Session: Towards systematically curating and integrating
Data product description information for data users

APPLICATION OF STANDARDS-BASED DESCRIPTION OF ENVIRONMENTAL SENSOR METADATA

NSF/EarthCube X-DOMES (Cross Domain Observational Metadata for Environmental Sensing)

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TEXAS A&M UNIVERSITY CORPUS CHRISTI | HARTE RESEARCH INSTITUTE FOR GULF OF MEXICO STUDIES

NSF/EARTHCUBE INTEGRATIVE ACTIVITIES: Cross-Domain Observational Metadata Environmental Sensing Network (X-DOMES)

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EARTHCUBE
TRANSFORMING GEOSCIENCES RESEARCH

GOAL

Leveraging existing relationships with large NSF-funded data management programs, EarthCube building blocks and working groups, and environmental sensor manufacturers, X-DOMES will establish a community of sensor manufacturers and other stakeholders to provide a unifying approach and standards-based description of environmental sensor metadata and observations across geo-science domains.

X-DOMES
Cross-Domain Observational Metadata for Environmental Sensing

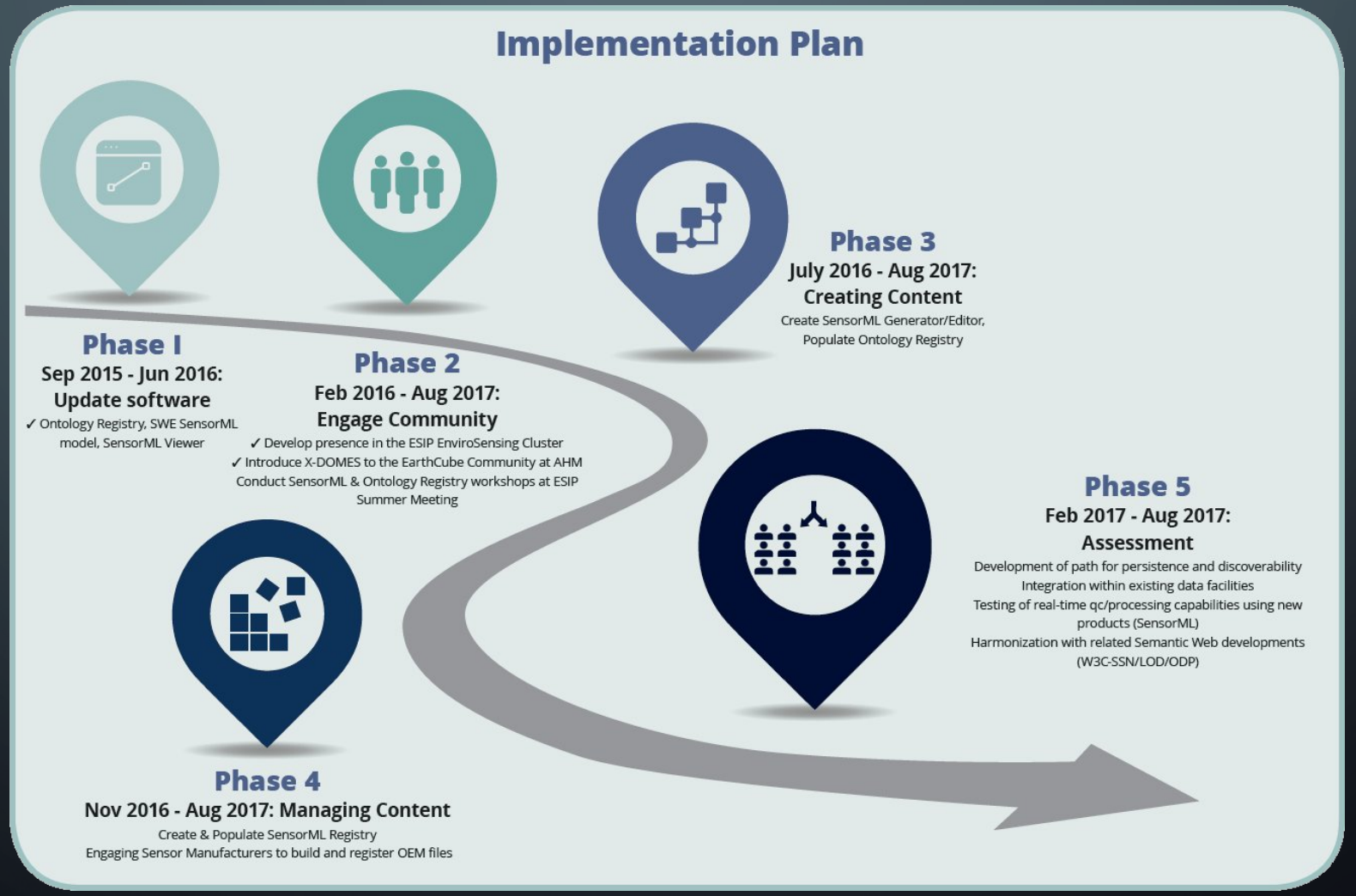
SensorML2

Sensor Model Language (SensorML 2.0) provides a standard encoding for describing:

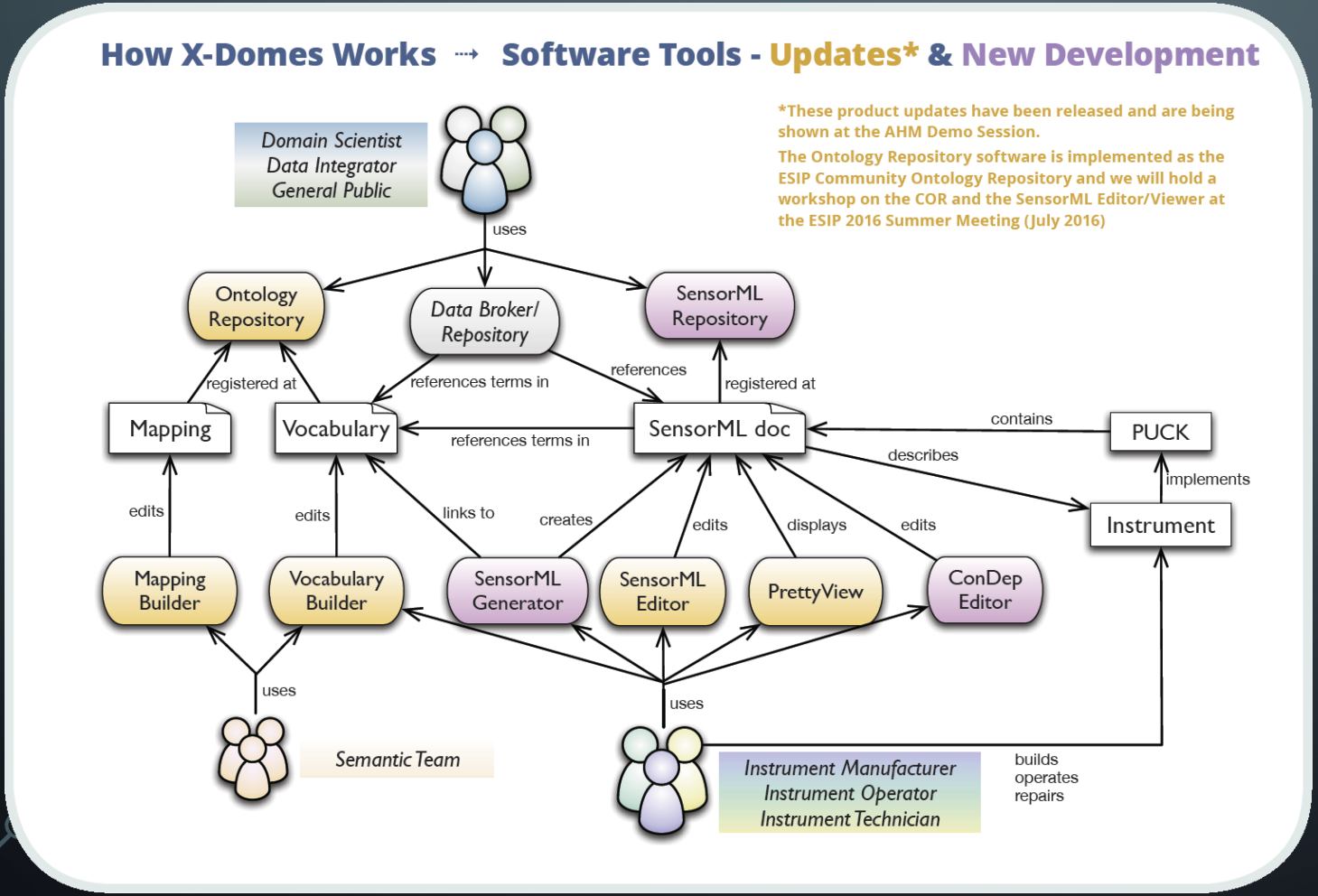
- sensors ("things that measure"),
- actuators ("things that act"), and
- processors ("things that calculate").

