Spatial Data on the Web Working Group

Geospatial IG @ RDA P9
Barcelona, 5 April 2017

Spatial Data on the Web

Joint effort of the World Wide Web Consortium (W3C) and the Open Geospatial Consortium (OGC)

https://www.w3.org/2015/spatial/charter

It aims at bridging the geospatial and Web platforms, thus facilitating the publication and use of spatial data across these communities

Launched in **January 2015**

Due to deliver its results in **June 2017**

Spatial Data on the Web: Mission

1. To determine how spatial information can best be integrated with other data on the Web
2. To determine how machines and people can discover that different facts in different datasets relate to the same place, especially when 'place' is expressed in different ways and at different levels of granularity
3. To identify and assess existing methods and tools and then create a set of best practices for their use
4. Where desirable, to complete the standardization of informal technologies already in widespread use

Spatial Data on the Web: Deliverables

1. **Use cases and requirements**
   https://www.w3.org/TR/sdw-ucr/
2. **Spatial data on the Web best practices**
   https://www.w3.org/TR/sdw-bp/
3. **Time Ontology**
   https://www.w3.org/TR/owl-time/
4. **Semantic Sensor Network Vocabulary**
   https://www.w3.org/TR/vocab-ssn/
5. **Coverages in Linked Data**
   https://www.w3.org/TR/eo-qb/

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Best Practices

Spatial Data on the Web Best Practices

Status: working draft, final version expected in June 2017

Extending the W3C Recommendation “Data on the Web Best Practices” to cover aspects specifically relating to spatial data

Topic: use of Web technologies as they may be applied to location.

Audience: practitioners, including Web developers and spatial data custodians

*Compiled based on **evidence of real-world application***

Best Practices: Summary (1/2)

Webiness

Use globally unique persistent HTTP URIs for spatial things

Make your spatial data indexable by search engines

Key spatial aspects

Provide geometries on the Web in a usable way (to be split in two)

Use spatial semantics for Spatial Things

Specify Coordinate Reference System for high-precision applications

Describe the location according to a Coordinate Reference System

Best Practices: Summary (2/2)

Access

Expose spatial data through 'convenience APIs‘

Metadata

Include spatial metadata in dataset metadata

Describe the positional accuracy of spatial data

Linking spatial data

Publish links from spatial things to related resources (to be split in two)

Other spatial aspects

Describe properties that change over time

Describe relative positioning

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SSN Ontology

Semantic Sensor Network Ontology - previous work

W3C **incubator** group 2009-11 → OWL-DL ontology for sensing and observations

Harmonized several existing observation models, esp.
- ISO 19156 (OGC **Observations and Measurements**)
+ integrated **Stimulus-Sensor-Observation** model

Highly cited in research literature, but very few (none?) operational deployments

Used **DOLCE-Ultralite** as foundation - complex, non-intuitive in some places

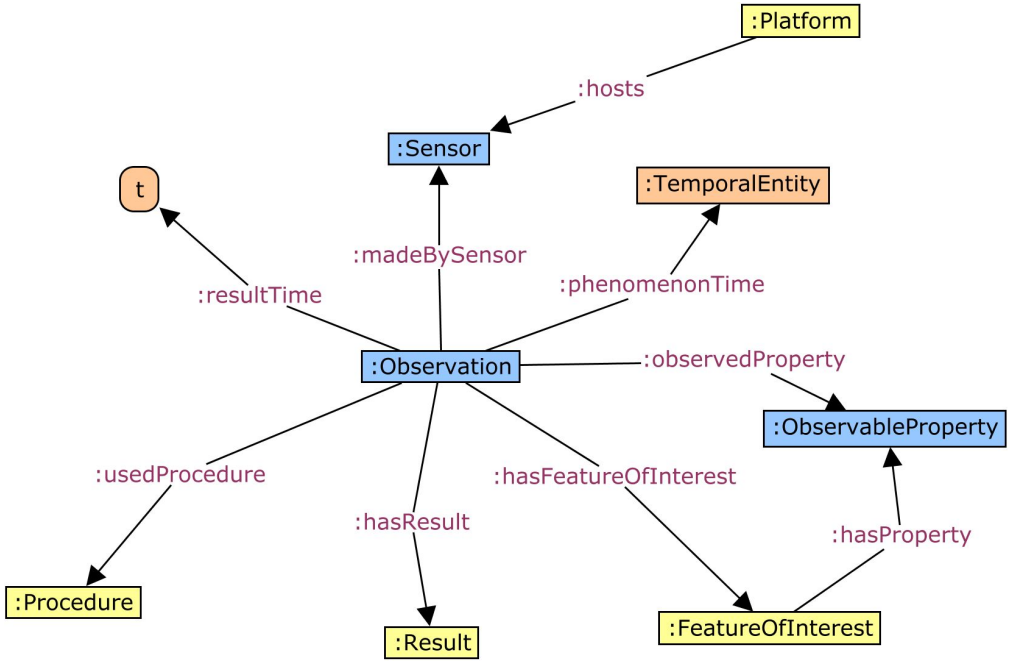
⟶ *revision desirable, dual branding with OGC*

