



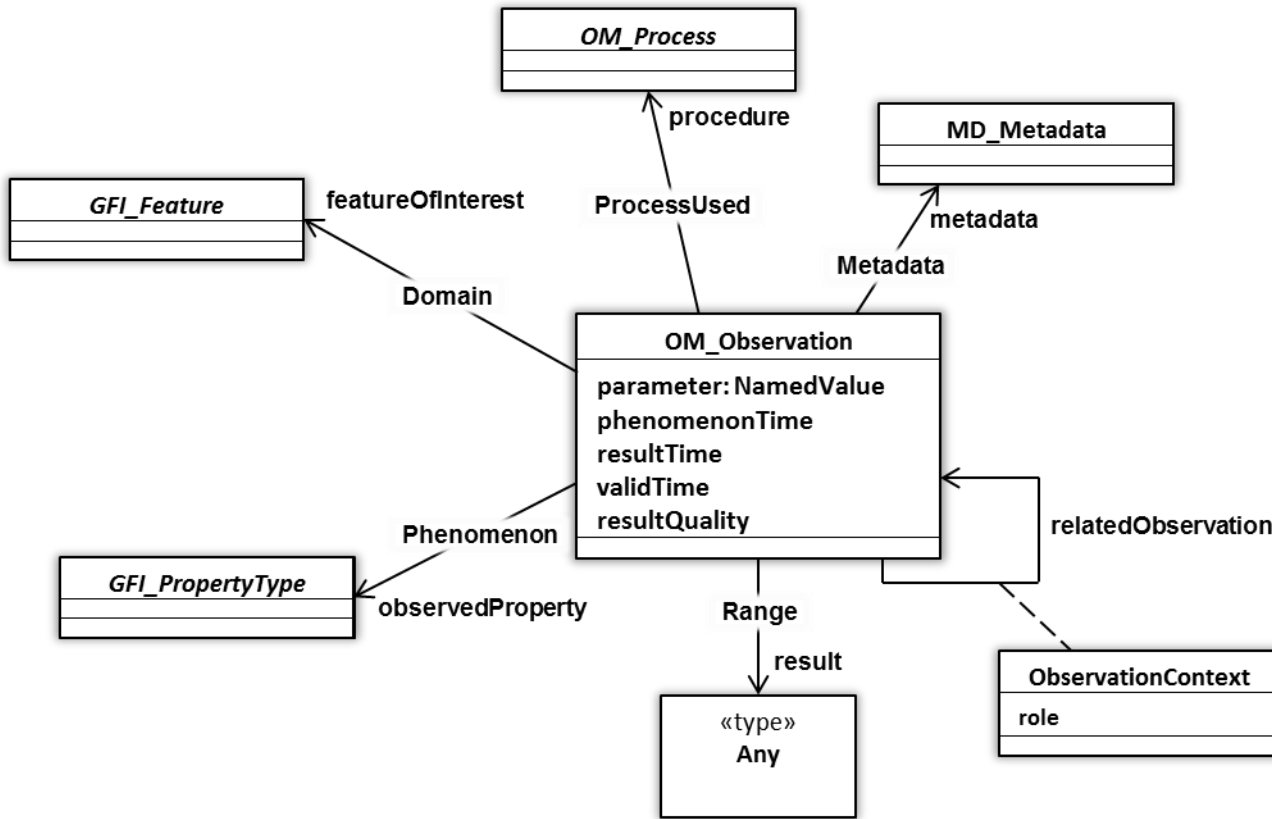
World Meteorological Organization

Weather • Climate • Water

Approach to model-driven development of data exchange standards

Jeremy Tandy

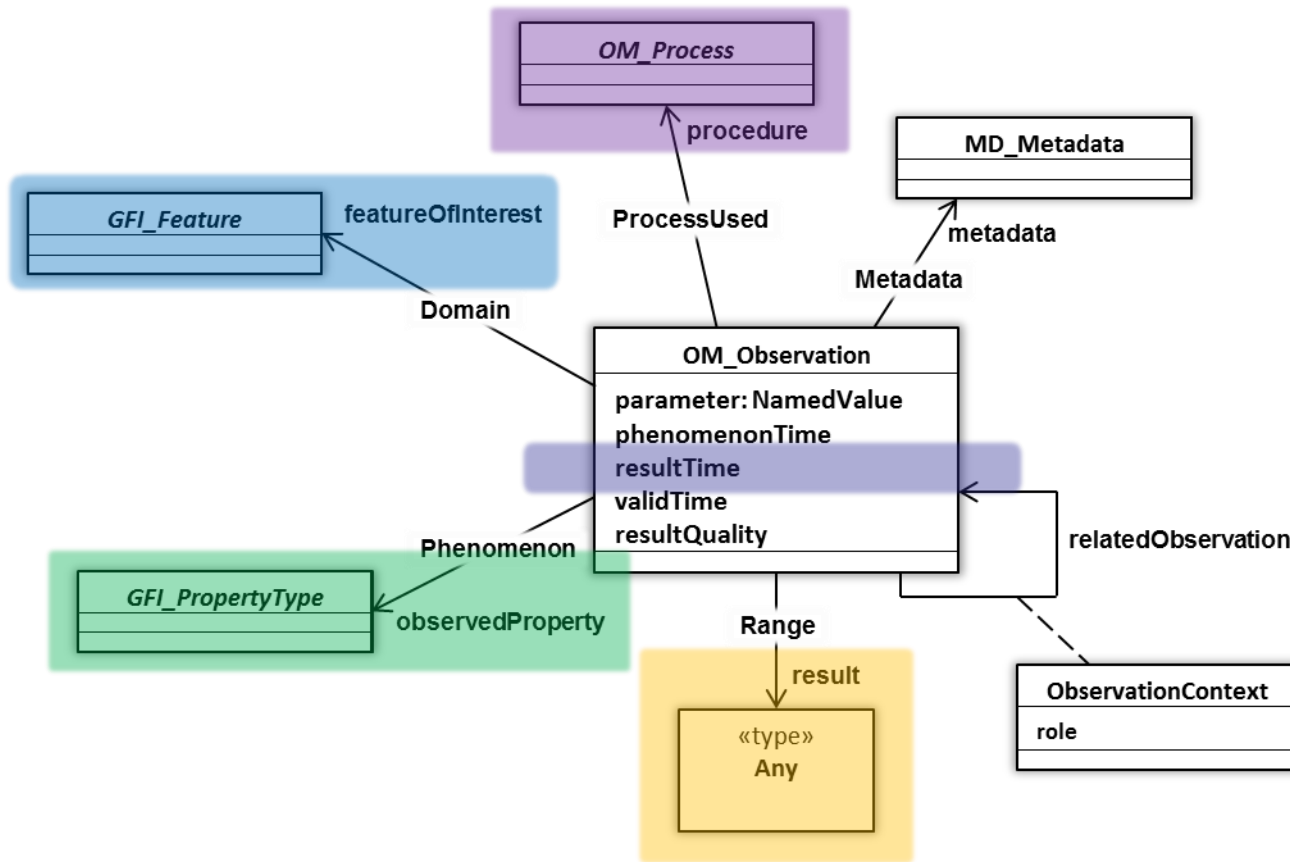
Observations and measurements



