EMSO Data Management Strategy

Data Management Service Group

Enoc Martínez (UPC)

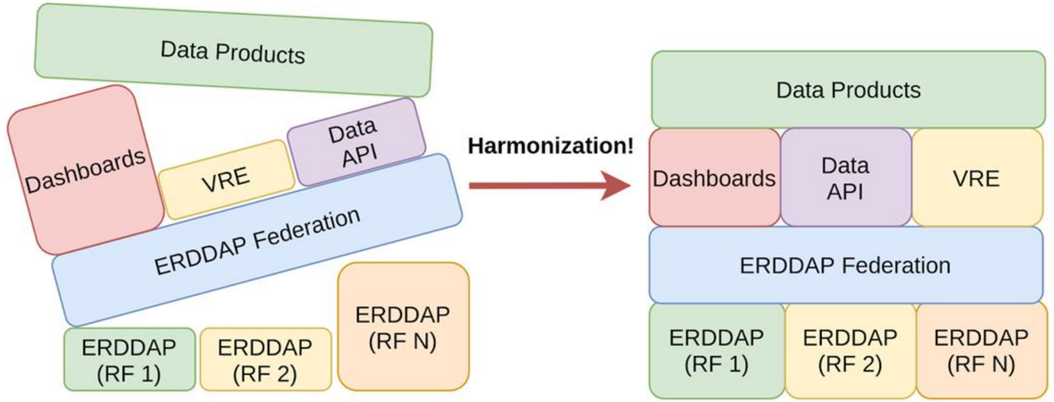
EMSO Strategic Workshop

Rome, 11-13th March 2025

Current EMSO IT Status

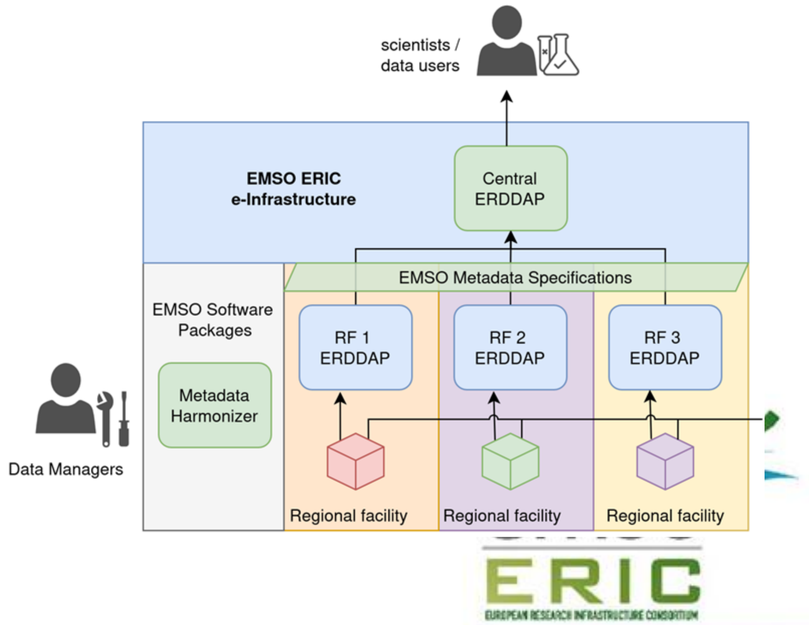
EMSO Metadata Specifications

- Rules to encode data & metadata
- Built on existing initiatives: Climate & Forecast, NVS, OceanSITES, SeaDataNet…



ERDDAP Federation

- Single point of access to EMSO data
- Human and machine-actionable interfaces



Current EMSO IT Status

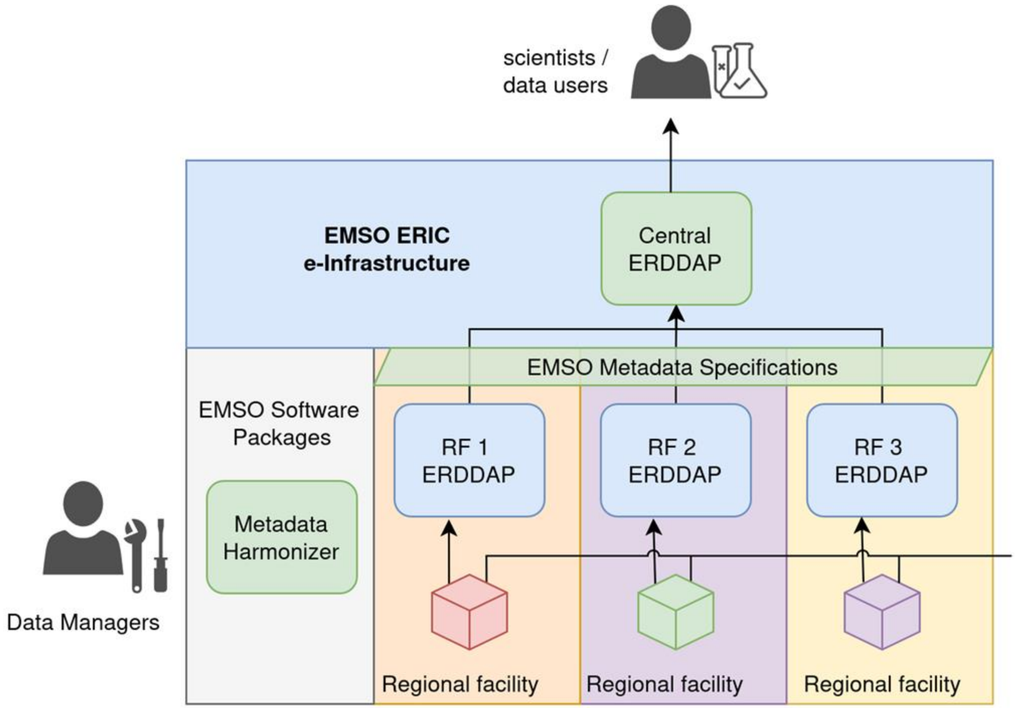
Harmonizer Toolbox

- **Dataset Generator:**
  - Creates EMSO-compliant NetCDF datasets
- **Metadata Checker**
  - Checks the metadata in datasets, providing a compliance score
- **ERDDAP autoconf**
  - Automatically dataset integration to ERDDAP
  - Avoids painful XML configuration

