



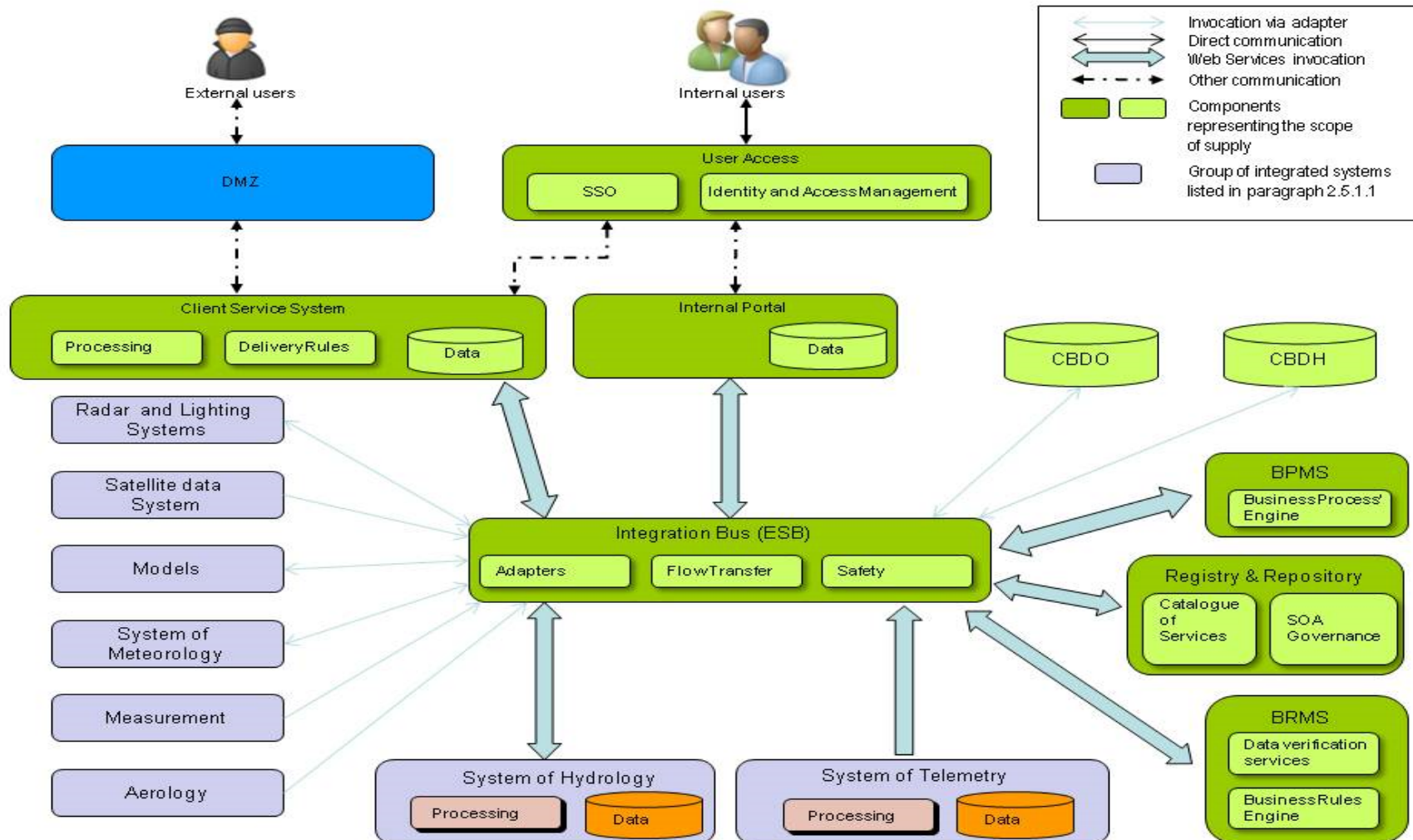
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The way to implementation of INSPIRE Download Service for weather stations in Institute of Meteorology and Water Management - National Research Institute

