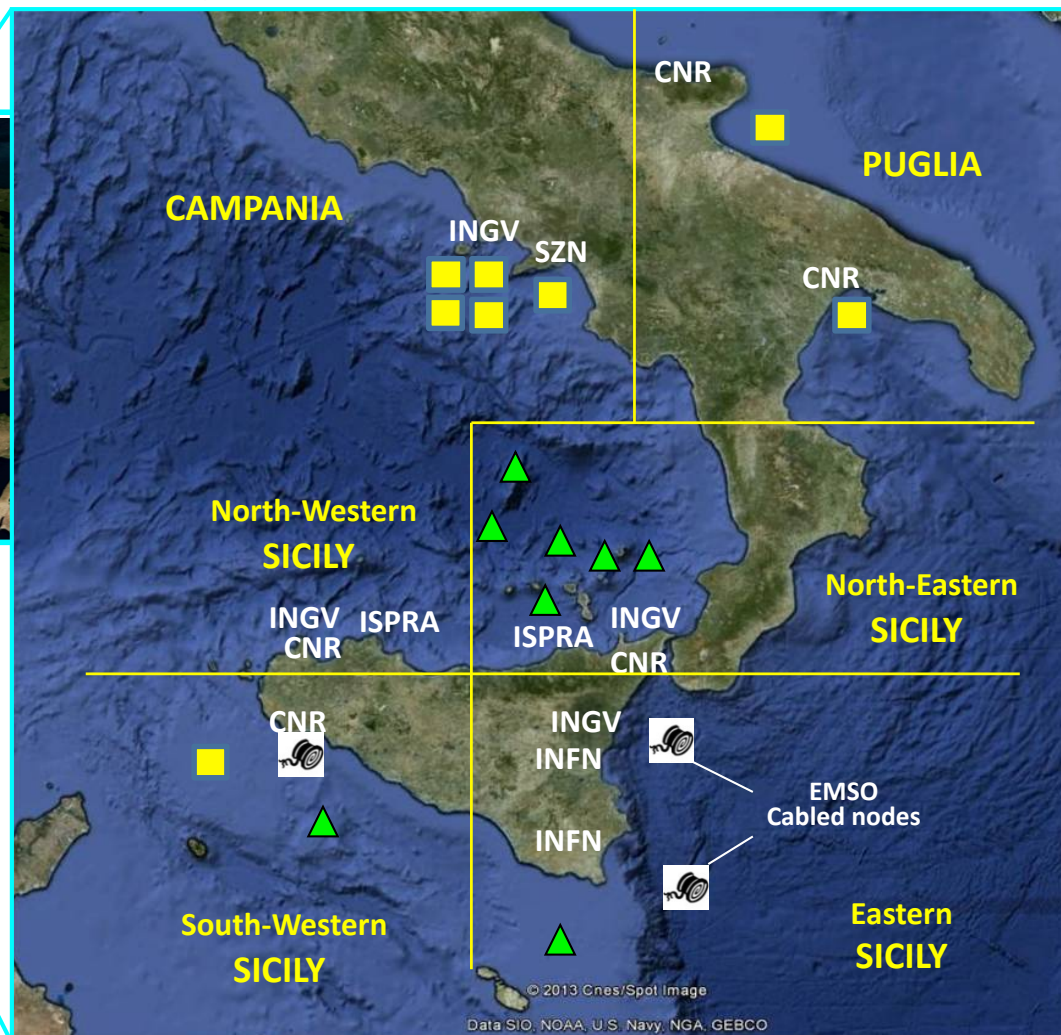
n°1258-6/13) EMSO-Medit  
in the context of EMSO and EMSO-Italy



- Fixed Infrastructures
- 📡 Cabled infrastructures
- ▲ Relocatable infrastructures