ISO 19156:2011 'Geographic information – Observations and measurements' provides a metamodel for describing the context required to interpret the results of an observation.



Observations and measurements



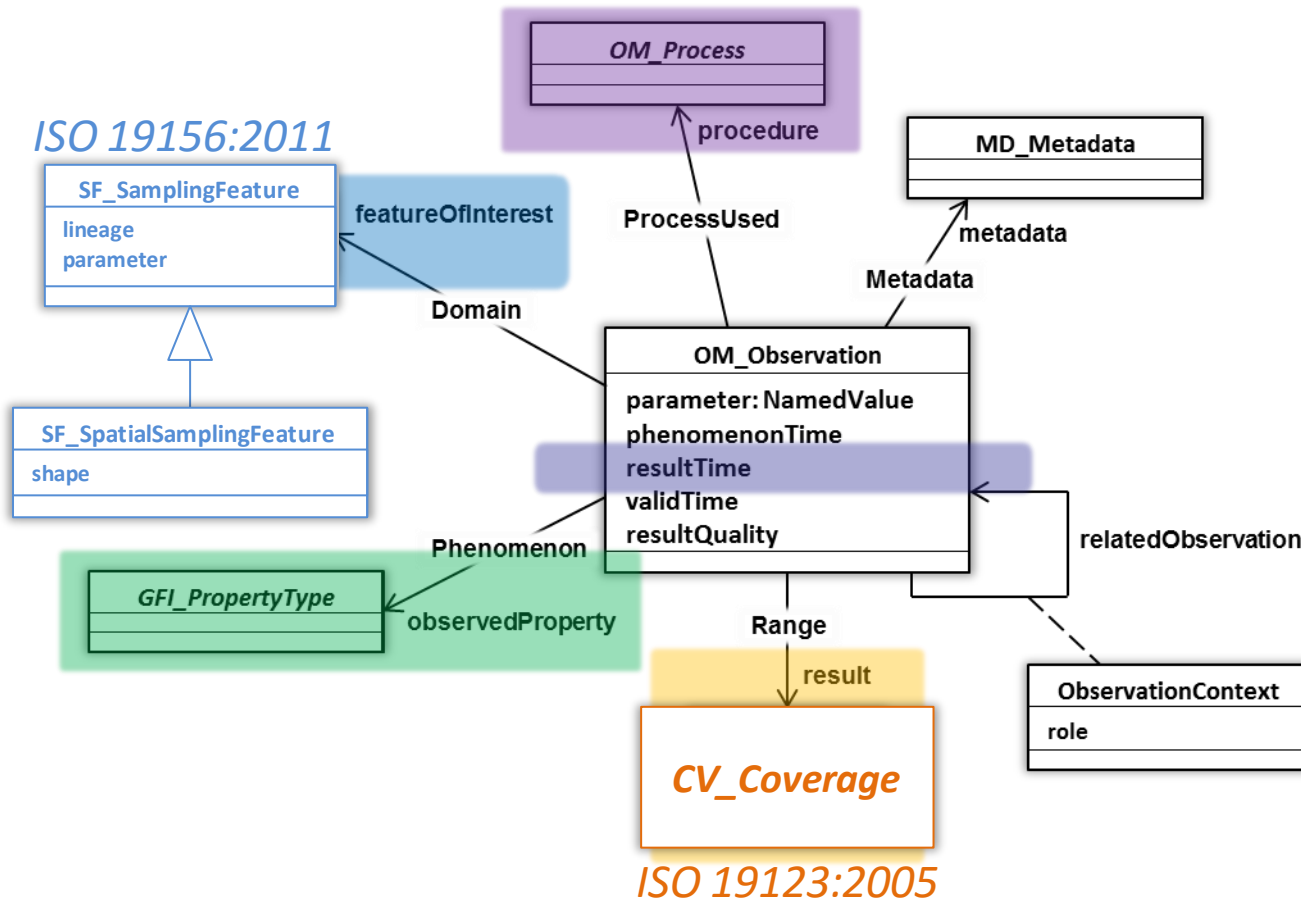
OM_Observation:

- an **EVENT** whose
- **RESULT** is an *estimate* of a value of some
- **PROPERTY** of some
- **THING** obtained using a specified
- **PROCEDURE** ...

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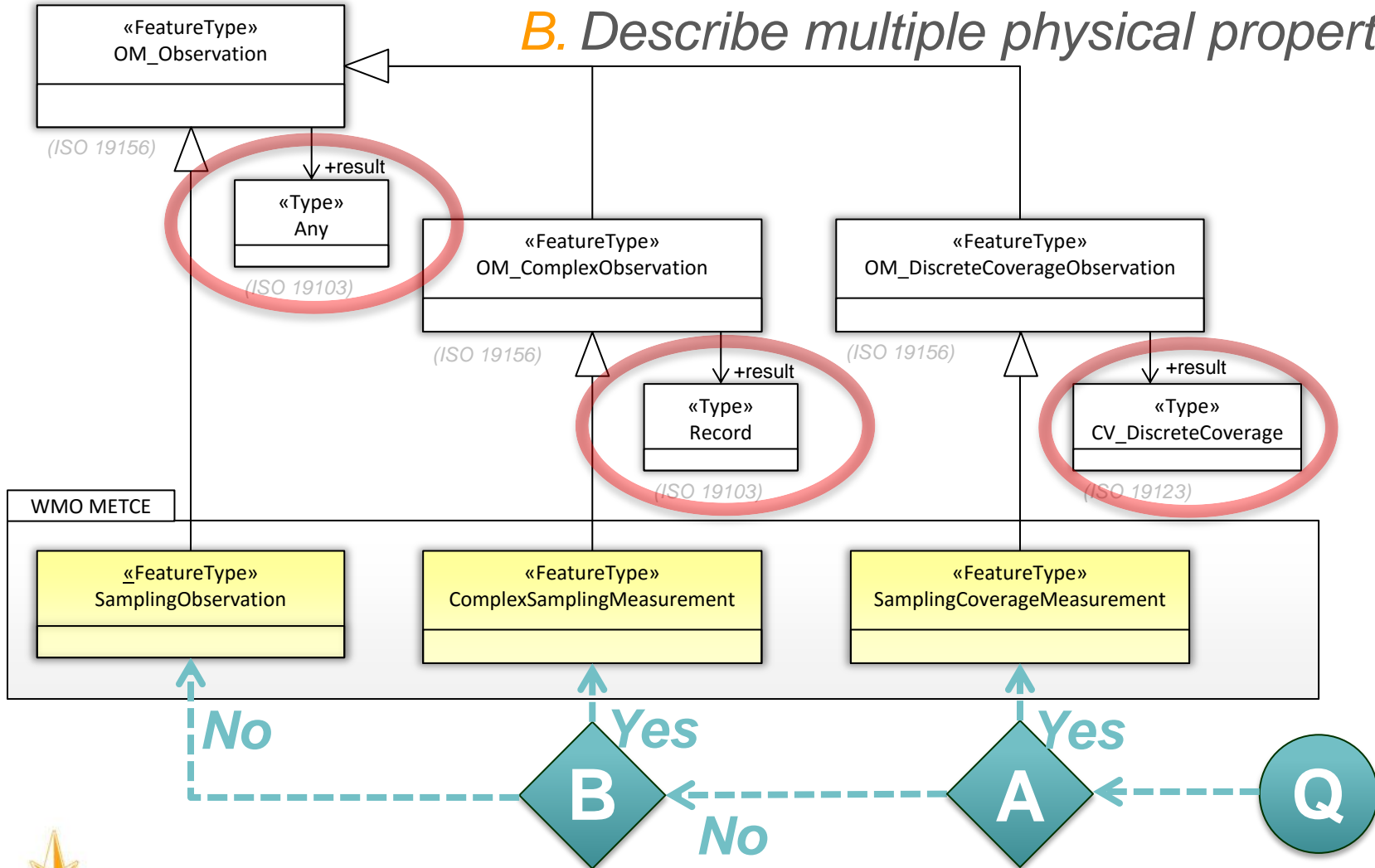


METCE: a *profile* of Observations and Measurements

Does the data collected (e.g. the 'result') from the Observation event:

