

Discovery Mechanisms for the Sensor Web

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Overview

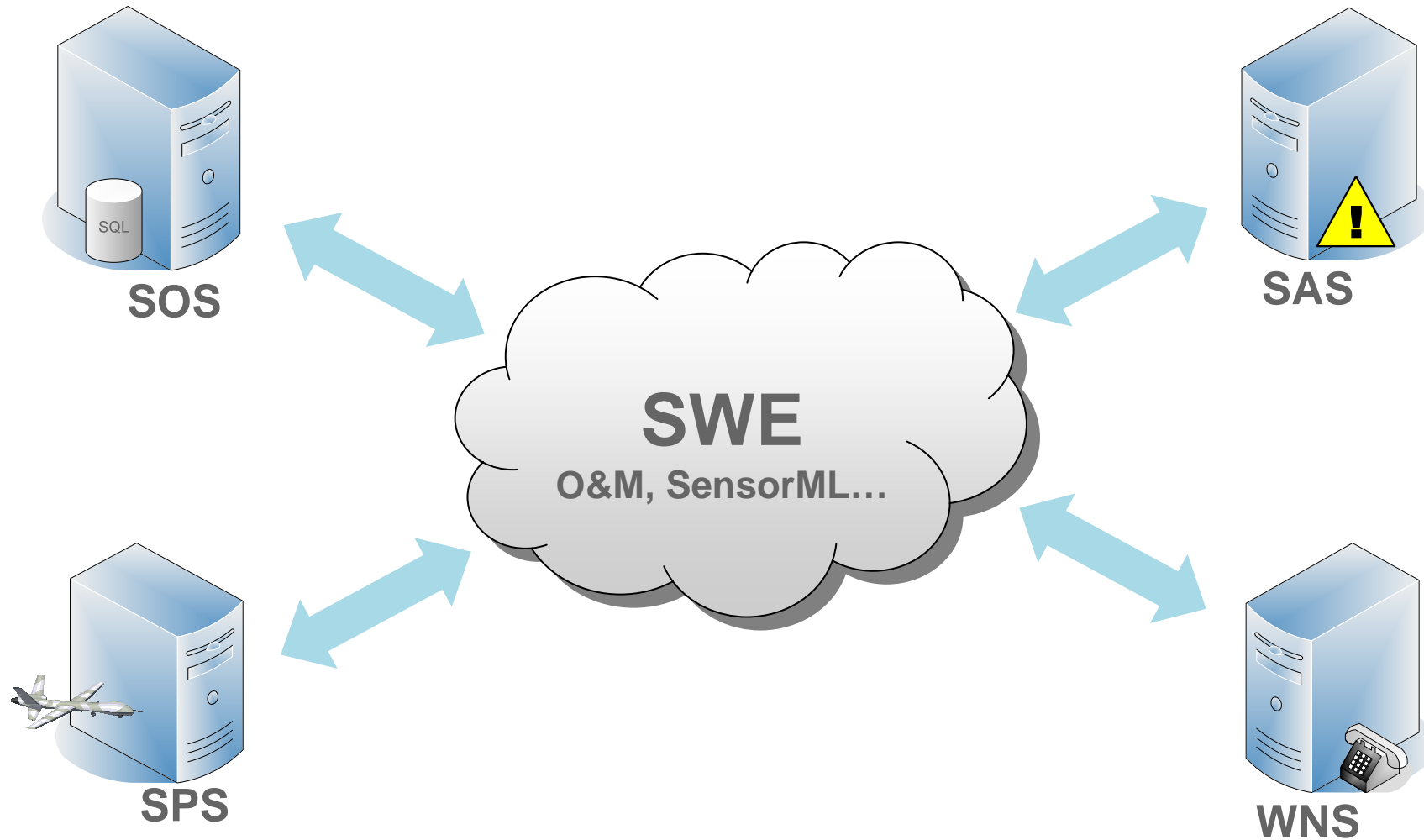
- Sensor Web Enablement
- Challenges of Sensor Discovery
- Metadata Harvesting Mechanisms
- Results
- Conclusion

Sensor Web Enablement

Sensor Web definition:

- Make all kinds of sensors via the WWW
 - Discoverable
 - Accessible
 - Controllable
 - Framework for a WWW-based Sensor Web
- **OGC Sensor Web Enablement (SWE)**

