



## SWE Ingestion Service and User Interfaces

WP9 - Deliverable D9.10



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[sdn-userdesk@seadatanet.org](mailto:sdn-userdesk@seadatanet.org) – [www.seadatanet.org](http://www.seadatanet.org)

SeaDataCloud - Further developing the pan-European infrastructure for marine and ocean data management

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D9.10

Short title

SWE Ingestion Service and User Interfaces

Long title

SWE Ingestion Service and User Interfaces

Short description

This deliverable describes the development tasks performed during the implementation of the SWE Ingestion Service and its user interface.

Author

Simon Jirka, Christian Autermann, Arne de Wall, Carsten Hollmann, Eike Hinderk Jürrens, Maurin Radtke, Matthes Rieke, Jan Schulte

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## History

Version	Authors	Date	Comments
1.0	Simon Jirka Christian Autermann Arne de Wall Carsten Hollmann Eike Hinderk Jürrens Maurin Radtke Matthes Rieke Jan Schulte	30/05/2018	Version submitted to the project coordinator for review
1.1	Dick Schaap	31/05/2018	Reviewed and technically accepted

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# 1. Abbreviations

CSV	Comma-separated Values
FTP	File Transfer Protocol
MQTT	Message Queue Telemetry Transport
O&M	Observations and Measurements
OGC	Open Geospatial Consortium
SEISI	Smart Electronic Interface for Sensor Interoperability
SensorML	Sensor Model Language
SOS	Sensor Observation Service
SWE	Sensor Web Enablement

# 2. Introduction

This document describes the implementation of the SeaDataCloud SWE Ingestion Service. The aim of this component is to support sensor operators, researchers and data owners during the publication of collected marine observation data. A more detailed specification of this component is available as part of the SeaDataCloud deliverable D9.9 “Specification of the SWE ingestion service, including SWE profiles and architecture”.

The description in this document comprises on the one hand the backend implementation which performs the collection of data from different sources, the interpretation and conversion into an internal data model (based on the ISO/OGC Observation and Measurements (O&M) standard, as well as the publication of the collected data into the database of an interoperable OGC Sensor Observation Service (SOS) instance (section 3). On the other hand, a frontend component is described which allows to define and manage data ingestion workflows (section 4).

# 3. Overview of the System Implementation Architecture

Figure 1 provides an overview of the implementation architecture of the SeaDataCloud SWE Ingestion Service. To ensure an efficient development and a sustainable re-use of existing related work, the core of the SWE Ingestion Service is based on the Spring Cloud Data Flow framework<sup>1</sup>. This framework provides the necessary base functionality for developing connectors to different types of data sources, processors to extract and convert incoming data streams, and to push the extracted data into specific sinks for persistent storage. Based on this foundation, dedicated connectors to MQTT and to FTP servers were used from the Spring Cloud Data Flow framework. Furthermore, a custom processor for incoming CSV data streams was developed so that any kind of observation data stream can be transformed into a harmonised internal data model. Finally, a dedicated sink implementation was developed to register and store the received sensor observation data into the database of an OGC SOS server.

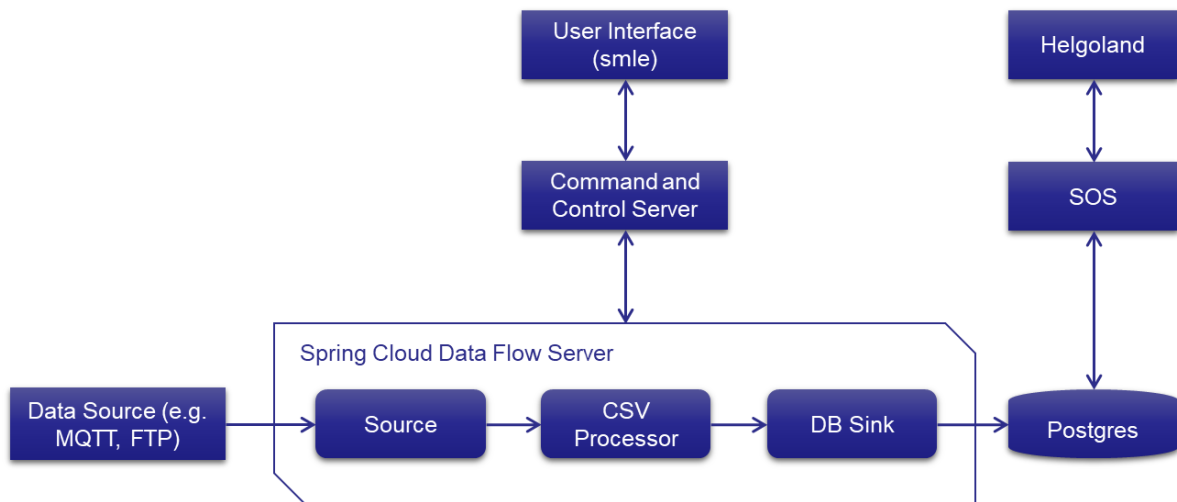
While the core components for receiving/loading, decoding and storing incoming data streams are provided by the Spring Cloud Data Flow framework (see Figure 2), a further component is available