A. Vary in space and or time?

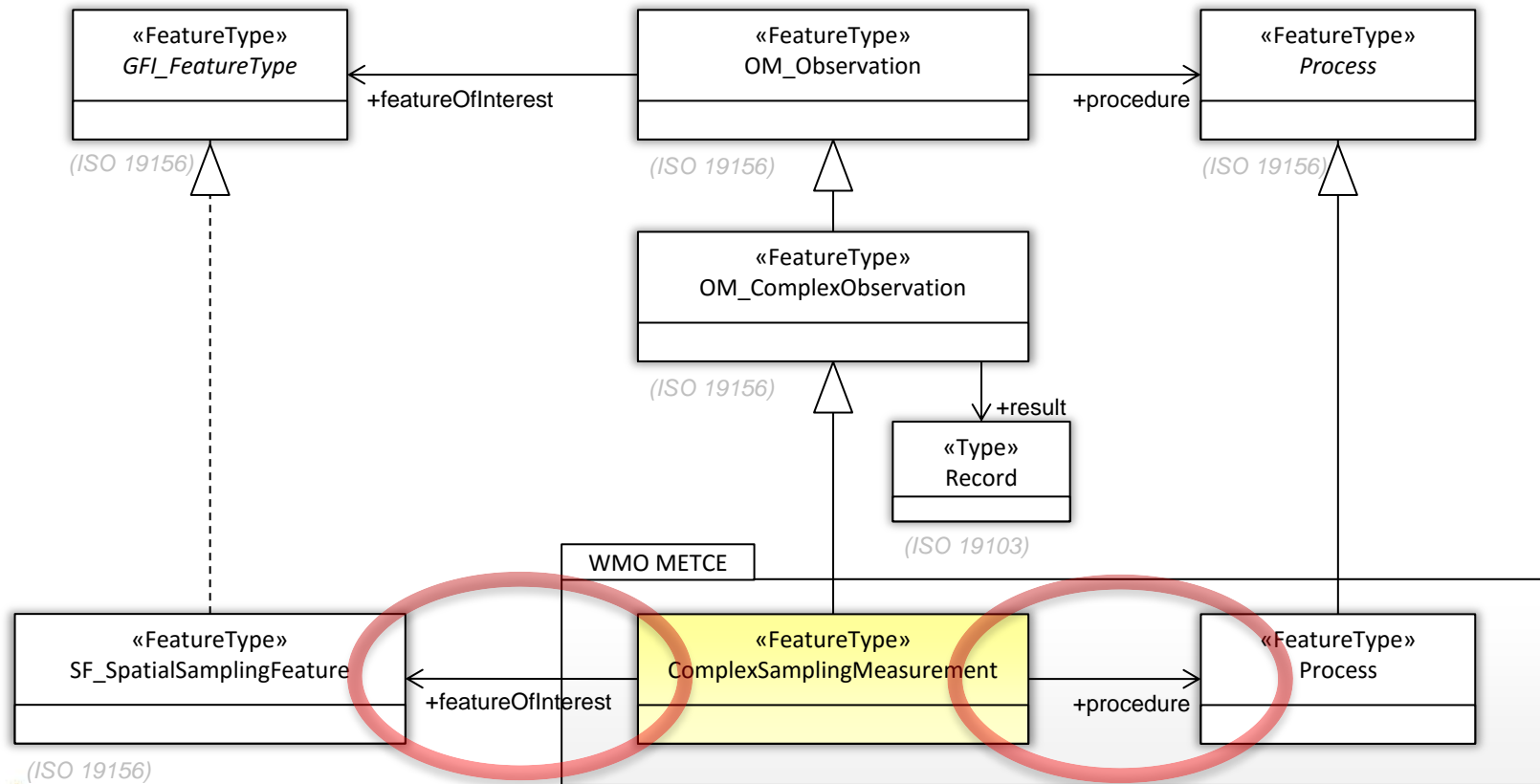
B. Describe multiple physical properties?



Common constraints applicable to all METCE types

All specialisations of *OM_Observation* defined in WMO METCE require:

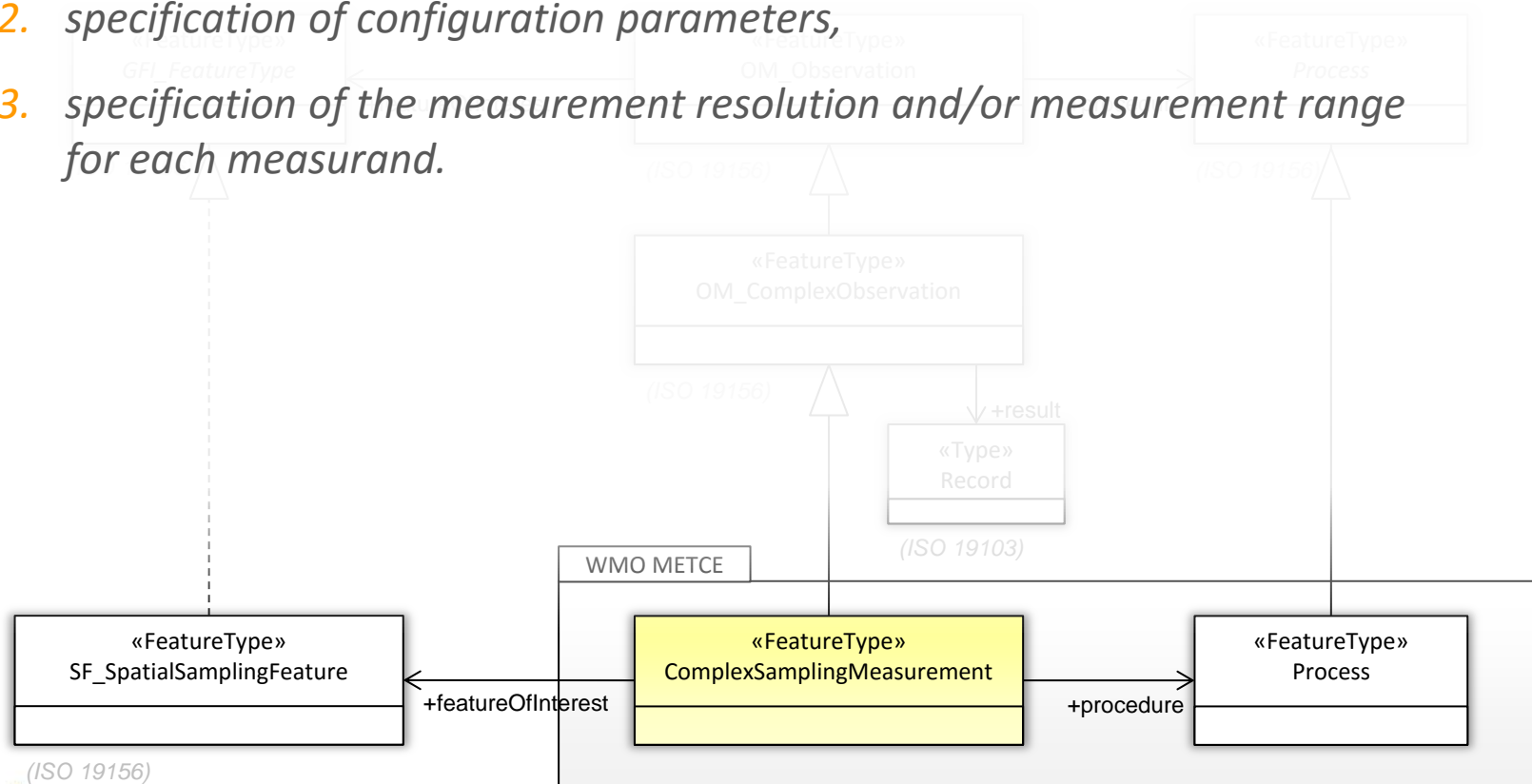
- association role 'featureOfInterest' shall be of type *SF_SpatialSamplingFeature*
- association role 'procedure' shall be of type *Process* (from WMO METCE)



METCE Process

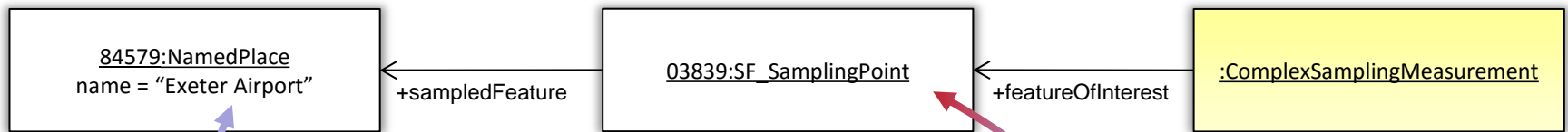
Process (from WMO METCE) provides a concrete implementation of the abstract OM_Process supporting the following requirements:

1. reference to supporting documentation,
2. specification of configuration parameters,
3. specification of the measurement resolution and/or measurement range for each measurand.



