WIGOS Metadata Representation & XML Schema

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Reference documents

- WIGOS Metadata Standard
  - https://library.wmo.int/opac/doc_num.php?explnum_id=3653
- WIGOS Metadata Schema
  - http://schemas.wmo.int/wmdr/1.0RC6
- WIGOS Guide
  - http://www.wmo.int/pages/prog/www/wigos/WGM.html
- OSCAR/Surface
  - http://oscar.wmo.int/surface

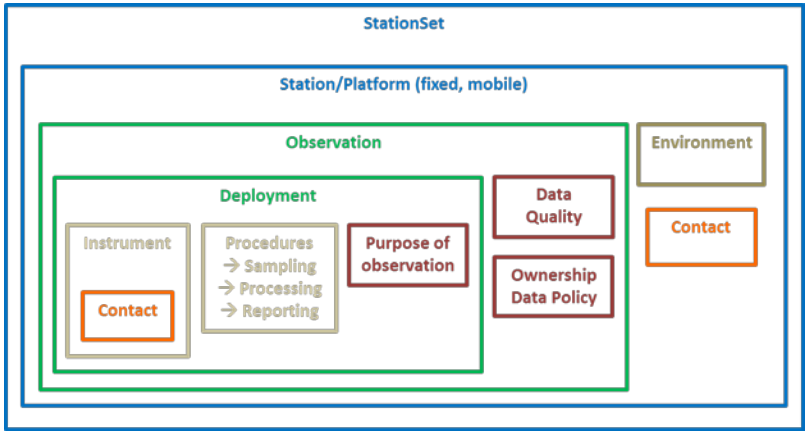
Outline

- Introduction
- Formalizing WIGOS metadata
- Understanding the WIGOS metadata model
- XML schema definition (XSD) & Schematron
- Example

INTRODUCTION

WIGOS Metadata Standard

1. Observed variable
2. Purpose of observation
3. Station/ platform
4. Environment
5. Instruments & methods of observation
6. Sampling
7. Data processing and reporting
8. Data Quality
9. Ownership and Data Policy
10. Contact



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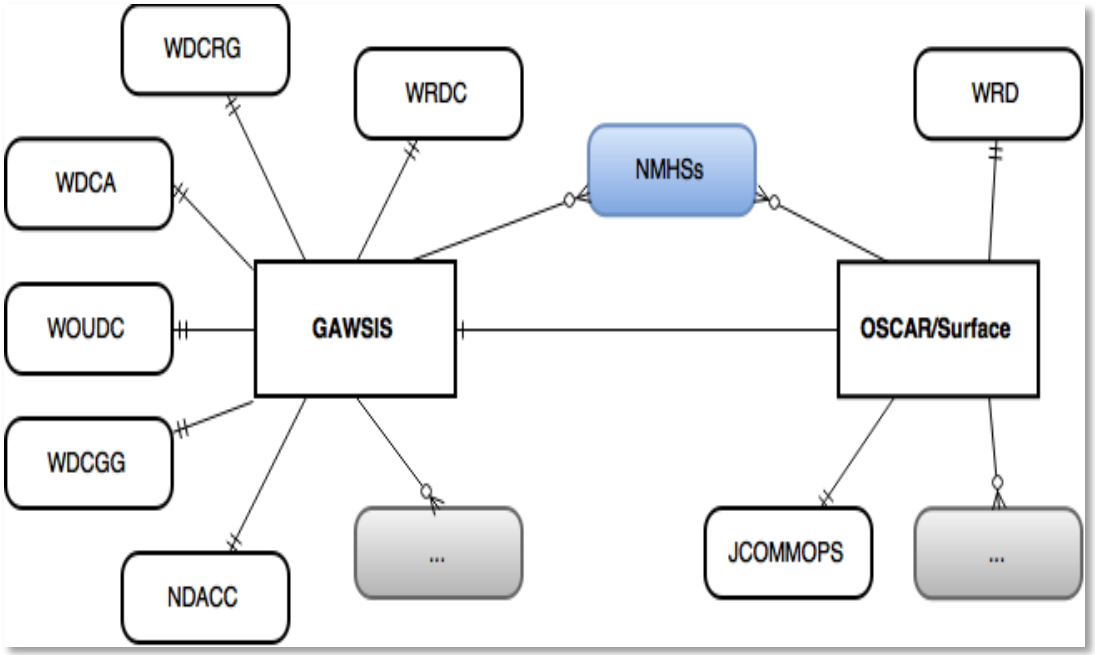
WMDS is a descriptive standard