EMSO IT Services

Planned IT Infrastructure

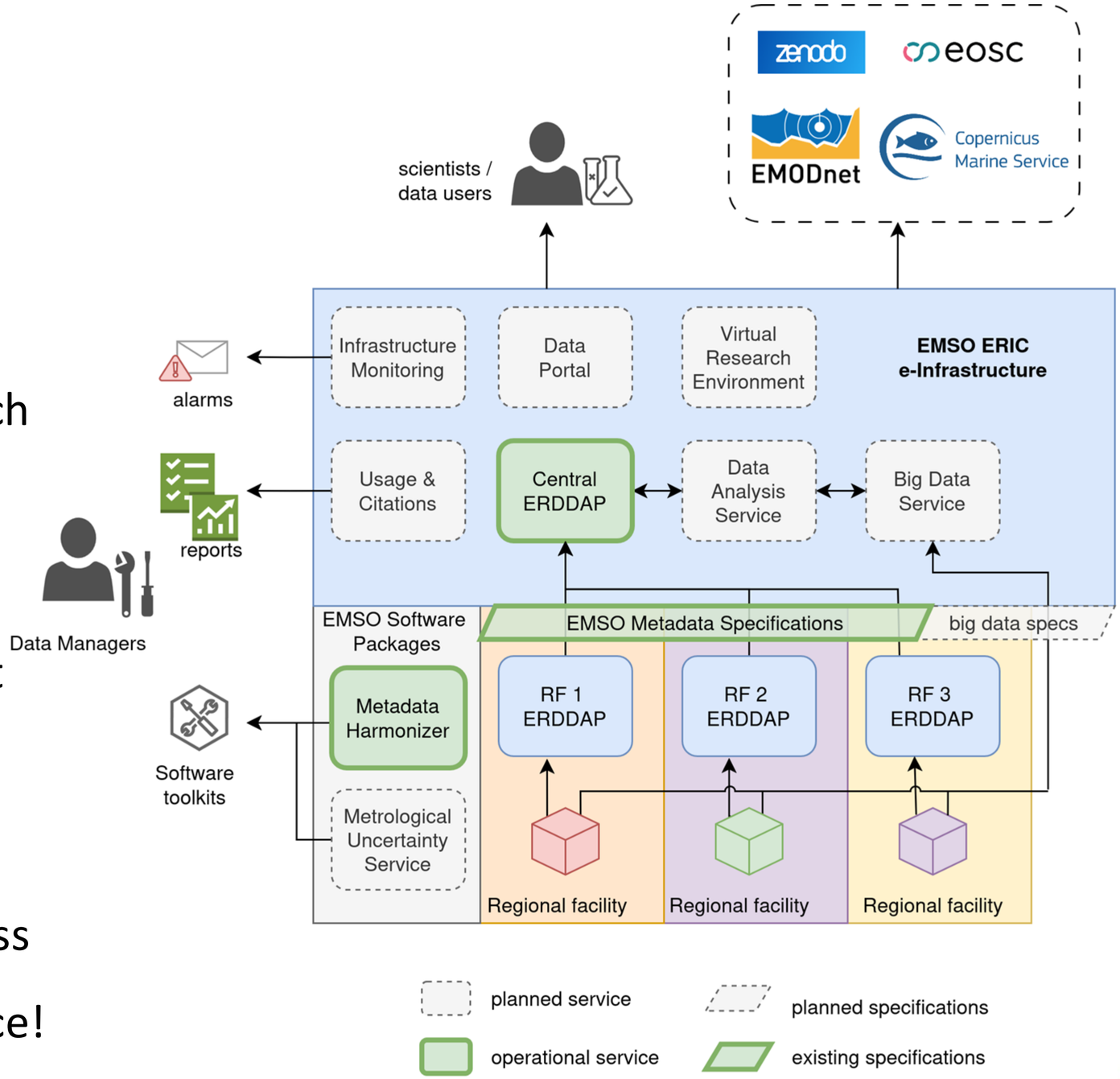
- Current IT infrastructure not enough!
- Better data access to users / aggregators
- Monitor data impact / usage
- Provide tools to internal data managers
- Handle more data types (not only time series)
- Foster new science



