

# GET-IT: Integrating sensor information and semantics-aware metadata in GeoNode

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# Context



TRAINING FOR EDUCATION, LEARNING AND LEADERSHIP  
TOWARDS A NEW METROPOLITAN DISCIPLINE



ICPSM



# Description (1)

## Software tools:

- GeoNode (now v2.7, soon v2.10)
  - Improved **geoext** library for SOS resources
  - JavaScript application (**upload\_observations**) for insertion of SOS observations
- EDI (v1.2)
  - Integrated via module **geosk.mdtools**
- 52°North SOS (v4.4.2)
  - Integrated via module **geosk.osk**

## Relevant formats:

- XML
  - Template language for definition of the metadata profile (and of the editing interface)
  - Storage format for metadata based on the template language
  - XPath simple paths specifying the XML nodes to be created
  - XSLT for:
    - modifying the target metadata output prior to insertion in the catalog
    - composing transactional SOS operations operated by JavaScript
    - HTML representation of XML SensorML
- RDF
  - Triple store
  - SPARQL

# Sensor management WF

	Insert Sensor	Sensor list	Sensor details	Insert observation	Maps with observations
Integration module	<b>geosk.osk</b>	<b>geosk.osk</b>	<b>geosk.osk</b>	<i>upload_observations</i>	<b>geoext</b> extended
Programming language	py	py	py XSLT	js	js
Software involved	EDI SOS	SOS	SOS GeoServer	SOS GeoServer	SOS GeoServer

[illegible][illegible][illegible]

[Search data](#)
[How data](#)
[Visual](#)
[Alerts](#)

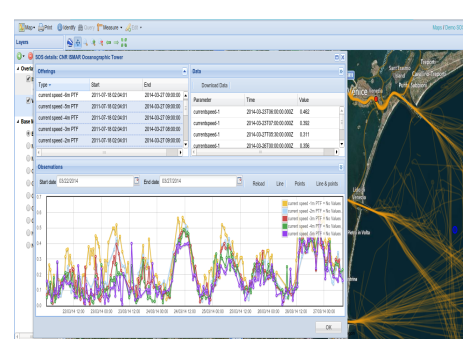
EXPLORE DATA

[Select Procedure](#)
[Select Location](#)
[Select Information](#)

### EUROPEAN OPERATIONS

Select one of the available "Phases of Interest" or create a new one

Name	Resolving status	Lat	Long	IRIS	Inspected Facilities (2/10)	Action
Louis Garmy - Cn17	45.82033	7.00013	<a href="#">View/Change location on the map</a> INFO:CN17	<a href="#">View/Change location on the map</a> INFO:CN17	<a href="#">View/Change location on the map</a> INFO:CN17	<a href="#">View</a>
Louis Garmy - Cn18	45.82033	7.00017	<a href="#">View/Change location on the map</a> INFO:CN18	<a href="#">View/Change location on the map</a> INFO:CN18	<a href="#">View/Change location on the map</a> INFO:CN18	<a href="#">View</a>
Louis Garmy - Cn19	45.81997	7.00019	<a href="#">View/Change location on the map</a> INFO:CN19	<a href="#">View/Change location on the map</a> INFO:CN19	<a href="#">View/Change location on the map</a> INFO:CN19	<a href="#">View</a>
Louis Garmy - Cn20	45.81701	7.00017	<a href="#">View/Change location on the map</a> INFO:CN20	<a href="#">View/Change location on the map</a> INFO:CN20	<a href="#">View/Change location on the map</a> INFO:CN20	<a href="#">View</a>
Louis Garmy - Cn21	45.82032	7.00016	<a href="#">View/Change location on the map</a> INFO:CN21	<a href="#">View/Change location on the map</a> INFO:CN21	<a href="#">View/Change location on the map</a> INFO:CN21	<a href="#">View</a>
Louis Garmy - Cn16	45.82032	7.01192	<a href="#">View/Change location on the map</a> INFO:CN16	<a href="#">View/Change location on the map</a> INFO:CN16	<a href="#">View/Change location on the map</a> INFO:CN16	<a href="#">View</a>



# 1. Insert sensor

	<b>Insert Sensor</b>
Integration module	<b>geosk.osk</b>
Programming language	py
Involved software	EDI SOS

