↑ ← →

- Basic idea of QUANTITY included values, errors, units
- Many different versions presented
- Most included a simple subobject similar to Ray's initial suggestion
- Need for a more complex MEASUREMENT object which includes coord frame, resolution, exposure subobjects
- Issue: Should simple object be instance of complicated with other things set null, or should complicated object inherit from simple object?
- In July: presented attempt to synthesize discussion
- Some reluctance to compromise

↑ ← →
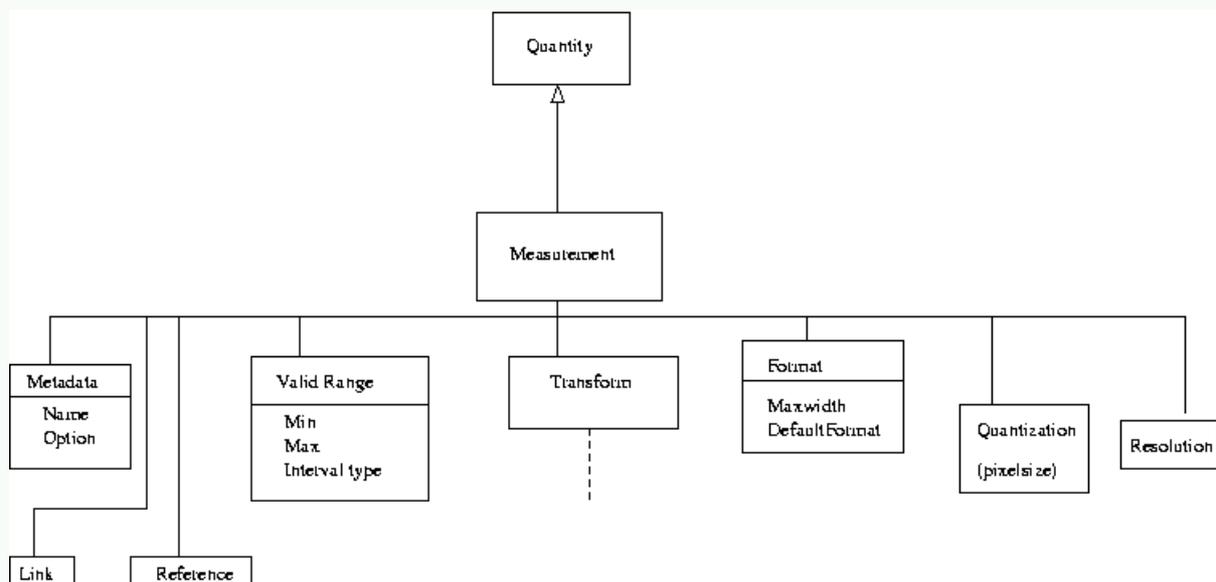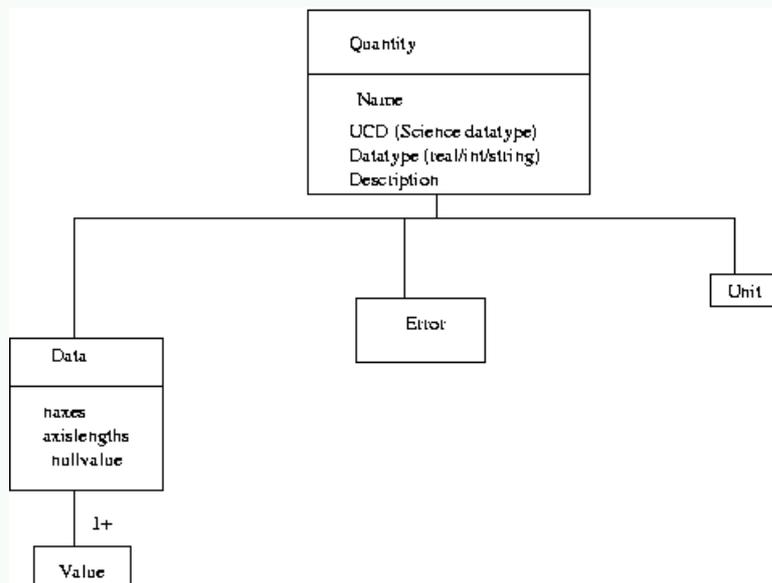
- Presented draft SPECTRUM model prior to Cambridge meeting
- Useful feedback to be incorporated
- Doug has led spectral survey use queries; folding back into Spectral DM

↑ ← →

SPECTRUM
naxes =1

AXIS VALUE CURATION OBS SPECTRUM_EXTRACT

PIXELS UNIT FRAME
RESOLUTION

DATA ERROR UNIT FRAME
QUALITY

COVERAGE (STC)

?