EMSO IT Services

Planned IT Infrastructure

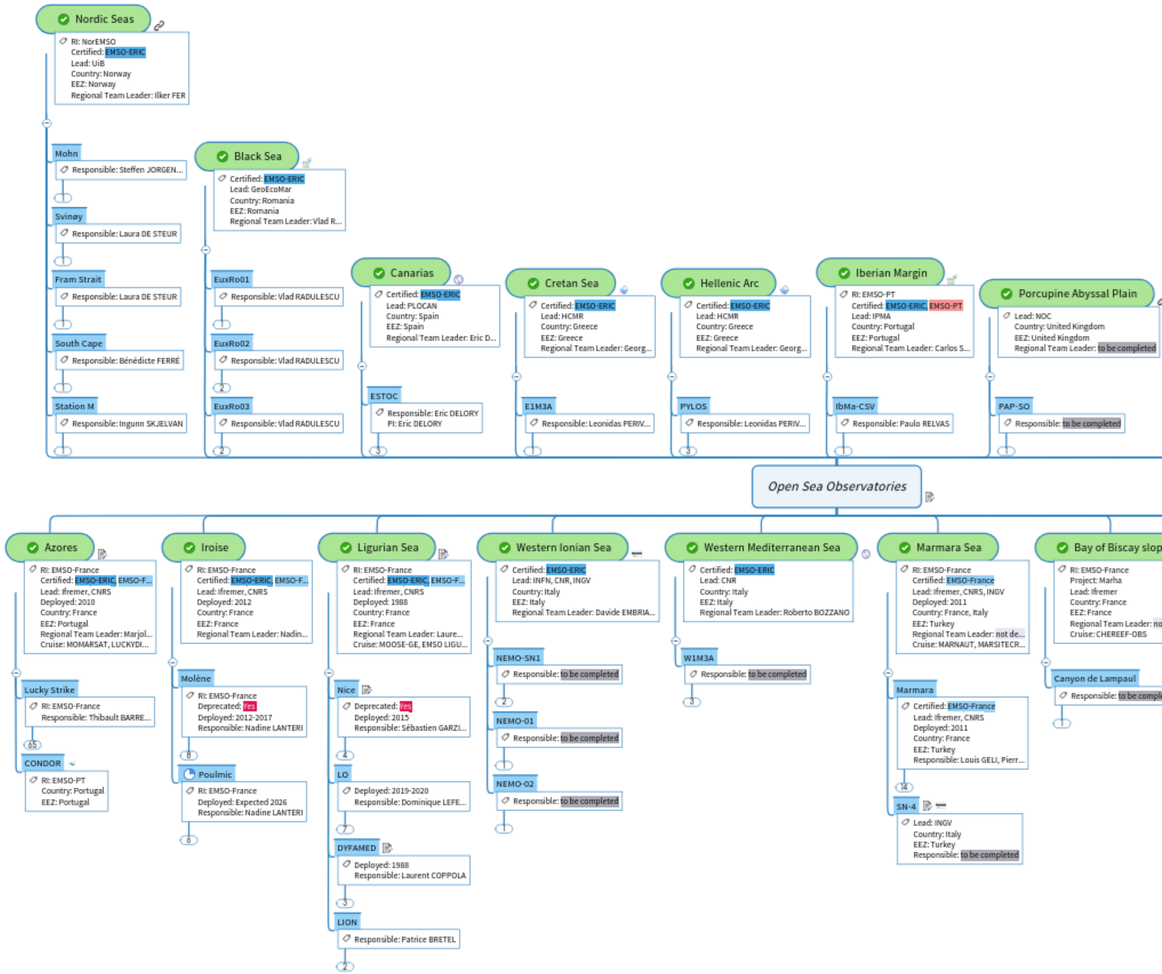
- Maintain federated data approach
- Focus on internal/external users
- Internal:
  - Tools to facilitate management
  - Reports / alarms
- External users:
  - Better, easier, faster data access
  - Data Analysis Services -> science!



EMSO IT Services

EMSO Vocabulary

- Machine-actionable hierarchical vocabulary:
  1. Regional Facility
  2. Site
  3. Platform
- Building block for future services



Priority: HIGH

Development Cost: 1 PM

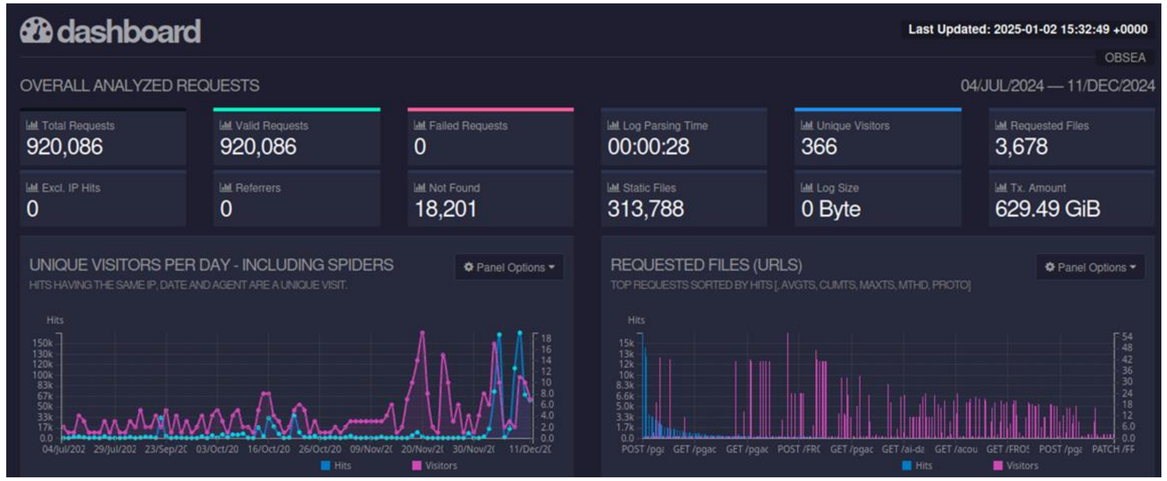
Operational Cost: 0.5 PM

Target users: internal / external

EMSO IT Services

GoAccess Reporting

- Provides statistics on:
  - data access
  - number of downloads
  - number of users (IPs)
- **Dependencies:** ERDDAP



