Current Developments in the Sensor Web Community

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Agenda

● Projects
  ○ RIESGOS
  ○ MuDak-WRM
  ○ WaCoDiS
  ○ CreatingInterfaces
  ○ SeaDataCloud
  ○ ECMWF Summer of Weather Code
  ○ CITRAM

● 52°North Sensor Web and Processing Components
  ○ 52°North SOS Server
  ○ Eventing API
  ○ Helgoland Toolbox
  ○ sos4R
  ○ Sensor Web Architecture Evolution

● Questions and Discussion
Projects
RIESGOS

- Started in November 2017
- Innovative research on multi risk analysis with respect to various natural hazards in the Andes region and related cascading effects
- Development of web services and integration into a modular multi-risk information system demonstrator
- http://www.riesgos.de/
RIESGOS

Hazard Scenarios
- Earthquakes
- Landslides
- Volcanoes
- Floods
- Tsunamis

Risk Assessment
- Exposure models
- Vulnerability assessment
- Cascading effects
- Multi-risk scenario integration

Information System Components
- System architecture
- Web-services
- Scenario-based demonstrator

Geospatial Sensor Webs Conference 2018
MuDak-WRM

- Multidisciplinary Data Acquisition: The Key for a globally applicable Water Resource Management
- Main goals
  - Identification of all relevant parameters influencing the long-term behavior of a reservoir
  - Development of a minimum monitoring concept
  - Reduction of complexity and data demand of given model approaches
  - Development of a globally applicable tool for surface water resources
WaCoDiS

- Combination of heterogeneous data sources and existing interoperable web-based information systems
- Connection to the Copernicus infrastructure and the extension of INSPIRE-compliant Sensor Web technology to deal with big raster data
- Innovative analyses of high temporal resolution Sentinel-1 and Sentinel-2 Copernicus satellite data that contributes to the exploration of heavy rain effects on agricultural areas
- Integration of in-situ and satellite data into domain-oriented models to optimize the simulation of pollutant flows
- https://wacodis.fbg-hsbo.de/
WaCoDiS

Domain Applications

- Water Industry Associations
- Suppliers
- Agricultural Sector
- Public

SDI

Analytics Services (Environmental Monitoring)

Business Models (material input etc.)

SDI

SDI (Geodata and Services)

Water Industry Geodata Services

Water Industry in-situ data (Sensor Web)

Open API

Open/External Measurement and Forecast Data

SDI

Open API

Open remote Sensing Data (Copernicus)
Creating Interfaces

- Building capacity for integrated governance at the Food-Water-Energy-nexus in cities on the water
- Fostering knowledge exchange and cooperation among local stakeholders on the FWE nexus
- Development and testing of innovative approaches for local knowledge co-creation and participation

Involved cities and case studies

- Wilmington
- Slupsk
- Tulcea
SeaDataCloud

- H2020 project
- Started in November 2016
- Follow-up project of SeaDataNet
- Pan-European infrastructure, developed by NODCs and major research institutes from 34 countries
- Infrastructure driving several portals of the European Marine Observation and Data network (EMODnet)

Role of 52°North
  - Support project networking activities
  - Submission of standards and best practices to ISO, OGC, W3C, INSPIRE
  - Development of strategies for governance of standards and development of common services
  - Provide integrated online services for ingesting autonomous observatory data
  - Development of SOS viewing services for operational data streams
SeaDataCloud

- Main activity until now: SWE Ingestion Service
SeaDataCloud
ECMWF Summer of Weather Code

- Development of a tool to search the web systematically, identifying data sources for observed environmental data
- Allowing improvement of the forecast model, the post-processing of forecasts, the verification of forecasts, development of future forecasts products
- Workflow
  - Translate keywords into several languages
  - Indexes a subset of the web, seeded by a Google search with the translated keywords
  - Score the resulting pages in regards to the question “does contain/link to data?”
  - Extract metadata about the data from the pages (where possible)
ECMWF Summer of Weather Code
CITRAM

- Citizen Science for Traffic Management
- Started on the 1\textsuperscript{st} of September 2018
- Improve the availability of traffic flow and quality data
- Input for optimizing the control of traffic lights
- Generate recommendations for drivers how to improve the efficiency
- Use and enhance the enviroCar platform for collecting new data based on a citizen science approach

- Partners
  - City of Chemnitz
  - City of Hamm
  - City of Krefeld
  - Technische Hochschule Deggendorf
  - TSC Beratende Ingenieure für Verkehrswesen GmbH & Co. KG
  - 52°North
52°North Sensor Web Components
52° North SOS Server

- **SensorThings API Module**
  - Support of the OGC Sensor Things API standard
  - Additional module in addition to SOS and Sensor Web REST-API interfaces
  - Currently in development

- **Harmonised Data Model**
  - Common approach for SOS, Sensor Web REST API, STA Module
  - Modular approach
  - Simplified core

- **MQTT Connector**
  - Facilitate the integration of Internet of Things data streams
  - Connect to MQTT brokers
  - Parsing of payloads sent via MQTT and loading into the SOS database
Eventing API

- Web-based architecture for detecting and communicating critical measurement values
- Developed in cooperation with the Wupperverband
  - Baseline from the COLABIS project
  - Further development as part of WaCoDiS
- Based on
  - OGC Sensor Observation Service
  - OGC Publish/Subscribe standard
- Eventing REST API provides means to subscribe to event rules
  - Pattern that is based on a specific threshold for a specific phenomenon at a given measuring station
Eventing API

- **Examples**
  - Rise of gauge above the threshold
  - Staying above the threshold
  - Fall below the threshold
  - Sensor failure

- **Push-based messages** are provided via different communication channels; by default, the operator is informed by email.

- **Next steps**
  - Integration of the eventing architecture into Helgoland
  - Investigate event processing tools

- **Presentation at the INSPIRE Conference**
Helgoland Toolbox

- Encapsulate building blocks for client development
- Several modules available, e.g.
  - Graph
  - Map View
  - Favorites
  - Caching
  - Data Selection
  - Permalinks
- Additional modules in the (near) future: eventing, processing, integration of raster data
- Contributions by several projects: COLABIS, MuDak-WRM, WaCoDiS
- Based on Angular
- Available on Github: https://github.com/52North/helgoland-toolbox
sos4R

- New development activities planned for fall 2018
  - Improve support of the SOS 2.0 standard
  - Include support of the SOS 2.0 Hydrology Profile
  - Better abstraction from the SWE concepts → increase user friendliness
Note: Two modes for the Sensor Web Database
1. Native Database Mode
2. Proxy Mode
Questions and Discussion

https://52north.github.io/sensor-web-tutorial/

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