IVOA building blocks for a Time series Data Model

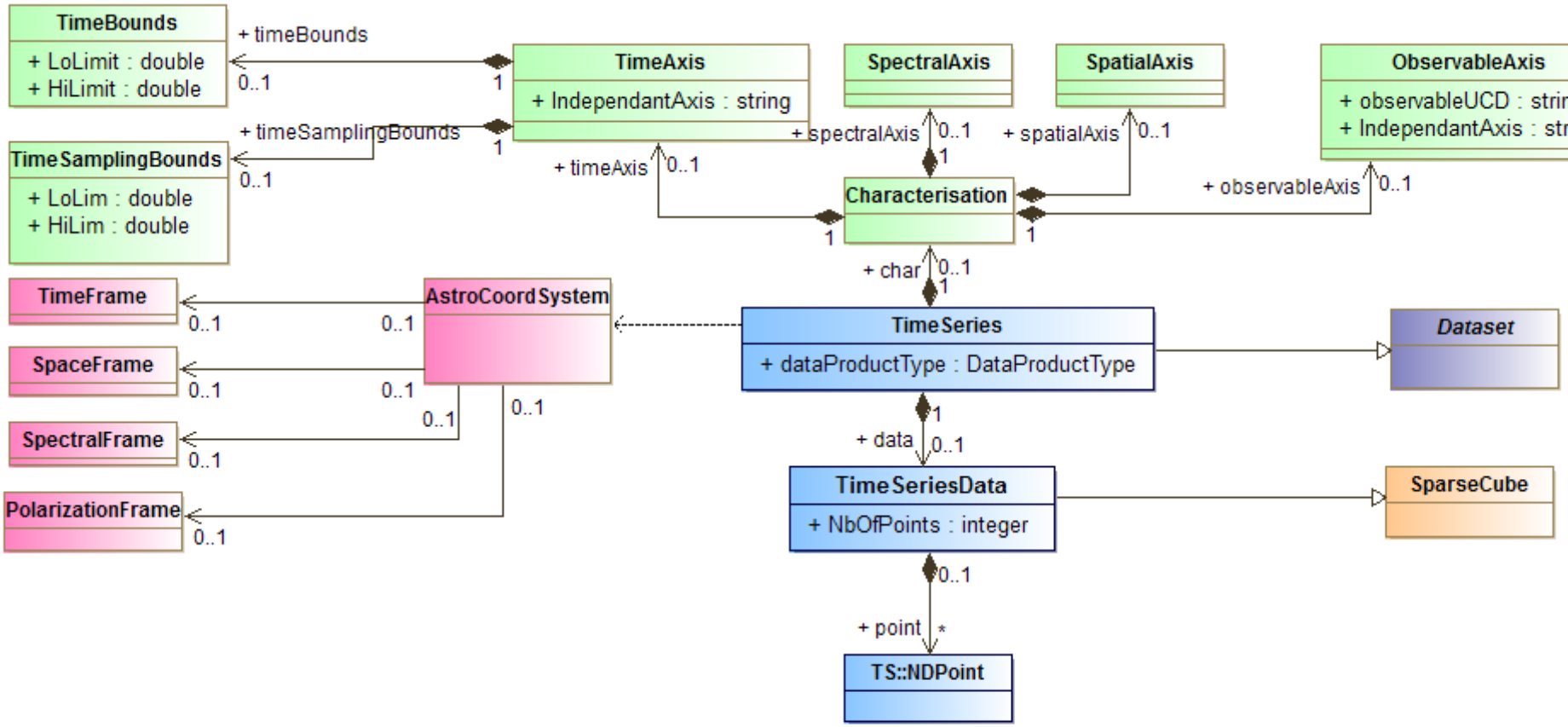
M.Louys, F. Bonnarel ,
L. Michel, A. Nebot

GOAL

- Here is a sketch for representing metadata involved in the discovery and analysis of time domain information.
- Time series is considered in a large sense as a collection of data samples, taken along a sequence of time stamps.
- F=f(t), with F being
  - a simple value for a measure,
  - a structured value for a measure , and its error, precision , etc.
  - Multiple values (e.g. multi wavelength)
  - A dataset itself , e.g. the data product resulting of a full observation.