Priority: **HIGH**

Development Cost: 0.5 PM

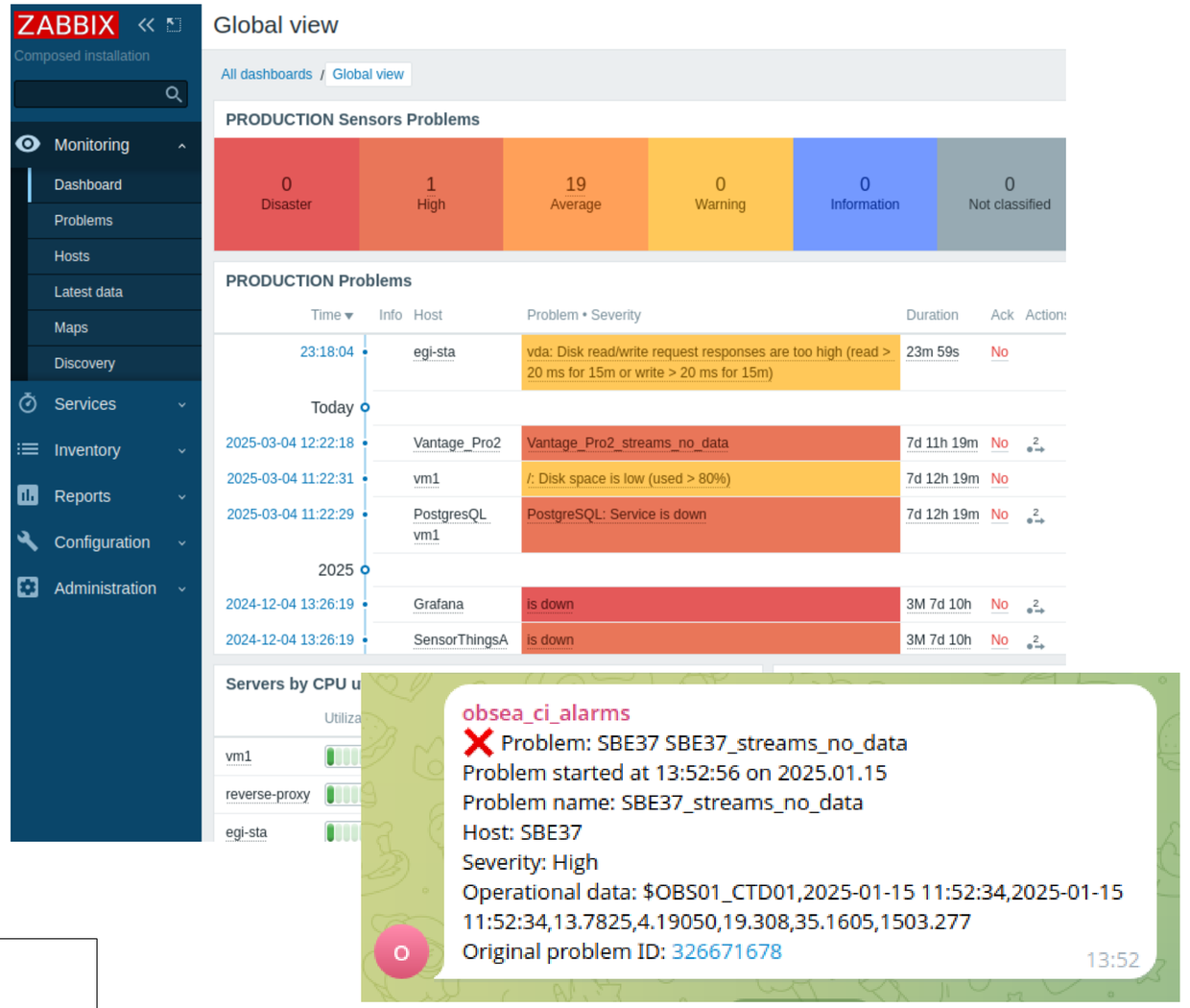
Operational Cost: 1 PM

Target users: internal (RF leaders, data managers)

EMSO IT Services

Infrastructure Monitoring

- Monitors infrastructure performance
- Detects downtimes
- Trigger alarms
- **Dependencies:** ERDDAP