## Register Sensor

**Description of system**

**Keywords**

**Identification of the system**

**System Classifiers**

**Temporal validity of metadata**

**Description of system**

Physical system name ⓘ

Description of the physical system ⓘ

Description of the physical system

**Keywords**

Free keyword ⓘ

+ Free keyword

**Identification of the system**

Manufacturer name ⓘ

Model ⓘ

Serial Number ⓘ

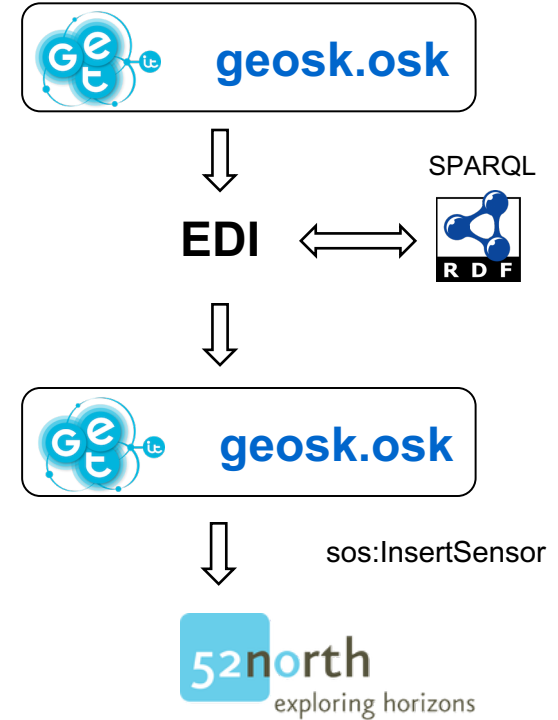
**System Classifiers**

Sensor type ⓘ

+ Sensor type


**Temporal validity of metadata**

Begin date



## 2. Sensor list

	Sensor list
Integration module	<a href="#">geosk.osk</a>
Programming language	py
Involved software	SOS


[Sensor data](#)
[Geo data](#)
[Views](#)
[Users](#)
[Search](#)
[Upload](#)

EXPLORE SOS    UPLOAD OBSERVATIONS

## Explore SOS

[Register a new Sensor](#)
[Capabilities](#)

### Identification

**Title**  
LTER-Italy Sensor Observation Service - Access of observations  
**Abstract**  
LTER-Italy Sensor Observation Service - Access of observations  
**Keywords**

### Provider

LTER-Italy  
**Name**  
LTER-Italy  
**Organization**  
None  
**Position**  
TBA  
**Address**  
Via F. Gobetti, 101  
**Postcode**  
40129  
**City**  
Bologna  
**Region**  
BO  
**Country**  
Italy  
**Email**  
lteritaly@gmail.com  
**Phone**  
+39 051 6398875  
**Fax**  
None  
**Site**  
<http://www.lteritalia.it>

### Sensors / Procedures

Number of sensors: 15

#### ENEA Santa Teresa meteorological station

The data acquisition system is a Campbell Scientific data-logger CR10. The programmable module reads the input signals from the sensors (max 12), generates the time clock, communicates with the PC and stores data (64 Kb RAM) also providing output processing instructions. The CR-10 is connected via a serial port to a PC that processes the metro data. The CR10 datalogger driven by the Loggernet v2.1 developed by Campbell Scientific allows one to program a specific instrumentation set that defines the sensors number/type, the sampling rate and the calibration coefficients. Loggernet allows one to schedule data collection in automatic mode. The specific program customized for the S. Teresa meteorological station acquires data according to WHOI (World Meteorological Organization) standard procedures. 1. Wind speed and direction are sampled every 10 seconds. These parameters are averaged over 10 minutes providing mean horizontal wind speed, resultant mean wind speed, resultant mean wind direction, standard deviation of wind direction; 2. Air temperature, air humidity, barometric pressure, solar global radiation are sampled every 10 seconds. These parameters are averaged over 10 minutes providing mean values; 3. Precipitation is provided every 10 seconds and the averaged value is provided every 10 minutes.