Reuse of Cube DM & STC

- Time series is a *SparseCube* cf TimeDomain Model Note (J. Nadvornik)
  - Is a PointDataProduct
  - For TS, the principal *DataAxis* is the TimeAxis
  - Observations depends on time samples
  - Can be represented as simple items : CoordMeasure as in CubeDM
  - Can also be a more compact DataProduct by itself
  - Series of images / spectra varying with time



Legend

is associated to

derives from

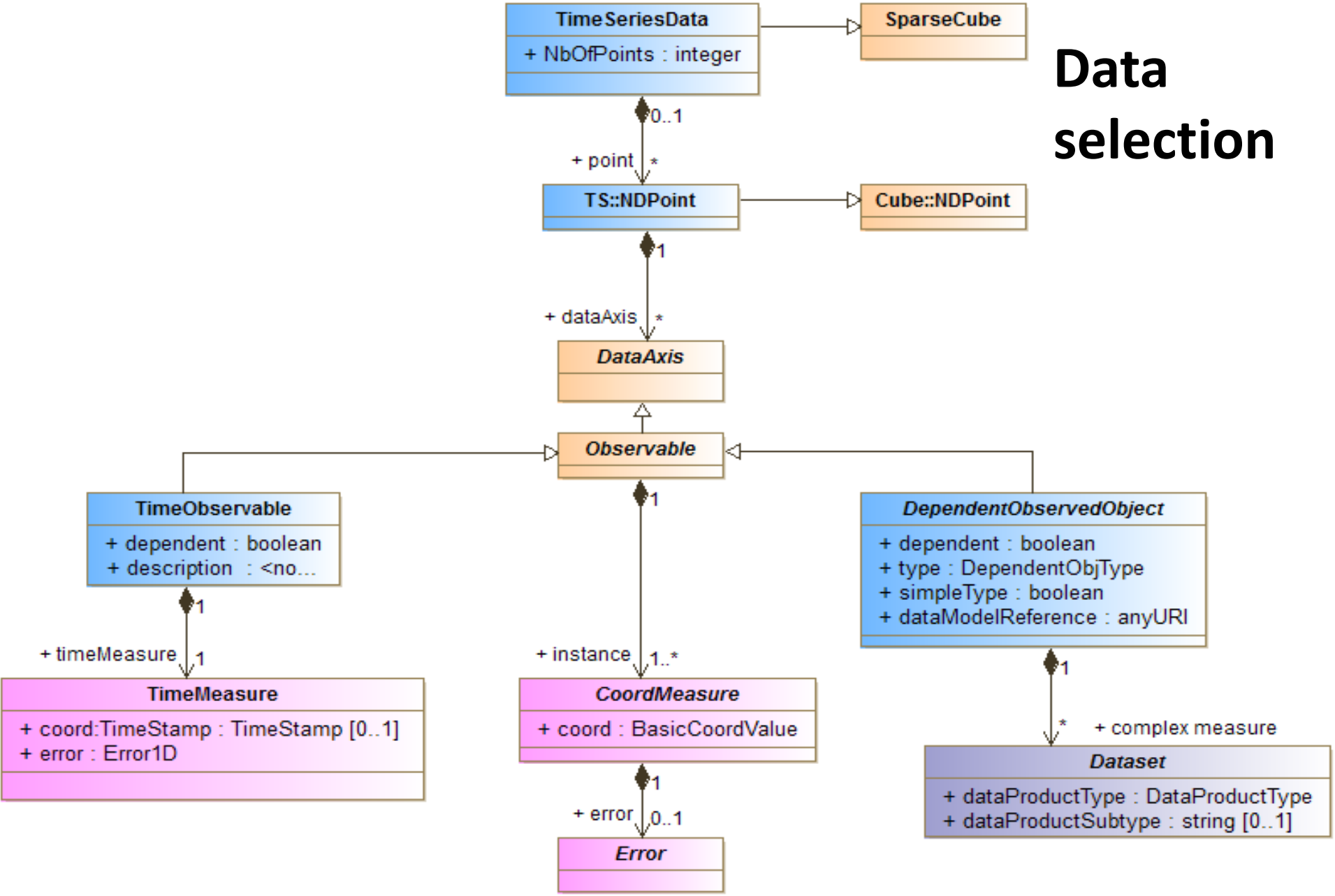
is composed Of

Color code for classes

- TimeSeries_DM
- Characterisation_DM Class
- Cube_DM Class
- STC_DM Class

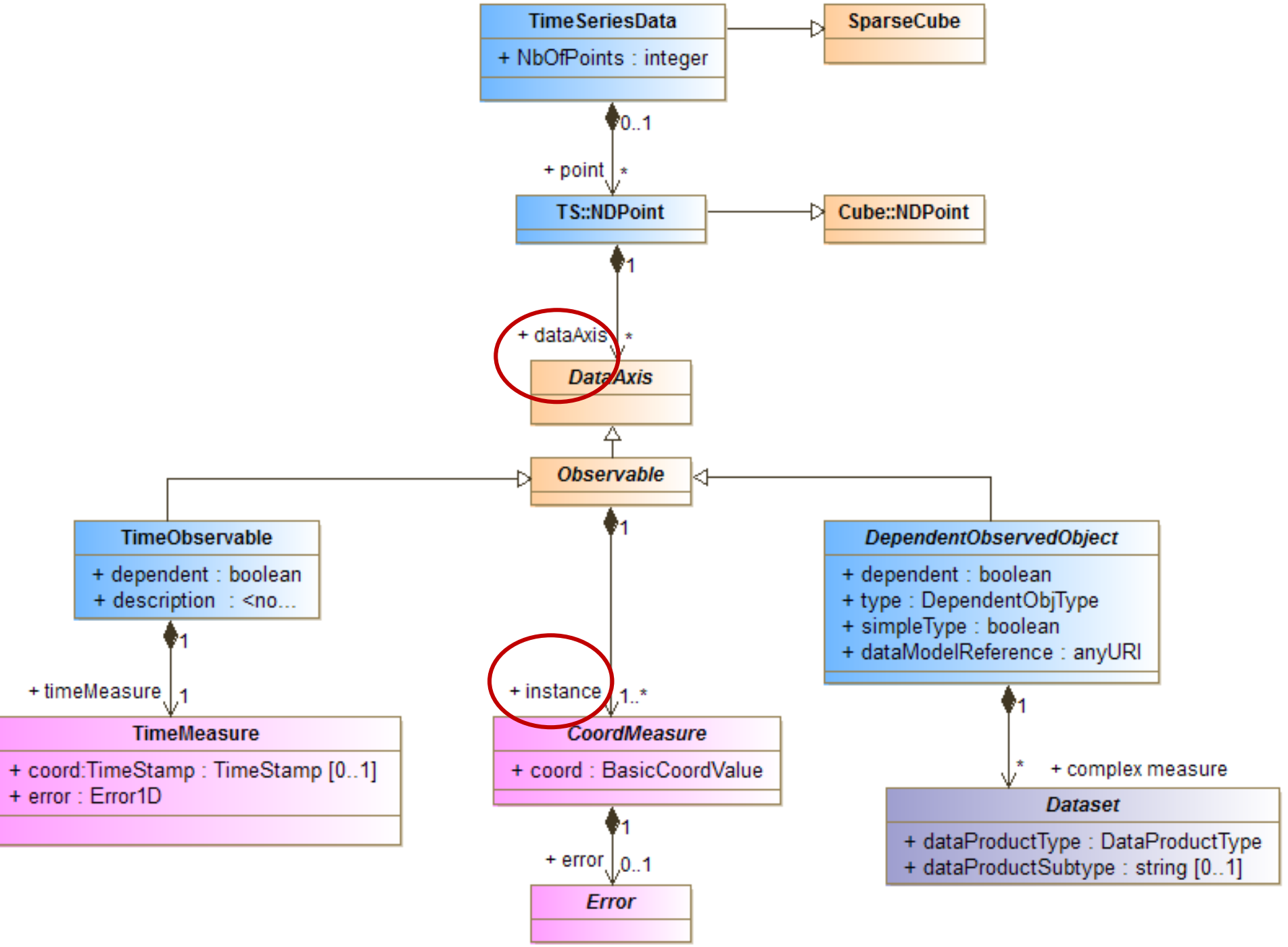
Discovery
→ Characterisation DM

Data selection



How to handle multiplicity

- Simple light curve 1 Time Axis , 1 Flux axis
- Multiwavelength light curve
  - Multiple DataAxis as Flux axis =f(λ)
- Heterogeneous TS
  - Lightcurve with associated images (or spectrum?)
- TS of datasets
  - Cube TS , e.g. MUSE series of hyperspectral cubes


TimeSeriesData
+ NbOfPoints : integer
SparseCube
0..1
+ point
*
TS::NDPoint
Cube::NDPoint
1
+ dataAxis
*
DataAxis
Observable
1
TimeObservable
+ dependent : boolean
+ description : <no...
DependentObservedObject
+ dependent : boolean
+ type : DependentObjType
+ simpleType : boolean
+ dataModelReference : anyURI
1
+ timeMeasure
1
+ instance
1..*
TimeMeasure
+ coord:TimeStamp : TimeStamp [0..1]
+ error : Error1D
CoordMeasure
+ coord : BasicCoordValue
1
*
+ complex measure
Dataset
+ dataProductType : DataProductType
+ dataProductSubtype : string [0..1]
1
+ error
0..1
Error

Modeling Status

- Coded in the Modelio UML modeler
- Import of Cube DM and STC DM
- To do
  - Explore more science cases
  - Re-use CharDM and EPN-Core DM for completing the TimeAxis description
  - Resolve multiplicity representation
  - Generation of the VO-DML xml description for this model
  - Generation of the html documentation via VO-DML tools