Funds: 20 M€

Partners: INGV (coord.), CNR, INFN, SZN, ISPRA





# WP4 EMSO-Medit

## Enhancement Eastern Sicily Node (Catania-Capo Passero)

Consortium  
**GARR**

10 Gbit link  
**GARR-X**

Catania Shore Lab

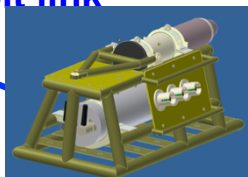


LNS-INFN Catania  
Data Repository

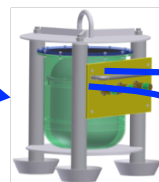


Capo Passero Shore Lab

1 Gbit link



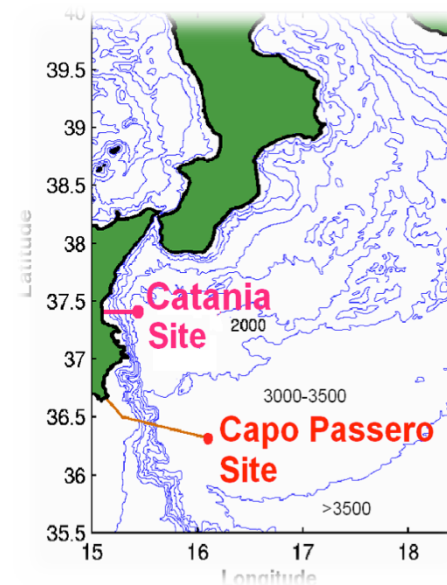
INFN



INGV



CNR



Partners involved: INFN (WP4 coord.), INGV, CNR

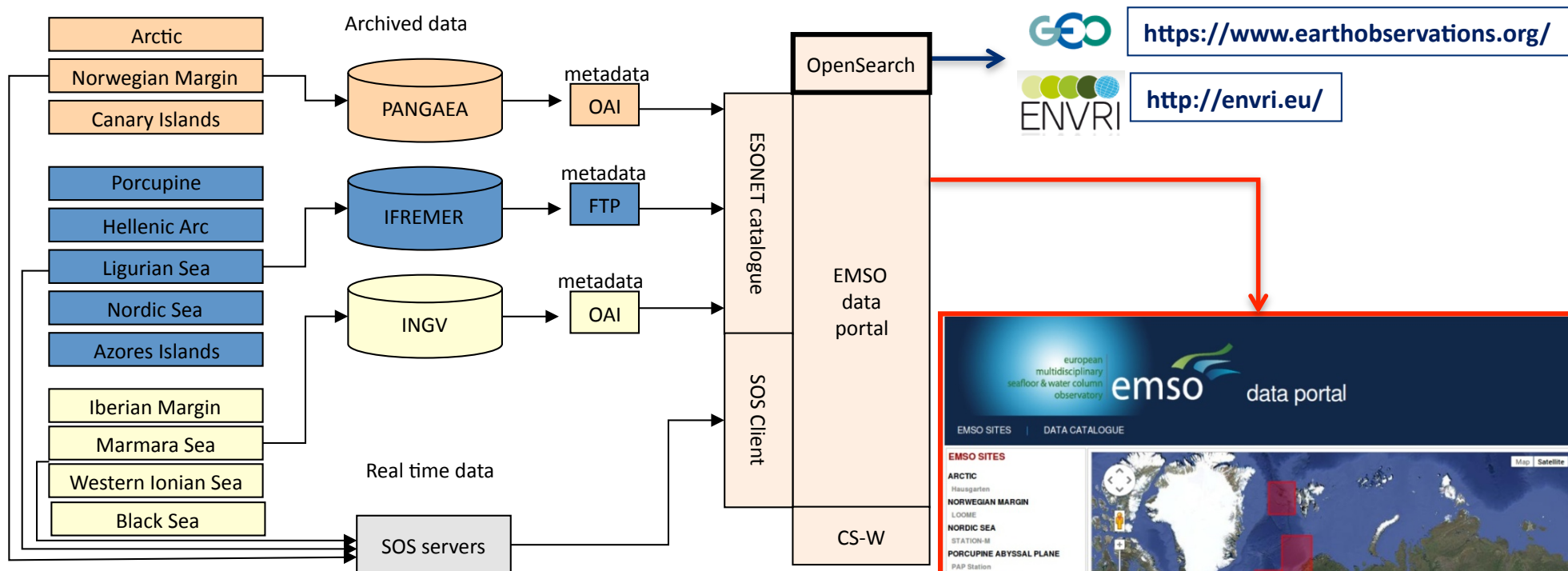
# Example of Data Rate - Western Ionian Sea