**Sensor ID:** [http://www.get-it-lt.com/sensors/getit\\_lteritalia.lt/procedure/CampbellScientificInc/noModelDeclared/NoSerialNumberDeclared/20170914050327762\\_790362](http://www.get-it-lt.com/sensors/getit_lteritalia.lt/procedure/CampbellScientificInc/noModelDeclared/NoSerialNumberDeclared/20170914050327762_790362)

Parameters:	
Air_pressure	hPa
Temperature_of_the_atmosphere_by_thermometer	degC
Wind_direction_relative_to_moving_platform_in_the_atmosphere_by_in-situ_anemometer	deg
Relative_humidity_of_the_atmosphere	%
Solar_Radiation	W/m <sup>2</sup>
rain_gauge	mm
wind_direction_SD	Degrees
wind_gust_speed	m/s
wind_vectorial_speed	m/s

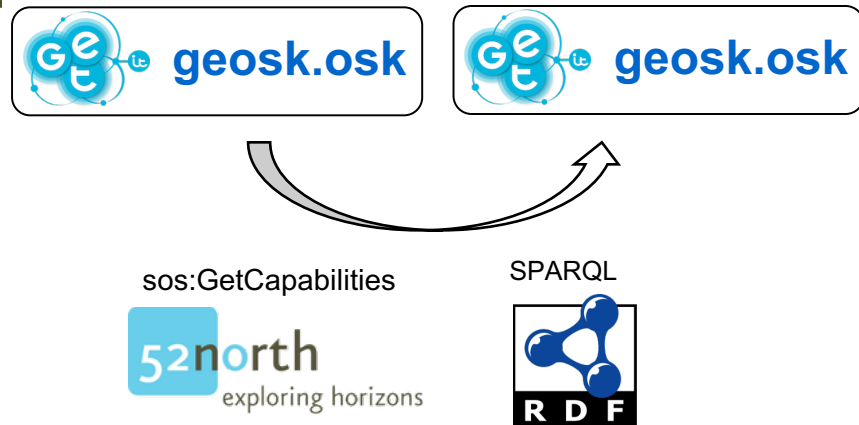
[Sensor details](#)
[download SensorML.XML](#)
[Upload observations](#)
[Delete sensor](#)

### Secchi disk freshwater version

The Secchi disk, as created in 1865 by Angelo Secchi, is a plain white, circular disk (30 cm in diameter or approximately 12 inches) used to measure water transparency in bodies of water. The disc is mounted on a pole or line, and lowered slowly down in the water. The depth at which the disk is no longer visible is taken as a measure of the transparency of the water. This measure is known as the Secchi depth and is related to water turbidity. Since its invention the disk has also been used in a modified, smaller 20 cm diameter, black and white design to measure freshwater transparency.

**Sensor ID:** [http://www.get-it-lt.com/sensors/getit\\_lteritalia.lt/procedure/NoManufacturer/noModel/noSerialNumberDeclared/201504110000\\_23190198](http://www.get-it-lt.com/sensors/getit_lteritalia.lt/procedure/NoManufacturer/noModel/noSerialNumberDeclared/201504110000_23190198)

**Parameters:**



# 3. Sensor details

	Sensors list
Integration module	geosk.osk
Programming language	py XSLT
Involved software	SOS GeoServer

Sensor (SensorML v2.0) landing page

Download all the data of this sensor

World Meteorological Organization weather station WMO ENEA

### ENEA Santa Teresa Meteorological Station

Sensor ID: [http://www.get-it.it/sensors/getit.it/italia.it/procedure/CampbellScientific/noModelDeclared/noSerialNumberDeclared/20170914050327762\\_790362](http://www.get-it.it/sensors/getit.it/italia.it/procedure/CampbellScientific/noModelDeclared/noSerialNumberDeclared/20170914050327762_790362)

The data acquisition system is a Campbell Scientific data-logger CR10. The programmable module reads the input signals from the sensors (max 12), generates the time clock, communicates with the PC and stores data (8M Kio RAM) also providing output processing instructions. The CR-10 is connected via a serial port to a PC that processes the meteor data. The CR10 datalogger driven by the LoggerNet v2.1 developed by Campbell Scientific allows one to program a specific instructions set that defines the sensors number/type, the sampling rate and the calibration coefficients. LoggerNet allows one to schedule data collection in automatic mode. The specific program customized for the ENEA meteorological station acquires data according to WMO (World Meteorological Organization) standard procedures: 1. Wind speed and direction are sampled every 10 seconds. These parameters are averaged over 10 minutes providing mean horizontal wind speed, resultant mean wind speed, resultant mean wind direction, standard deviation of wind direction; 2. Air temperature, air humidity, barometric pressure, solar global radiation are sampled every 10 seconds. These parameters are averaged over 10 minutes providing mean values; 3. Precipitation is sampled every 10 seconds and the averaged value is provided every 10 minutes.