COORDS BINNING TRANSFORMED DATA

BACKGROUND EXPOSURE

SENSITIVITY

↑ ← →
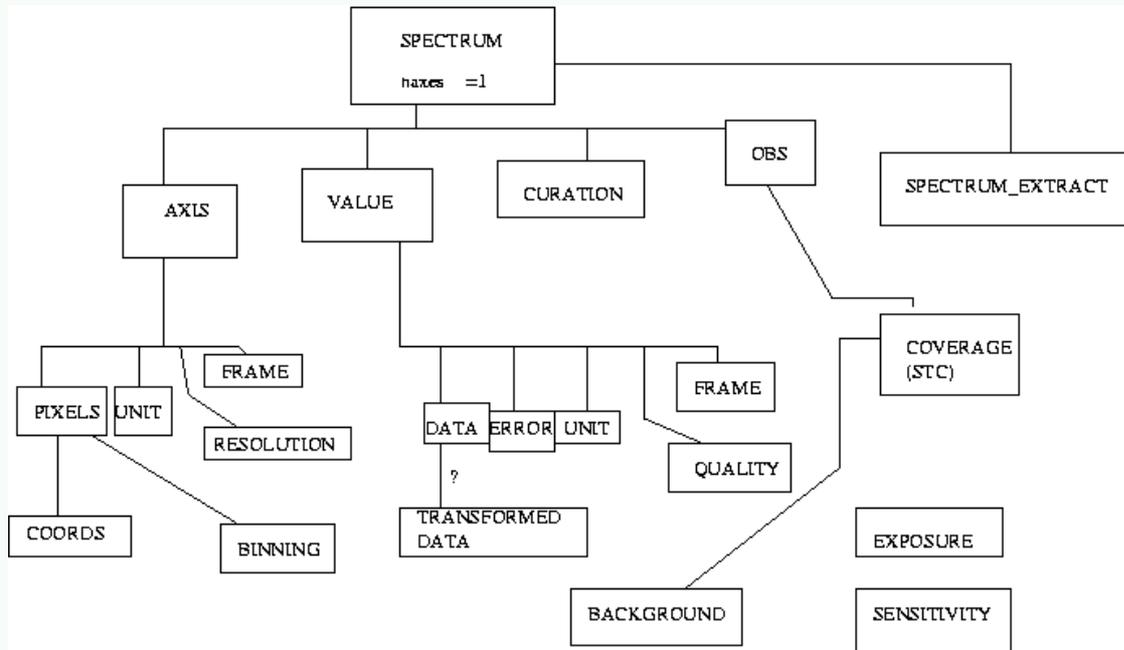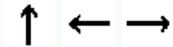
Special cases from use survey

- Antenna temperature spectra (e.g. SWAS) - include in possible observables
- Wavenumber spectra *do* exist in archives - e.g. Arcturus atlas
- Ratio spectra, e.g. Arcturus/Telluric - include in possible observables; needs extra metadata?
- Combination spectra using same X axis: e.g. Arcturus, Telluric, Ratio. Design decision: require them to be presented as three different spectra? Or implement array of spectra (note observables not all the same)
- May need to include object redshift, even if data presented in observed frame
- Corrections to observable: absorption (telluric, galactic, etc), continuum subtraction
- Other flags to observable: fit, model, etc.
- Line IDs and parameters - a separate problem out of this scope?
- Arc lamp spectra from NOAO - what metadata?
- SDSS spectra: nx4 image, with different observables in each plane (data, continuum-subtracted, error, mask).
- Other metadata: spectral type, etc. - at higher level index?