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Evolutionary process of building the infrastructure





First approach to overview available standards for download service Implementation

- WFS - very flexible and capable but not dedicated to measurement data
- ATOM - limited to predefined data sets, not dedicated to measurement data
- SOS – ready to use for measurement data



Choosing the standard best suited for the domain and the organization

We thought that OGC SOS could be used based on document: [Guidelines for the use of Observations & Measurements and Sensor Web Enablement-related standards in INSPIRE Annex II and III data specification development](#) and expected fast future issue of Technical Guidelines for Download Service.



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Choosing the implementation of the standard

After the overview of available OGC SOS implementation we have chosen 52°North solution which is operational, well documented, ready to install and INSPIRE friendly.



Mapping the internal data structures to the INSPIRE data structures

- creating table with mapping between entities in existing systems and OGC SOS and O&M
- deciding whether to use URL or URN identifiers



Choosing the methods to enter data to the publication database

Available Options:

- transactional webservices
- dedicated 52°North application to import data (based on transactional webservices)
- direct database insert

Decision:

direct database insert



Publication and monitoring

First tests performed quite well but further works are necessary including necessary improvements in mapping entities and sensor metadata model.

We consider whether to use alternative approach. Achieving the goal - easy access to weather stations data, shall be postponed.



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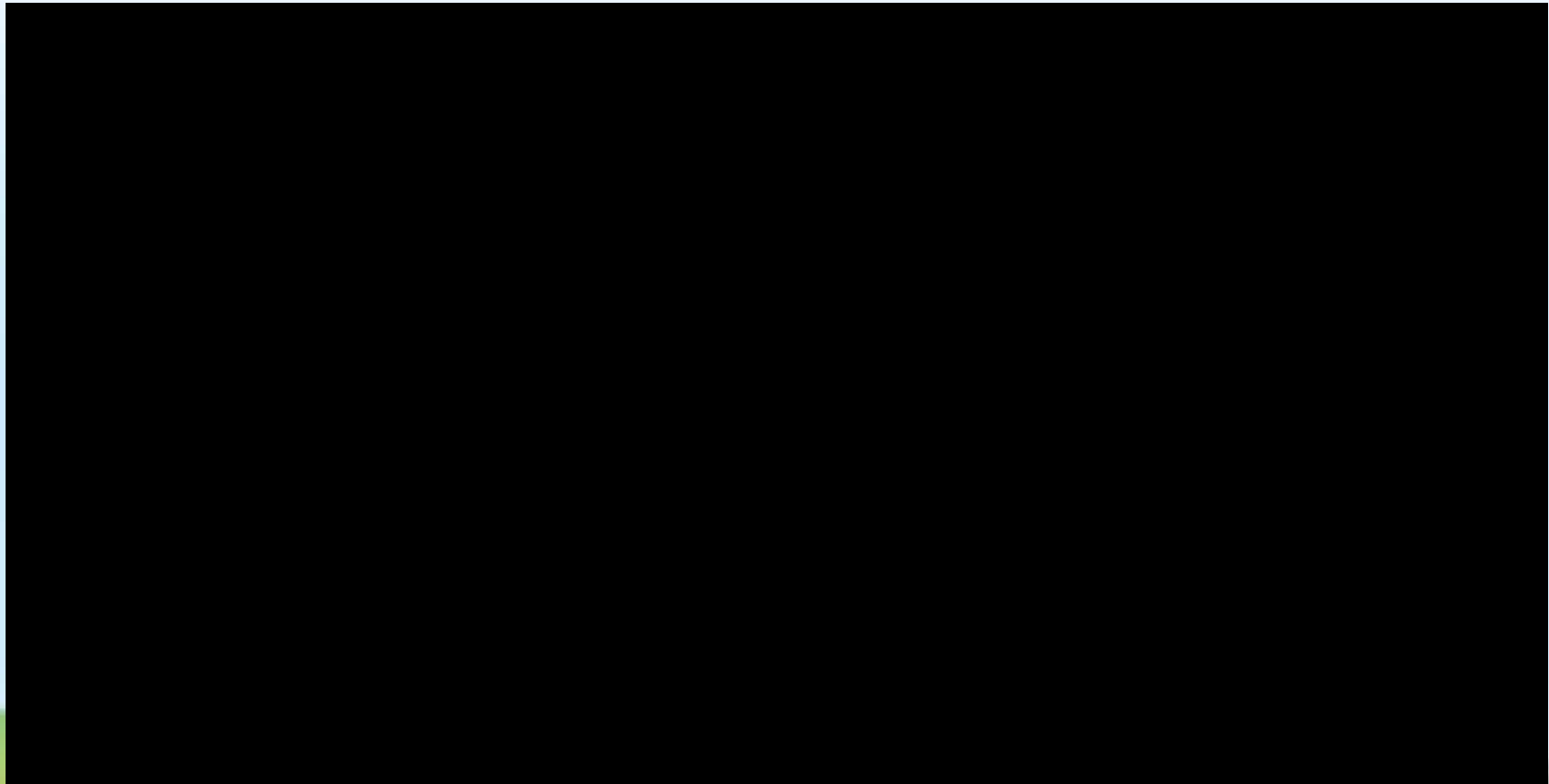
Alternative approaches to provide convenient access to a
meteorological data