SamplingFeature as OM_Observation.featureOfInterest

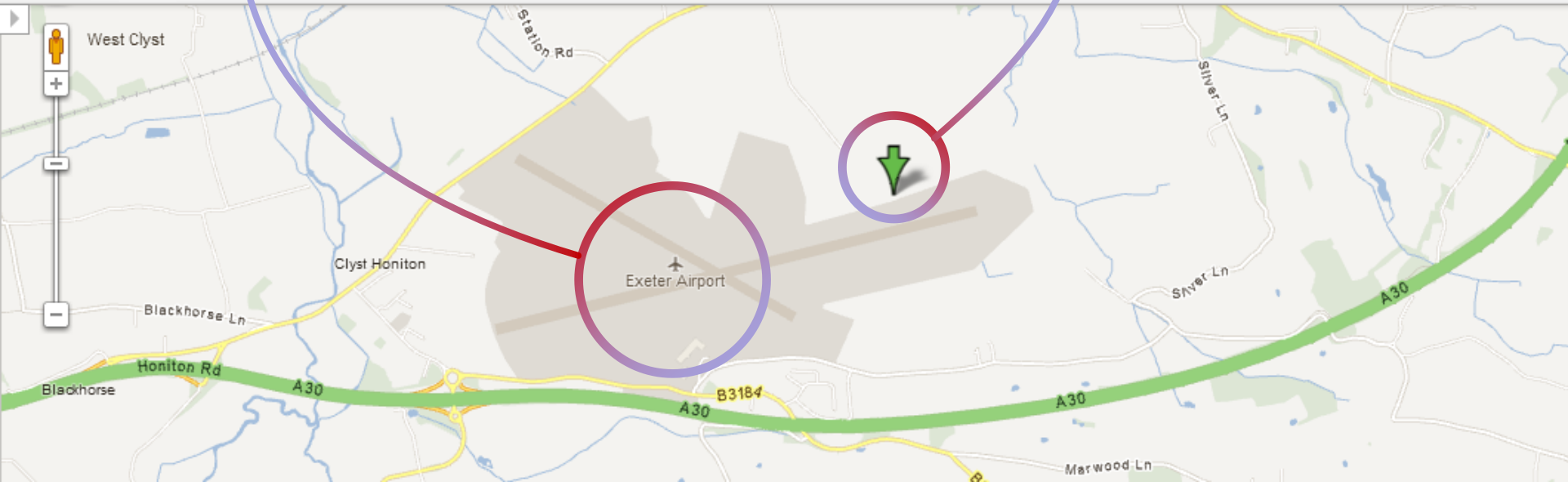
In meteorology, we define a sampling regime that enables us to observe, measure or simulate the real-world. Sampling Features (from ISO 19156 'Observations and measurements') provide a way to characterise this sampling regime and the relationship to the real-world.



Google

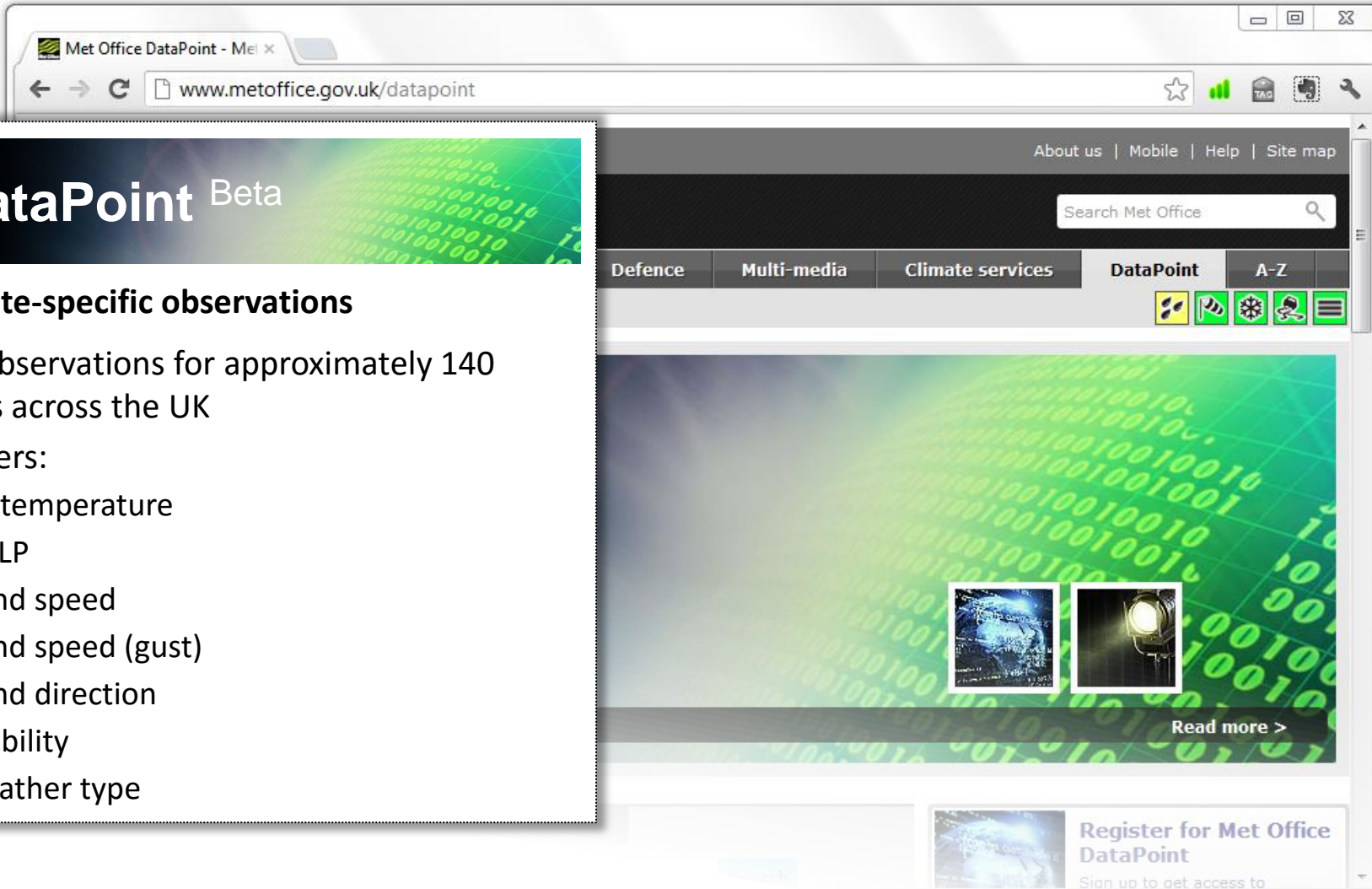
50.737,-3.405

:Point
@srsName "EPSG:4326"
pos = "50.737 -3.405"