Priority: HIGH

Development Cost: 0.5 PM

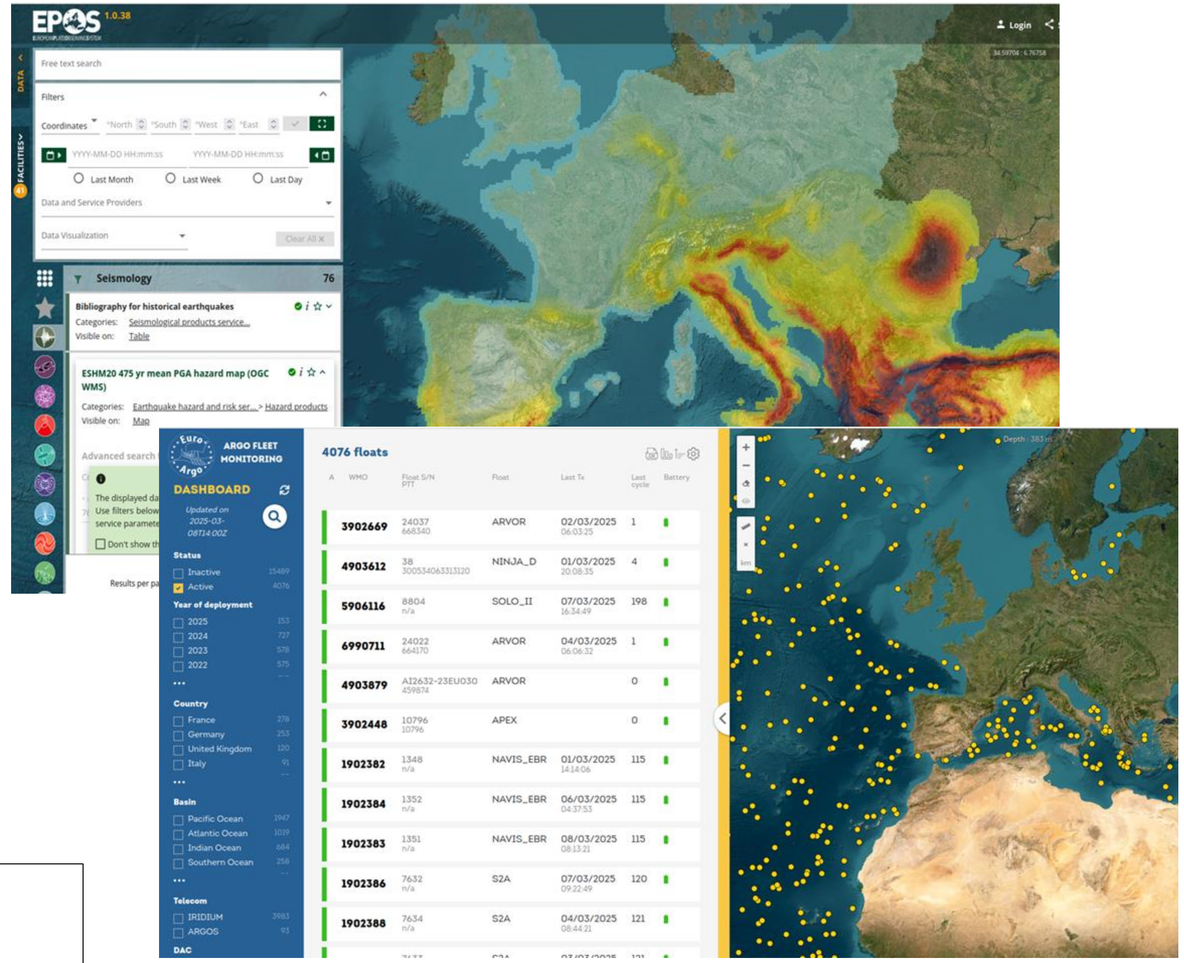
Operational Cost: 1 PM

Target users: internal (data managers)

EMSO IT Services

Data Portal

- User-friendly portal to access EMSO data
- Interactive Plotting
- Re-use existing solutions such as:
  - EURO ARGO
  - EPOS ERIC



Priority: HIGH

Development Cost: 4 PM

Operational Cost: 2 PM

Target users: external

EMSO IT Services

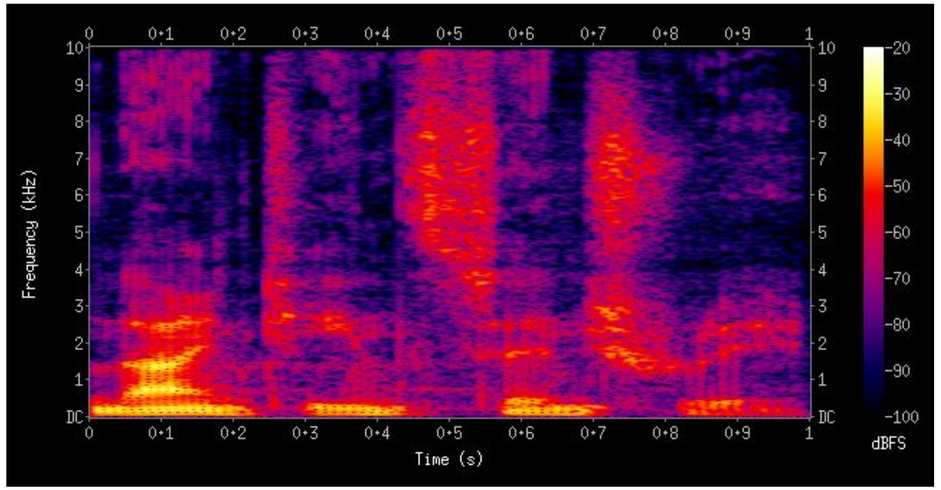
Connection with Data Aggregators

- Ensure that EMSO data is properly harvested and data is accessible through aggregators

- Technical tools (ERDDAP) already set up
- **Dependencies:** ERDDAP, Vocabulary

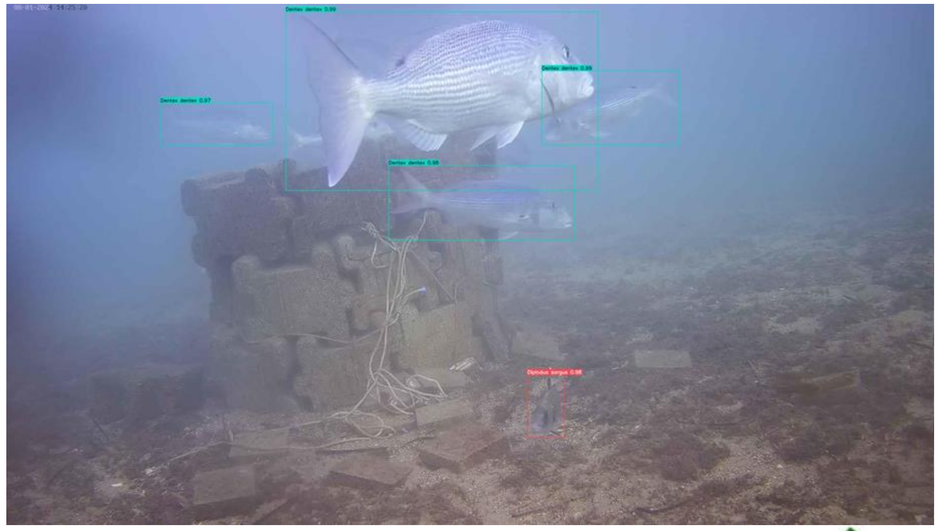
Priority: HIGH
Development Cost: 2 PM
Operational Cost: 1 PM
Target users: external