- WMDS describes concepts and principles
- 10 categories
- Mix of general and specific metadata items
- Ambiguous without further specification
- Need formal specification of metadata items
- Need cardinalities
- Need «best practice» guidance material

OSCAR/Surface metadata sources

- NMHSs are primary source of information
- Integrate existing metadata automatically to reduce burden



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FORMALIZING WIGOS METADATA

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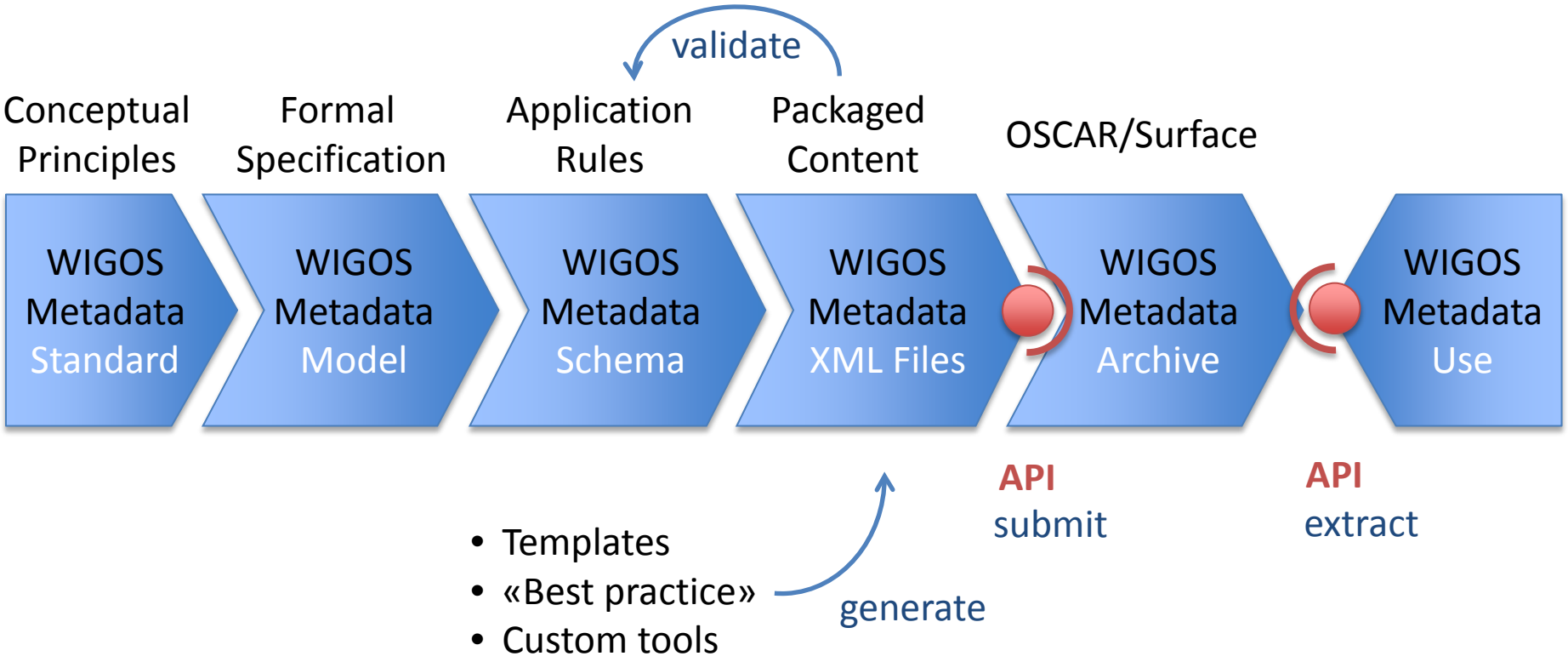
Formalizing WIGOS Metdata
From Standard to Use



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What is a formal specification?

