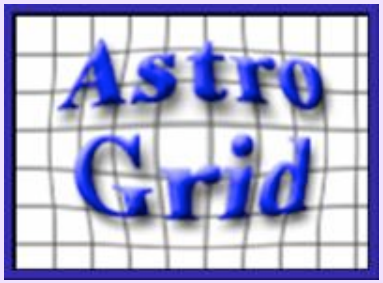
Virtual Observatory 2.0 ?



- VO today
- VO tomorrow


Virtual Observatory recap

The VO vision

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- web all docs in the world inside your PC

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- web all docs in the world inside your PC
- VO all databases in the world inside your PC

The VO vision

- web all docs in the world inside your PC
- VO all databases in the world inside your PC

- Most astronomy data are already on line
- So is that all we need ?

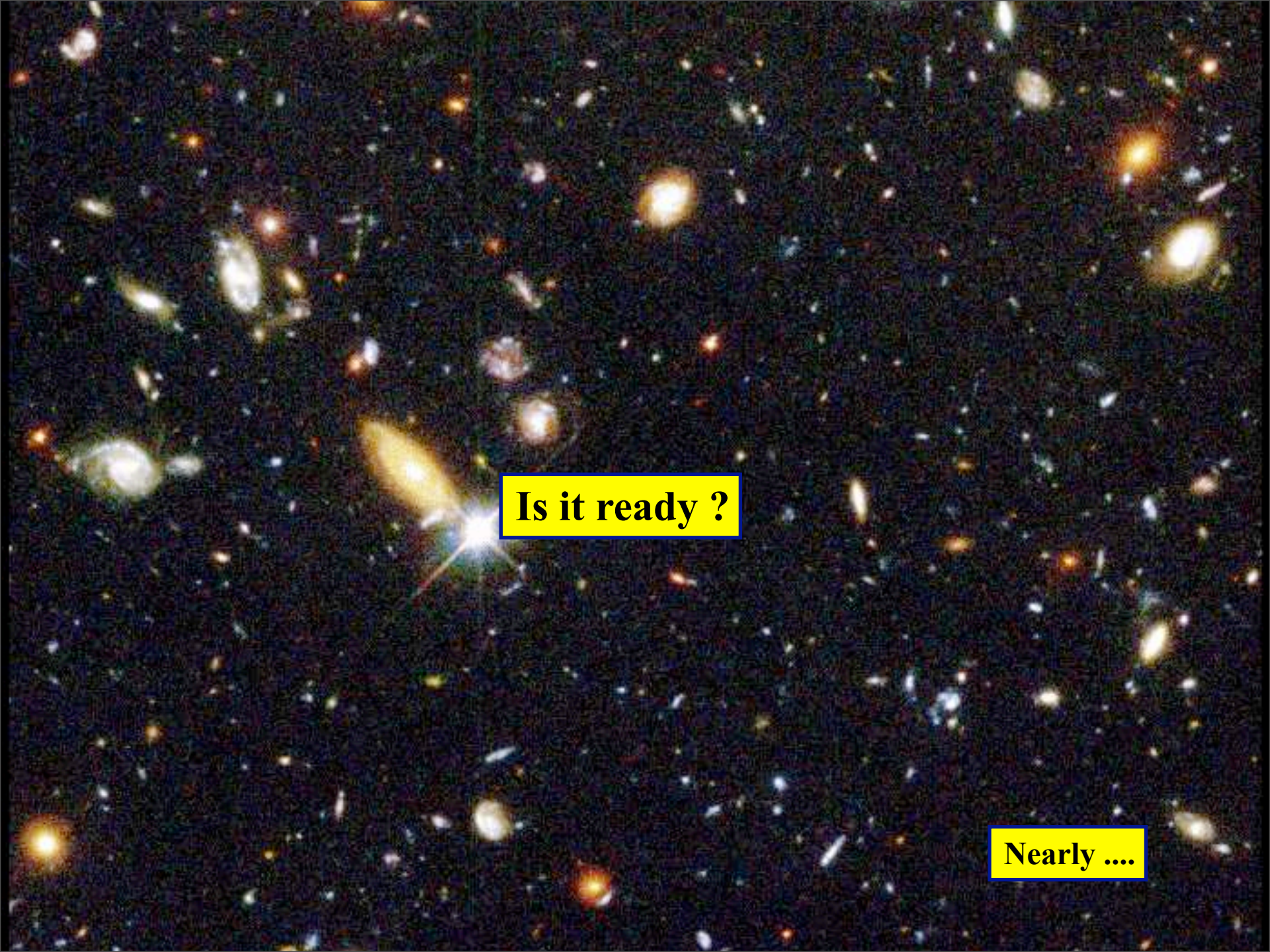
Two Problems

- Tower of Babel
  - too many different web pages, formats, keywords, table column names, access methods, passwords etc etc
  - standardise !!!!
- Data Deluge
  - some modern datasets VAST
  - cannot "download and hack"
  - need online data *search and analysis services*

So ...we need ...

