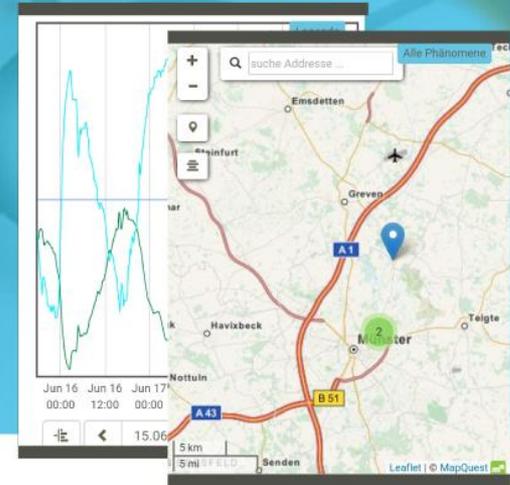


September 3–5, 2018 Muenster, Germany

Geospatial Sensor Webs Conference 2018



Current Developments in the Sensor Web Community

Dr. Simon Jirka, jirka@52north.org

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



RIESGOS

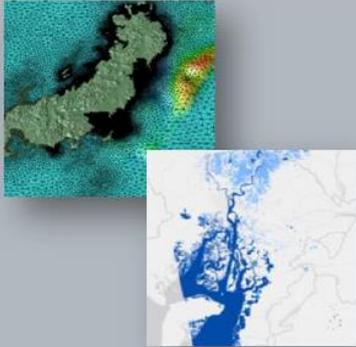
MULTI-RISK ANALYSIS AND INFORMATION
SYSTEM COMPONENTS FOR THE ANDES REGIONS

