



NDCube

Time domain application

Mark Cresitello-Dittmar, SAO



The USVOA is recognized by the American Astronomical Society (AAS) as a Special Interest Group (SIG) of the Working Group on Astronomical Software (WGAS).

Models

DatasetMetadata:

- provides high level dataset description
- primarily to support access and discovery

Cube:

- describe multi-d image and cube dataset instances
- simple image → sparse data cube

Coordinates:

- coordinates, frames, systems

Measurements:

- Measured values + errors

Example Serializations

+ example datasets

- 2D image (2 spatial axes)
- 4D VLA image (2 spatial, 1 spectral, 1 polarization)
- X-ray event list

+ 15 example files:

<https://volute.g-vo.org/svn/trunk/projects/dm/CubeDM-1.0/examples/>

- straight VOTable-1.3
- vo-dml annotated with flattened VOTable (1.4)

+ validated against schema

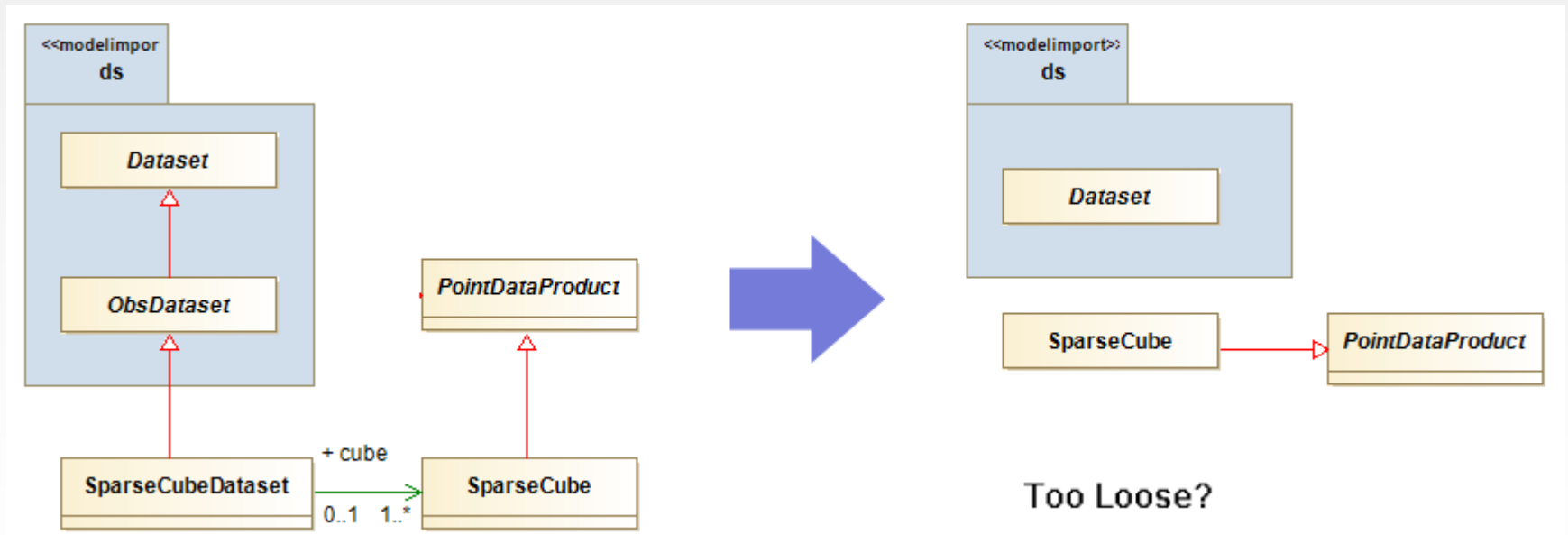
+ validation against model spec. is work in progress

Time Series in Cube

- + Note delivered to DM mail list (Feb 2017)
 - showed high level of correlation with cube model
 - sparked very productive discussion
 - providing usability input to models.
- + Concerns fit into 2 categories
 - modeling (concepts not properly related)
 - annotation (not meeting user expectations)
- + Often a concern can be addressed by either, so is important to determine which is 'correct' place.