This description is valid from: 2019-04-05 - 2041-02-05: unknown

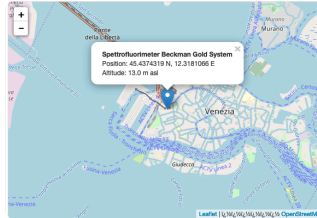
## Parameters measured

- Phenomenon Time  
Unit of measure: <http://www.opengis.net/def/uom/ISO-8601/0/Gregorian>
- Air pressure  
Unit of measure: hPa
- Temperature 10-minute mean of the atmosphere  
Unit of measure: degC
- Direction (from) of wind relative to moving platform and heading (wind direction) in the atmosphere by in-situ anemometer  
Unit of measure: deg
- Relative humidity (10-minute mean) of the atmosphere  
Unit of measure: %
- Solar Radiation  
Unit of measure: W/m<sup>2</sup>
- Precipitation rate (liquid water equivalent) in the atmosphere by in-situ rain gauge  
Unit of measure: mm
- Direction (from) standard deviation of wind relative to True North (wind direction) in the atmosphere by in-situ anemometer  
Unit of measure: Degrees
- wind\_speed\_of\_gust  
Unit of measure: m/s
- Wind speed (10-minute mean) in the atmosphere by in-situ anemometer  
Unit of measure: m/s

## Manufacturer

Campbell Scientific, Inc.  
Tel: +1-435-753-2342  
W 1600 N, B15  
Logan  
US  
<mailto:info@campbellsci.com>  
<http://www.campbellsci.com>