EMSO IT Services



Big Data Management

- Move beyond time series data
- Service to archive and serve file-based data
  - Acoustics, imagery…
- **Dependencies:** Vocabulary
- ***Added Value!***



Priority: MEDIUM

Development Cost: 10 PM

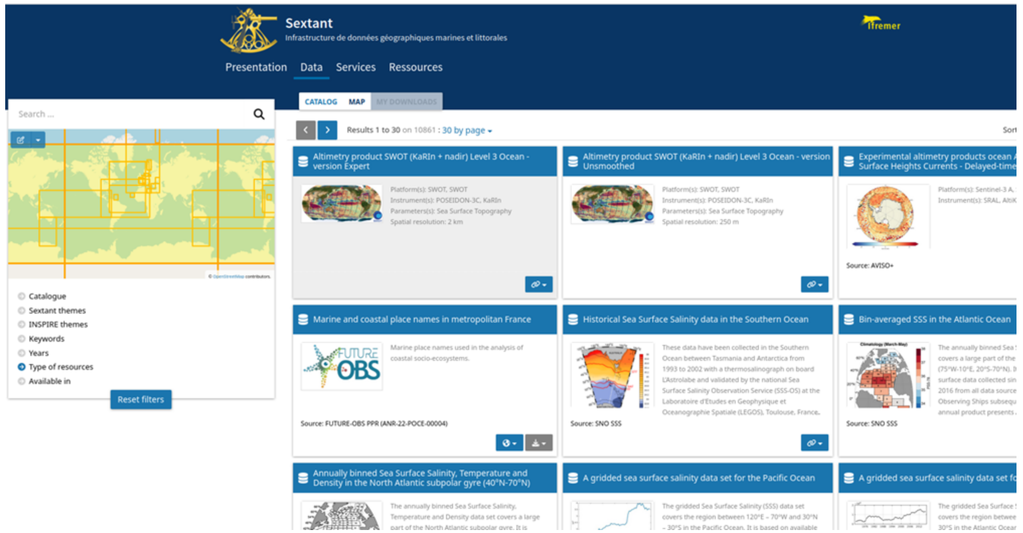
Operational Cost: 4 PM

Target users: internal / external

EMSO IT Services

Data Catalogue

- Centralized catalogue that points to EMSO data
- Curated and well archived metadata
- Can be used to automatically mint DOIs
- **Dependencies:** Vocabulary, ERDDAP



Priority: MEDIUM

Development Cost: 3 PM

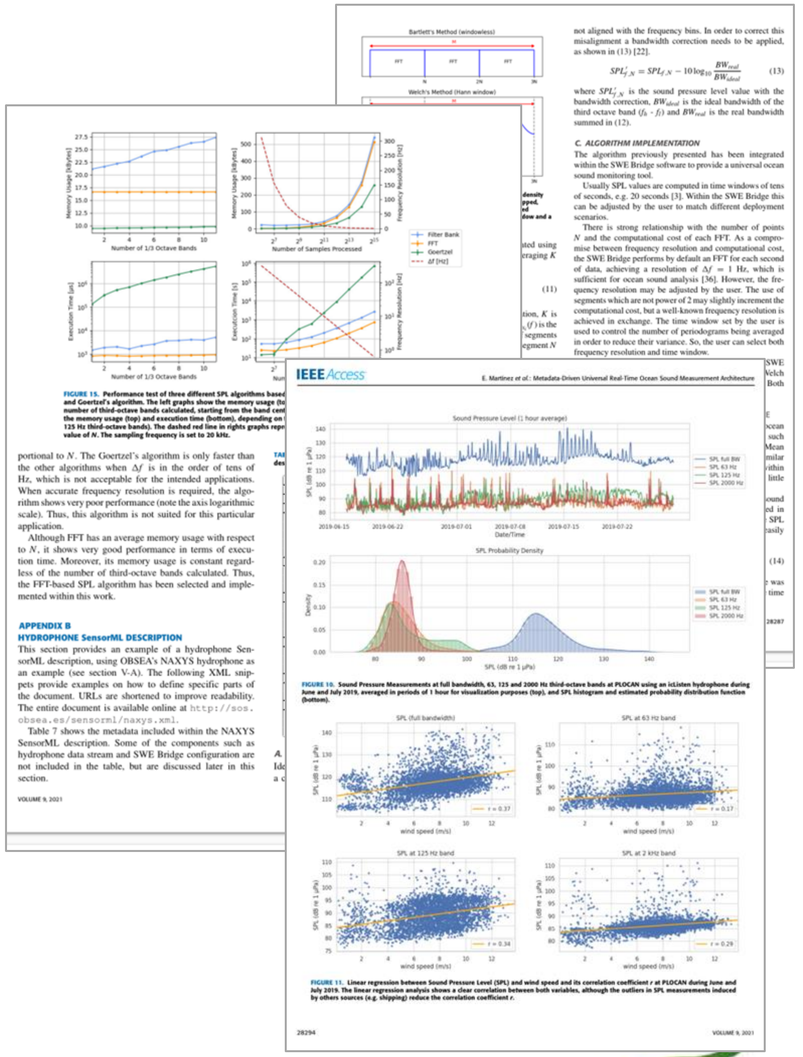
Operational Cost: 1 PM

Target users: internal / external

EMSO IT Services

Citation Reports

- Track usage of EMSO data across scientific papers
- Monitors scientific impact of EMSO
- Reporting needs