Atom + OpenSearch + GeoRSS



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Preliminary Concepts – feed syndication



"dynamic" means that feed can be generated on the fly





Preliminary Concepts – data access - URL

URL to resource:

[imgw.pl/Inspire/MeasurementStationsData/ATOM/
CSV2D/IMGWstationID/ClassificationCode/YYYY/MM](http://imgw.pl/Inspire/MeasurementStationsData/ATOM/CSV2D/IMGWstationID/ClassificationCode/YYYY/MM)

where

IMGWstationID is unique ID in IMGW measurement network

Classification Code is unique ID for measurement procedure

YYYY - year

MM - month



Preliminary Concepts – data access - CSV

Example of URL to resource

imgw.pl/Inspire/MeasurementStationsData/ATOM/CSV2D/354180135/B100E02000/2016/09

Example of response from resource:

Latitude, Longitude, Time, Value

52.233333, 21.016667, 2016-09-05T13:39:00Z, 13.1

52.233333, 21.016667, 2016-09-05T14:39:00Z, 12.0

52.233333, 21.016667, 2016-09-05T15:39:00Z, 11.5

...



Preliminary Concepts – data access – GML, O&M, JSON

Alternatively to CSV the response could return GML, O&M or JSON

But I can see any advantage of these formats in this specific use case. Compressed CSV with gzip would be:

- the smallest one
- the processing would be the fastest
- there are hundreds of applications on the market which can use csv without any additional effort



Preliminary Concepts – technology

CBDO, CBDH => data => Java on the fly extractor and publisher gets data by webservice to generate response from resource

CBDO => metadata => Java on the fly extractor and publisher gets metadata by webservice to generate Atom Feeds and data response from resource

Rome Java library for Atom Feeds:
<https://rometools.github.io/rome/>



Preliminary Concepts - advantages

- Already clear legal status
- It is simple to develop data download application (e.g. wget in BASH or in other shell script)
- It is very easy to develop by data consumer application
- There are many standard applications to consume measurement and scientific data (e.g. Excel, Matlab, Octave, GnuPlot, etc.)
- There is no problem with large requests because datasets are predefined and can be easily cached by standard web mechanisms
- Very well defined dataset concept