- 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

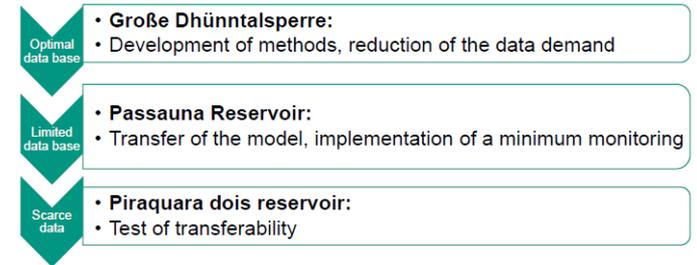
INFORMATION SYSTEM COMPONENTS



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



- 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

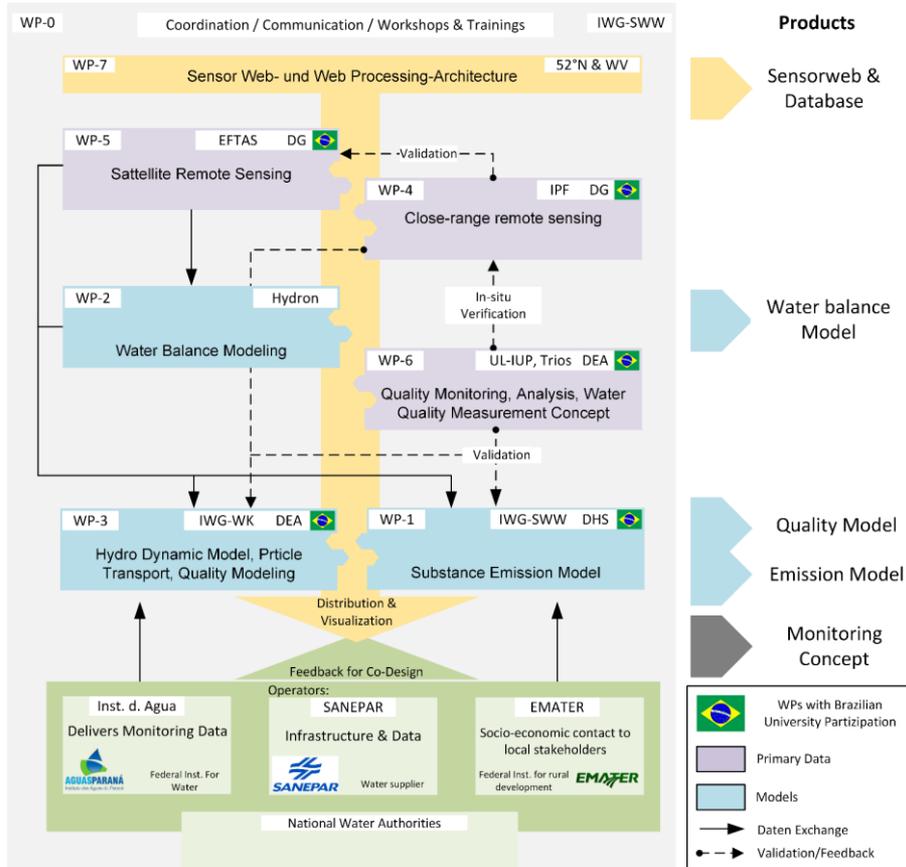


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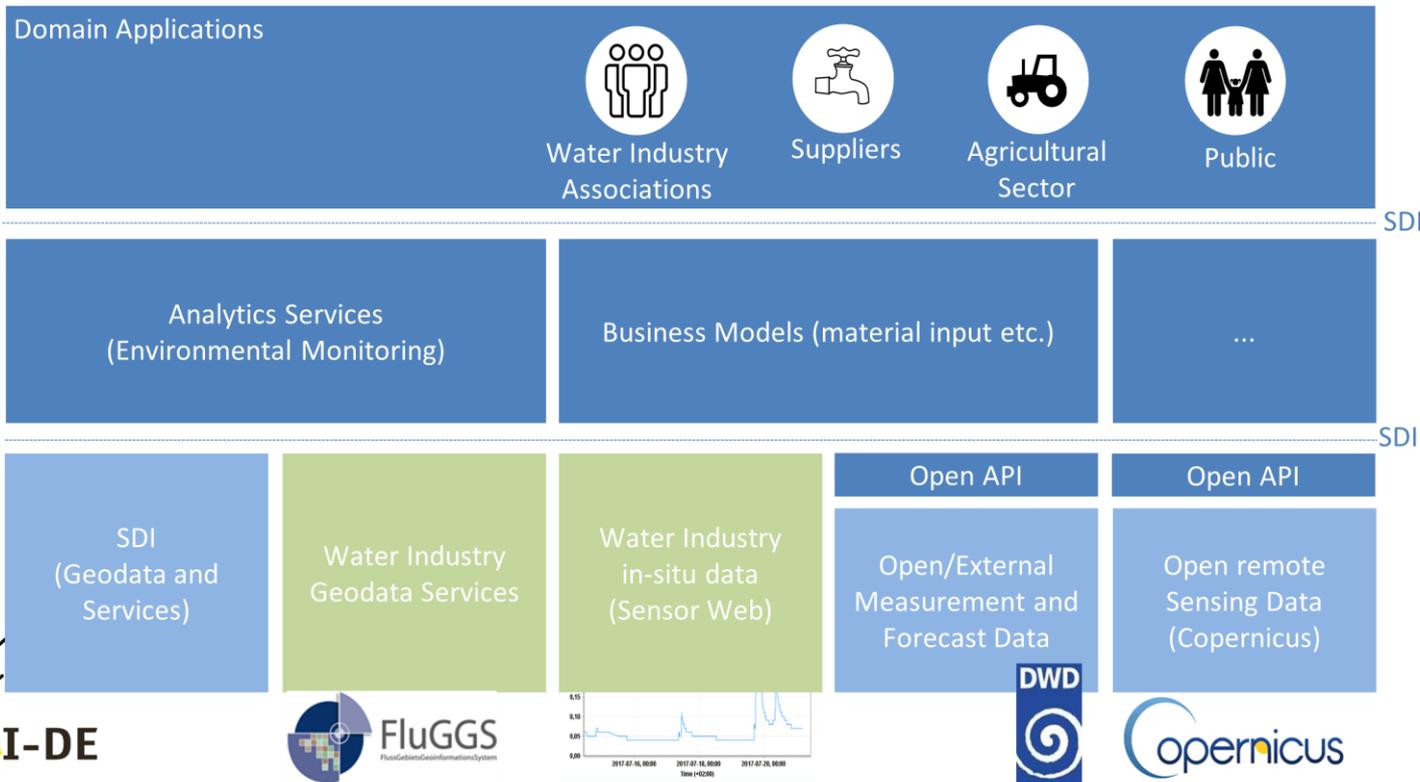


