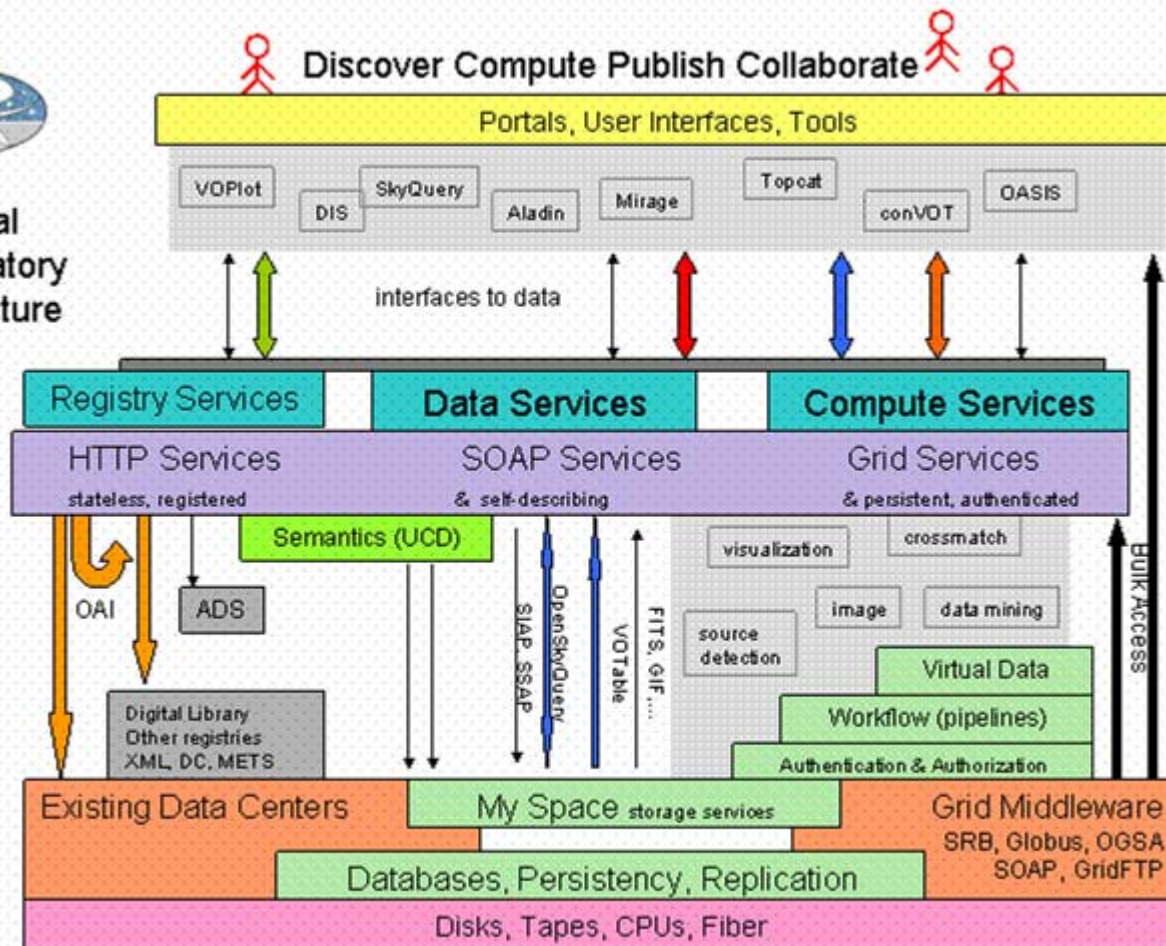


# Interoperability standards

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# Virtual Observatory Architecture



- Interoperability standard development is a key topic for the VO
- Interoperability standard is a VO TECH topic: input to IVOA
- Not only a topic for DS3 *Infrastructure*

# IVOA WGs

- DM (Data Models)
- WS (Web Services) & GRID
- Registry
- DAL (Data Access Layer)
- VOQL (Query Language)
- UCD (Unified Content Descriptors) – *DS5*
- VOTable
- Standards and processes

# Scientific Interoperability

- Being science driven forces scientific interoperability to be addressed
- Scientific Interop Issues:
  - Coordinates – WCS, FITS - OK
  - Photometry – e.g. Creating SEDs
    - Need photometry metadata – filters, ZP etc.
  - Sampling, Resolutions, PSF
    - Need PSF, sampling info linked to data

- Prototype VO tools for science
  - *Led to Discovery of Type 2 QSOs – A&A 2004*
- Enabled by real gains in standards for:
  - Data access
  - Manipulating image and catalogue data
- Employed *many VO tools* to access and use VO compatible data from many sources