Preliminary Concepts - advantages

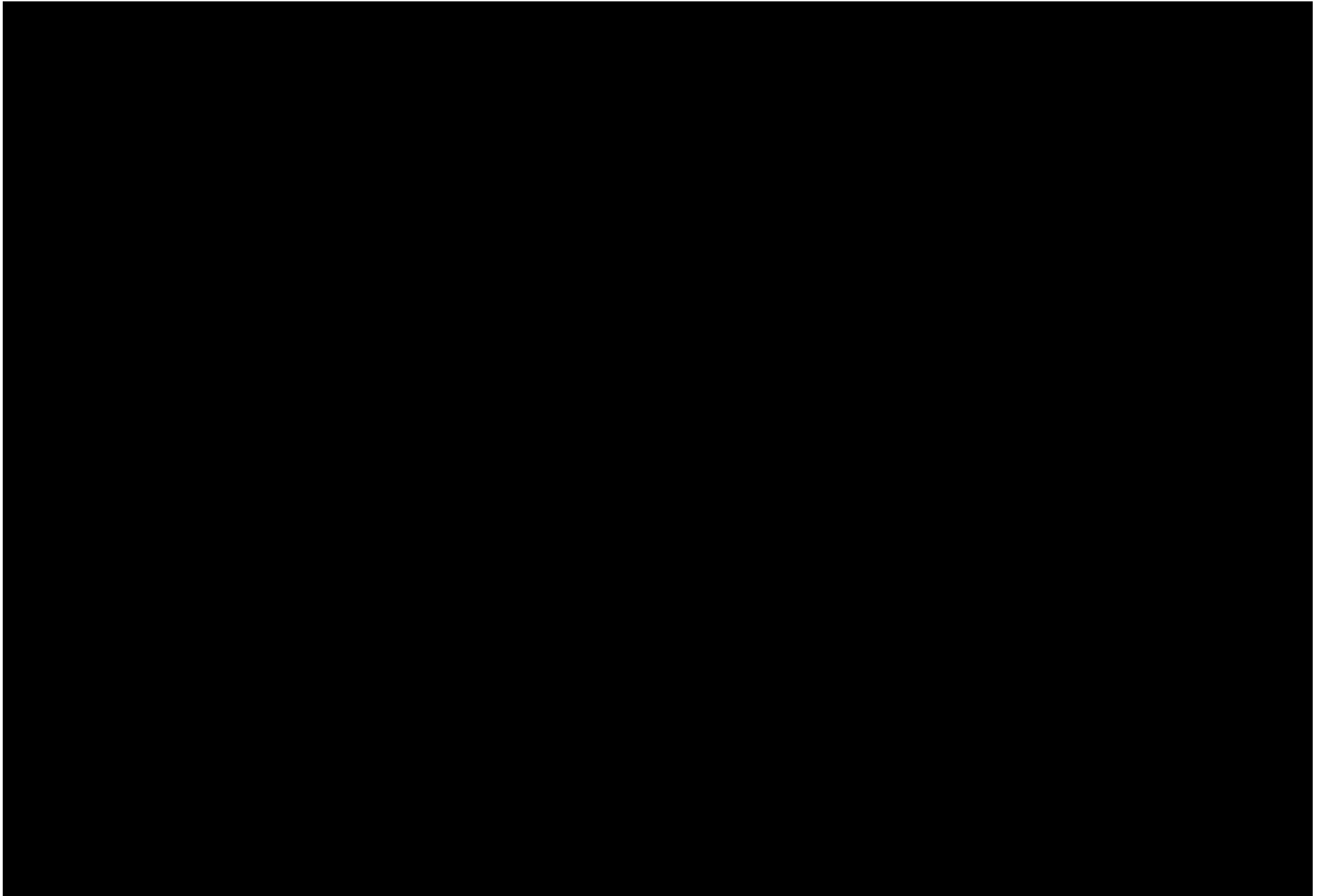
- Very precise requirements in Technical Guideline for Download Services
- Allows for avoiding mapping problem "offering = procedure" which is convenient for heterogenous networks where there are many procedures, different sensor and so on
- Decent custom software development cost