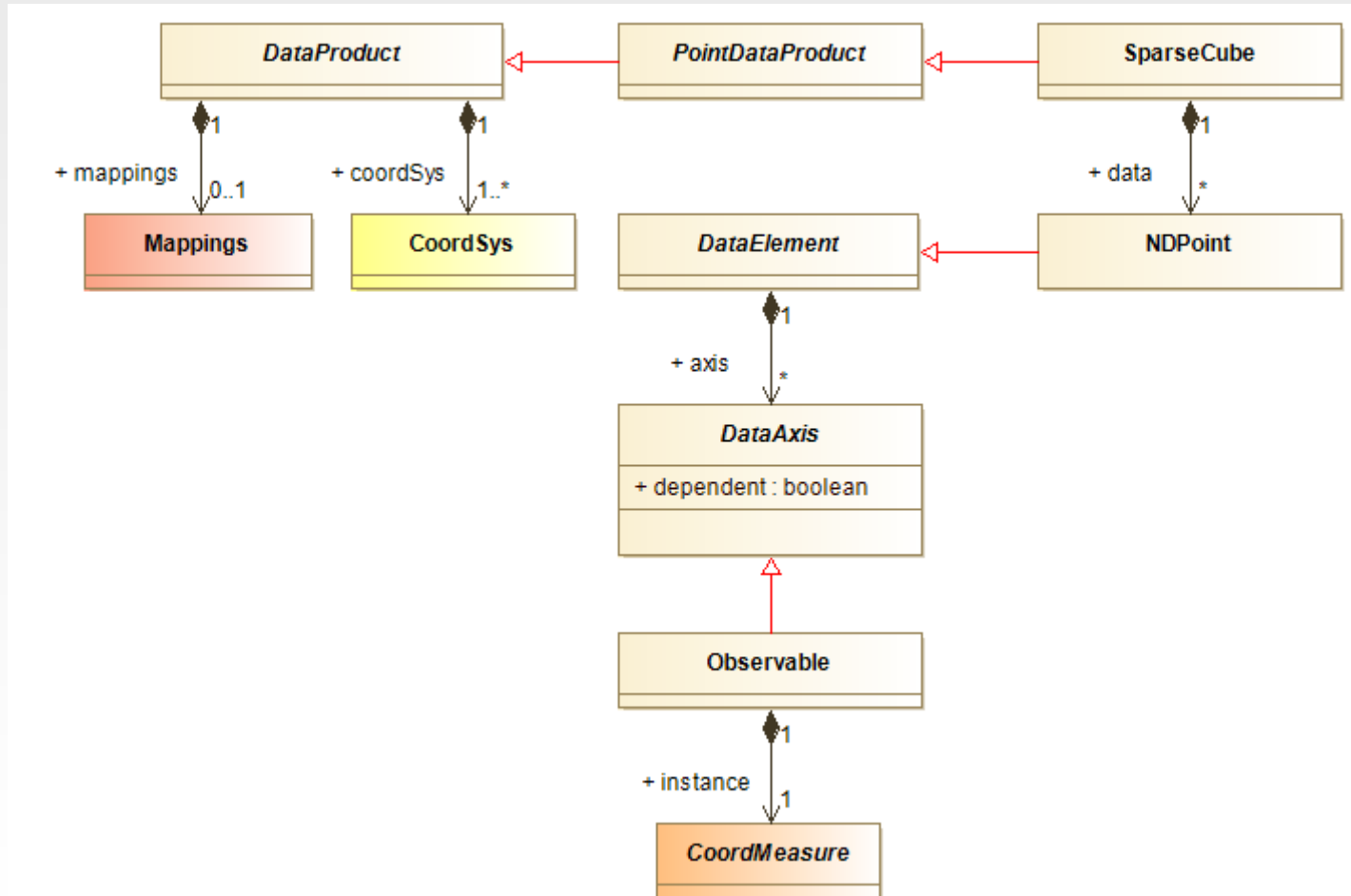
Model changes

- + added concept of 'dependent' to DataAxis
 - In current use cases, all are independent
- + strict relation of Dataset/Cube 'loosened'