- ~~heads knocked together~~ *international standards*
- *data services* that follow the rules
- *yellow pages* for data (Registry)
- *VO software* that understands this stuff
  - infrastructure
  - tools
  - a software ecosystem not a "one stop shop" portal


Is it ready ?


Is it ready ?
Nearly ....

Whats done ?

www.astrogrid.org

- Many (but not all) key standards
- Thousands of datasets
- Yellow pages
- Lots of techy stuff
  - Middleware, API, VOSpace, Identity services ...
- Several good interoperating user tools
  - VO Desktop, Aladin, Topcat, VOSpec ..
- Two related popular tools
  - Google Sky and World Wide Telescope

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- Thousands of datasets *most* of them work...
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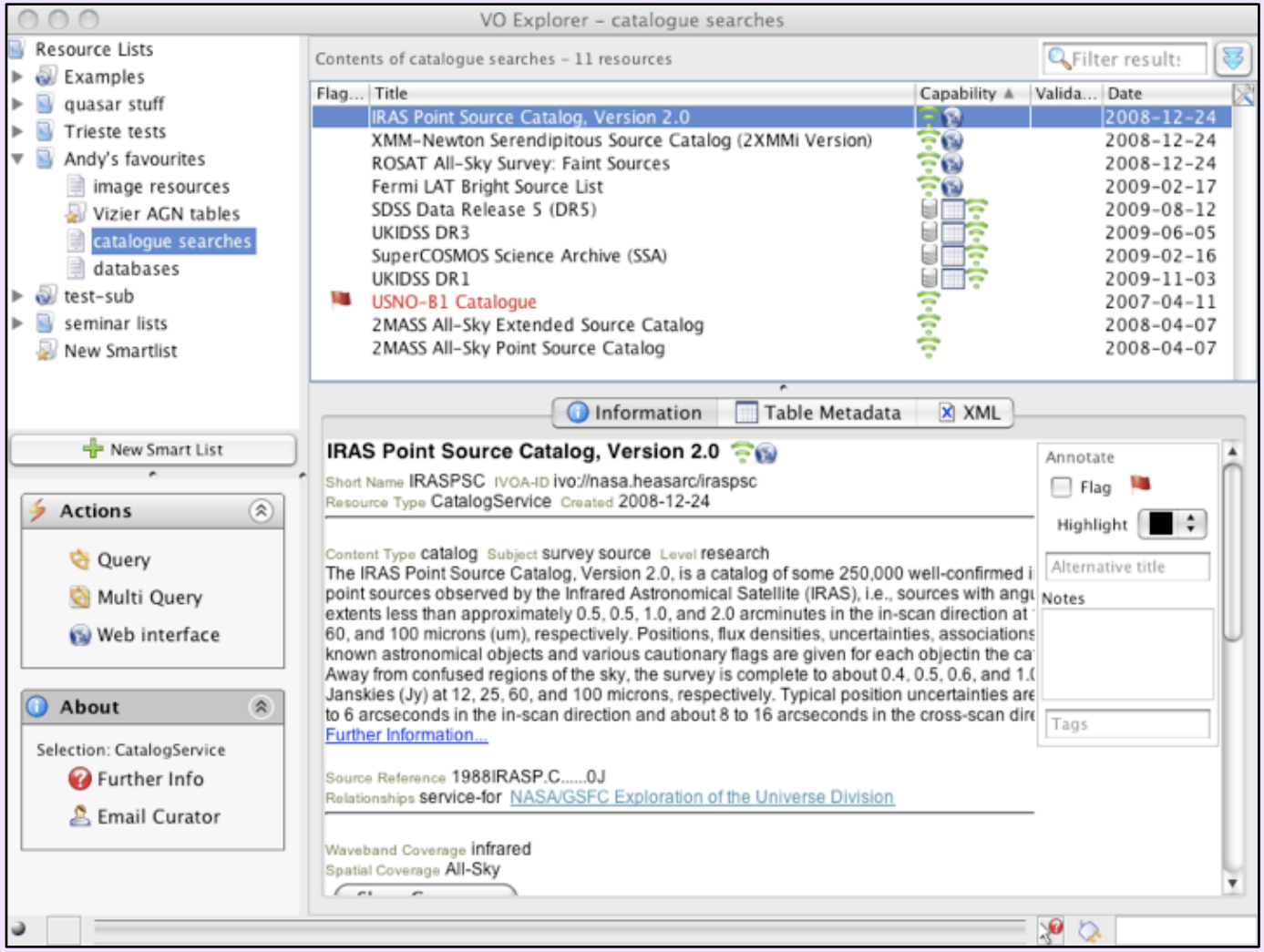
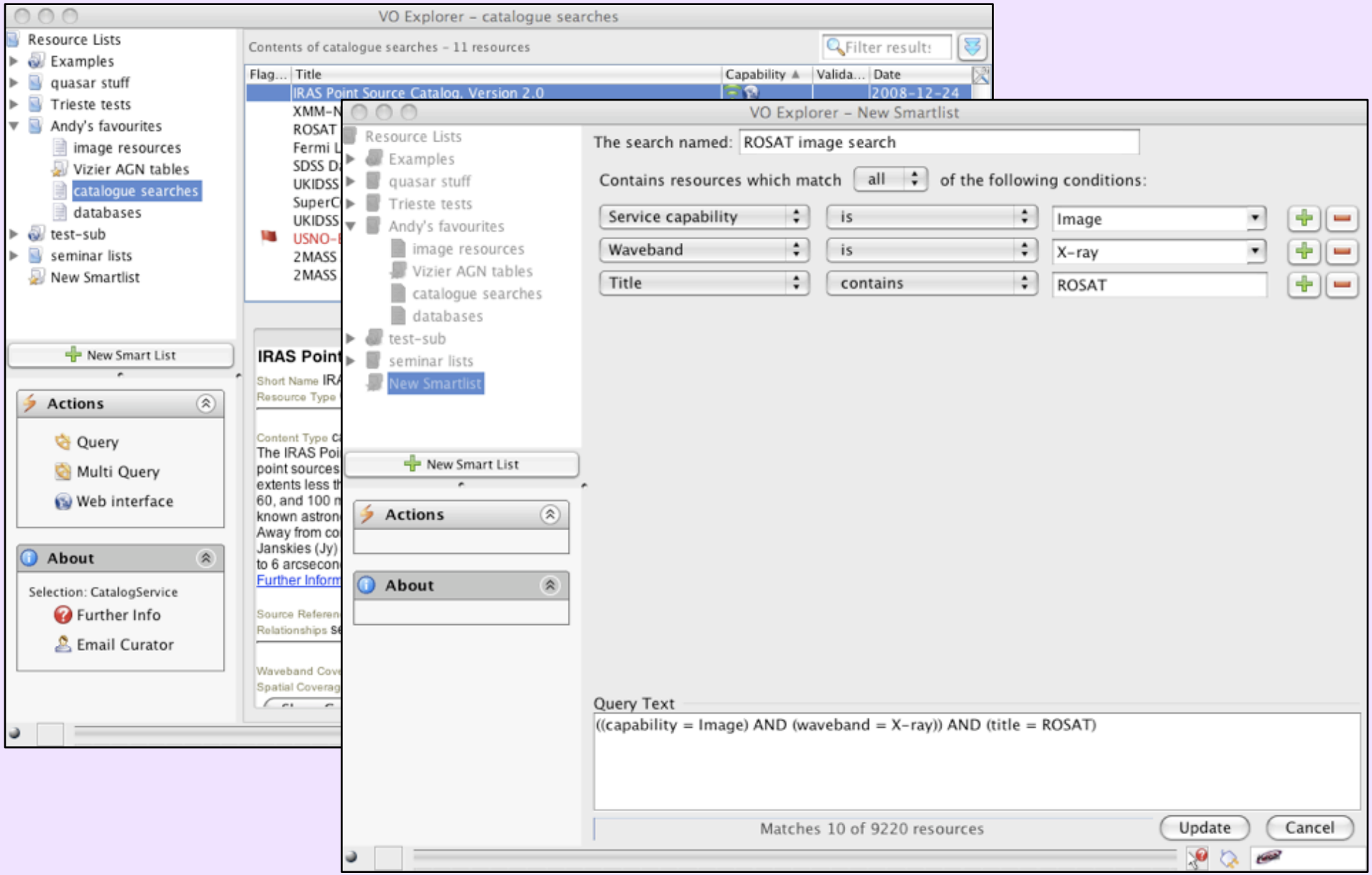
Sky Browsing approach