Preliminary Concepts – disadvantages

- It is not so cheap because requires the custom software to generate Atom Feeds and csv files
- It is not COTS like 52 North SOS so it requires long testing
- It is not so elegant like 52 North SOS from modeling point of view: there are no beautiful O&M and SensorML models

Evolution of technologies





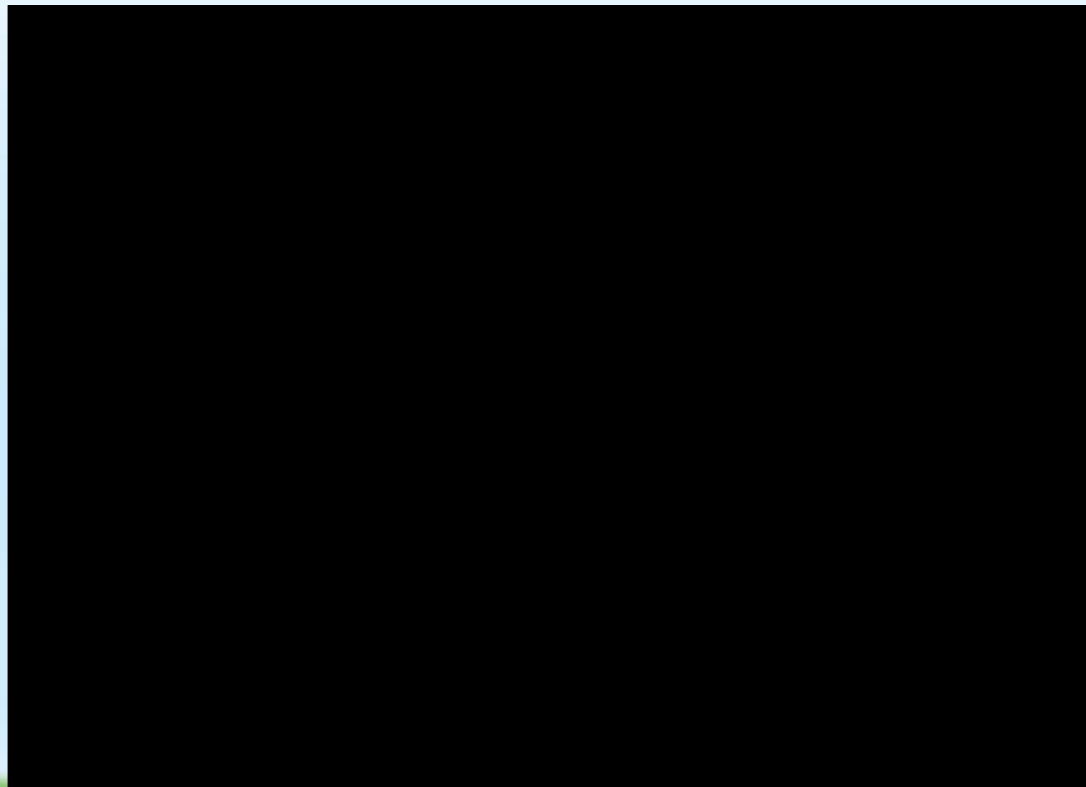
OGC SensorThings API

- The OGC SensorThings API provides an open, geospatial-enabled and unified way to interconnect the Internet of Things (IoT) devices, data, and applications over the Web. At a high level the OGC SensorThings API provides two main functionalities and each function is handled by a part. The two parts are the Sensing part and the Tasking part. The Sensing part provides a standard way to manage and retrieve observations and metadata from **heterogeneous IoT sensor systems**. The Tasking part is planned as a future work activity and will be defined in a separate document as the Part II of the SensorThings API
- request / response based on REST and JSON
- messaging protocol based on MQTT



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OGC SensorThings API





Future ?

SOS
GIS and Measurement

SensorThings API
Internet of Things and GIS



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Question



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Thank you