SensorML is part of the OGC Sensor Web Enablement (SWE) suite of open standards that are based on open and universally accepted schemas to facilitate interoperability.

X-DOMES: Implementation Strategy



COMMUNITY STANDARDS: Semantic Web (W3C) & SensorML (OCG-SWE)



1. Domain Communities and sensor manufacturers create registered vocabularies and ontologies in an Ontology Registry for versioning and persistence (https://xdomes.org/ont#/).
2. Sensor manufacturers create the Original Equipment Manufacturer (OEM) SensorML documents that describe sensor model metadata
3. Field operators create SensorML documents that reference the OEM SensorML and provide information about the specific sensor and its deployment.
4. Data providers can reference these files and include SensorML that describes processes, such as QC and derived products.

1. Vocabulary Registry and Repository

(prototype @ https://xdomes.org/ont#/)

Marine Metadata Interoperability Ontology Registry and Repository (MMI ORR; http://mmisw.org/orr/) version 3.3.x instance @

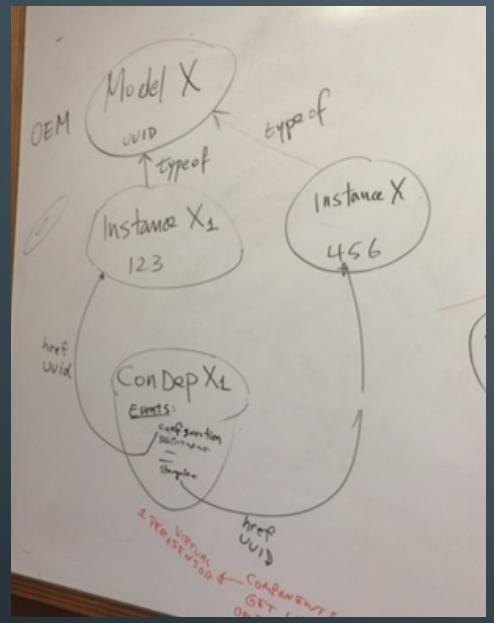
- ESIP: http://cor.esipfed.org/ont/
- X-DOMES: https://xdomes.org/ont/
- Common documentation: http://mmisw.org/orrdoc/
- Common API doc.: https://xdomes.org/ontapi/

New Features (among many):

- Import from spreadsheets;
- Mapping of terms from different collections (e.g. http://mmisw.org/ont/cf/parameter/sea_water_temperature.html);
- Remote hosting; and
- Export in RDF/XML, JSON-LD, N3, Turtle, N-triples and RDF/JSON

2. Describe the Sensor Model (OEM)

(prototype @ http://opensensorhub.github.io/sensorml-editor/SensorMLEditor.html)



"Get our descriptions out of notebooks and PDFs and into machine-actionable documents that can be queried for QC, data curation and translated into human-readable results – with the full power of the Semantic Web."