- List allowed elements
- Specify cardinalities
  - 0..1 (optional, at most one)
  - 0..* (optional, many allowed)
  - 1 (mandatory, exactly one)
  - 1..* (mandatory, at least one)
- Specify hierarchy between elements
  - «A» depends on «B»
- More documentation

UNDERSTANDING THE WIGOS METADATA MODEL

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Formal WIGOS Metadata Model

WMD Record

«WIS»-type metadata

Observation

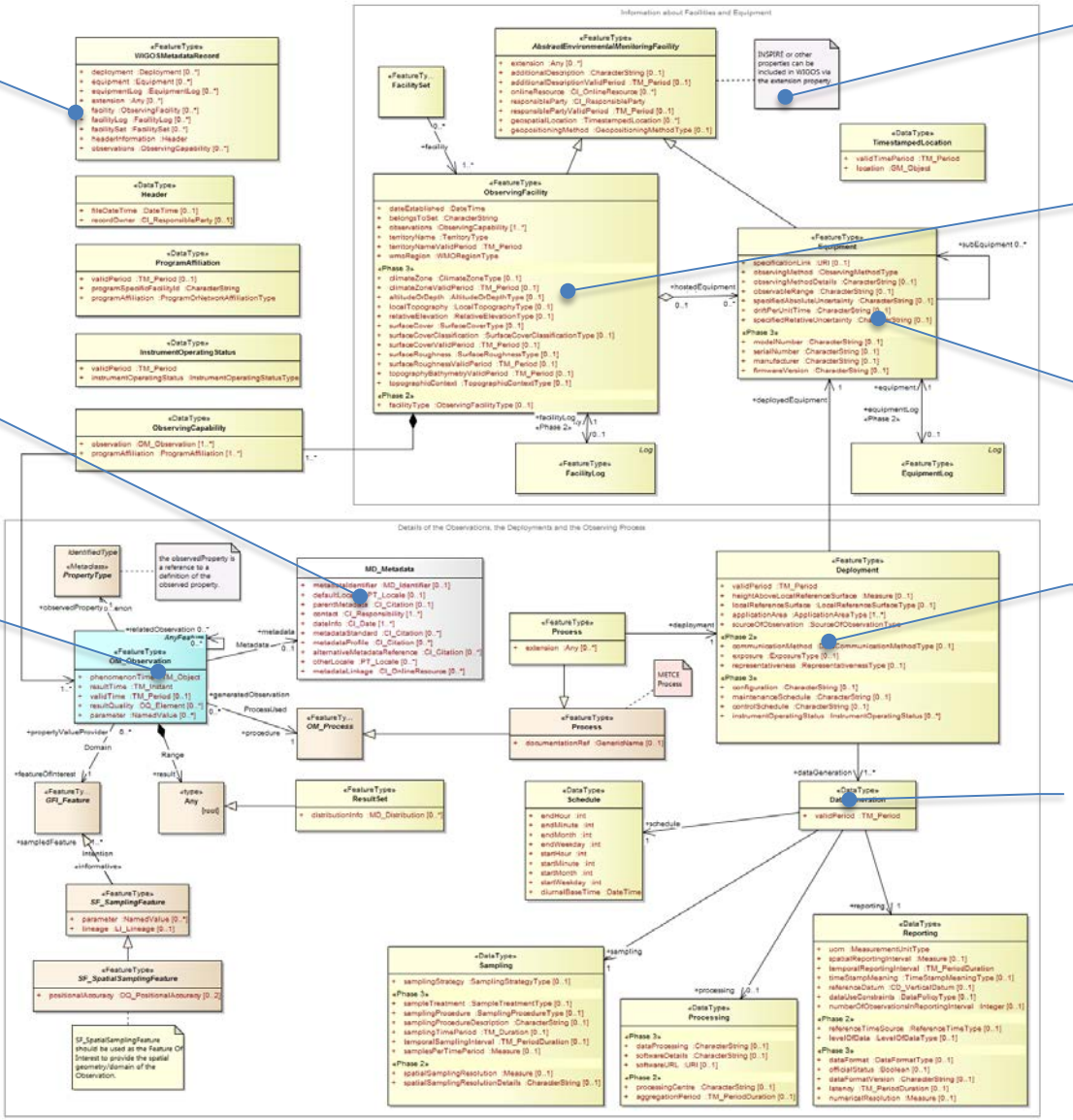
Extensions

Observing facility

Equipment

Deployment

DataGeneration
- Schedule
- Sampling
- Processing
- Reporting



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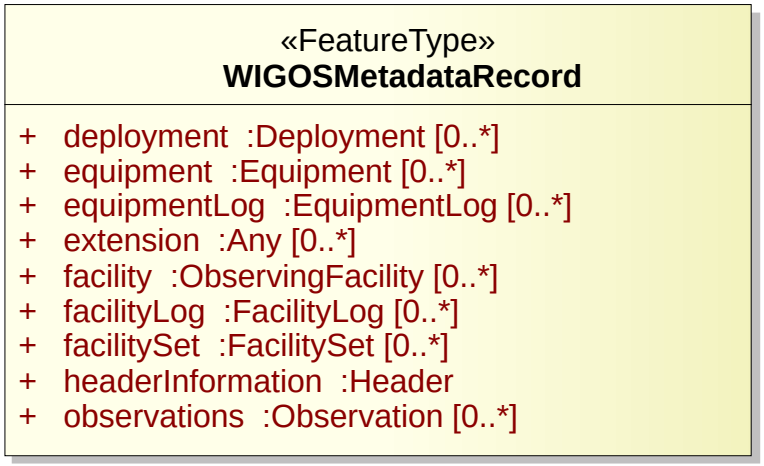
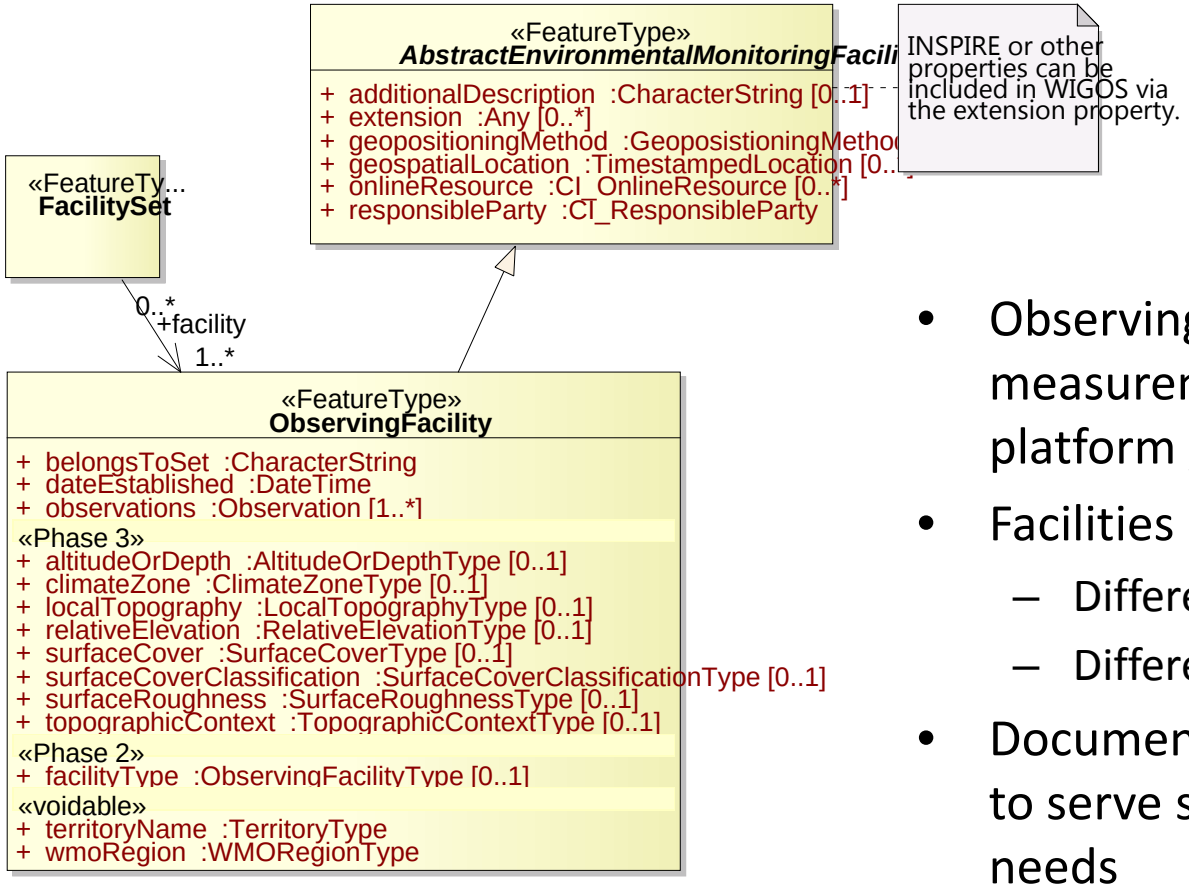
«FeatureType» WIGOSMetadataRecord



