sensors.ws
Site for Web-based Sensor Ontologies

Mike Botts
Botts Innovative Research, Inc.
OGC TC (SWE DWG) – Toulouse, France
September 2010
Introduction

• Sensor Web Enablement (SWE) is highly dependent on the presence of online definitions

• Ontologies provide best means for providing definitions
  – Can define as flat list in RDF
  – Can define mappings between ontologies as we go (i.e. “this term is the same as that term”)

• SWE has always stated the importance of online semantic definitions that can be resolved through a URI, but we have always lacked them in reality
  – Needs include both general and community-specific terms
  – Providing tools for creating, editing, searching, and resolving term is critical to making online ontologies a reality
An Approach – MMI Tools

• The Marine Metadata Initiative (MMI) has done an excellent job of gathering tools and making them interoperate within a web environment (services and browsers)
  – These have also been heavily integrated with the sensor/observation/processing needs for SWE
  – Currently supported within the oceans community
    • Observables
    • Sensor terms, site characteristics, etc.
    • QC Tests types and parameters (i.e. lineage)

• Links:
  – Main site: http://mmisw.org/
  – Ontologies and tools: http://mmisw.org/orr/#b
  – Framework Description: http://marinemetadata.org/semanticframework
MMI ONT Tool Suite

- MMI ONT is an integrated collection of separate tools
  - Stanford Bioportal backend – Registry and Repository
  - VOC2RDF - Import csv file into RDF
  - Vine - Mapping between ontologies and terms
  - SparQL - Ontology Query Language
  - Reasoner - handles inferences
  - More tools planned
  - Other tools can be used but not integrated into web service

- MMI ONT is being reconfigured to ease deployment on other sites

- MMI looking for interested parties who can contribute to suite

- Without account: browse, search, reference ontologies
- With account: create/edit ontologies and maps

- Special thanks to the MMI Team (John Graybeal, Carlos Rueda, Luis Bermudez, and Paul Alexander, now of BioPortal), as well as the Stanford BioPortal team.
Examples

- Demonstrate current MMI tools
  - http://mmisw.org/orr/#b

- Example ontology (from sensor OEM):

- Example SensorML description using terms in ontology:

  <sml:input name="seaWaterTemperature">
    <swe:ObservableProperty
      definition="http://mmisw.org/ont/mvco/properties/seaWaterTemperature">
    </swe:ObservableProperty>
  </sml:input>

  <sml:input name="volumetricBackscatter">
    <swe:ObservableProperty
      definition="http://mmisw.org/ont/mvco/properties/volumetricBackscatter">
      <gml:description>doppler backscatter</gml:description>
    </swe:ObservableProperty>
  </sml:input>
Direction

• Botts-Inc recently purchased sensors.ws domain to use as a community agnostic site for providing ontologies, etc

• Have installed the MMI ONT tools on sensors.ws (thanks to Carlos Rueda) – http://sensors.ws/orr

• Will begin building necessary ontologies on sensors.ws

• Would welcome any help adding ontologies and maps, or helping with tool development
Ontologies Needed

Observable properties / phenomena / deriveable properties
  - temperature, radiance, species, exceedingOfThreshold, earthquake, SST, etc.
  - rotation angles, spectral curve, histogram, time-series, swath, etc.

Identifiers and classifiers
  - Identifiers – longName, shortName, model number, serial number, wing ID, etc.
  - Classifiers – sensorType, intendedApplication, processType, etc.

Sensor and process types and terms
  - thermometer, weatherStation, videoCamera, FLIR, passiveMicrowave, FFT, edgeDetection, etc.
  - IFOV, focal length, slant angle, weight, Polynomial coefficients, matrix, etc.

Role types
  - Expert, manufacturer, integrator, etc.
  - Specification document, product_image, algorithm, etc.

Capabilities, Characteristics, Interfaces, etc.
  - Width, height, material composition, etc.
  - Ground resolution, dynamic range, peak wavelength, etc.
  - RS-232, USB-2, bitSize, baud rate, base64, etc.

Sensor and process events
  - Deployment, decommissioning, calibration, etc.