Federal Ministry
of Education
and Research

MuDak-WRM



- 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/>



Creating Interfaces



creating
interfaces

water food energy

- 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



SeaDataCloud

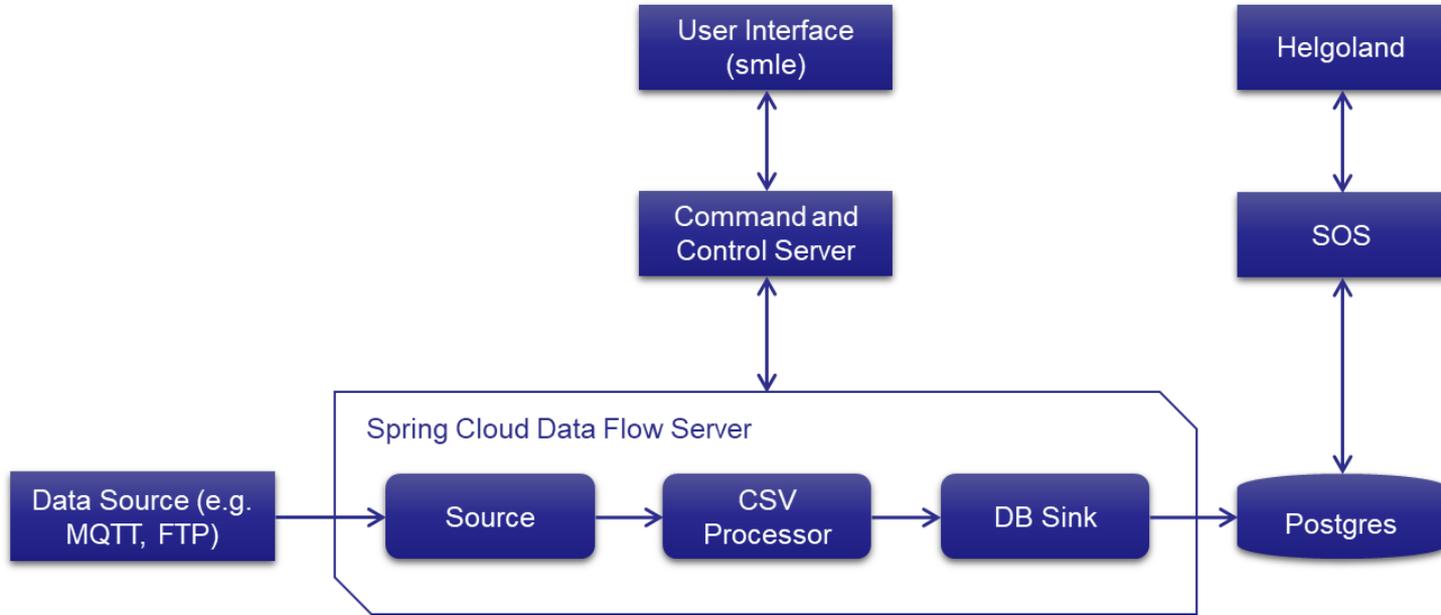


- H2020 project
- Started in November 2016
- Follow-up project of SeaDataNet
- Pan-European infrastructure, developed by NODCs and major research institutes from 34 countries
- Infrastructure driving several portals of the European Marine Observation and Data network (EMODnet)
- Role of 52°North
 - Support 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



smle / smatlv — The Friendly SensorML Editor © Streams

Component Show all Reset Close

Name: source_output

Physical System: marine-weather

GML ID: marine-weather

Identifier Value: AIRMAR-RINVILLE-1

Code space uniqueID:

Identification

Identifier list (Long name: Marine Institute - AIRMAR Weather Station, Short nam... Remove)

+ Add

Outputs

output: streamOutput Remove

Create new output entry ▾

Position

Vector (eastng: -8.977098, northing: 53.247642, altitude: 17) Remove

+ Add Vector + Add Data Record

Publish

spring App Runtime **Streams** Tasks Jobs Analytics About

Streams

Create a stream using text based input or the visual editor.

