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)**

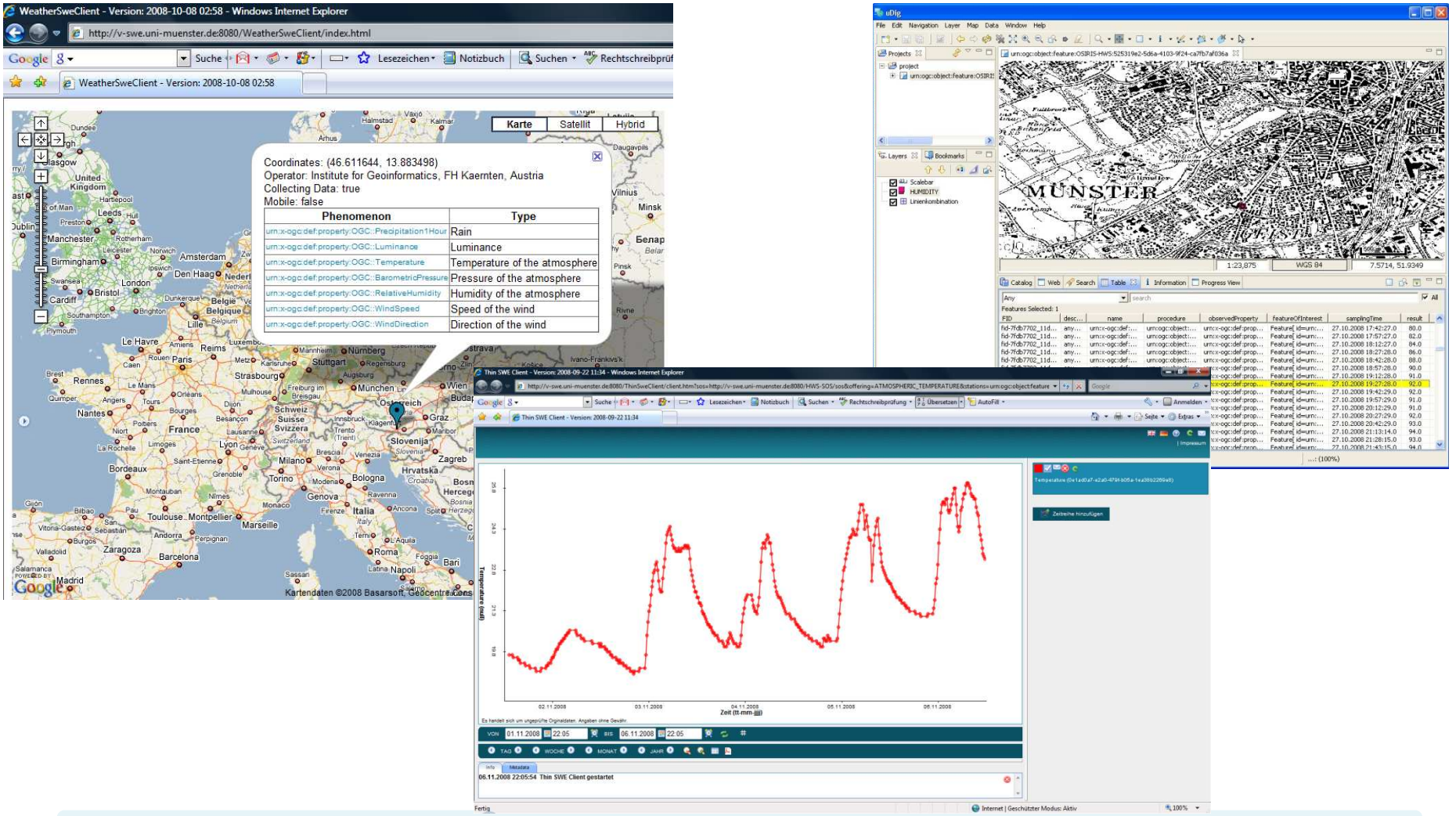
Sensor Web Enablement

OSIRIS

ifgi
Institut für Geoinformatik
Universität Münster

52north
exploring horizons

Sensor Web Enablement



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?

