Sensor Web Enablement and international initiatives - questions and answers

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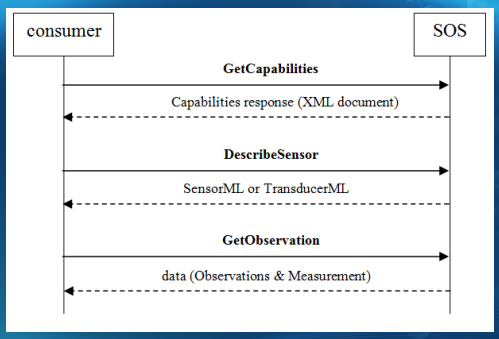
Sensor Web Enablement and its future development

Sensor network – different producers, different protocols…

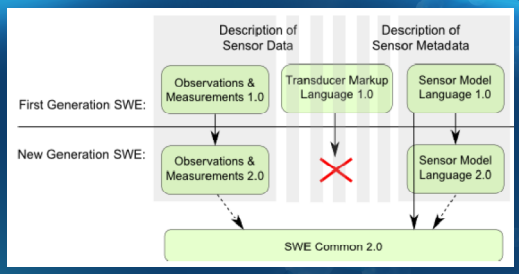
SWE:
- initiative of the Open Geospatial Consortium (OGC)
- standardizes web service interfaces
- hides the different hardware and communication protocols

SWE framework:
- SOS – obtain observations from sensors
- SPS – control the sensor (e.g. make image at this time)
- SAS – receive sensor alert messages (e.g. low battery)
- WNS – SAS alerts can be delivered by e-mail, SMS…
- SensorML, TransducerML – model and XML schema for describing sensors
- Observation/Measurement – model and XML encoding of observations

SOS – Sensor Observation Service

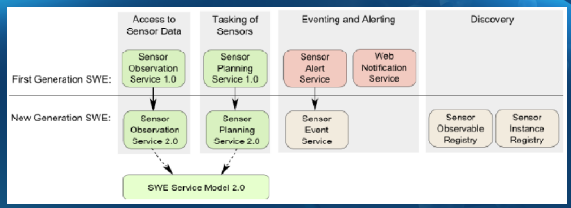


SWE 2.0 – new version of framework



TransducerML – not used
O&M – upgraded to ISO standard
SWE Common – common data types definitions for various parts of SWE

SWE 2.0 – new version of framework



SAS is replaced by Sensor Event Service (SES) – use standards
SWE Service Model – common parts of SOS and SPS
Sensor Observable Registry (SOR) and Sensor Instance Registry (SIR) should be new interfaces to support discovery of sensor systems.

SWE 2.0 – new version of framework

1) SWE 2.0 is a great improvement of SWE 1.0. Specifications are much more elaborated than old version. They are harmonized to each other and they refer to many other standards.

2) High number of references to other standards = a very complex structure. To implement one specification successfully you need to implement many other standards.

3) Retirement of TransducerML is a good idea. This specification was not very useful and was redundant with SensorML.

SWE 2.0 – new version of framework

4) **Sensor Instance Registry, Sensor Observable Registry**

SIR and SOR should not replace OGC Catalogue Service in sensor network topic. The ISO 19119 metadata model (used by OGC CS) cannot cope with the sensor dynamics, such as changing location. Therefore, an implementation on ebRIM is recommended. ebRIM is service description standard more flexible than ISO 19119.

52°North already proposed a mapping of the metadata model (which they currently use for SIR and SOR internally) to ebRIM. Members of 52°North proposed OGC discussion papers - OGC SIR and OGC SOR.

My visit in Ispra and its topics

Joint Research Centre
Institute of Environment and Sustainability
Spatial Data Infrastructures Unit
Ispra, Italy

Searching of state of art of Sensor Web Enablement, version 2.0

Searching connections between SWE and three big initiatives – Inspire, GMES and GEOSS.

SWE 2.0

New version of SWE is being developed. **When will be SWE 2.0 released as a definitive standard?**

SWE Common 2.0 was released in January 2011
SPS 2.0 - was released in March 2011
SOS 2.0 - should be soon released
O&M 2.0 - was released in March 2011
SensorML 2.0 - it requires more discussions due to the complexity
SES - a new standard, it will take for a while to release final version

SWE and Inspire

Data specifications for Annex II and III are prepared. Their testing is going to start in May 2011. An important part of these annexes is connected to sensor data. **Will be SWE and sensors mentioned or recommended in Data Specifications of Annex II and III? What version of SWE specifications will be recommended in Inspire Data Specification for Annex II and III?**

Data specifications for Annex II and III – internal version 1.0.
Version 2.0 for comments from wider community – June 2011.