## Feature of Interest



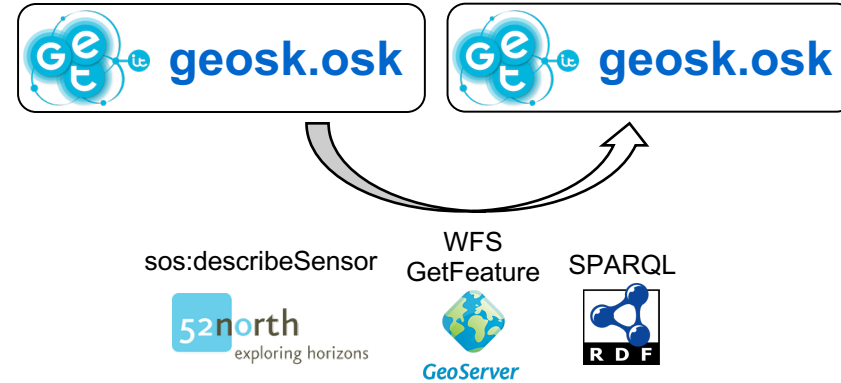
## Contact

### Owner

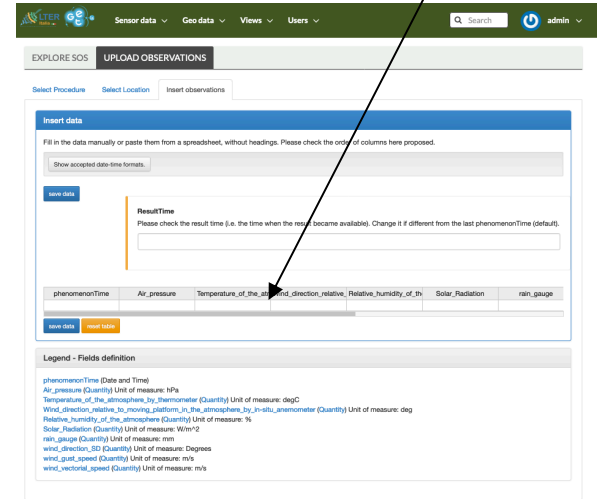
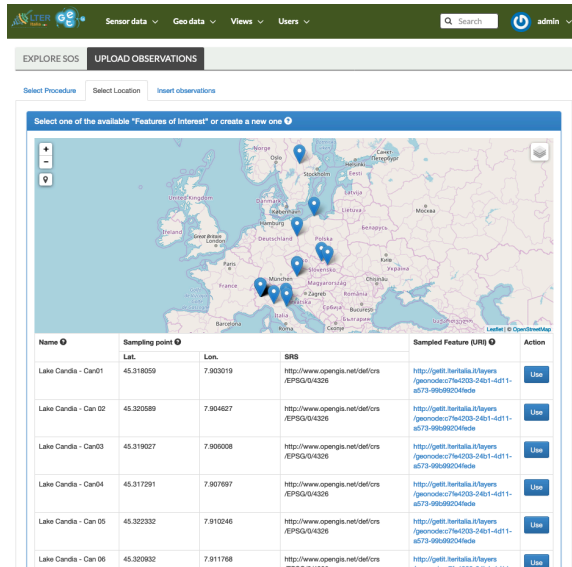
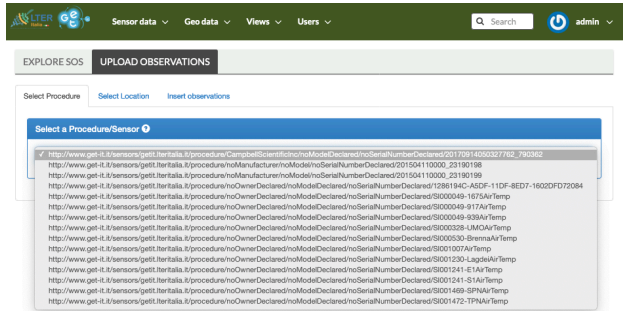
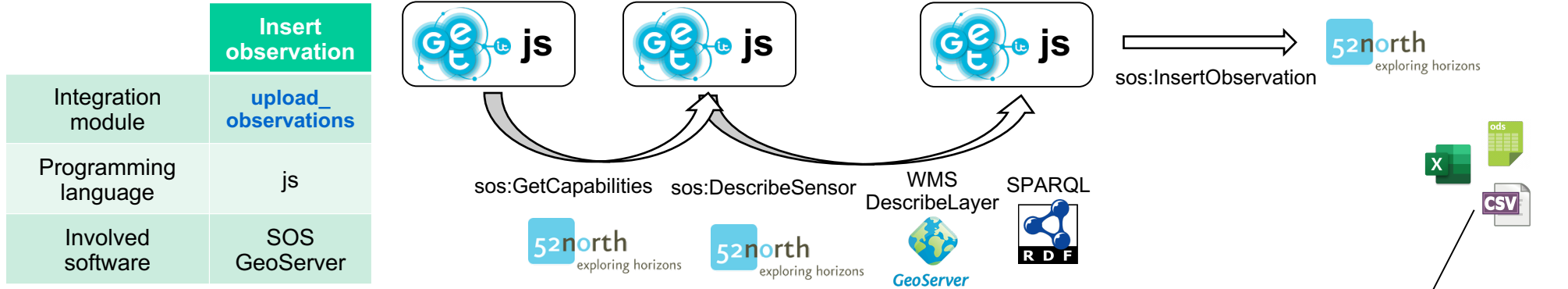
Silvia Cocchi  
Tel: (+39) 0187 878 255  
Località Pozzuolo di Lerici  
San Terenzo (SP)  
19032  
Italy  
[mailto:silvia.cocchi@enea.it](mailto:mailto:silvia.cocchi@enea.it)  
<https://projet.sept.enea.it/people/#!/via-cocchi>

### Operator

Andrea Bordon  
Tel: (+39) 0187 878 255  
Località Pozzuolo di Lerici  
San Terenzo (SP)  
19032  
Italy  
[mailto:andrea.bordon@enea.it](mailto:mailto:andrea.bordon@enea.it)  
<https://projet.sept.enea.it/people/#!/andrea-bordon>