Priority: MEDIUM

Development Cost: 3 PM

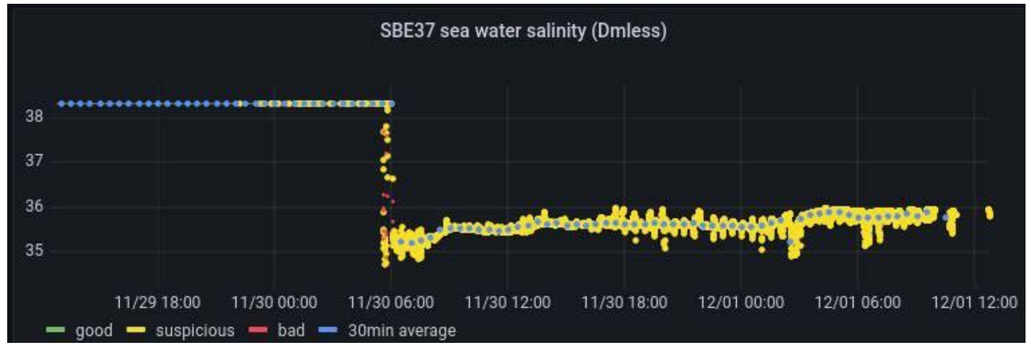
Operational Cost: 2 PM

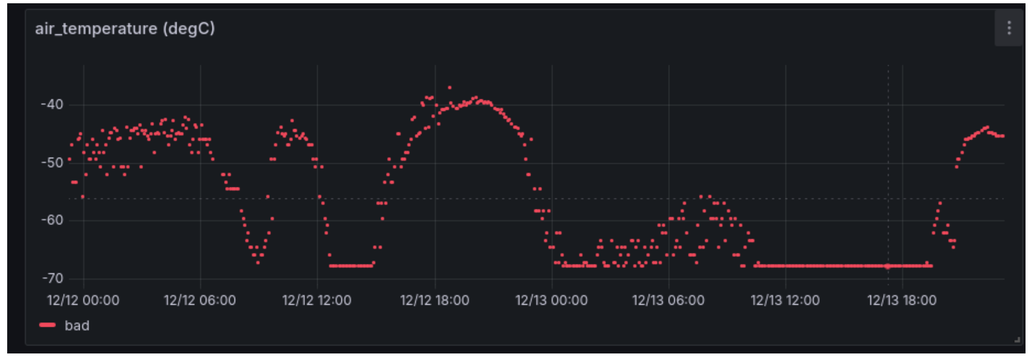
Target users: internal

EMSO IT Services

Quality Control / Quality Assurance

- Currently harmonized flagging scheme…
- … but not harmonized protocols
- We need a common QC/QA methodology
- ⚠ It could disrupt existing workflows





Priority: MEDIUM

Development Cost: 3 PM

Operational Cost: 2 PM

Target users: internal

EMSO IT Services

Virtual Research Environment

- Notebook service
- Computational resources close to the data
- Very important for Acoustics, DAS, etc.

Priority: LOW
Development Cost: 3 PM
Operational Cost: 2 PM
Target users: internal / external

EMSO IT Services

Data Analysis

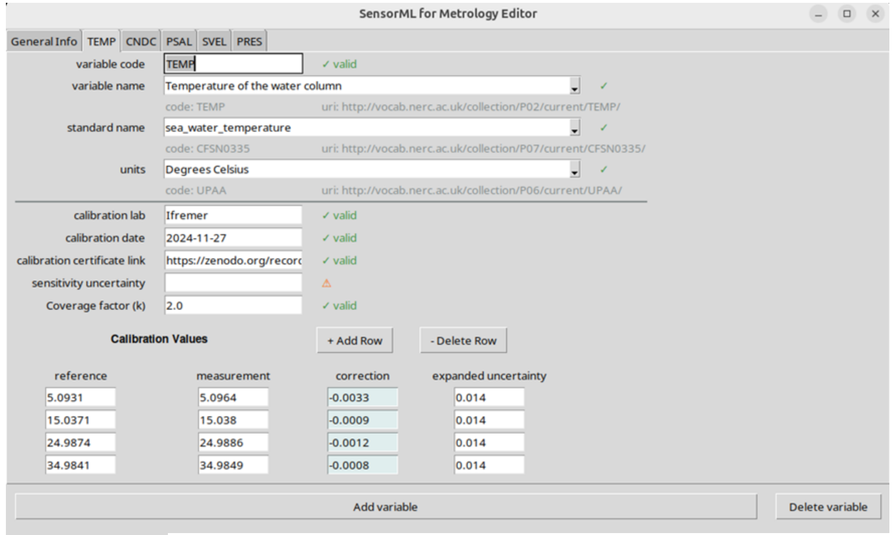
- Standardized data processing applied to ALL data:
  - e.g. Long-term trends of EOVs
- From simple calculations to complex AI workflows
- **Dependencies:** Virtual Research Environment (VRE)
- ***Added Value!***

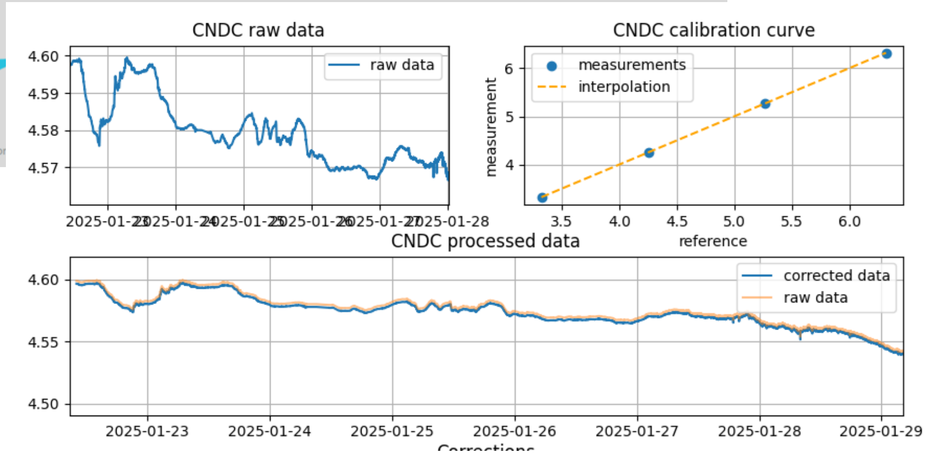
Priority: LOW
Development Cost: 6 PM
Operational Cost: 2 PM
Target users: internal / external