2MASS  
ESO-WFI  
Chandra  
VLT-ISAAC  
HST-ACS  
DSS  
My Data

**Data Tree**

- GOODS-WFI
  - DEEPC2-FV-PREVIEW 38.1 'x37.3' 2000-10-2
  - DEEPC2-FV 8.2 'x8.2' 2000-10-26
- GOODS-ACIS
  - ACISMCDFS000 1.2 "x1.2" 1999-10-14
- GOODS-ISAAC
  - GOODS-10 2.5 'x2.5' 08/04/2002
  - GOODS-11 2.5 'x2.5' 08/04/2002
  - GOODS-14 2.5 'x2.5' 08/04/2002
  - GOODS-15 2.5 'x2.5' 08/04/2002
  - GOODS-20 2.5 'x2.5' 08/04/2002
  - GOODS-16 2.5 'x2.5' 08/04/2002
  - GOODS-21 2.5 'x2.5' 08/04/2002
  - GOODS-9 2.5 'x2.5' 08/04/2002
- GOODS-HST-ACS
  - F775W
    - epoch1
    - epoch2
    - epoch3
    - epoch4
    - epoch5
  - version1.0
    - CDF-SOUTH-SECT32-VERSION1.0
    - CDF-SOUTH-SECT25-VERSION1.0
    - CDF-SOUTH-SECT23-VERSION1.0
    - CDF-SOUTH-SECT21-VERSION1.0
    - CDF-SOUTH-SECT44-VERSION1.0
    - CDF-SOUTH-SECT14-VERSION1.0
    - CDF-SOUTH-SECT42-VERSION1.0
    - CDF-SOUTH-SECT12-VERSION1.0
    - CDF-SOUTH-SECT35-VERSION1.0
    - CDF-SOUTH-SECT33-VERSION1.0
    - CDF-SOUTH-SECT31-VERSION1.0
    - CDF-SOUTH-SECT24-VERSION1.0
    - CDF-SOUTH-SECT22-VERSION1.0
    - CDF-SOUTH-SECT45-VERSION1.0
    - CDF-SOUTH-SECT43-VERSION1.0
    - CDF-SOUTH-SECT13-VERSION1.0
    - CDF-SOUTH-SECT11-VERSION1.0
    - CDF-SOUTH-SECT34-VERSION1.0

Data available at selected point are highlighted in tree

**Info Frame**  
CDF-SOUTH-SECT23-VERSION1.0

Observation_Name	CDF-SOUTH-SECT23-VERSION1.0
ObservingProgram_Name	GOODS-HST-ACS
FilterName	F775W
Size_alpha	4.1'
Size_delta	4.1'
Angular Pixel Size	0.029"
Origin	STSCI
OriginalCoding	FITS
CentralPoint_RA	03:32:38.72
CentralPoint_DEC	-27:48:18.3
DateAndTime	2002-08-01
Position Angle	0.0°

Cutout Target: 03 32 33.50 -27 47 36 [Grab]

Stick FoV in stack LOAD Close

Image metadata

**A.V.O demonstration prototype v1.0**

Field: 03:32:25.77 -27:48:07.4 38.08'x37.2'

cds

Field of view outlines are plotted automatically

Field of view outlines are plotted automatically

- Dealing with VO complexity: more developments/tests required
- Test different approaches
- Test use cases: tools (DS4)

# Access layer to heterogeneous data

- IVOA DAL and DM have addressed «Simple Access» protocols for images and spectra
- Protocol for accessing heterogeneous data sets with complex relationship
- E.g.
  - search for images with associated source catalogues (including the knowledge of extraction parameters)
  - Search for images with associated source catalogues, and spectra for these sources
- Data model/DAL extension?
- May lead to revisit the Simple Access protocols

# Access layer: Specific versus Generic (1)

- Where is the knowledge about the services: do we propagate it to the user or do we manage it at another level?
  1. **specific (machine level)** : **select a.ra, a.de, b. where a ...** (*skynode-type, VOQL approach*) – consumer has acquired the knowledge
  2. **less specific (server level)** : **get VizieR(USNO2) m1** (*Aladin or CONEsearch-type approach*) – consumer has some knowledge about the data
  3. **generic (user level)** : **get catalog where magB..** (*as a goal:...real language/ontology...*) – consumer has some knowledge about the parameters he/she needs
  4. **very generic (google level)** : **"magB astronomy catalogs"**
- Same issue at the **Result** level (generic UCD versus specific column name schema)

## Generic versus Specific (2)

- **All the levels are required**
- **Not an exclusive technical choice** : Generic approach has certainly to be built on top of specific mechanisms
- But at which level have we to manage the generic to specific mapping/translation :
  - by each provider ?
  - through a third party (registry, translator,...?)
  - or directly at the end application/browser ?
- Implications on Query syntax, Result Syntax...