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Data Models WG - Introduction

- Mission: **Identify and standardize** the objects (software sense, i.e. concepts) in astronomy data
- Metadata is not just a list of keywords: the information is heavily **structured**.
- Most important for **data analysis** once data is retrieved
- Goals for Cambridge:
  - **Standardize process** for definining and adopting data models
  - Path from UML-style diagrams to XML implementation
  - Specific topics: 'Quantity' atomic object
  - Specific topics: 'Observation' metadata
  - Specific topics: Interoperable definition of 'Spectrum'
- WG meeting Tuesday
  - am: Introductory presentations, general discussion
 - pm: Work on collaborative document

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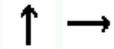
Compliant Data Models

- First step: a text white paper defining concepts
- Second step: UML Class diagram and text description of classes with
    - Versioning
    - UCDs for each attribute

  To avoid huge diagrams we recommend a set of nested diagrams with only half a dozen boxes per page. In general, the IVOA data models will define class attributes but not a complete set of methods; rather, interoperable interfaces will be the purview of the DAL WG. However, a DM definition is permitted to prescribe required methods; if these are present, the text must include relevant UML activity diagrams and description of algorithm and arguments (including UCDs for each argument where possible).
- Third step: Provide a reference XSD schema and some XML instance examples. We recommend that XSD be created by a tool to ensure its validity; provides a reference representation. The XML instance examples clarify the intent of the schema.
- The IVOA DMWG can consider the model for adoption. We recommend that at least one pair of groups should have demonstrated interoperable exchange of data using an implementation before model is formally adopted.

↑ ← →
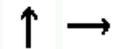
Work Packages

- Identified several kinds of model - container models, models of archive/query, models of data
- archive/query data models similar to data analysis models but go less deep (more approximate).
- Complete model of astronomy will be ongoing process.
- Pick small pieces of model to do in detail; prioritize those needed for demos and DAL WG
- Deliverables as discussed in process above
- Work on dm@ivoa.net mailing list, with subject header e.g. [RESOLUTION]
- Supplement by (monthly?) telecons
- Models selected (target: white paper by ADASS)
    - QUANTITY (Leader - Ray Plante)
    - SPECTRA (Leader - Jonathan McDowell)
    - RESOLUTION (Leader - Pat Dowler)
    - TIME-OBS (Leader - Pat Dowler)
- In addition, more open ended projects:
    - TRANSFORM (including WCS and units) (Leader - Dave Berry)
    - INTERFEROMETRY (Leader - Peter Lamb)
    - SIMULATIONS (Leader - Gerard Lemson)
    - OBSERVATIONS (CDS/CVO/Astrogrid) - reconcile big picture models

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Presented Models

- Container models
  - HDX (Giaretta, Gray)
- Observation models
  - IDHA (Louys)
  - Canadian VO (Dowler)
- Smaller models
  - Quantity (Plante)
  - Spectra (McDowell)
  - Spacetime Coords (Rots)
  - Starlink WCS (Berry)

Some objects discussed

- Grid resources - model in other WG
- Kinds of data:
  - N-d image
  - 2d image
  - spectra
  - interferometry
  - 3D cube
  - 2d spectra
  - Timeseries
  - simulations
  - event lists
- Measurement quantities:
  - Axes (incl. polarization)
    - Transforms, WCS
  - Observable (flux, luminosity, counts)
- observation metadata
  - Processing
- coverage (spatial, spectral, temporal)
  - TIME-OBS, SKY REGION, SPACETIME COORDS
- Field properties (e.g. limiting flux, spatial bandpass)
- Source
- Object

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- Cambridge meeting agreed on topics to attack
- Also adopted provisional standardization procedure
- Initial discussions on QUANTITY and SPECTRUM objects
- Rather quiet over the summer
- Ray's recent proposal for metadata schemas

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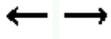
Data Model Working Group Summary

Jonathan McDowell, CfA

- Compliant Data Models
- Work Packages
- Presented Models
- Some Objects Discussed

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