- A container for various sections
- All sections are optional
- Enables documentation of partial WMD records, e.g.
  - a list of observing facilities only
  - a subset of observations at a facility

«FeatureType» ObservingFacility



- ObservingFacility describes a measurement station / site / platform /observatory / …
- Facilities can be grouped into sets
  - Different WIGOS IDs
  - Different sites
- Documentation can be extended to serve specific community needs
  - Interpreters will likely ignore extensions

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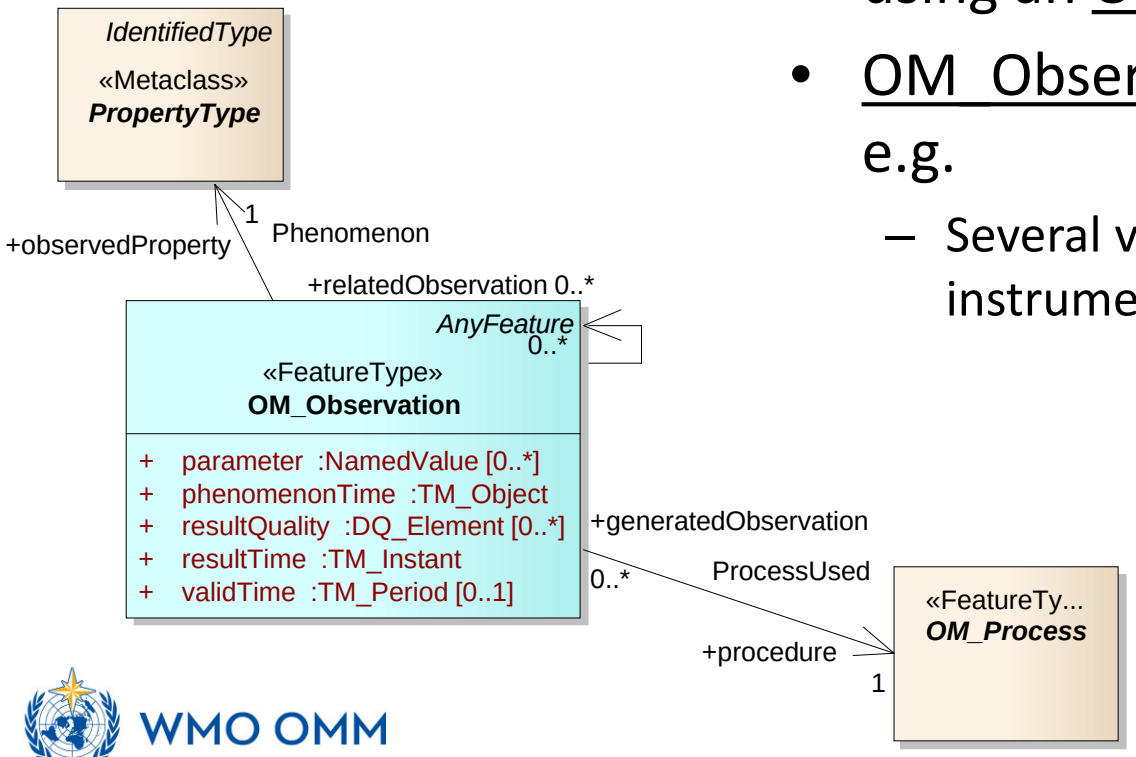
«FeatureType» OM_Observation

- OM_Observation used to describe (a time series of) observations of an observedProperty obtained using an OM_Process
- OM_Observations can be related, e.g.
  - Several variables observed by same instrument