daily/monthly by NEMO-SN1 observatory

<b>INSTRUMENT</b>	<b>byte/day</b>	<b>byte/month</b>
<b>Oceanographic sensors</b>	<b>13 M</b>	<b>390 M</b>
<b>Gravity meter</b>	<b>5 M</b>	<b>150 M</b>
<b>Magnetometers</b>	<b>2.5 M</b>	<b>75 M</b>
<b>Seismic sensors</b>	<b>933 M</b>	<b>28 G</b>
<b>DACS monitor</b>	<b>11 M</b>	<b>330 M</b>
<b>Bio-acoustic Hydrophones*</b>	<b>372 G</b>	<b>11 T</b>
<b>Station monitoring</b>	<b>163 M</b>	<b>5 G</b>

Lossless data compression algorithms (e.g., FLAC) may reduce file-size to 30% of the original size

# EMSO Data Management (1/2)



## Distributed Data Architecture

## EMSO Data Portal Welcome Page Overview of EMSO sites

<http://www.emso-eu.org/>

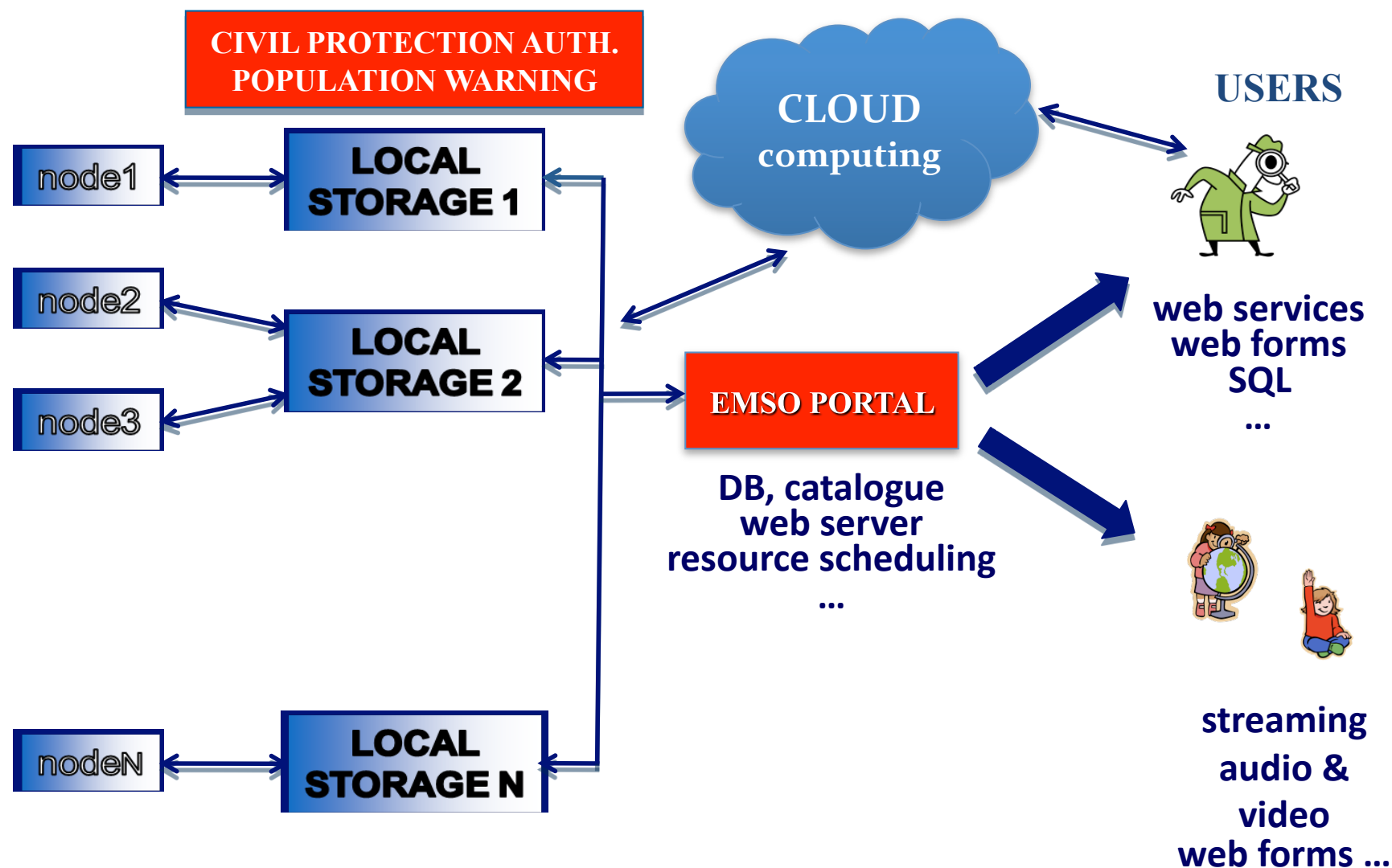


## EMSO Data Management (2/2)

- EMSO needs to create a **data infrastructure to serve the wide communities** of scientists studying bio and ambient acoustics, oceanography, geophysics, high energy astro-particle physics, and ecology
- A special objective is to also provide **open access** and shared tools for collaborative studies with state-of-the-art analysis algorithms
- The **distributed computing** paradigm of the EU e-infrastructure will be used to provide large CPU and storage capacity