Definitions **Create Stream**

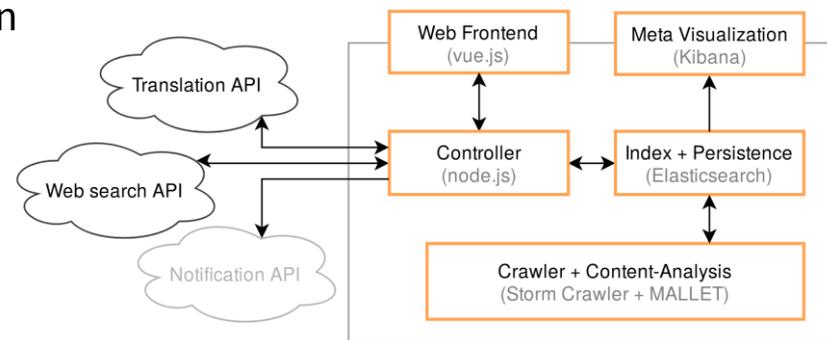
```
1 mqtt-source-rabbit --url="tcp://nexus.dev.52north.org:1884" --topics=airmar-rinville-1 | csv-processor --
  sensormurl="http://cnc:8082/cnc/api/streams/s1cb9981c-1288-47a6-bc4e-70cda9fd17e" --offering=AIRMAR-
  RINVILLE-1/observations --sensor=AIRMAR-RINVILLE-1 | db-sink --
  sensormurl="http://cnc:8082/cnc/api/streams/s1cb9981c-1288-47a6-bc4e-70cda9fd17e" --offering=AIRMAR-
```

```
graph LR
  source[mqtt-source...] --> processor[λ csv-processor]
  processor --> sink[db-sink]
```

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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



WeatherCrawl <

Search Results 0

Crawls 0

New Crawl

Configure and Launch a Crawl

Submit a custom query to crawl more pages for datasets.

A Keyword Group specifies the search terms used for a web search to kickstart the crawl with seed URLs.

By adding more Keyword Groups, multiple search queries for the initial crawl sites can be added.

Each Keyword Group may be translated into the official language of the selected countries.

Keywords

Keyword Group 1* translate

stream-flow real-time data

Keyword Group 2* translate

hydrological data-set

+ ADD KEYWORD GROUP

Common Keywords translate

open data

ECMWF Summer of Weather Code

SUMMER OF
Weather Code



WeatherCrawl <

Search Results 33

Crawls 1

New Crawl

streamflow

Filter by Crawl

Hydro Crawl Test

EXPORT

Title	Host	Dataset Score	Dataportal Score
USGS Instantaneous Values Web Service	waterservices.usgs.gov		
HESS - Development of a large-sample watershed-scale hydrometeorological dat ...	www.hydrol-earth-syst-sci.net		
Water Resources Maps and GIS Data	water.usgs.gov		
How streamflow is measured. Part 3: The stage-discharge relation : USGS Wate ...	water.usgs.gov		
Map of 7-Day Average Streamflow - River Forecast Centre - Province of Britis ...	bcrfc.env.gov.bc.ca		
Map of Current Streamflow Conditions for All Real-time WSC Stations in BC	bcrfc.env.gov.bc.ca		
Real-Time Hydrometric Data - Water Level and Flow - Environment Canada	wateroffice.ec.gc.ca		
Browse by Communities & Collections - Zurich Open Repository and Archive	www.zora.uzh.ch		
Publications - Institute for Atmospheric and Climate Science ETH Zurich	www.iac.ethz.ch		
OGC® WaterML 2: Part 3 - Surface Hydrology Features (HY_Features) - Conceptu ...	docs.openeospatial.org		