Sensor Web Enablement



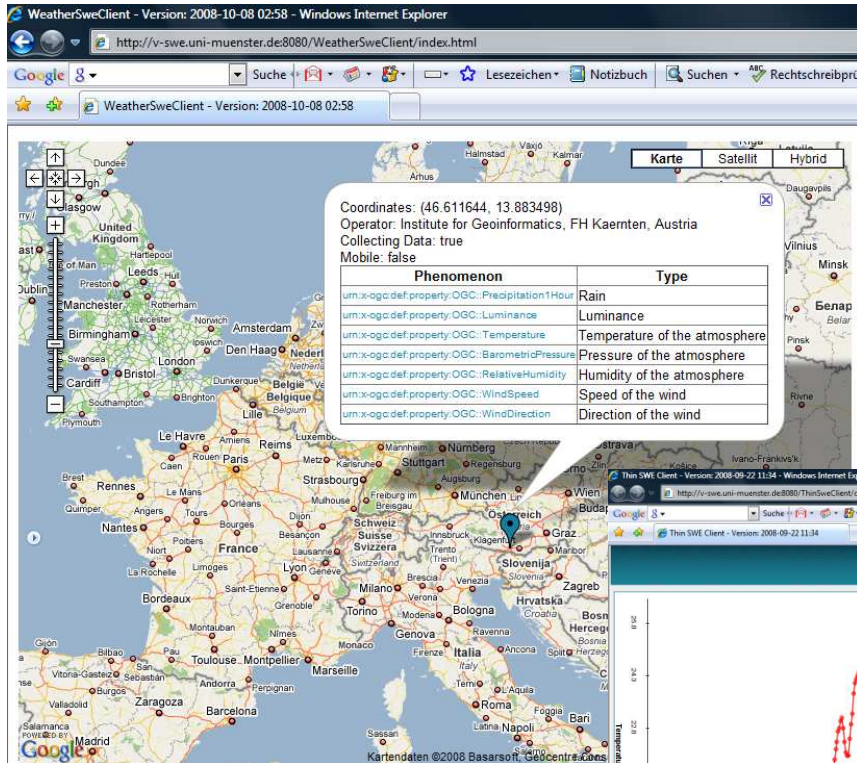
Sensor Web Enablement

WeatherSweClient - Version: 2008-10-08 02:58 - Windows Internet Explorer

http://v-swe.uni-muenster.de:8080/WeatherSweClient/index.html

Suche

WeatherSweClient - Version: 2008-10-08 02:58



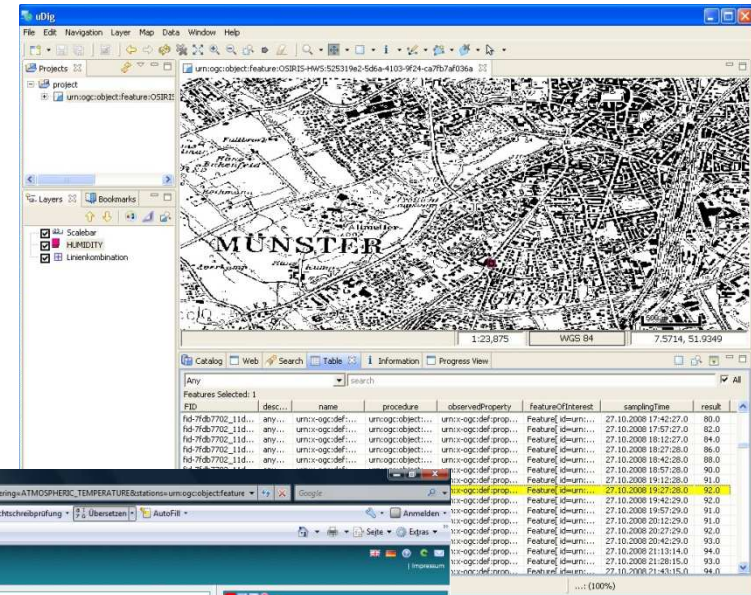
Coordinates: (46.611644, 13.883498)
 Operator: Institute for Geoinformatics, FH Kaernten, Austria
 Collecting Data: true
 Mobile: false

Phenomenon	Type
urn:x-ogc:def:property:OGC:Precipitation1Hour	Rain
urn:x-ogc:def:property:OGC:Luminance	Luminance
urn:x-ogc:def:property:OGC:Temperature	Temperature of the atmosphere
urn:x-ogc:def:property:OGC:BarometricPressure	Pressure of the atmosphere
urn:x-ogc:def:property:OGC:RelativeHumidity	Humidity of the atmosphere
urn:x-ogc:def:property:OGC:WindSpeed	Speed of the wind
urn:x-ogc:def:property:OGC:WindDirection	Direction of the wind