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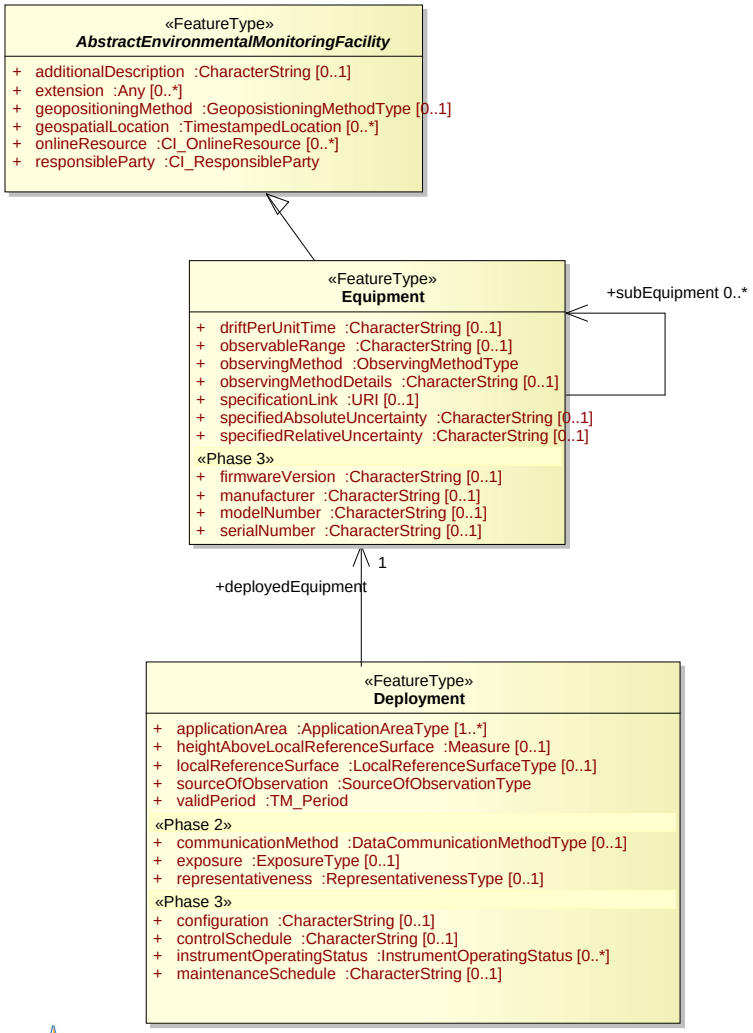
«FeatureType» Equipment, Deployment



- Deployments describe
  - when, where, why (applicationArea), what Equipment has been used
  - configurations, maintenance and calibration routines
  - instrument operating status as a fxn of time
- Deployments can be parallel or consecutive
- Deployments also describe the DataGeneration processes

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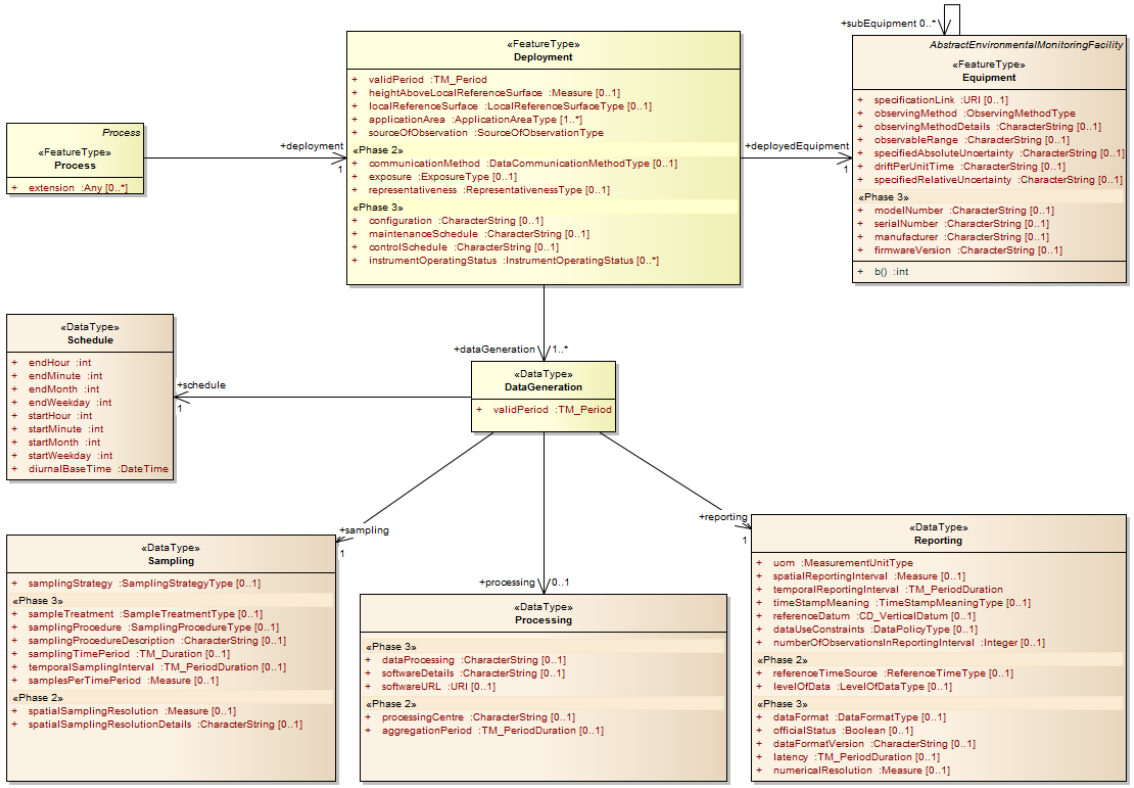
«DataType» DataGeneration