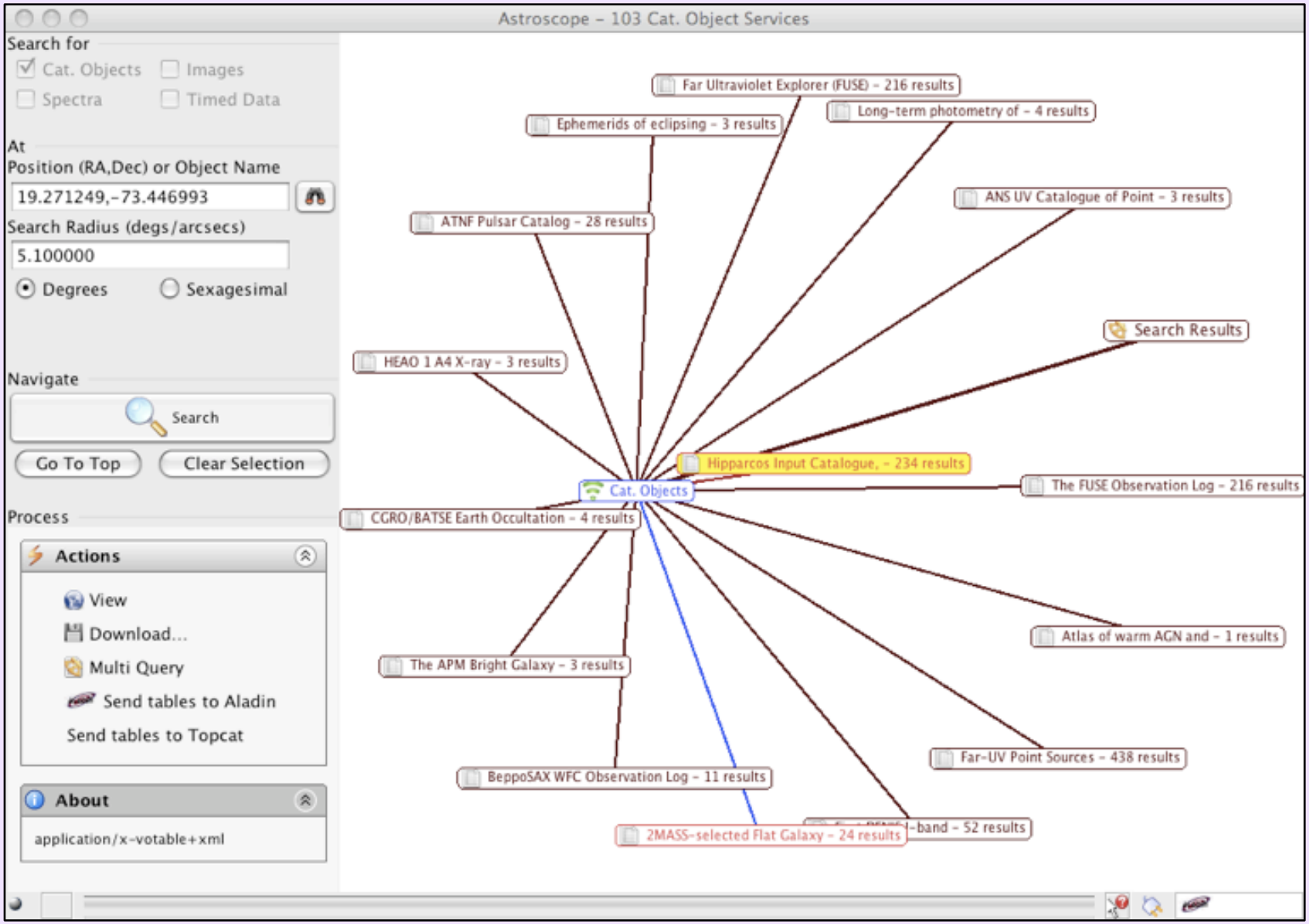
Yellow Pages Approach



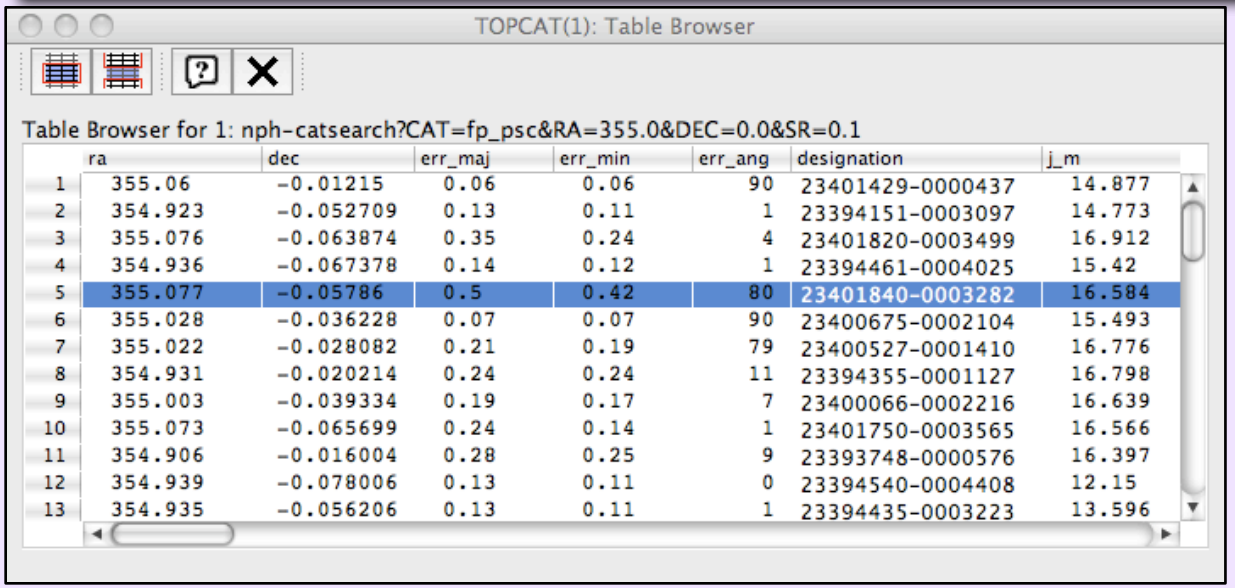
Yellow Pages Approach