EMSO IT Services

Uncertainty/Metrological Metadata

- Include Metrological metadata
  - Calibration certificates / Uncertainties
- Automated tools to correct data
- Legacy of MINKE EU project
- ***Added Value!***





Priority: LOW

Development Cost: 6 PM

Operational Cost: 2 PM

Target users: internal / external

Conclusions

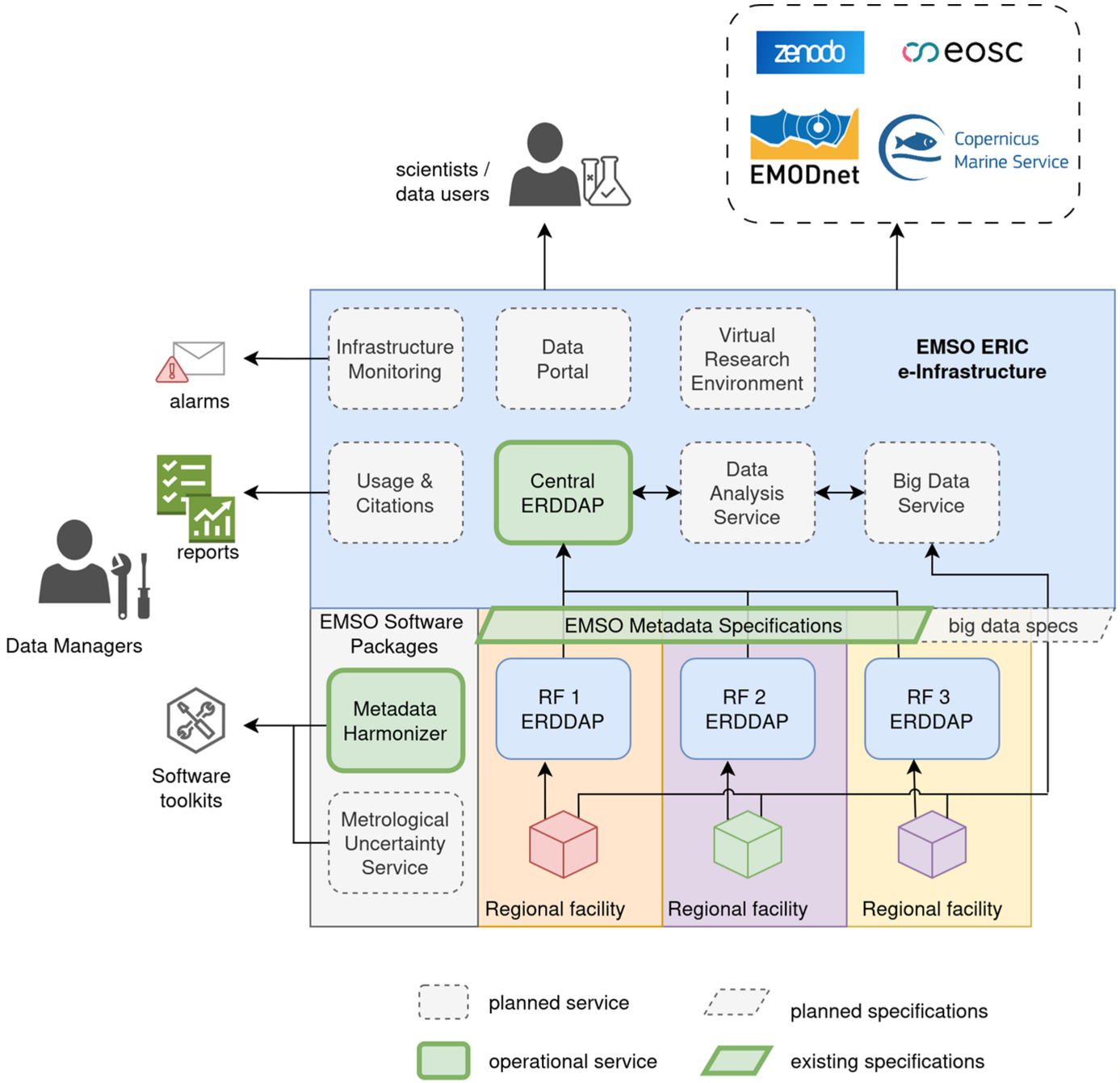
- Basic building blocks in place…
- …but we need to move forward!
- Several new services to be implemented

  -> Foster new science
- In-kind contributions not enough
  - Funding required
  - Workload to be distributed among RFs

EMSO Services Cost_2

IT Service	priority	# Development PM (start-up cost)	# Operational PM (recurrent cost)
GoAcess Usage Statistics	HIGH	0.5	1
Infrastructure Health Monitoring	HIGH	0.5	1
Data Portal	HIGH	4	2
Connection with data aggregators	HIGH	2	1
EMSO Vocabulary	HIGH	1	0.5
Data Catalog	MEDIUM	3	1
Service for Big Data management	MEDIUM	10	4
Quality Control / Quality Assurance	MEDIUM	6	3
Data Repository Connector	MEDIUM	2	1
Automated citation report for data usage	MEDIUM	3	2
EMSO Virtual Research Environment (VRE)	LOW	6	3
Data analysis (including AI)	LOW	6	2
Inclusion of Calibration/Uncertainties in metadata	LOW	6	2
TOTAL		**44**	**21.5**

Thank you for your attention!



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