Observation & Measurement –
- good basement for producing of data models of Annex II and III themes
- complex and difficult for implementation
- O&M 1.0 is used now, O&M 2.0 will be probably preferred in future

Other SWE services – maybe in Data specification version 2.0 and 3.0.

SWE and Inspire

Inspire Network services should start in short time. Discovery and View Services must be prepared this year and Transformation and Download Services should work next year. **Are there any connections between SWE and Network services – especially Download Services?**

Discovery services, View services should be operable in November 2011 (for Annex I themes). SWE is not mentioned in Technical Guidelines.

Download services – July 2012
Web Feature Service is used in Technical Guidelines draft. Current version is for Annex I. It is possible that WFS will not be enough for Annex II and III. SOS could be a solution in this case.

Transformation services – July 2012
Web Processing Service with added Transform operation from WCTS is used in Technical Guidelines draft.

SWE and Inspire

CAFE project

The aim of the Clean Air for Europe Programme is to establish… …strategy to tackle air pollution.

- SOS used as a Download service prototype
- CAFE project summary:
  - O&M + SensorML Data models cover all CAFE requirements
  - „WFS is a quick win, but SOS is a solid long-term solution for structural and semantic interoperability across domains“

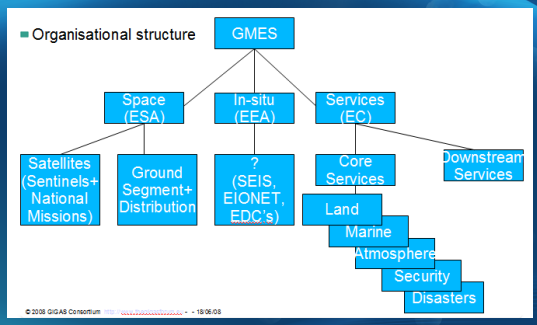
SWE and GMES

GMES services should enter into initial operations in period 2011-2013 and into operational phase in 2014. Sensor data and its transfer is very important part of this initiative. Both data providers and consumers should be prepared for this situation, so they need to be informed. **What is the state of art of GMES preparation?**

- Not only EU member states participate in GMES. There is also Canada, Switzerland and other states.
- GMES is not defined as "European part of GEOSS" or "European contribution to GEOSS". But it can be it.

- **Space division** – ESA. First satellite from number of three should be launched in 2013.
- **In situ division** – EEA – also sensors on airplanes and balloons
- **Service segment** – EC. This segment should produce "value added products" from raw data of ground and space division – e.g. landcover maps.

SWE and GMES



SWE and GMES

GMES plan for 2011:

Start of GMES Initial phase (2011-2013)

Services preparation should start (delivery in 2013-2014):

- GMES emergency management services – Mapping in support to crisis management inside and outside EU. It will be based on FP7 SAFER project and LINK-ER project.
- European Flood Alert System (EFAS).
- Pan-EU Land Cover monitoring service
- Space segment preparation. First sentinel from number of three should be launched in 2013.

GMES services = INSPIRE Spatial Data Services.
Different from INSPIRE Network Services.

SWE and GMES

Is SWE framework considered in preparation of GMES?

Part of In situ segment – EEA should be responsible for it.
Lack of information.

SWE tested in GMES projects: e. g. **OSIRIS**

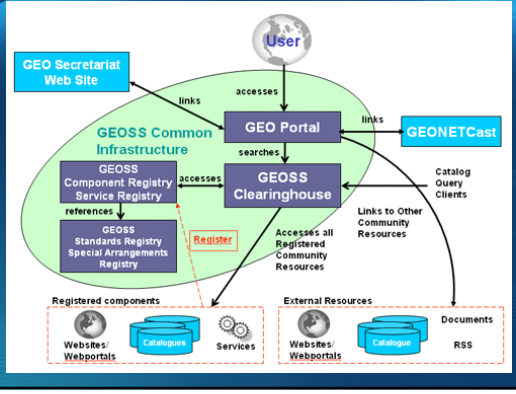
- services improving the continuous monitoring of the environment and the real time management of a crisis.
- SOS, SensorML and O&M were used

SWE and GEOSS

What is the state of art of GEOSS preparation?