Example use of METCE: Met Office DataPoint

*Illustrative example demonstrating how METCE provides a foundation to domain specific **Application Schema** ...*



The screenshot shows a web browser window displaying the Met Office DataPoint website. The browser's address bar shows the URL www.metoffice.gov.uk/datapoint. The website header features the Met Office logo and the text "DataPoint Beta". A navigation menu includes links for "Defence", "Multi-media", "Climate services", "DataPoint", and "A-Z". A search bar is present with the text "Search Met Office". The main content area has a green background with binary code and two small images: a satellite view of the Earth and a close-up of a light fixture. A "Read more >" link is visible below the images. At the bottom right, there is a registration prompt: "Register for Met Office DataPoint" with the subtext "Sign up to get access to".

UK hourly site-specific observations

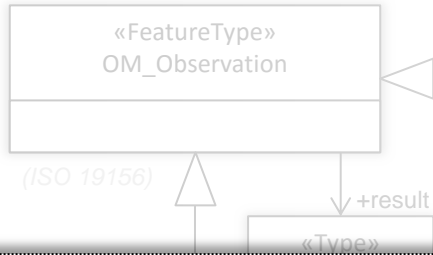
- Hourly observations for approximately 140 locations across the UK
- Parameters:
 - Air temperature
 - MSLP
 - Wind speed
 - Wind speed (gust)
 - Wind direction
 - Visibility
 - Weather type

Which type of OM_Observation?

Does the data collected (e.g. the 'result') from the Observation event:

A. Vary in space and or time?

B. Describe multiple physical properties?



DataPoint observation results:

A. DO NOT vary in time or space – instantaneous observation at fixed location; and

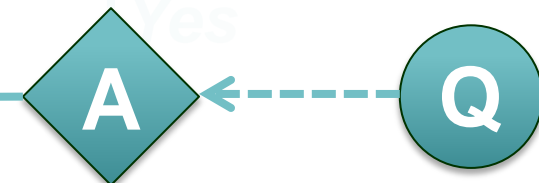
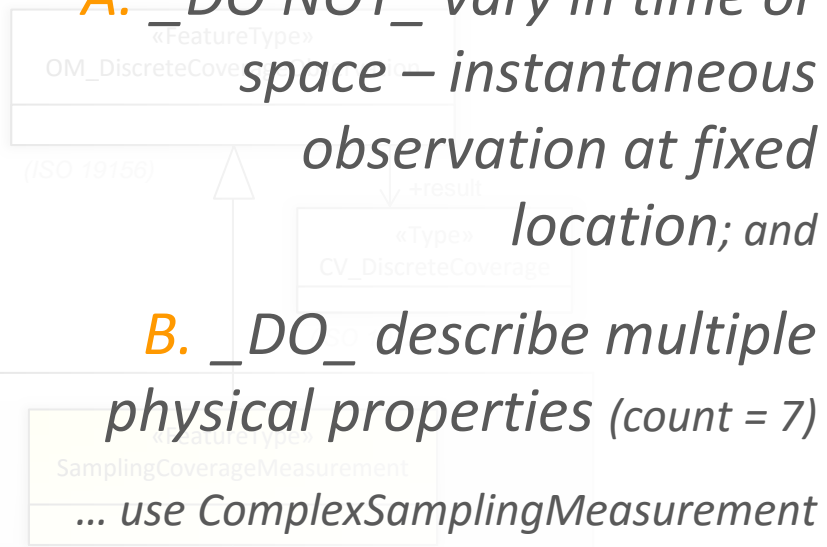
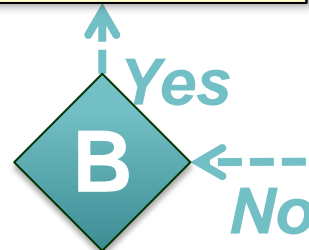
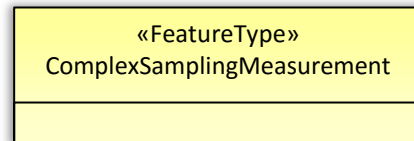
B. DO describe multiple physical properties (count = 7)

... use ComplexSamplingMeasurement



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Validatable data products: bespoke Records class

The Record class (from ISO 19103) provides a set of name-value pairs.