Search data services



Pipe results to other apps



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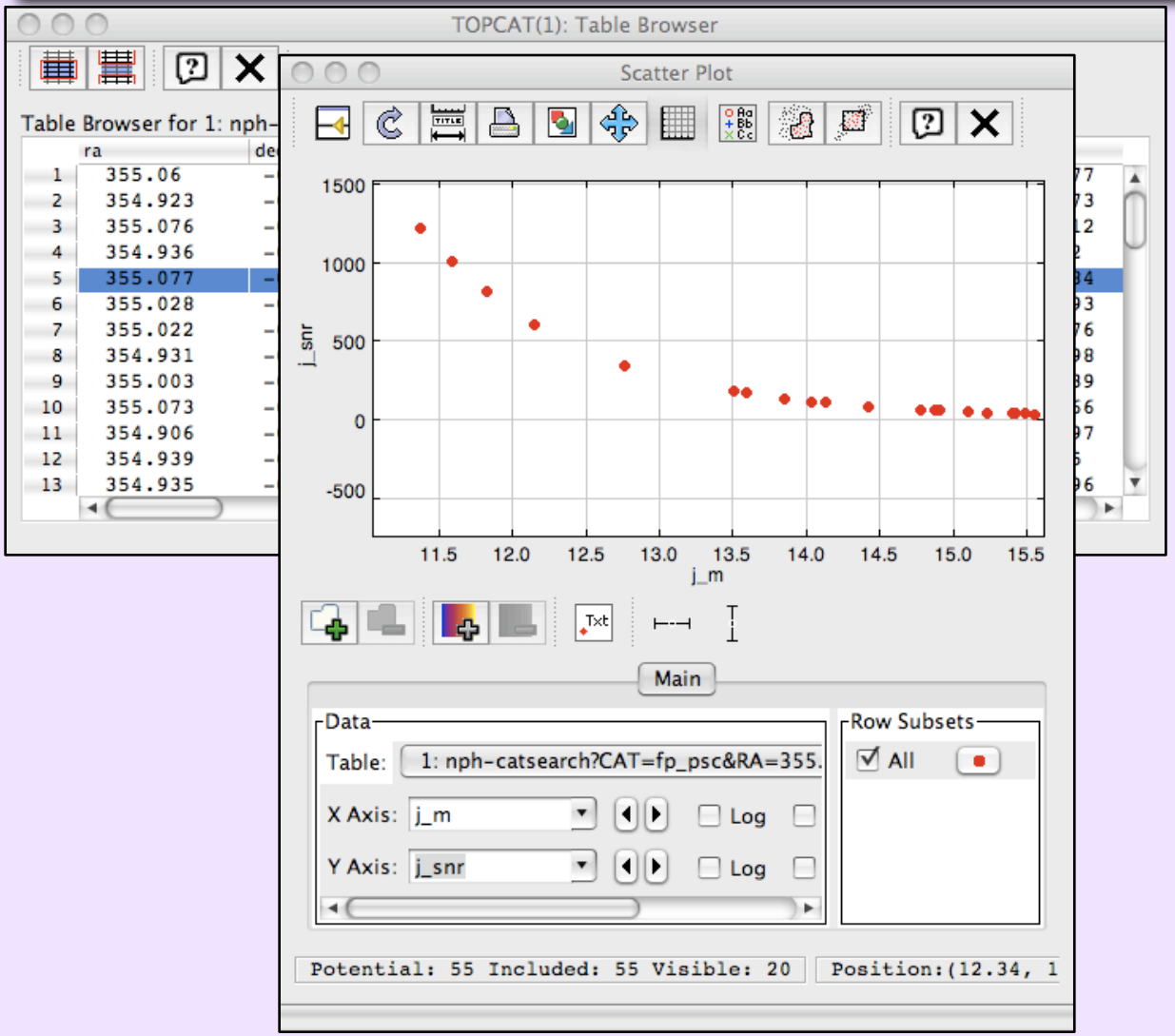