- started in 2005 with implementation plan to year 2015
- shorter term work plans exist, currently 2009-2011 WP
- 79 states and 56 organizations participate
- voluntary basis – no strict roadmap

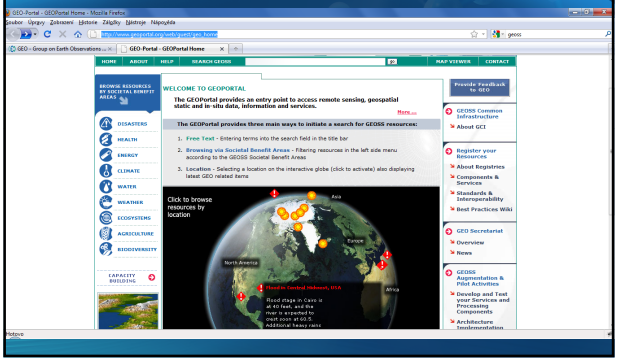
SWE and GEOSS



SWE and GEOSS

http://www.geoportal.org

GEOSS Standard Registry - a search for GEOSS resources



SWE and GEOSS

GEOSS Standard Registry

• SOS, SPS, SensorML and Observation&Measurement are registered as a GEOSS standard

GEOSS Clearinghouse

• great amount of data available

• there is no ranking - search results are often not very relevant

SWE and GEOSS

Is SWE framework considered in preparation of GEOSS?

TASK-AR-09-02C: Sensor Web Enablement for In-Situ Observing Network Facilitation

• led by Terence Van Zyl and Ingo Simonis

• „to foster the development of space-borne, air-borne, sea-based and ground-based sensing networks“

• scenarios and use cases development

• organization of Sensor Web workshops, SWE trainings, test beds

SWE and GEOSS

Problems of using of SWE in GEOSS:

• Standards for interoperable sensor networks exists, but are hard to implement.

• Tools are missing. I do have a sensor, how to make it available to GEOSS?

• Sensor and observed properties registries are missing.

• Hardware manufacturers need get on board in order to equip new hardware with metadata compliant with Sensor Web demand.

SWE and GEOSS

GEOSS Architecture Implementation Pilot

Testing of scenarios and use cases.

Their results are then implemented into GEOSS.

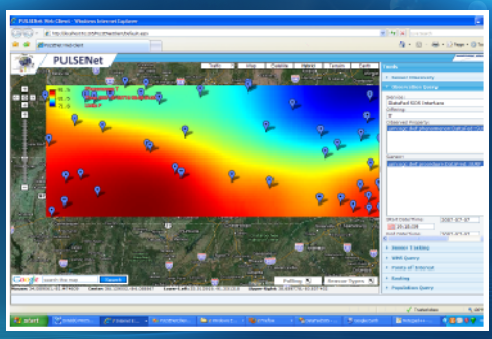
AIP-1 – Using of SOS was tested in forest fires scenario.

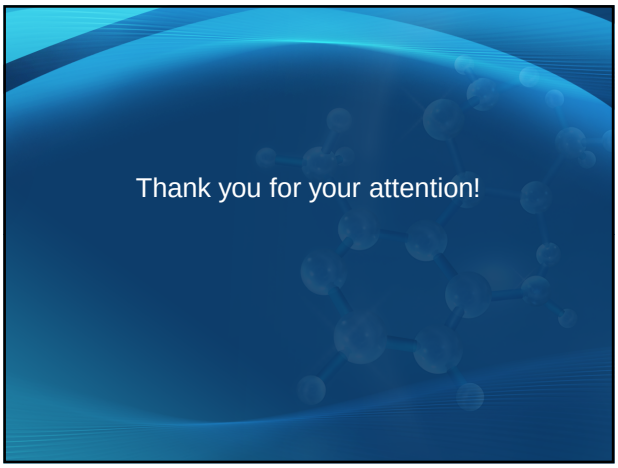
AIP-2 – SOS was mentioned in AIP-2 but mostly as a “future possibility to solve alerting” etc.

AIP-3 ended in February 2011

- SOS was tested in combination with WPS
- SOS about air quality was found and connect
- WPS found and used for SOS data interpolation

SWE and GEOSS




Thank you for your attention!