The Semantic Sensor Network Ontology, Revamped

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W3C SSN Incubator Group 2009 - 2011

• Developed an ontology for modelling sensors, sensor networks, and their measurements

• Considered how to use it to supplement the OGC’s SWE (XML-based) sensor interoperability standards
By 2014

• SSN paper in JWS was highly cited
• The OGC wanted to move towards semantic representations for spatial data
• The Linking Geospatial Data Workshop was held at Google Campus in London in March
• A joint OGC and W3C Charter for the Spatial Data on The Web Working Group was drafted
• First meeting: Jan 2015
2017: What we achieved
But for SSN

• 1. Make it easier to use
• 2. Make it easier to use
• 3. Make it easier to use
1. Disentangle upper ontology

• Dolce Ultral-Lite (DUL) had been used to anchor the concepts and also to provide some general-purpose terms that were needed.

• But DUL had moved on, as had upper ontologies

✓ Created an alignment module ssn-dul to contain the dul terms that can be optionally imported
2. Rethink O&M relationship

- The term “observation” had been derived from the OGC’s “O&M” use of the word, where it is an act, commonly understood as an event. In SSN it was reconceived as an information construct, viz dul:Situation
- Reconceive as event, OGC-style
- Don’t lose sleep every time a sensor makes an event
3. Modularise

- To hide aspects that are irrelevant to application
- Usually defined by something like
  - signature of the terms you need, plus
  - sufficient axioms from the whole, to
  - ensure all the consequences are maintained wrt the signature

✓ Simple universal core of frequent terms; their interpretations are more constrained as you layer outwards with growing vocabulary.

✓ Behaviour of signature similar; behaviour of inference very different.
So it looks like
The SOSA core

- OWL-DL ontology
- Many annotation properties used
- Has \texttt{rdfs:isDefinedBy} for tools to retrieve this definition in the module where it is first introduced.
- The only semantic construct is \texttt{owl:inverseOf}
- There are no non-atomic classes, subclasses, subproperties etc
- Uses \texttt{schema:domainIncludes} and \texttt{schema:rangenIncludes}
The SOSA Core

• Sensors and Observations without stimuli
✓ Samplers and Actuators
✓ The four foci are patterned similarly
✓ DatatypeProperty hasSimpleResult
SSN modules

- SSN: more complex modelling, much as it was, some deprecated or renamed terms
- System: properties of sensors in their systems (capabilities, precision, battery, maintenance, ....)
Others

- Sample relations
- Alignment to upper ontologies: PROV, OBOE, DUL
- Compatibility Ontology: alignment to old SSN of the incubator group
The standard and the ontologies: **Semantic Sensor Network Ontology** [https://www.w3.org/TR/vocab-ssn/](https://www.w3.org/TR/vocab-ssn/)


**Key message**: If you know the old one you will find the new one feels familiar. Please use the new one!