Revision: “SOSA”

1. Lightweight core for web community
    - ‘schema.org’ semantics - e.g. `domainIncludes, rangeIncludes`
2. SSN expressivity & OWL axiomatization in ‘vertical extension’ of core
    - … DUL dependency removed
3. Add Actuation and Sampling (IoT applications)

⟶ **Sensing, Observations, Sampling and Actuation** ontology

http://w3c.github.io/sdw/ssn/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:madeBySensor
:resultTime
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:usedProcedure
:hasFeatureOfInterest
:hasResult
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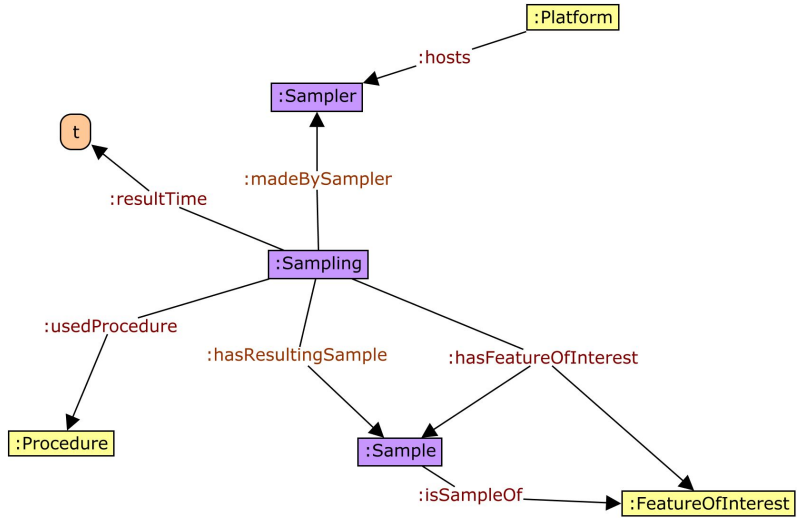
:FeatureOfInterest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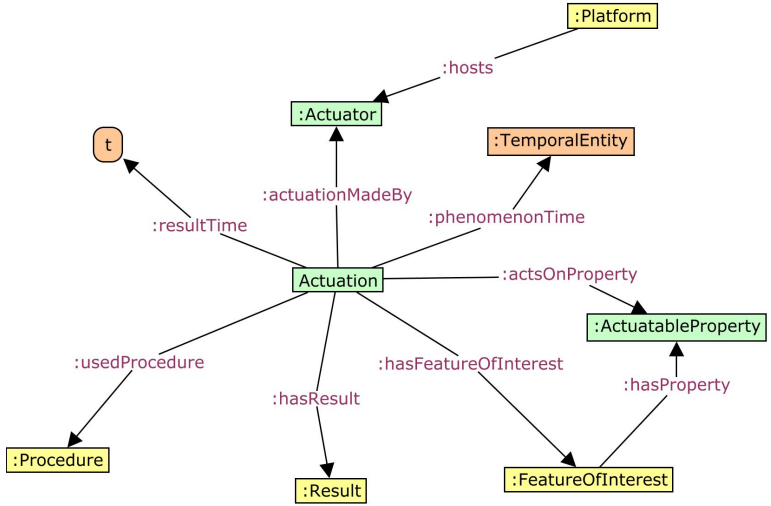
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:hasResult
:hasProperty
:Procedure
:Result
:FeatureOfInterest