Rows per page: 25 1-10 of 10

CITRAM

- Citizen Science for Traffic Management
- Started on the 1st 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

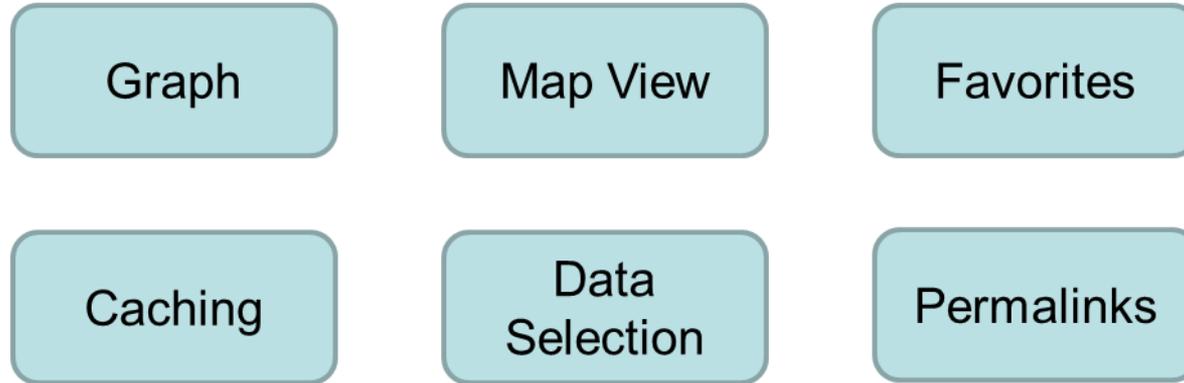
- Web-based architecture for detecting and communicating critical measurement values
- Developed in cooperation with the Wupperverband
 - Baseline from the COLABIS project
 - Further development as part of WaCoDiS
- Based on
 - OGC Sensor Observation Service
 - OGC Publish/Subscribe standard
- Eventing 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

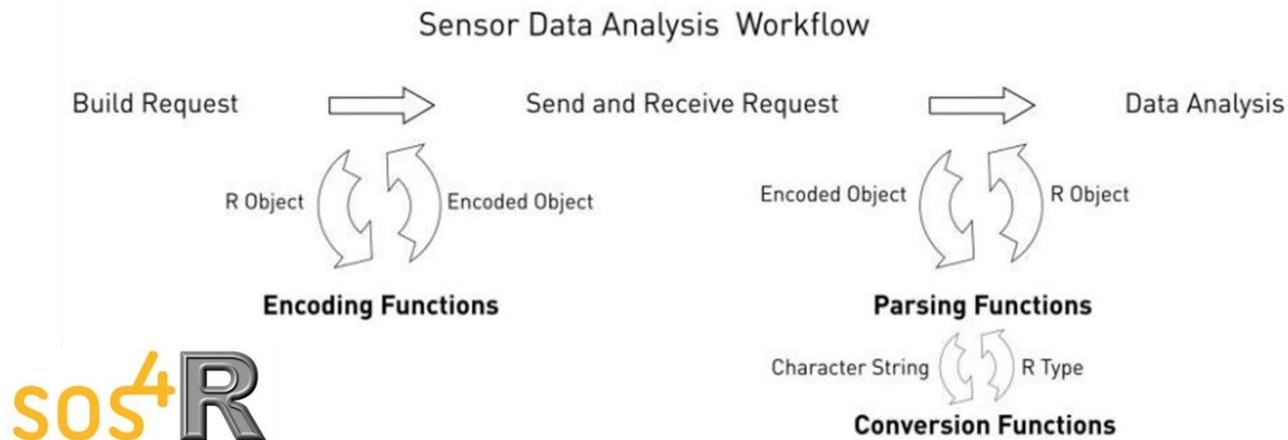
- Encapsulate building blocks for client development
- Several modules available, e.g.