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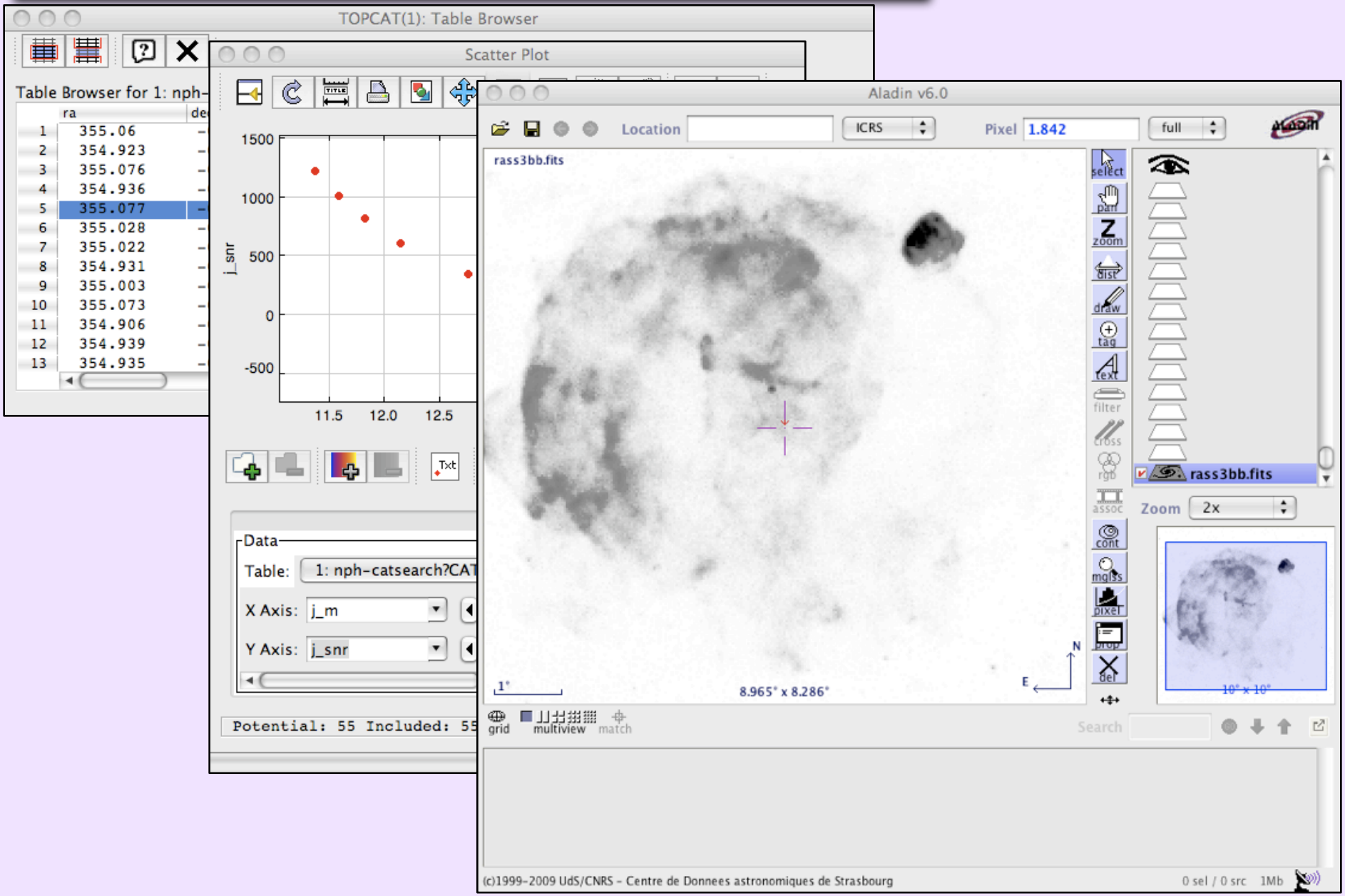