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OWL-Time Ontology

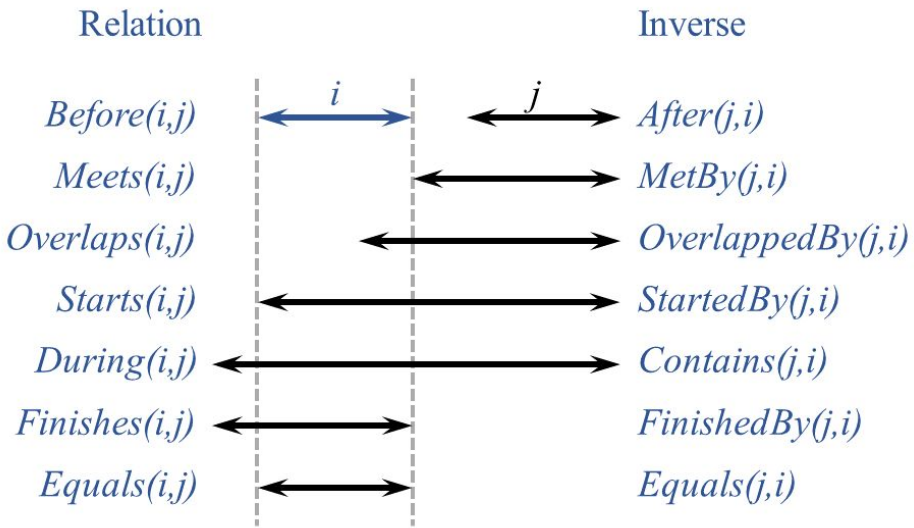
OWL-Time - previous work

OWL-DL ontology for time entities, *W3C Draft* 2006 [Hobbs and Pan]