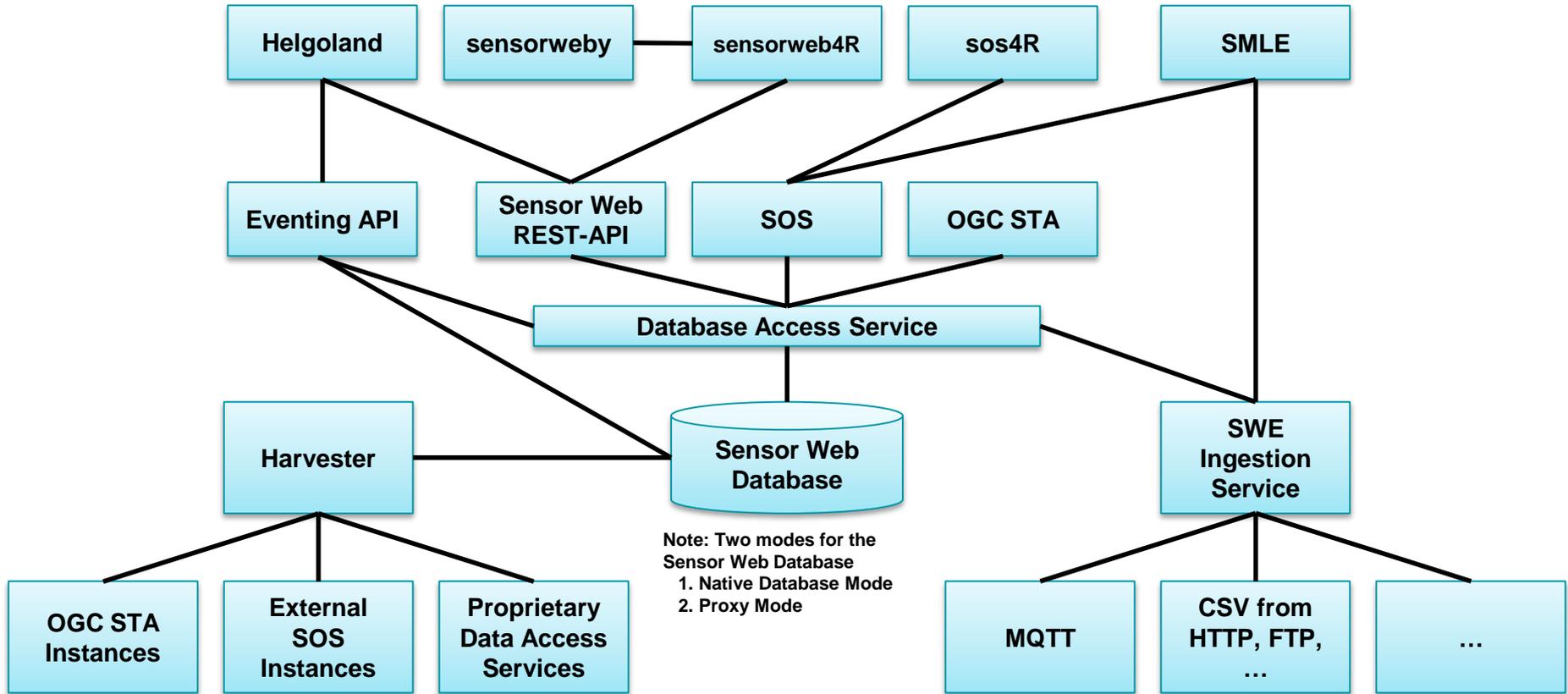
- Additional modules in the (near) future: eventing, processing, integration of raster data
- Contributions by several projects: COLABIS, MuDak-WRM, WaCoDiS
- Based on Angular
- Available on Github: <https://github.com/52North/helgoland-toolbox>

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



Sensor Web Architecture Evolution



Questions and Discussion

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

jirka@52north.org