The OEM (Original Equipment Manufacturer)

- *Unique Identifier* – references a particular Sensor Model

- Characteristics and Capabilities (accuracy, precision, operational range, etc.)
- Contact of the manufacturer and references to documentation
- Keywords, enabling technologies, intended applications, observable properties (input), output properties …

- Is created by and registered by the **manufacturer** – providing a web-reference (IRI) to the document

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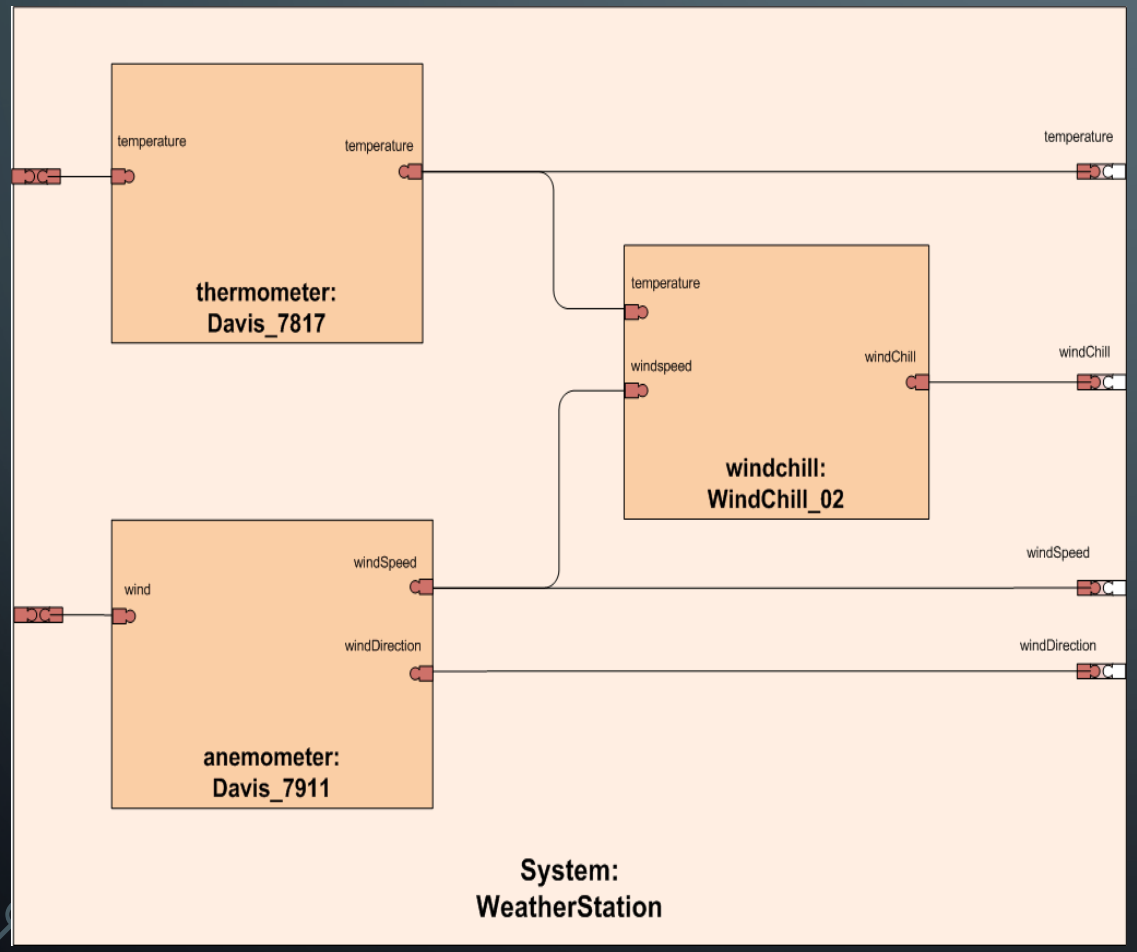


