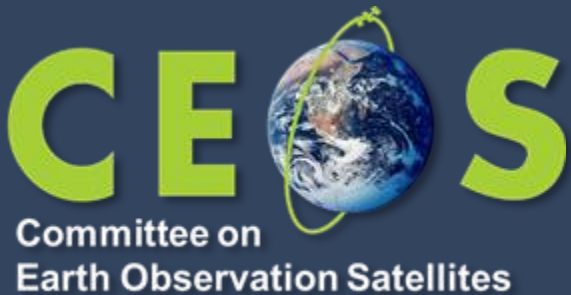


CEOS-ARD

Framework update



Peter Strobl, EC-JRC

Agenda Item

LSI-VC-18

Ispra, Italy

2-5 September, 2025

Why a framework?



- ❖ Provide structure
- ❖ Support consistency
- ❖ Increase efficiency
- ❖ Facilitate orientation
- ❖ Enable modularity

 requires abstraction!

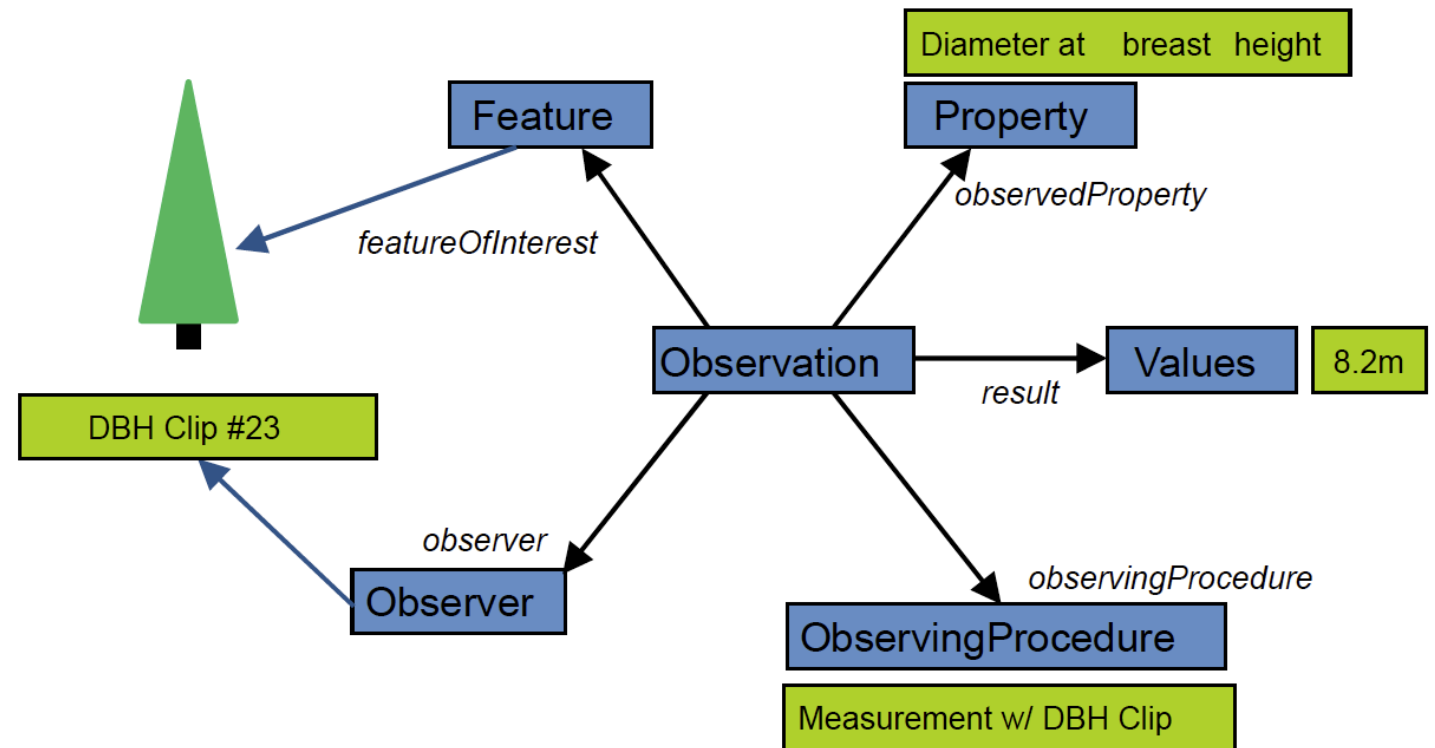
OGC/ISO Abstract Specification: *Observations, Measurements, and Samples*

OGC 20-082r4 and ISO/DIS 19156:2022(E)

OGC 20-082r4 and ISO/DIS 19156:2022(E)

Essential functional entities:

- Observer
- Feature
- Property
- Procedure
- Values



(Earth) Observation basics



- Similar but not identical concepts
e.g. feature(of interest) vs. phenomenon
- varying terminology

ISO – EO counterparts:

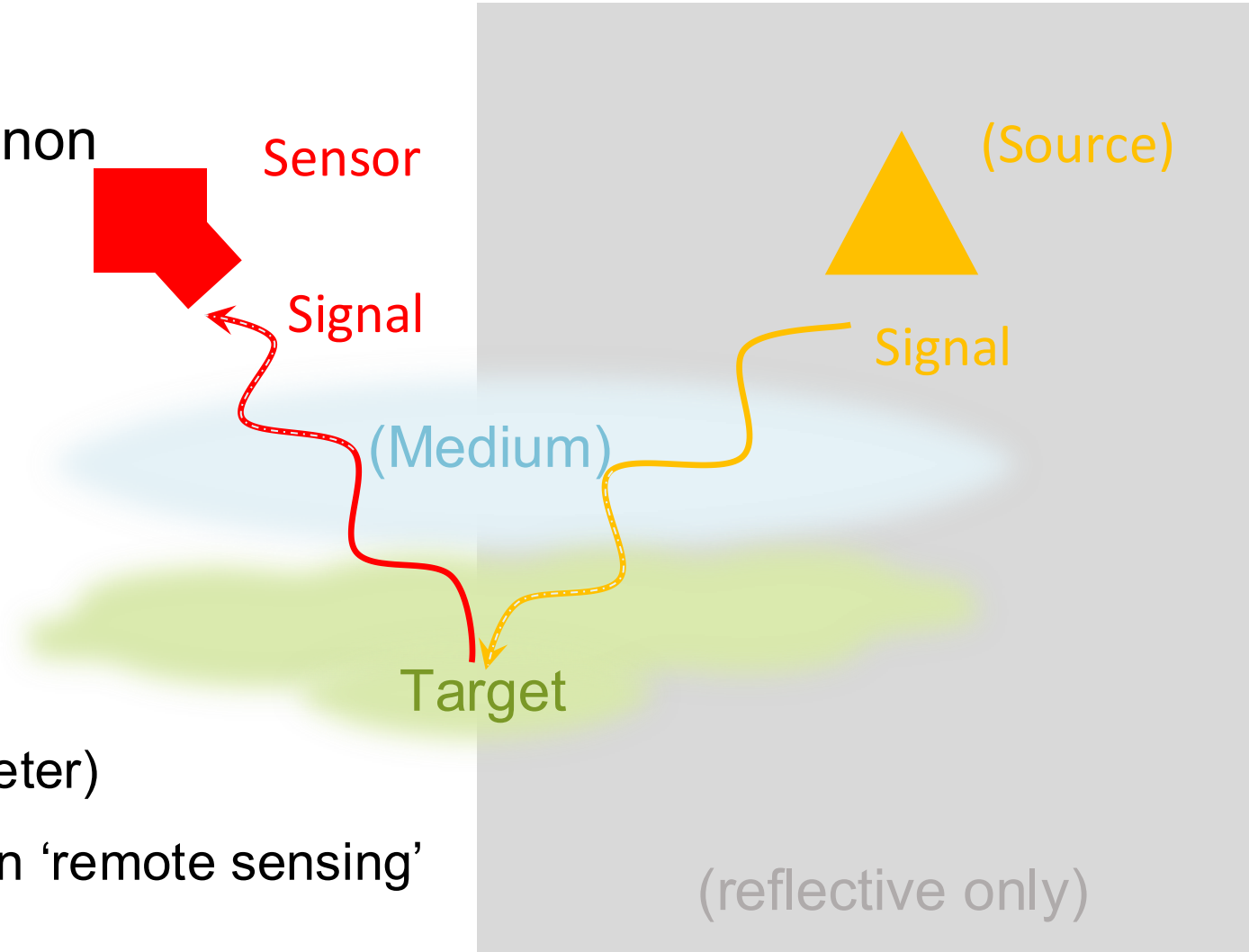
Observer: Sensor

Feature: Target (phenomenon)

Property: Property (variable/parameter)

Procedure: 'Sensing (via signal)' often 'remote sensing'