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<sup>1</sup> <https://cloud.spring.io/spring-cloud-dataflow/>

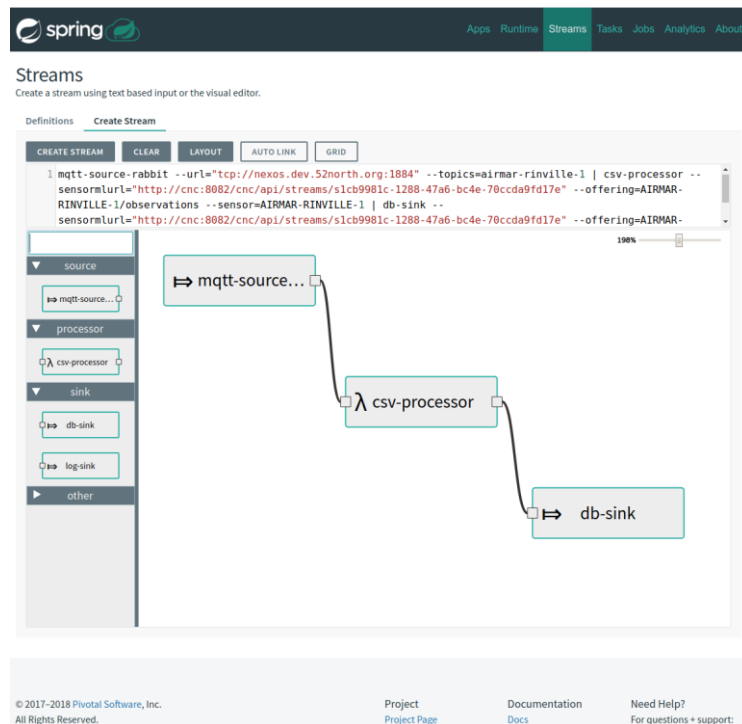


that allows to compose data ingestion workflows by orchestrating and configuring the different elements of the Spring Cloud Data Flow server. This functionality has been developed as a dedicated component: The SWE Ingestion Command and Control server. This server also acts as entry point for the SWE Ingestion Service User Interface that provides users functionality to define and manage ingestion workflows.



**Figure 1. Overview of the Implementation Architecture**

The implementation of the backend of the SWE Ingestion Service has been published as open source software via GitHub: <https://github.com/52North/SWE-Ingestion-Service>. The open source implementation of the user interface is described in section 4.