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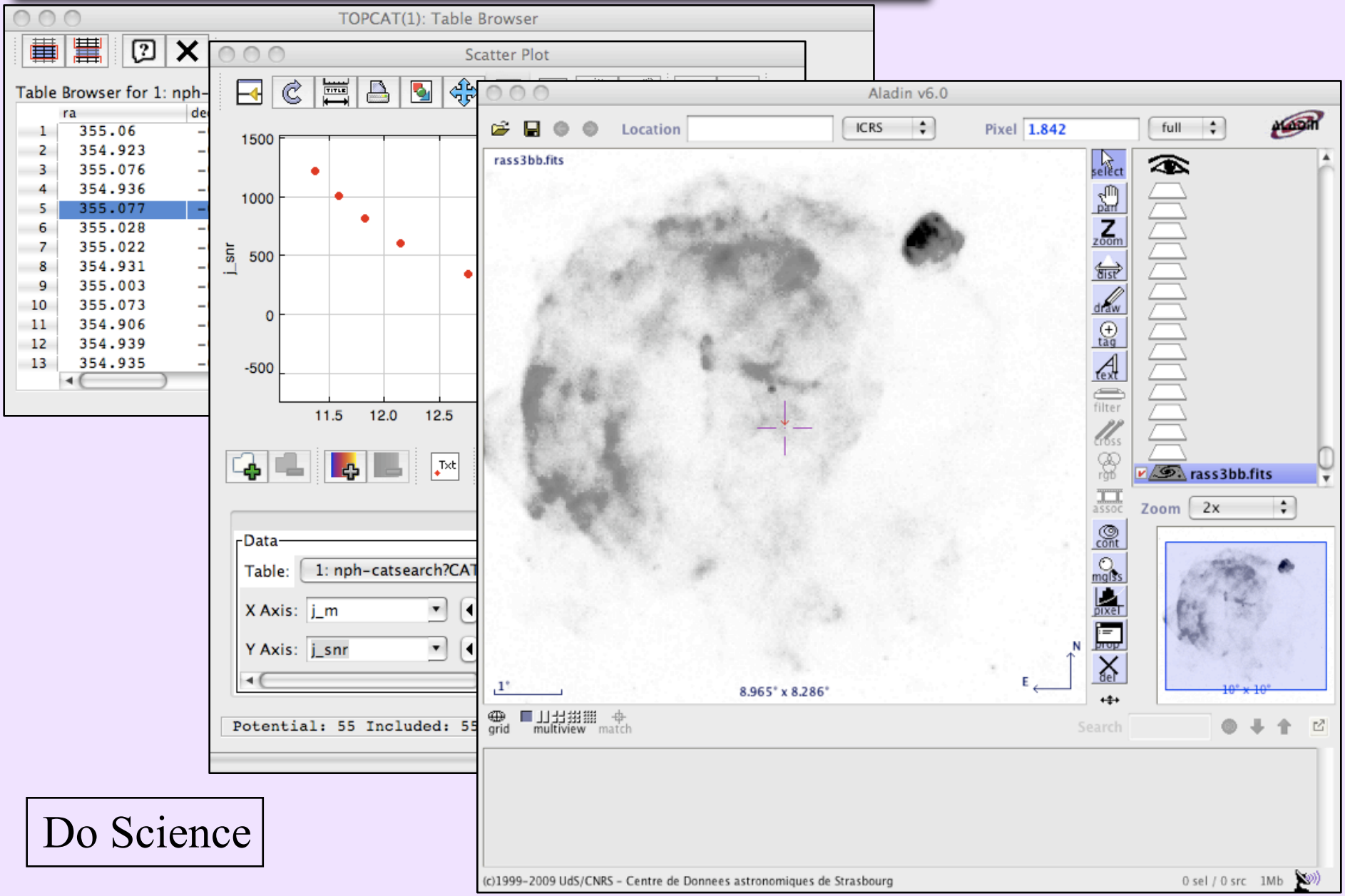

Do Science

Scripting Approach

```
#!/usr/bin/python
"""
Sends a query to WFCAM Science Archive; saves result to file on local disk.

Usage:    python wsa_gps.py
will write a file named wsa_gps_res.vot to the current directory.
History:   20071212 Written by E. A. Gonzalez-Solares
"""

from time import sleep
from astrogrid import acr, DSA, MySpace

# Uncomment if automatic login is not enabled
# acr.login('ukidss')

# Define SQL here
# This query selects for each source, the x and y position in the detector as well as the
# size of the detector in which it was detected and the pixel scale. Only sources which are
# more than 10 arcsec away from the chip edges are returned in a search box
#
# NOTE: If the 'top 100' clause is removed then see below and save the output to a file in MySpace.
sql="""SELECT top 100
        s.sourceID, s.ra, s."dec", s.jmhPnt, s.pStar, s.pGalaxy, s.pNoise, s.pSaturated,
        s.jAperMag3, s.jAperMag3Err, s.jClass, s.hAperMag3, s.hAperMag3Err, s.hClass,
        s.k_1AperMag3, s.k_1AperMag3Err, s.k_1Class, d.x, d.y, m.xSize, m.ySize, c.xPixSize,
        c.yPixSize
    FROM
        gpsSource AS s, gpsDetection AS d, MultiframeDetector AS m, CurrentAstrometry AS c
    WHERE
        s.k_1ObjId = d.objID AND d.multiframeID = m.multiframeID AND d.extNum = m.extNum AND
        d.multiframeID = c.multiframeID AND d.extNum = c.extNum AND
        s.ra between 310.8 AND 313.0 AND s."dec" between 43.14 AND 44.0 AND
        d.x*c.xPixSize>10 AND d.y*c.yPixSize>10 AND
        (m.xSize-d.x)*c.xPixSize>10 AND (m.ySize-d.y)*c.yPixSize>10"""

# Define the enpoint service
dsa=DSA('ivo://wfau.roe.ac.uk/ukidssDR2-dsa/ceaApplication')

# Write all the SQL in one line
sql = ' '.join(sql.split())

# Submit
r=dsa.query(sql)

# For large queries better use a file in MySpace
# r = dsa.query(sql, saveAs='#ukidss/wsa_gps_res.vot')

# Wait until query status is completed
while r.status()<>'COMPLETED':
        sleep(10)

# Save results to file
open('wsa_gps_res.vot','w').write(r.results()[0])

# If the file is saved in MySpace then do
# open('wsa_gps_res.vot','w').write(urllib2.urlopen(r.results()[0]).read())
```

AstroGrid
Python script


Is this all a bit old fashioned ?