Allen's interval algebra

OWL-Time is a dependency of many subsequent ontologies, *but no formal status*

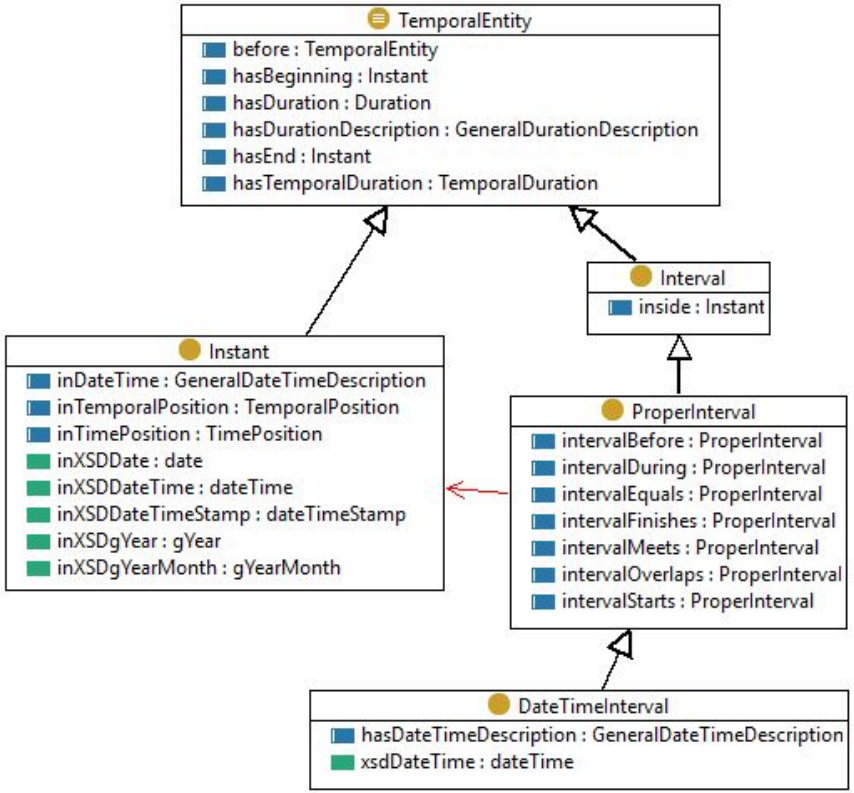
⟶ W3C *Recommendation* + OGC *Standard*

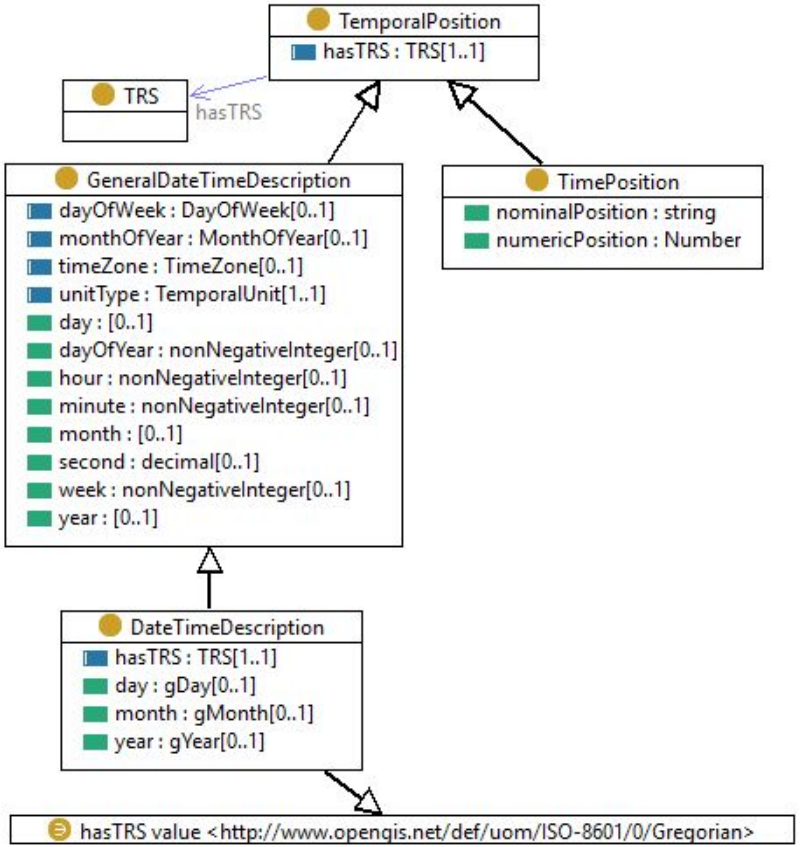


Revision

1. Support non-Gregorian temporal reference systems for time position
    - Including ‘numeric’ time values, ordinal timescales (e.g geologic time), alternative calendars ...
    - Allen interval algebra still applies
2. Additional predicates
    - hasTRS, hasTime, intervalIn, intervalDisjoint
3. Convenience instances
    - Month-of-year [January … December]
4. More complete documentation - formal specification, less narrative

http://w3c.github.io/sdw/time/


TemporalEntity
before : TemporalEntity
hasBeginning : Instant
hasDuration : Duration
hasDurationDescription : GeneralDurationDescription
hasEnd : Instant
hasTemporalDuration : TemporalDuration
Interval
inside : Instant
Instant
inDateTime : GeneralDateTimeDescription
inTemporalPosition : TemporalPosition
inTimePosition : TimePosition
inXSDDate : date
inXSDDateTime : dateTime
inXSDDateTimeStamp : dateTimeStamp
inXSDgYear : gYear
inXSDgYearMonth : gYearMonth
ProperInterval
intervalBefore : ProperInterval
intervalDuring : ProperInterval
intervalEquals : ProperInterval
intervalFinishes : ProperInterval
intervalMeets : ProperInterval
intervalOverlaps : ProperInterval
intervalStarts : ProperInterval
DateTimeInterval
hasDateTimeDescription : GeneralDateTimeDescription
xsdDateTime : dateTime


TemporalPosition
hasTRS : TRS[1..1]
TRS
hasTRS
GeneralDateTimeDescription
dayOfWeek : DayOfWeek[0..1]
monthOfYear : MonthOfYear[0..1]
timeZone : TimeZone[0..1]
unitType : TemporalUnit[1..1]
day : [0..1]
dayOfYear : nonNegativeInteger[0..1]
hour : nonNegativeInteger[0..1]
minute : nonNegativeInteger[0..1]
month : [0..1]
second : decimal[0..1]
week : nonNegativeInteger[0..1]
year : [0..1]
TimePosition
nominalPosition : string
numericPosition : Number
DateTimeDescription
hasTRS : TRS[1..1]
day : gDay[0..1]
month : gMonth[0..1]
year : gYear[0..1]
hasTRS value <http://www.opengis.net/def/uom/ISO-8601/0/Gregorian>

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Coverages

Two Approaches to Coverages

1. Start with RDF Data Cube (models hypercubes on the Web, based on SDMX)
   - Extend spatio-temporal components
   - Leads to: “Publishing and Using Earth Observation Data with the RDF Data Cube and the Discrete Global Grid System”: https://www.w3.org/TR/eo-qb/
2. CoverageJSON, use URIs to denote key concepts such as units, observed properties, coordinate reference systems, domain types, but value space is JSON.
3. Both:
   - Aim to enable processing of coverages in Web applications;
   - Semi-experimental, not ready for full standardisation

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