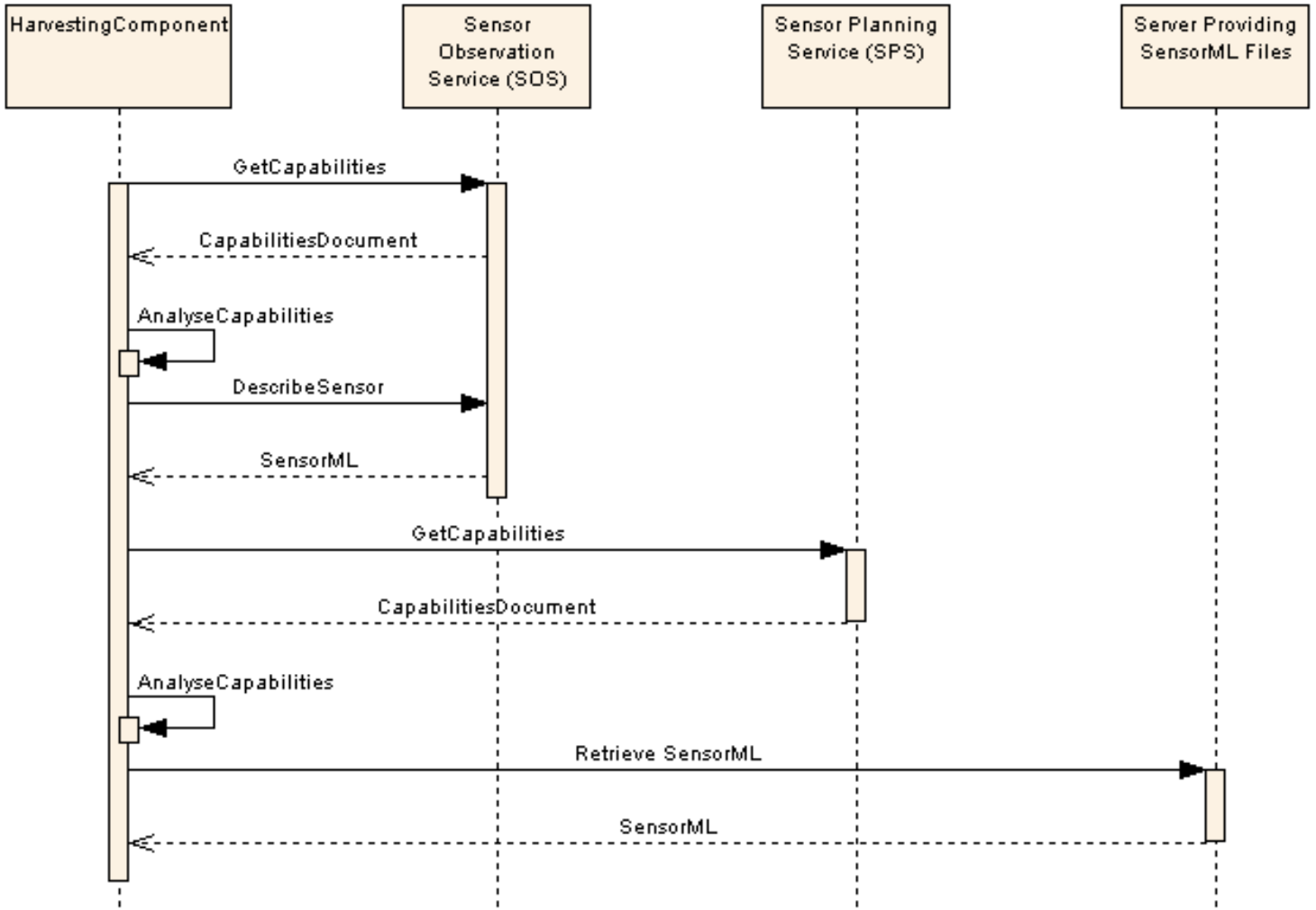
Challenges of Sensor Discovery

- 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

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- 52°North: www.52north.org
- OSIRIS: www.osiris-fp6.eu