ODANext



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# *List of Acronyms*

API – Application Programming Interface

GUI – Graphical User Interface

O&M – Observations and Measurements

RV – Research Vessel

SML – SensorML

SOS – Sensor Observation Service

SWE – Sensor Web Enablement

XML – Extensible Markup Language

# *Introduction and objectives*

The primary focus of the Sensor Model Language (SensorML) is to provide a robust and semantically-tied means of defining processes and processing components associated with the measurement and post-measurement transformation of observations. This includes sensors and actuators as well as computational processes applied pre- and post-measurement.

The main objective is to enable interoperability, first at the syntactic level and later at the semantic level (by using ontologies and semantic mediation), so that sensors and processes can be better understood by machines, utilized automatically in complex workflows, and easily shared between intelligent sensor web nodes. This standard is one of several implementation standards produced under OGC’s Sensor Web Enablement (SWE) activity.

In practice, for sensor timeseries, the procedure of an O&M observation is a specific sensor that can be described by a Sensor ML document.

At this moment, Sensor ML editors such as smle by 52°North [[1]](#footnote-1)and CNR EDI[[2]](#footnote-2) cover all elements of SensorML and have as output the actual SML XML. Additionally, smle can update and create sensor descriptions in a running SOS system. But in the end, both have the disadvantage of being nothing more than nice front-ends to static text editors, with no or limited persistence of the individual elements represented in the SML.

The needs in ODANext with regards to sensors information storage are the following:

* 1. Creating a single data structure where sensor information is kept for each sensor separately.
  2. If possible, directly linked to the data streams of en-route data acquisition
  3. If possible, with a GUI, accessible on the ship.
  4. The data structure should be exportable to other places
  5. The data structure should be expressible in SML, and should therefore contain all mandatory elements of SML

Through the requirements of the tender between MSO and the Freire shipyard, Kongsberg Maritime has been tasked with extending the MDM500 software, among others, with a logbook to store information on the sensors.

The Kongsberg logbook covers needs 1, 2 and 3. 4) will need to be solved either by a full or a partial MDM500 database synchronization between the ship and the Ostend copy, and forms part of Deliverable 2.3.2: Transporter specification. 5) is achieved by web services communicating directly with the MDM500 Logbook.

## Kongsberg MDM500 Logbook description

The specification of the Logbook has been compiled in a confidential document, after several input rounds from BMDC and MSO. Kongsberg has created a mock-up of the basic design, displayed in Figure 1. All requirements have been taken into account.

