Critical Success Factors of the ReefTEMPS sensors-oriented environmental information system for a real operationality.

Fiat Sylvie, Régis Hocdé, David Varillon, Antoine de Ramon N’yeurt, Jérôme Aucan

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Critical Success Factors of the ReefTEMPS sensors-oriented environmental information system for a real operationality
ReefTEMPS

Network of coastal oceanic sensors since 1953

Component of the French Seashore and Coastal Research Infrastructure

3 research teams

4 data management sub-networks

Global ReefTEMPS pacific zone
Institute of Research for Sustainable Development
University of South Pacific
South Pacific Community
University of New Caledonia
More than 60 years of data collection

- Temperature, sea pressure, salinity, wave, turbidity, conductivity
- Global warming, Lagoon water circulation, Tsunamis, Coral bleaching, Algae proliferation, decision manager
Each platform: mono / multi-parameters instrument (s)

Installation of sensors → Collecting / replacement (6 months, 1 year, 2 years according stations)

Memory discharge: 1 raw data cycle (OA)

Cycle qualification (e.g. 1B) → NetCDF OceanSites Importation

Qualification (researcher) Historical series (e.g. 2C+)

Dataset

Services
- Discovery
- Visualisation
- Diffusion
- Access
- ...

Live

60s / 30mins acquisition rates

Data cycle

NetCDF following Climate and Forecast (CF) Convention and OceanSites Data Format Reference

Data qualification includes manual and automatic controls

72 sensors in activity

±70 data imports per year

+5 M measurements per year (exponential growth)
Data dissemination

Findable
- Ensure data continuity in a virtual warehouse or data center logic
- Diffuse data in catalogs

Accessible
- Make data accessible and validated to the community

Interoperable
- Be interoperable and provide data to data warehouses
- France Ex: CORIOLIS
- Europe Ex: SeaDataNet
- South Pacific region, International Ex: SOPAC, PI-GOOS, IMOS

Reusable
- Produce and disseminate maps and indicators
- Clear and accessible data usage licence

Objectives

Understandable formats for (all kind of) researchers

> NetCDF, WMS, WFS, SOS, CSW, CSV, raw images access formats availables

> Compliance with FAIR data practices
AODN portal is the Australian Ocean Data Network

- Information system design v.1 - 2010

> AODN portal is the Australian Ocean Data Network

> Standards and Open sources software deployed as a Server/Client architecture
SOS v.1

SensorML

Standard → Our data

System

Platform

Component

Timeserie

Data cycle

DescribeSensor

GetObservation

Geospatial sensing conference, September 3rd, 2019
SOS v.1 - GetObservation

SOS Server limitation of the request set to 1 year

Pressure measurements frequency up to every 60s

Requesting one year returns more than 500,000 entries

XML file generated size is in hundreds of Mo

Download reaching 10mins

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Strength & Weakness SOS v.1

**Strength**
- ✓ Findable
  → Well referenced
- ✓ Accessible
  → Data easy to get

**Weakness**
- ↘ Interoperable
- × SOS mapping
- ↘ Reusable
- × Response time

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Architecture made as services consumed by ReefTEMPS data portal

SEANOE is a publisher of scientific data in the field of marine sciences. It is managed by the ODATIS data center of France’s Earth System research
Critical success factors #1

- SOS v1 was too permissive
- Offering as physical parameter instead of platform prevented us from using 52North client solution
- SOS v2 is more explicit
Critical success factors #2

- XML generation is too expensive
- XML download is too heavy
- JSON is a better data exchange format.
- XML is a better document exchange format.
- REST is easy of implementation
- JSON is easy to read
Critical success factors #3

- Ad hoc database is to be kept
- SQL Join are heavy with volumetry
- SQL Views are the same
- Materialized views are an option
- Duplication of data in dedicated SOS schema is fast
Critical success factors #4

- No user identification required
- No delay due to id validation
- No permission to ask
- Users will get used to using a DOI for data used in publication
- Seamless interface
Critical success factors #5

MANY WAYS TO ACCESS THE DATA

- Oceanograph physicists can use NetCDF
- Sensor Information systems can use SOS
- Ecologists (among others) can understand CSV
- Catalogs can browse CSV
- Geo Catalogs can browse GIS
- People can have a quick look at the data on images
- Remote systems can listen to data publications updates
- As in marketing strategy, the implementation of services competing with SOS leads to an increase in the attractiveness and use of SOS

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Conclusion

More usages / visits / citations

More datas and types of data

Future

- From timeseries to series
- NoSQL?
- Big Data?

- Integration of profile data is ready to go
- Document oriented = direct insertion of netcdf files?
- Handling exponential growth of data

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THANK YOU!

http://reeftemps.science