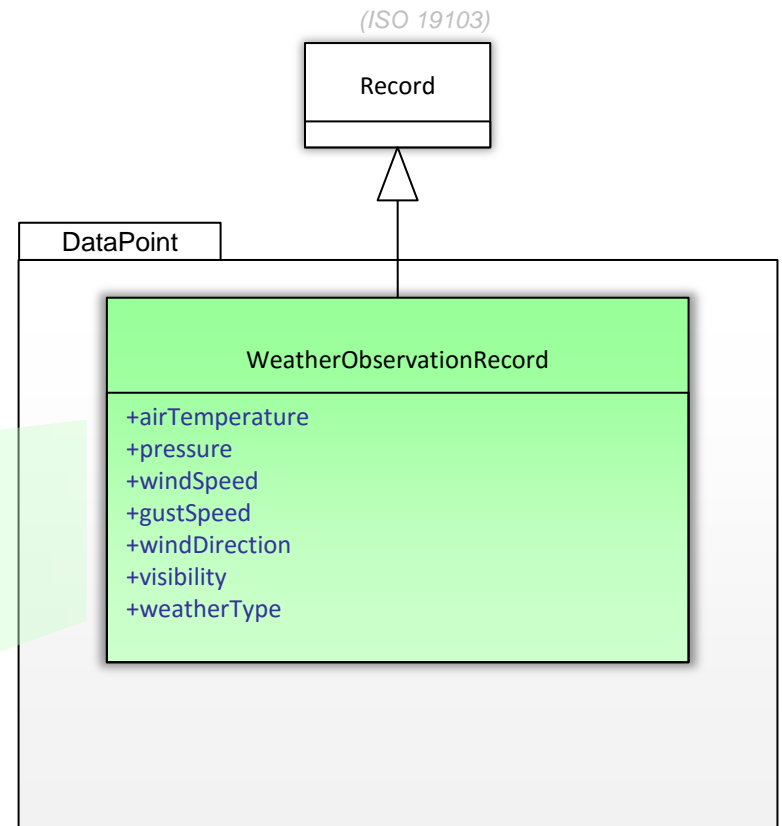
In GML, this can be implemented using SWE DataRecord ...

However, in this example, we require validatable data products. Therefore, we need to generate an XML Type for the Record – which is derived from our Application Schema:



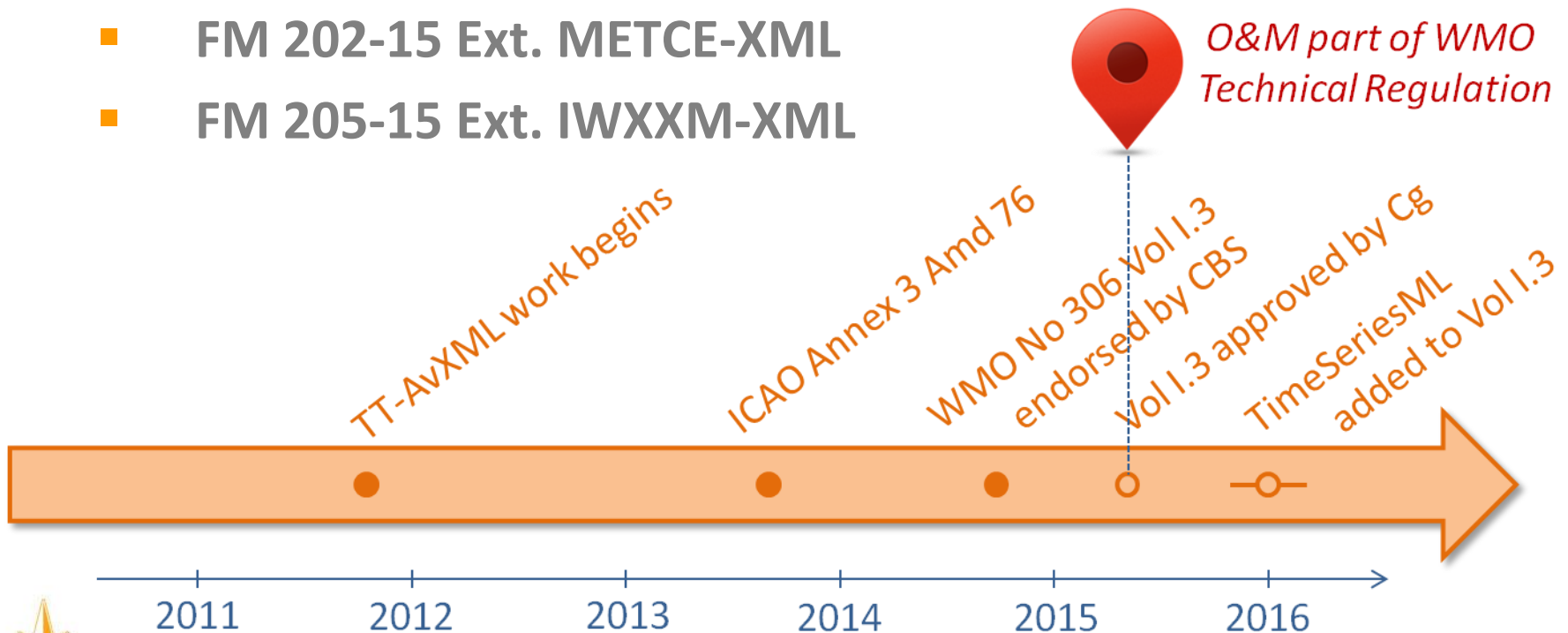
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WMO and O&M convergence

- WMO tasked by ICAO to deliver GML application schema for aeronautical meteorology data exchange
- WMO (TT-AvXML) adopt model-driven approach based on O&M; new code forms include
 - FM 202-15 Ext. METCE-XML
 - FM 205-15 Ext. IWXXM-XML





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Thank you

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