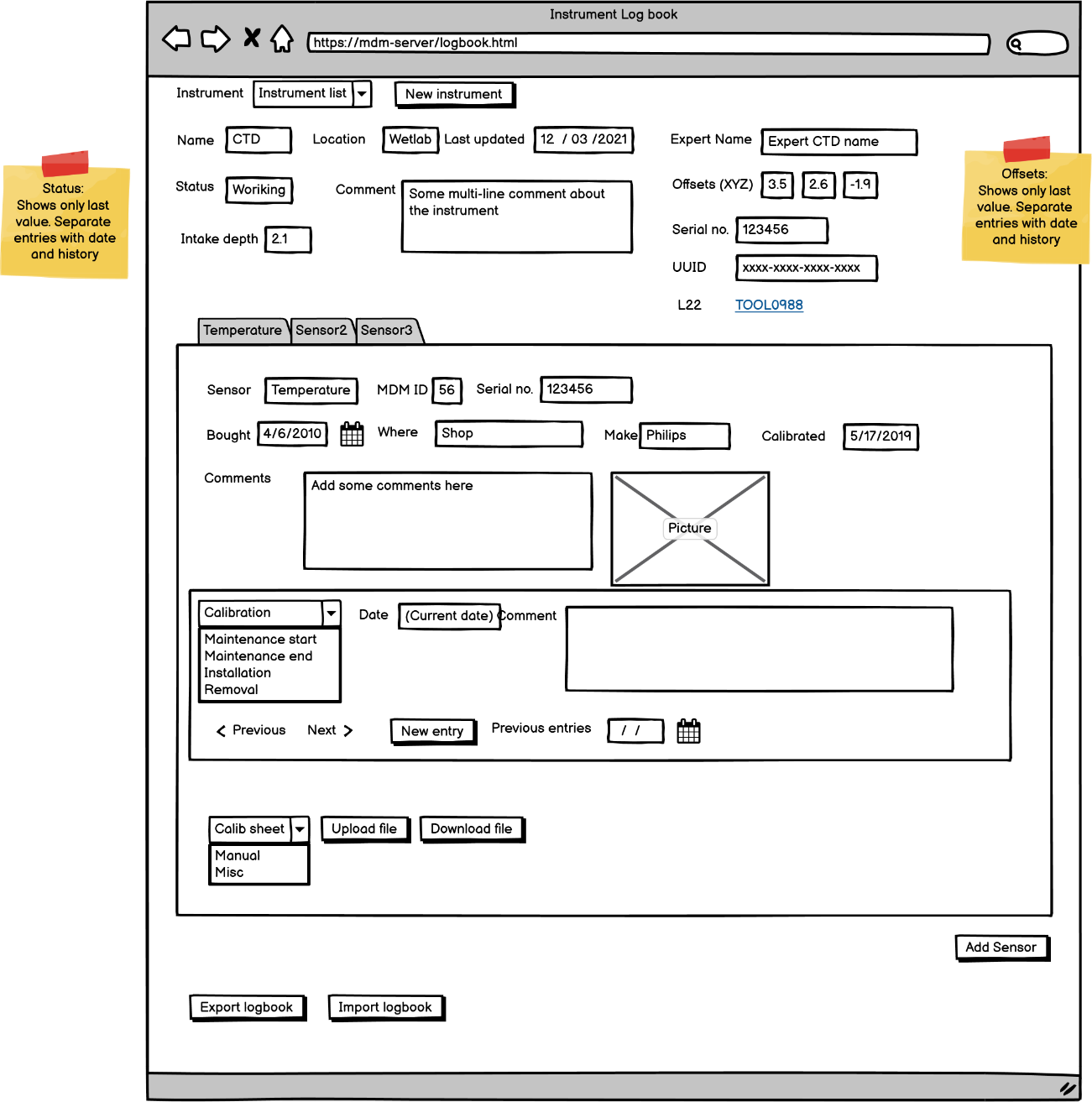


Figure 1 : Mock-up of the logbook web-application GUI.

## Kongsberg MDM500 Logbook database tables

The Logbook tables form part of the MDM 500 Microsoft SQL database and are coupled to the Instrument and Data tables. The database design will be shared with RBINS in August. Requirements have been transferred to Kongsberg along with the formulation of the front-end needs.

## Expression into SensorML

BMDC has designed a java SensorML library that can serialize objects into SensorML 2.0. This library has originally been written for the Eurofleets+ project to express the EARS events into SML history elements of a PhysicalComponent (individual instrument), which belongs to a Physical System (the platform, in this case RV). Sensors inside an instrument can be expressed as well, and are linked to the parent instrument via SML “attachedTo” elements. Note that specific sensors sometimes don’t have L22 model identifiers specified. For ODANext this library is extended with sensor identification, capabilities and characteristics. The library is open source and available here: <https://github.com/naturalsciences/SensorMLGenerator>. All elements present in the mock-up can be expressed in the SensorML.

The SensorML library is a standalone library and can be used in any context; it makes use of interface classes to make it pluggable into existing systems. These systems' object classes can either implement the interfaces or have functions that perform explicit conversions to the interfaces. To communicate with the MDM database, an extra component is needed. This component will be written as a Spring Boot web application that exposes the sensor descriptions with simple, "cool uris" [[3]](#footnote-3). As a middle layer between the SML library and the Ostend MDM 500 database, it implements the library interfaces, and calls the serialization code of the library when an HTTP request is made for specific sensor.

1. https://github.com/52North/smle [↑](#footnote-ref-1)
2. http://edidemo.get-it.it/ [↑](#footnote-ref-2)
3. https://www.w3.org/TR/cooluris/ [↑](#footnote-ref-3)