- EMSO community will access the data through high level **web-based interfaces** to:
  - easily archive/share data and metadata
  - analyse/compare events and whole recordings from multiple sources/sensors / locations
  - Use state of the art analysis algorithms/develop and share new algorithms
  - Search for specific events



# EMSO distributed storage & database



## Links with projects among major related

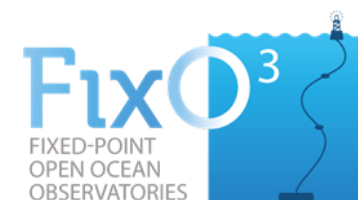


<http://www.genesi-dec.eu/>



scidip-es

<http://www.scidip-es.eu/>



<http://www.fixo3.eu/>



<http://emodnet.eu/>

European  
multidisciplinary  
seafloor & water column  
observatory

emso



<http://www.seadatanet.org/>



<http://envri.eu/>



<http://www.coopeus.eu/>



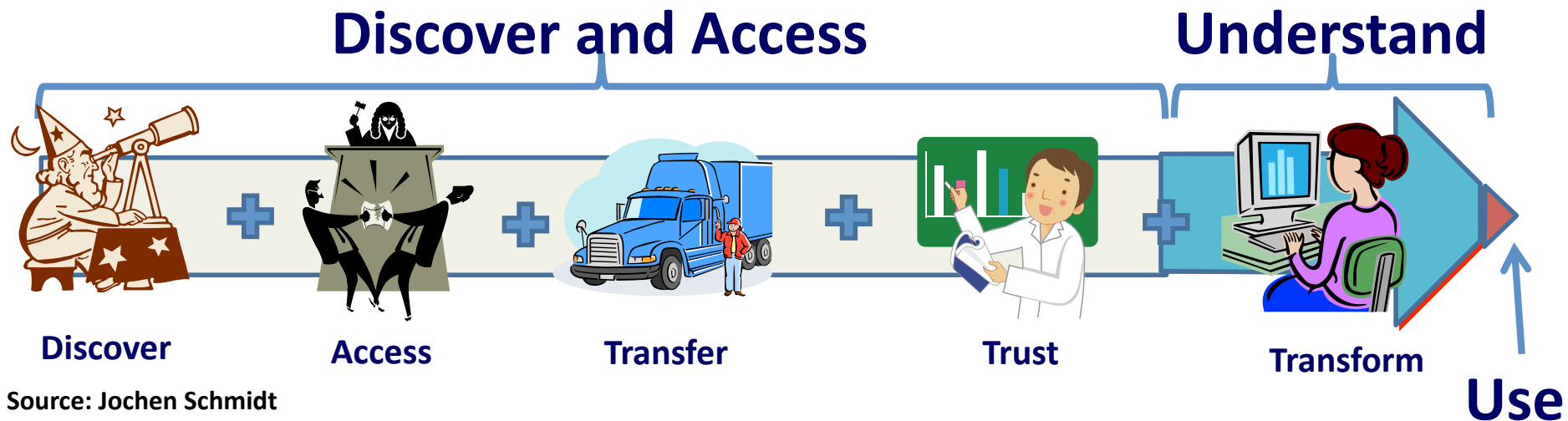
<http://marsite.eu/>





**ENVRI** Common Operations of  
Environmental Research Infrastructures

**“In the process to using a data set, 80% of the cost is associated with discovering and negotiating access to it. Of the remaining 20%, 80% is taken in understanding, trusting and manipulating the data set into a useful form. Meaning only 4% of the total cost is associated with actually using the data set”**