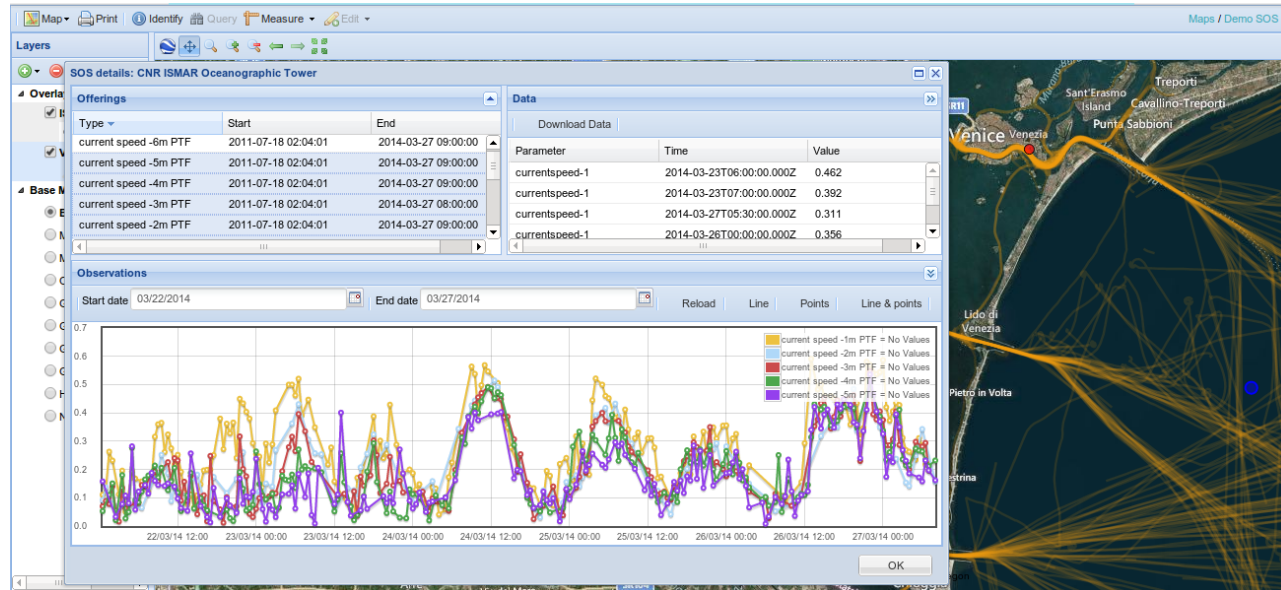
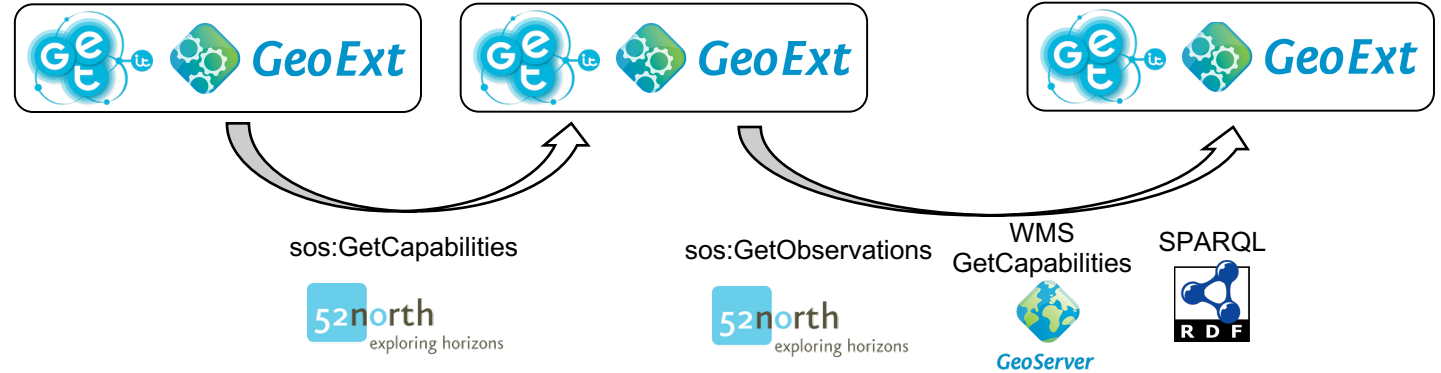
## 4. Insert observation





# 5. Maps with observation

	Maps with observation
Integration module	geoext extended
Programming language	js
Involved software	SOS GeoServer