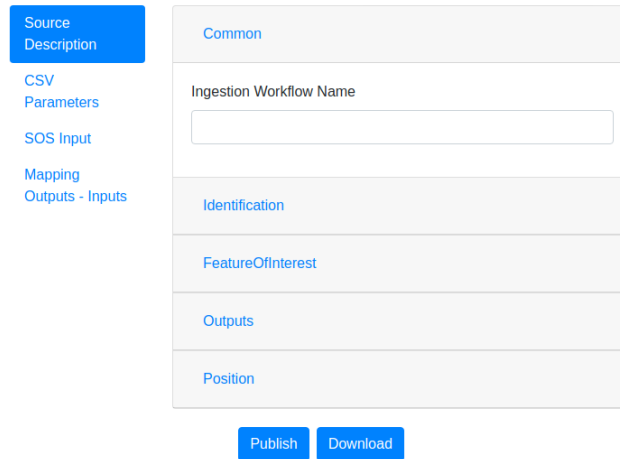


**Figure 2: Exemplary Visualisation of a Spring Data Cloud Workflow**

## 4. User Interface

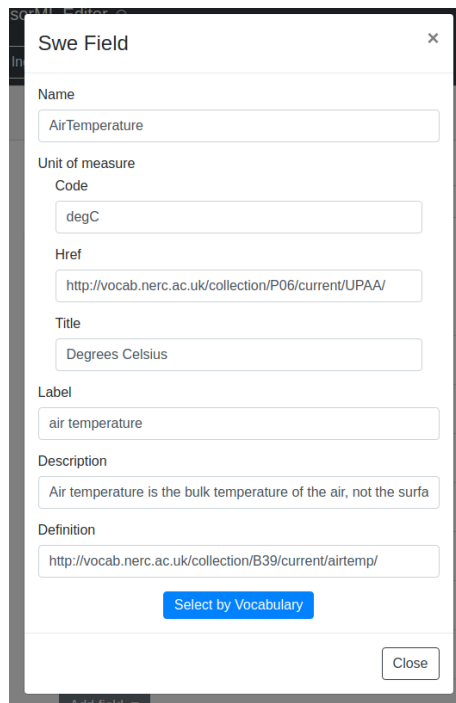
Complementary to the backend components, a user interface has been developed based on the 52°North smle project, a generic open source SensorML editor that is an output of several previous research projects.

As part of SeaDataCloud several important enhancements were made to smle to provide the necessary functionality for creating (see Figure 3) and managing SWE Ingestion workflows. It provides a comprehensive user interface which interacts with the SWE Ingestion Command and Control server.



**Figure 3: View to create new SWE Ingestion Workflows**

Specific attention was given to semantic interoperability by integrating the vocabulary servers operated by the SeaDataCloud partner BODC/NERC. Using a SPARQL endpoint, the user interface allows to search for terms and to include references to their definitions into ingestion workflows (see Figure 4).



**Figure 4: View for setting the Observed Properties of an incoming Data Stream**

Another important feature of the user interface is a menu that allows to retrieve statistics about the inserted data streams. This functionality is based on Kibana<sup>2</sup>, an open source tool for exploring and visualizing a broad range of different data types.

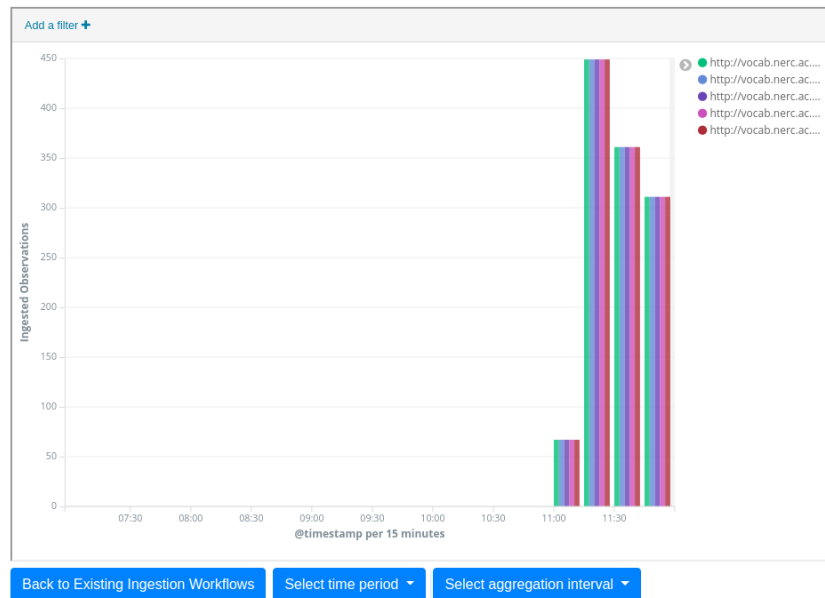


Figure 5: Statistics View

The user interface of the SWE Ingestion Service has been published as a dedicated branch of the smle project: <https://github.com/52North/sml/tree/project/SeaDataCloud>

## 5. Summary and Outlook

With this deliverable a first operational version of the SeaDataCloud SWE Ingestion Service is provided. Tested with different types of data sources (MQTT data streams as well as CSV files delivered via FTP servers) the functionality of this component has been validated. However, due to the broad range of different types of data sources available in the world of marine sciences, the SWE Ingestion Service will undergo continuous extension and adjustment in order to support further types of data sources that may become available. For this purpose, 52°North is already in contact with several partners of the SeaDataCloud consortium to apply the SWE Ingestion Service also to their data sources.

The user interface based on 52°North smle has been extended to enable users to describe the data streams they want to publish. However, based on further experiences gained during the operation of the SWE Ingestion Service we expect that further usability improvements will be performed in the future.

<sup>2</sup> <https://www.elastic.co/products/kibana>