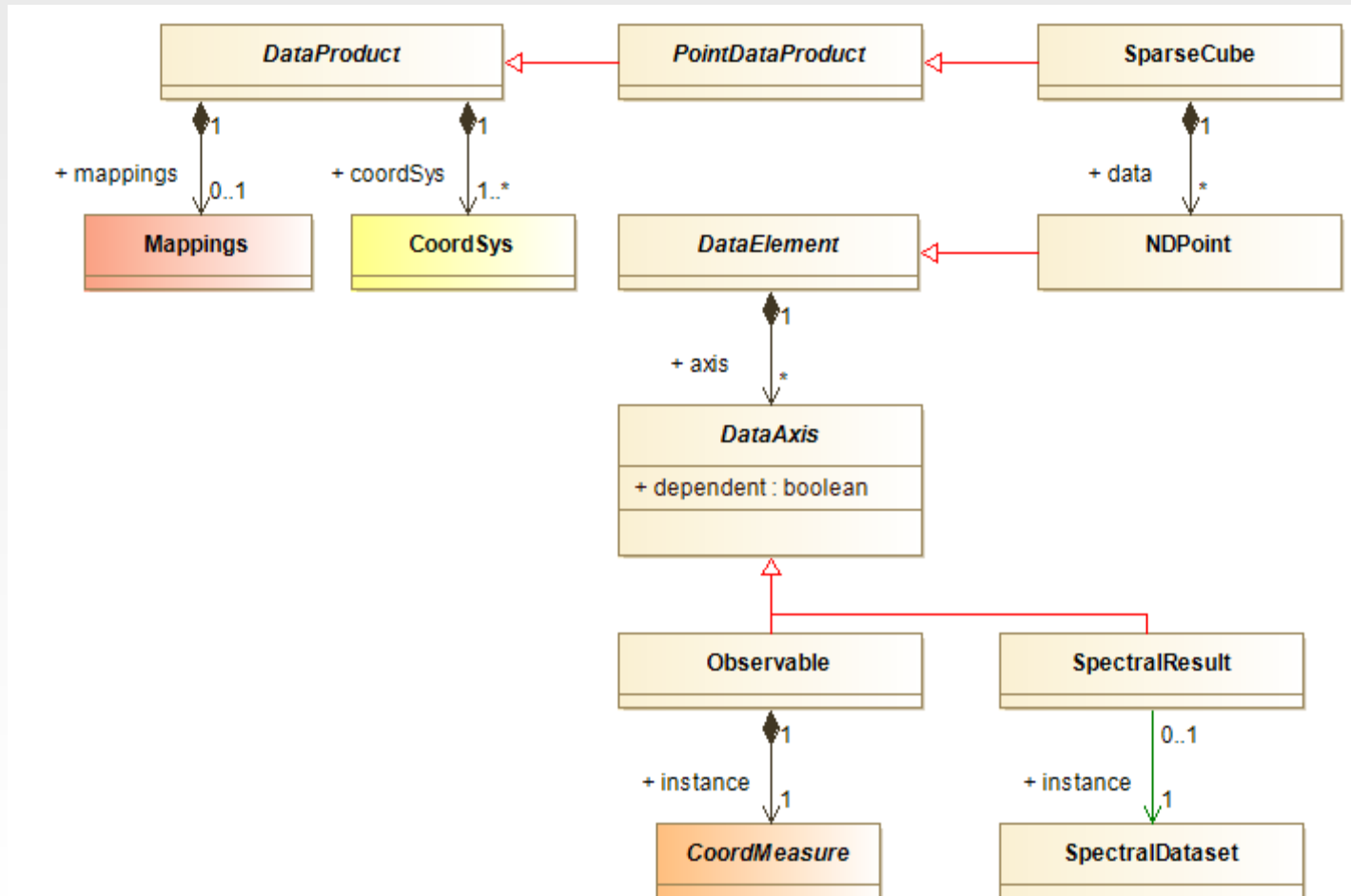
Model Changes (cont)

+ TimeSeries of 'spectra' => abstracting DataAxis tree



Model Changes (cont)

+ TimeSeries of 'spectra' => abstracting DataAxis tree



Model Changes (cont)

New requirement:

“naive clients should be able to find basic element with minimal specialized knowledge”

Effect:

Moved coords/meas from pattern model to realized base model

- Minimizes the number of vo-dml IDs

Annotation

```
<INSTANCE dmtype="cube:Observable">
  <ATTRIBUTE dmrole="cube:DataAxis.dependent">
    <LITERAL dmtype="ivoa:boolean" value="True"/>
  </ATTRIBUTE>
  <COMPOSITION dmrole="cube:Observable.instance">
    <INSTANCE dmtype="meas:GenericCoordMeasure">
      <ATTRIBUTE dmrole="meas:CoordMeasure.coord">
        <INSTANCE dmtype="coords:domain.generic.GenericCoordValue">
          <ATTRIBUTE dmrole="coords:PhysicalCoordValue.cval">
            <COLUMN ref="_col-MAG" dmtype="ivoa:RealQuantity"/>
          </ATTRIBUTE>
          <REFERENCE dmrole="coords:CoordValue.coordAxis">
            <IDREF>_0121WLLnSEBj0p46</IDREF>
          </REFERENCE>
        </INSTANCE>
      </ATTRIBUTE>
      <COMPOSITION dmrole="meas:CoordMeasure.error">
        <INSTANCE dmtype="meas:BasicError1D">
          <ATTRIBUTE dmrole="meas:BasicError1D.statError">
            <INSTANCE dmtype="meas:Symmetrical1D">
              <ATTRIBUTE dmrole="meas:Symmetrical1D.radius">
                <COLUMN ref="_col-MAGERR" dmtype="ivoa:RealQuantity"/>
              </ATTRIBUTE>
            </INSTANCE>
          </ATTRIBUTE>
        </INSTANCE>
      </COMPOSITION>
    </INSTANCE>
  </COMPOSITION>
</INSTANCE>
```

M
e
a
s
u
r
e
m
e
n
t

C
o
o
r
d

E
r
r
o
r

Ongoing Work