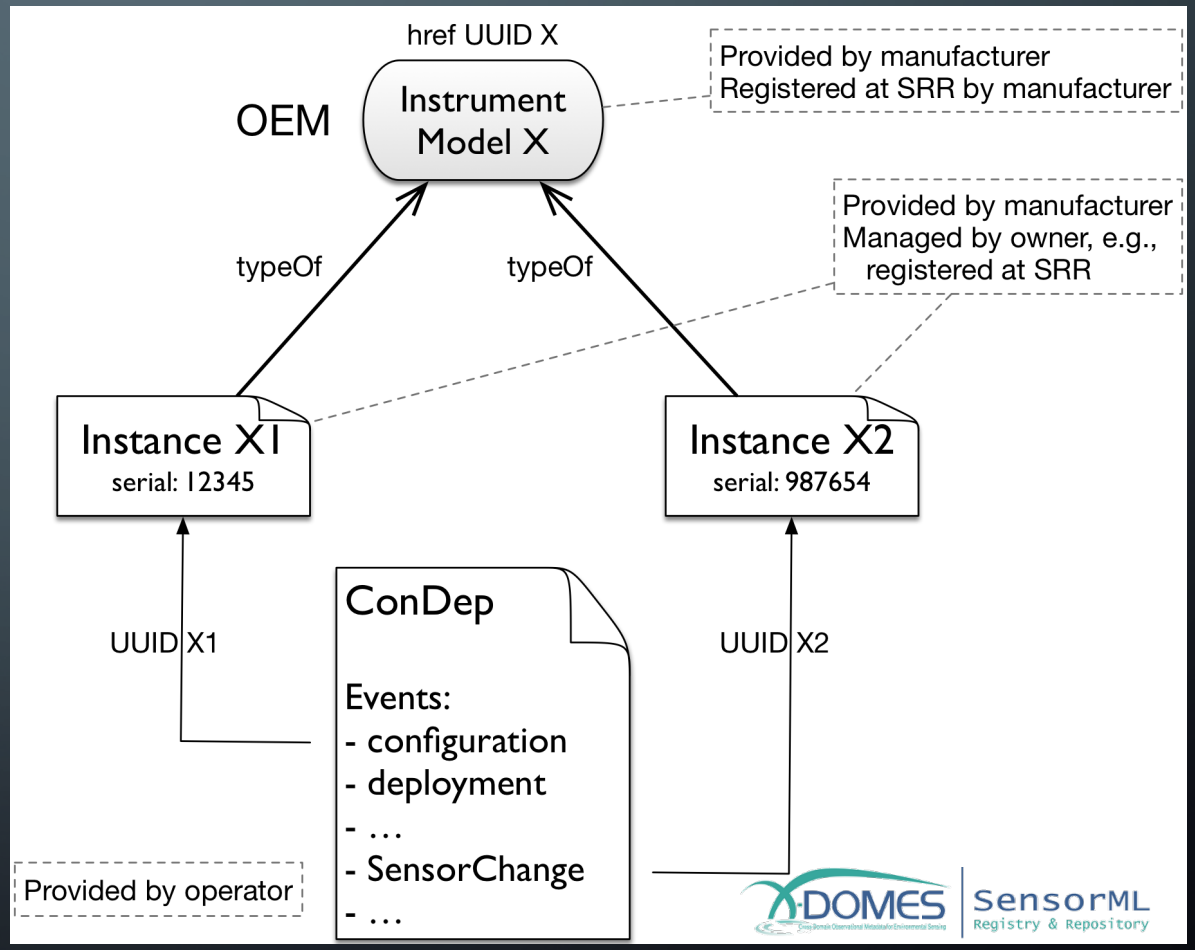
Instrument Identity (InstID): Sensor Descriptions

- *Unique Identifier* – references a particular Sensor
- It is **created by the manufacturer and delivered to the sensor owner**
- Only information that is specific to the sensor as-built is included
- it references the OEM file indicating that this sensor is a 'typeOf' the sensor model – thus inherits the descriptions unless explicitly documented otherwise.

3. SensorML Repository and Registry (SRR)

SensorML Repository and Registry (SRR)

- Maintains a central repository of SensorML files from manufacturers and sensor owners/data providers;
- Maintains versions
- Can be referenced in other OGC standards such as OGC SOS DescribeSensor;
- Can be accessed for QC processes; and
- Can be used to generate catalogs or listing of sensors.



COMMUNITY INVOLVEMENT

TELEDYNE TECHNOLOGIES INCORPORATED

THANK YOU!

Application of standards-based description of environmental sensor metadata: NSF/EarthCube, Cross Domain Observational Metadata for Environmental Sensing (X-DOMES) Project
http://esipfed.org/earthcube-xdomes

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