uDig

File Edit Navigation Layer Map Data Window Help

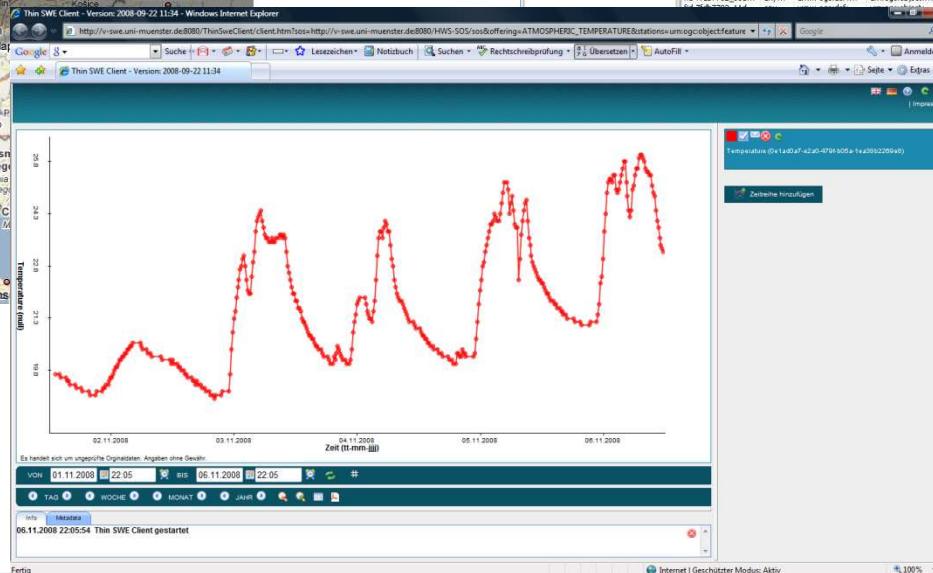
urn:ogc:object:feature:OSIRIS-HWS-525319e2-5d5e-4103-9f24-ca7b7af036a



fid	desc	name	procedure	observedProperty	featureOfInterest	samplingTime	result
fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 17:42:27.0	80.0
fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 18:12:27.0	82.0
fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 18:27:28.0	84.0
fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 18:42:28.0	86.0
fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 18:57:28.0	88.0
fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 19:12:28.0	91.0
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fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 20:42:29.0	93.0
fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 21:13:14.0	94.0
fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 21:28:15.0	93.0
fid-7f6b7702_11d...	any...	urn:ogc:def:prop...	urn:ogc:objec...	urn:ogc:del:prop...	FeatureOfIntere...	27.10.2008 21:43:15.0	94.0

Thin SWI Client - Version: 2008-09-22 11:34 - Windows Internet Explorer

http://v-swe.uni-muenster.de:8080/ThinSWIClient/client.html?osa=http://v-swe.uni-muenster.de:8080/HWS-SDS/so5/offering=ATMOSPHERIC_TEMPERATURE&stations=urn:ogc:object:feature...



Temperature (in 1e01/7.42:27.0/91.0/5.1x20822094)

Zeitraum hinzufügen

Es handelt sich um ungeprüfte Copiedaten. Angaben ohne Gewähr.

VOM: 01.11.2008 22:05 BIS: 06.11.2008 22:05

TAU: WOCHE MONAT JAHR

INFO: Münster
06.11.2008 22:05:54 Thin SWI Client gestartet

Sensor Discovery

- SWE services and clients provide a powerful framework
- Clients and SWE services are loosely coupled
- Mechanisms needed for finding
 - Sensors
 - SWE services
- Specific SWE metadata formats (i.e. SensorML)
- Align Sensor Web discovery to existing standards (i.e. OGC Catalogue)

Challenges of Sensor Discovery

- Specific metadata formats → i.e. SensorML
 - How to extract the relevant information from a SensorML document?
 - What must be contained in a SensorML document? → Profiles
 - How to map from SWE encodings to catalogue information models?
 - How to interact with the different SWE service interfaces?

Challenges of Sensor Discovery

- Dynamic structure of sensor networks
 - How to handle continuously changing sensor metadata (e.g. mobile sensors)?
 - How to deal with sensors that are available through different SWE services? (potentially time dependent)
 - How to handle time dependent data availability?

Challenges of Sensor Discovery

- **Sensor Status**
 - How to integrate/use additional sensor status information (e.g. battery level)?
- **Semantics**
 - How to describe what a sensor measures?
 - How to use semantics for improving interoperable search mechanisms?

