Standing Committee for Science Priorities (CSP)

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EURO VO

CoSADIE Project

IVOA

Multi-dimensional Data

Radio astronomy, Integral Field Spectroscopy, high energy, polarization, simulation, data mining datasets + ...

Time Domain Astronomy

Time Series, light curves, transient event reports, +...

- Need to ensure that these are accessible and useable within the VO

Approach

- Focus Sessions *(May 2013, May 2014)*

  - To engage projects and surveys that produce and use multi-d and time domain data

  - Invited presentations / Panel Discussions

- Part of IVOA process - requirements, motivate WG activity, feedback from implementation.

Science Drivers

- ## Uniform discovery and access to multi-d data

Use Cases : e.g. Search for water maser features in a star formation region
Need: 3-D image cube consisting of 2 space and 1 frequency/velocity axes, with ability to search in frequency/velocity at every spatial pixel

Show me a list of data that satisfies:
I. Datatype=cube with 3 dimensions
II. Axes include Frequency
III. Axes include RA
IV. Axes include DEC
V. Frequency range includes 22 GHz

- ## Interoperability of multi-d data

  - compare and combine at different levels, e.g. compare coverage, combine measurement axes

- ## Visualisation - big cubes, combined data

Minimal requirements

- **Data Discovery (Query)**
  - A service shall be able to receive queries regarding its data collection(s) from a client, with the client placing one or more of the following constraints:
    - RA,Dec
    - Frequency/wavelength
    - Polarization states
    - Spatial size
    - Angular resolution
    - Integration time
    - Time of observation
  - A service shall return to the client a list of observations, and the corresponding metadata for each observation, meeting the user-imposed constraints. In the event that the user places no constraints, the entire list of observations, and the corresponding metadata for each data set, shall be returned. In the event that no data meet the user's constraints, the service shall indicate the absence of any matches.
- **Data Access**
  - Once a user has the list of observations that satisfy the constraints, they select all or a subset of the observations and:
    - Download the complete science data for each of the selected observations (the service shall return the complete multi-dimensional science data and metadata for each selected observation) or;
    - Download simple cutouts of the science data for each of the selected observations (the service shall be able to extract and return a user-specified subset of the complete multi-dimensional science data and metadata for each selected observation).
- **Simple Cutout**
  - For a simple cutout, the user-specified subset is restricted to be a contiguous interval within each dimension of the multi-dimensional science data. The user should *not* be allowed to specify subsets with "gaps" or resampling or anything like that.
    - Spatial: (a coordinate and a radius)
    - Energy: one interval (from energy1 to energy2)
    - Time: one interval (from time1 to time2)
    - Polarization: a list

Next Steps

May 2014

- Finish first standards - ASAP *SIAV2.0, DataLink, AccessData, ObsCore1.0*

  - Very important check-point

  - Reference Implementations *(prototype -> ref. implementation?)*

- Promote implementation (who/when/how?)

- Continue consultation with community to define use cases and set priorities for next steps

Banff 2014

- Check convergence of 3 Multi-d stds *(and their use as a basis for future steps)*

- Path to reference implementations

- Plan for maintaining engagement with data producers - promote implementation

'Multi-d Implementation' Focus Session May 2015?

Banff 2014

- Time Domain - community engagement largely via VO participation in TD community, e.g. Transient Universe

  ▸ check on progress *(TDIG session)*

- CSP - meeting on Saturday 11-12.30

  ▸ CSP participation, maintaining community engagement