- DataGeneration involves
  - Sampling
  - Processing
  - Reporting

  according to a
  - Schedule
- Multiple schedules can be defined, e.g.
  - Working days vs weekend
  - Winter vs summer

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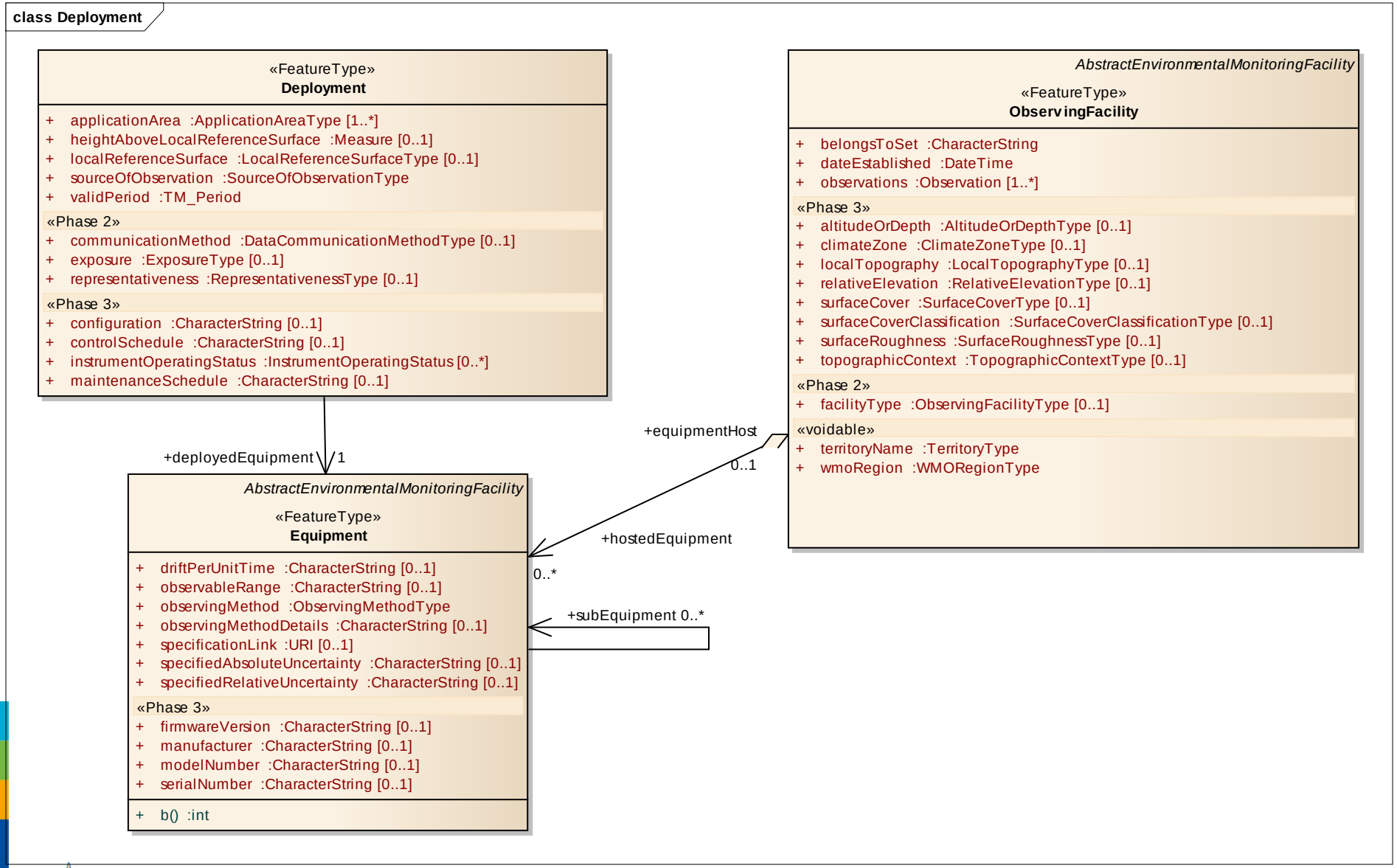
class Deployment
«FeatureType»
Deployment
+ applicationArea :ApplicationAreaType [1..*]
+ heightAboveLocalReferenceSurface :Measure [0..1]
+ localReferenceSurface :LocalReferenceSurfaceType [0..1]
+ sourceOfObservation :SourceOfObservationType
+ validPeriod :TM_Period
«Phase 2»
+ communicationMethod :DataCommunicationMethodType [0..1]
+ exposure :ExposureType [0..1]
+ representativeness :RepresentativenessType [0..1]
«Phase 3»
+ configuration :CharacterString [0..1]
+ controlSchedule :CharacterString [0..1]
+ instrumentOperatingStatus :InstrumentOperatingStatus [0..*]
+ maintenanceSchedule :CharacterString [0..1]
AbstractEnvironmentalMonitoringFacility
«FeatureType»
ObservingFacility
+ belongsToSet :CharacterString
+ dateEstablished :DateTime
+ observations :Observation [1..*]
«Phase 3»
+ altitudeOrDepth :AltitudeOrDepthType [0..1]
+ climateZone :ClimateZoneType [0..1]
+ localTopography :LocalTopographyType [0..1]
+ relativeElevation :RelativeElevationType [0..1]
+ surfaceCover :SurfaceCoverType [0..1]
+ surfaceCoverClassification :SurfaceCoverClassificationType [0..1]
+ surfaceRoughness :SurfaceRoughnessType [0..1]
+ topographicContext :TopographicContextType [0..1]
«Phase 2»
+ facilityType :ObservingFacilityType [0..1]
«voidable»
+ territoryName :TerritoryType
+ wmoRegion :WMORegionType
+deployedEquipment
1
+equipmentHost
0..1
+hostedEquipment
0..*
+subEquipment 0..*
AbstractEnvironmentalMonitoringFacility
«FeatureType»
Equipment
+ driftPerUnitTime :CharacterString [0..1]
+ observableRange :CharacterString [0..1]
+ observingMethod :ObservingMethodType
+ observingMethodDetails :CharacterString [0..1]
+ specificationLink :URI [0..1]
+ specifiedAbsoluteUncertainty :CharacterString [0..1]
+ specifiedRelativeUncertainty :CharacterString [0..1]
«Phase 3»
+ firmwareVersion :CharacterString [0..1]
+ manufacturer :CharacterString [0..1]
+ modelNumber :CharacterString [0..1]
+ serialNumber :CharacterString [0..1]
+ b() :int