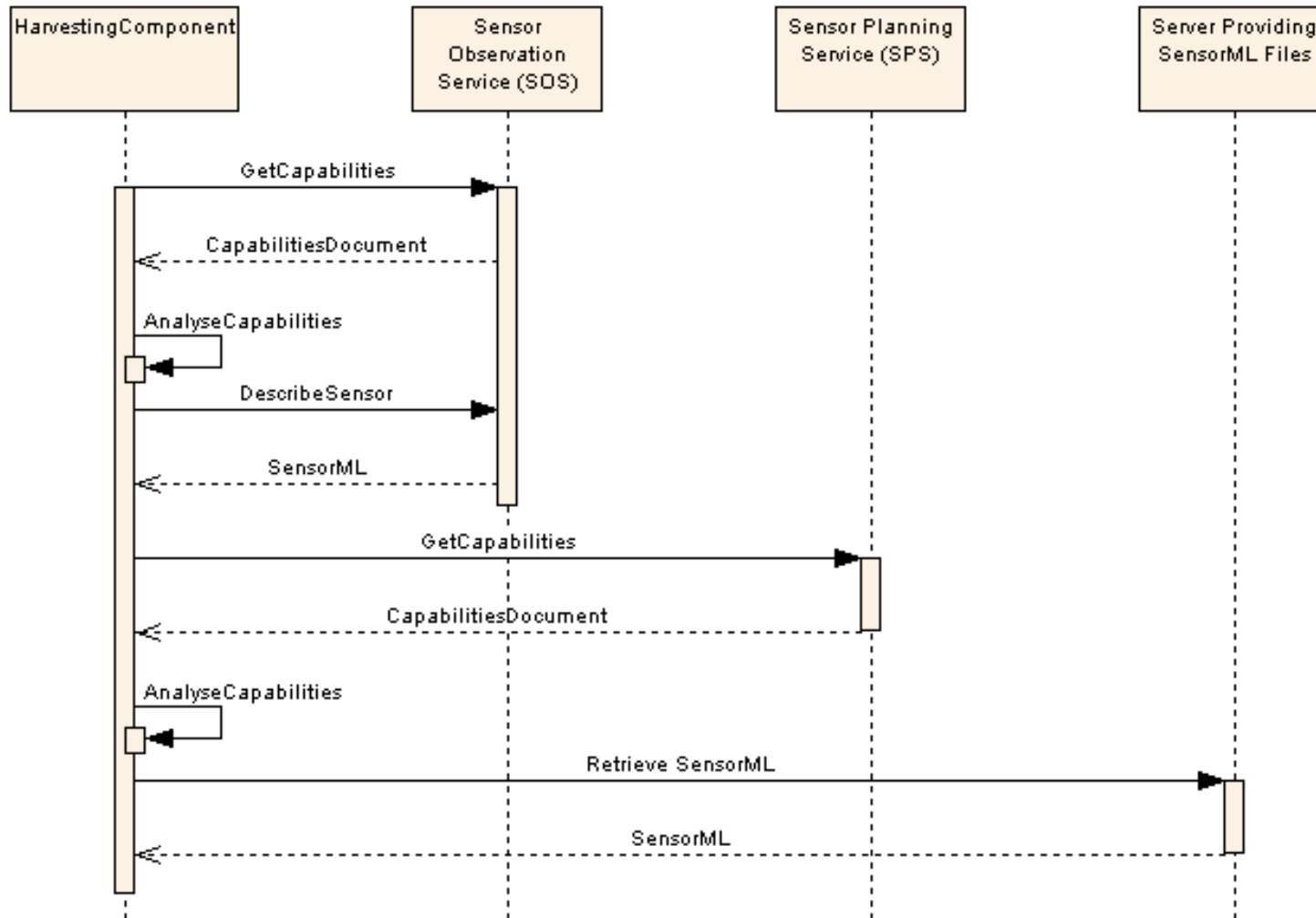
Challenges of Sensor Discovery

- Search Interface
 - How to design an interface for a sensor catalogue/registry?
 - How to align sensor discovery with the OGC Catalogue?
- Identification of sensors
 - How to identify the same sensor within multiple sensor services?

Metadata Harvesting Mechanisms

- First step: Build a harvesting mechanism for sensor/sensor service metadata
- First version is completed
 - Harvesting of the current OGC SWE services
 - Indexing of the harvested information (spatial and thematic, temporal not yet available)
- Basis for further work on more complex questions → experimental framework

Metadata Harvesting Mechanisms



Results

- Implementation of a Sensor Instance Registry (SIR) → <http://52north.org/>
- SIR testing
 - Implementation within the EC funded project OSIRIS
 - Integrated into the OSIRIS scenarios
 - Fire detection
 - Forest fire fighting
 - Air pollution
 - Water pollution
 - Successfully used for integrating a wide range of SWE service instances
 - Sensor status additionally implemented and tested
 - Basic use of semantic relationships → searching for similar sensors

Conclusion

- Discovery mechanisms for flexibly integrating sensors and sensor data
- Several challenges have to be addressed
- Harvesting mechanisms are a first step
- OSIRIS Sensor Instance Registry provides a proof of concept
- Much work still needs to be done
- Link to the OGC standardization process!

More Information

- E-Mail: jirka@uni-muenster.de
- 52°North: www.52north.org
- OSIRIS: www.osiris-fp6.eu