Source: Jochen Schmidt  
National Science Centre for Environmental Information  
New Zealand

The **ENVRI Reference Model** illustrates common characteristics of environmental science research infrastructures in order to provide a common language and understanding, promote technology and solution sharing and improve interoperability

<http://envri.eu/>



# SCIDIP-ES

SCIENCE DATA INFRASTRUCTURE FOR PRESERVATION-EARTH SCIENCE

**Data is the new gold: we have a huge goldmine.  
Let's start mining it! Neelie Kroes (EU)**

**Paving the way for the set-up of an harmonized and common  
approach for the Long-Term Preservation of Earth Science Data:**

- To develop and deploy generic and sustainable digital data preservation services and toolkits
- Validate and use them in the Earth Science with EMSO as use case domain as a start
- To harmonise data preservation policies and approaches, metadata and ontologies in the Earth Science domain

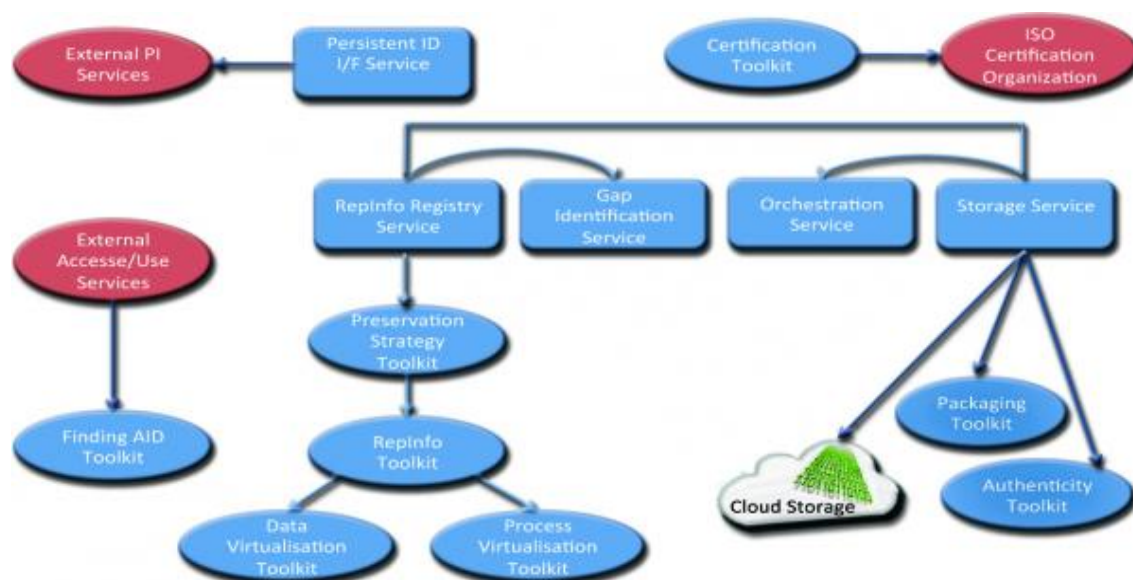




# SCIDIP-ES

SCIENCE DATA INFRASTRUCTURE FOR PRESERVATION-EARTH SCIENCE

## overview of the SCIDIP-ES Services and Toolkits



The Service and Toolkits have not to be taken as a full and closed system. They are a set of functionalities that can work together but can also be used separately. Many repositories already own a preservation system and could be interested in adding some new specific functionalities

<http://www.scidip-es.eu/>

**How do I know something is changing in my archive?**

The **Orchestration Manager** is a notification system notifying when something related to preserved data happens

**Where do I store all data related knowledge?**

The **RepInfo Registry Service** allows the capture of networks of knowledge related to preserved digital objects

**How can I understand change implications for my datasets?**

The **Gap Manager** is a engine which analyses the dependencies between modules inside the RepInfo network. It is needed - for example - to analyze the effects that a change on a module (e.g., a file format change) would effect the other elements of the network

# Grazie per l'attenzione

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