XML SCHEMA DEFINITION (XSD) & SCHEMATRON

What is what?

- XSD
  - Formal validation rules
- Schematron
  - Additional formal constraints that cannot be expressed in XSD
- On-line validators exist for XSD
  - https://www.freeformatter.com/xml-validator-xsd.html
  - http://www.xmlvalidation.com/
- Stand-alone tools
  - XMLSpy

WMDR

- 1.0RC6
  - http://schemas.wmo.int/wmdr/1.0RC6/
  - Caution: Schematron not updated

- http://test.wmocodes.info/wmdr

EXAMPLES

Example 1

- Example Jungfraujoch
  - http://schemas.wmo.int/wmdr/1.0RC6/examples/

Known issues

- Some code tables missing from http://testcodes.wmo.info/wmdr
- Some codes differ between this registry and OSCAR/Surface
- Some code tables still require codes and scrutiny (most importantly: variables, methods)
- GAWSIS-OSCAR API endpoint just being released as an alpha.

How can you help?

- Think about what information you would like to send to OSCAR/Surface or GAWSIS
  - Full records of a single station?
  - Incremental changes of your entire network?
  - …?
- Prepare «real-world» XML example files
- Validate, share and discuss with the OSCAR/Surface team what works for you and what doesn't

Thank you
Merci
شكرا

You & your organization!

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