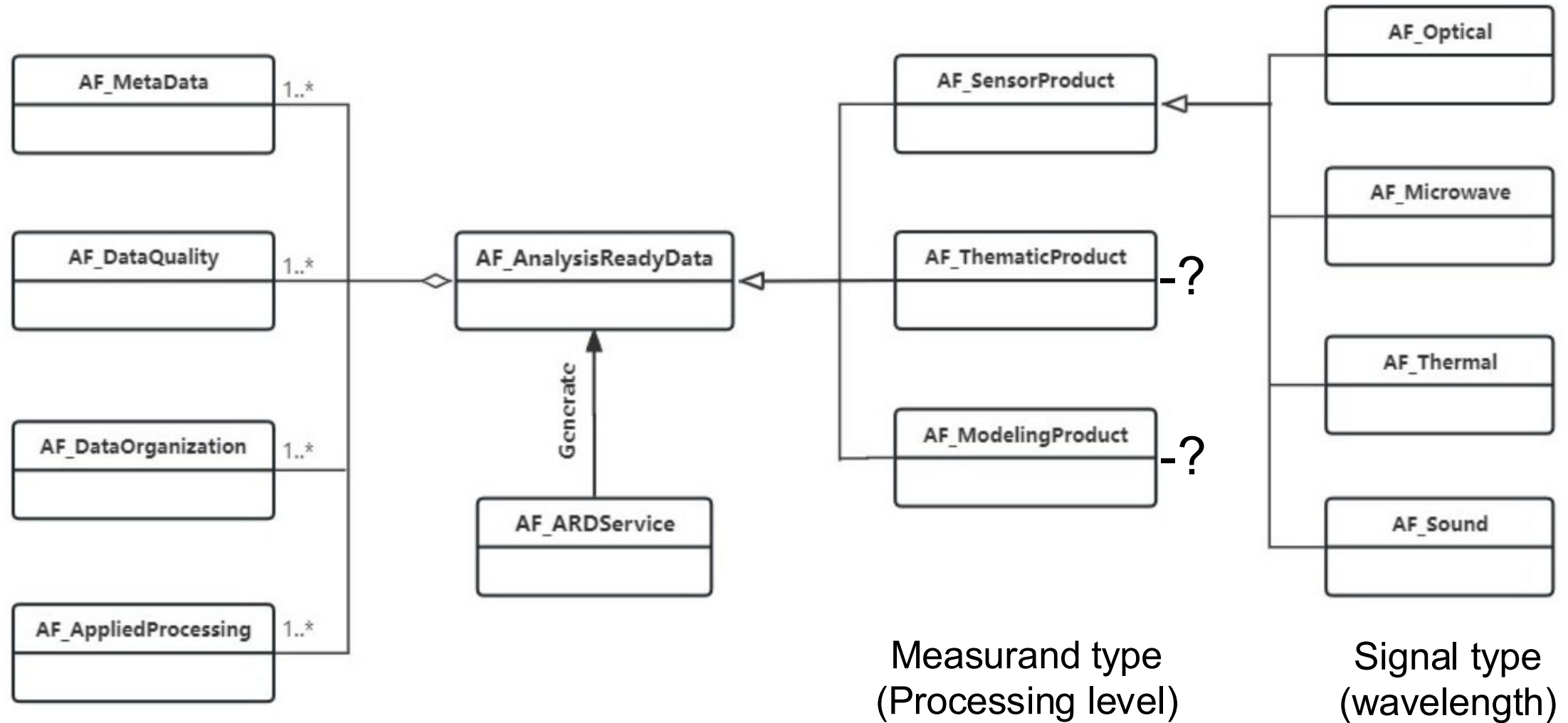
Result: Data



❖ How to structure ARD overall?

- by sensor type (active, passive)
 - by spatial sampling method (sounder, profiler, imager)
 - by signal type (electromagnetic, mechanic(acoustic))
 - by signal source (reflective, emissive)
 - by (electromagnetic) signal wavelength domain (x-ray, optical, microwave, ...)
 - by spectral sampling method (panchromatic, mono-, multi-, hyperspectral, spectrometer)
 - by measurand processing level? (L1, L2, L3, ...)
 - by measurand type (geophysical variable)
 - by target type (atmosphere, hydrosphere, biosphere, ...)
 - by application domain (meteorology, agriculture, urban development, ...)
- ... some or all of these, others?

ISO Proposed top-level UML



- ❖ What kind of structure do we need for (CEOS-)ARD?
- ❖ Should we adopt a flat or hierarchical structure?
- ❖ If hierarchical, how many levels, which first, which order?
e.g. Processing Level -> signal type -> sensor type -> measurand?
- ❖ Different order for different sub-hierarchies?
e.g. Processing Level -> target type -> application domain -> measurand?
for Level 3+
- ❖ Proper structure facilitates standardisation

CEOS-ARD PFS typology (subset)



PFS name	Measurand type	Signal domain	Target interaction	Sensor type	Signal source
Surface Reflectance	Target property	Optical UV-SWIR	reflective	passive	(extern) sun
Aquatic Reflectance	Target property	Optical UV-NIR	reflective	passive	(extern) sun
Surface Temperature	Derived target property	Optical TIR	emissive	passive	target
Nighttime Lights Surface Radiance	Signal property	Optical VIS	mixed	passive	target
LiDAR Terrain and Canopy Top Height	Derived target property	Optical VIS-NIR	reflective	active	sensor
SAR	mixed	MW	reflective	active	sensor

- ❖ Proper structure will facilitate utility of fine-grained building blocks through logical grouping (meta-blocks)
- ❖ How to group metadata?
 - per data sample/observation/pixel
 - per data (sub-)set/file/scene
 - per data collection/mission

All these touch (at least) on 'Architecture' and 'Semantics'!
Groundbreaking work is needed here!

Thank you!