# Formats: XML

```
<element xml:id="resp">
  <label xml:lang="en">Responsible party</label>
  <label xml:lang="it">Responsabile</label>
  <produces>
    <item datasource="person"...>
      <label xml:lang="en">Email</label>
      <label xml:lang="it">Email</label>
      <hasPath>/.../gmd:electronicMailAddress/...</hasPath>
    </item>
    <item ...>
      <label xml:lang="en">Institute</label>
      <label xml:lang="it">Istituto</label>
      <hasPath>/.../gmd:organisationName/...</hasPath>
    </item>
    <item ...>
      <label xml:lang="en">Role</label>
      <label xml:lang="it">Ruolo</label>
      <hasPath>/.../gmd:CI_RoleCode/...</hasPath>
    </item>
  </produces>
</element>
```



The form is titled "Responsible party" with a question mark icon. It contains three input fields: "Email", "Institute", and "Role". The "Email" field has a placeholder text "Email". The "Institute" field has a placeholder text "Institute". The "Role" field has a placeholder text "Author" and a dropdown arrow. Below the fields is a button labeled "+ Responsible party".

# Formats: RDF

```
<datasources>
<sparql xml:id="person">
  <query>
    <![CDATA[
      SELECT ?contact ?label
      WHERE {
        ?contact rdf:type foaf:Person .
        ?contact vcard:email ?label .
        FILTER(
          REGEX( STR(?label) ,"$search_param","i" )
        )
      }
      ORDER BY ASC(?label)
    ]]>
  </query>
  <url>http://url.to.endpoint/</url>
</sparql>
</datasources>
```

Responsible party ?

Email

joh|

mailto:john.doe@acmeresearch.org

mailto:john.smith@acmeresearch.org

+ Responsible party

Responsible party ?

Email

mailto:john.doe@acmeresearch.org

Institute

ACME Research

Role

+ Responsible party

Owner

Point of contact

Principal investigator

Processor

Publisher

Resource provider

User

Author

+ Responsible party

# GET-IT specific endpoints

URL / Endpoint	Type	Title	Software
/layers/[layername]#ediclient_container	GUI	Semantic metadata editor	GET-IT (EDI Client)
/maps/	GUI	Explore view/map	GeoNode/GET-IT (SOS Client)
/observations/	GUI	SOS 52°North Home page	SOS 52°North
/observations/sos/	Service	SOS	SOS 52°North
/sensors/	GUI	Explore sensor	GET-IT (SOS Manager)
/sensors/#ediclient_container	GUI	Semantic metadata editor	GET-IT (EDI Client)
/sensors/sensor/ds/[sensor_id]	GUI	Sensor details	GET-IT (SOS Manager)
/sensors/upload?[sensor_id]	GUI	Upload observations	GET-IT (SOS Manager)
/sensors/deletesensor?[sensor_id]	GUI	Delete sensor	GET-IT (SOS Manager)
/whoami	API	Who am I (GET-IT info)	GET-IT
/mdtools/api/listediml	API	List of EDIML resources	GET-IT
/layers/[layername]/ediml	API	EDIML resource metadata	GET-IT
/layers/[layername]/rndt	API	RNDT resource metadata	GET-IT
/mdtools/api/importediml	GUI/API	Import EDIML metadata	GET-IT
/mdtools/api/importrndt	GUI/API	Import RNDT metadata	GET-IT
/static/EDI-NG_client/	GUI	EDI Client	GET-IT (EDI Client)

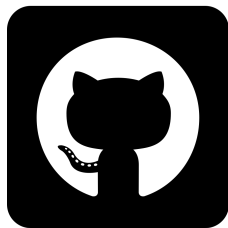
# Outcome

- Integration of geographic and sensor data
  - Both for authentication and visualization
- Semantic characterization of metadata
  - Allow for advanced assisted editing of metadata
  - Integrated with the GeoNode structures (e.g., for facets)
  - Enables query expansion in discovery tasks

# Outlook

- Internal triple store (e.g., Virtuoso, Jena) for self-contained customization of the metadata editing facilities
- SDI-wide federated authentication / authorization among the nodes (and selected third-party applications)
  - An internal triple store would allow for RDF-based representation of users and re-use of this information for editing metadata
- Semantic lift of existing metadata for re-EDItting
- Community support

# Question time



<https://github.com/SP7-Ritmare/starterkit>



<http://get-it.it/>



<https://getit.readthedocs.io/en/latest/index.html>