The wisdom of the crowd ?

- Is this is all too rigid ?
  - life dominated by big missions and data centres
  - the IVOA dictates and you must obey
- Why can't the VO just *emerge* ?
  - all the new postdocs are smarter than the greybeards
- Is there a Web 2.0 style VO ?

Web vs Web 2.0

- Web : world becomes transparent
  - but clear divide between *creators* and *readers*
  - and between *servers* and *clients*
- Web 2.0 : users create, adjust, vote
  - blogs, tagging, wiki, Digging etc
- What is the astro equivalent ?

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Note : most "people power" examples actually rely on infrastructure provided by large corporations...

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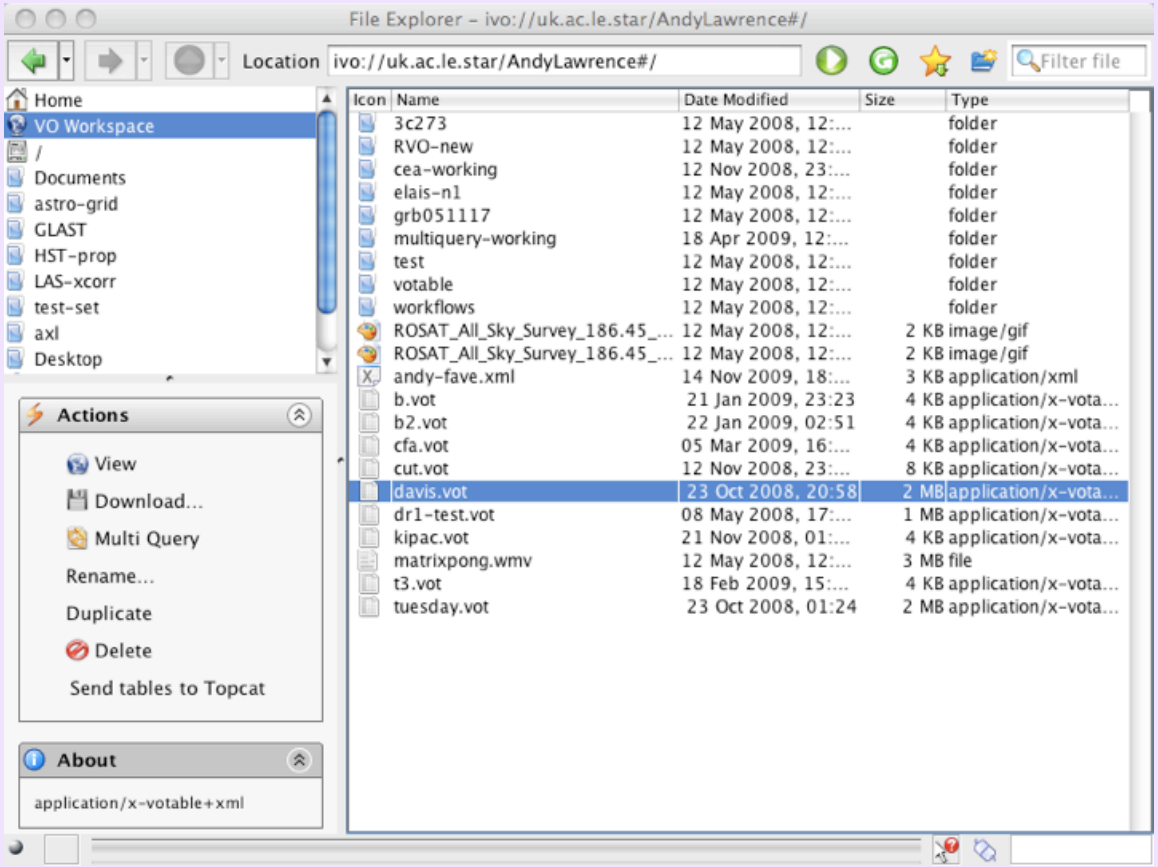
Note : most "people power" examples actually rely on infrastructure provided by large corporations...

Likewise : astro-social apps will also need a supporting infrastructure.....


Seven Ideas for VO 2.0

Collaboration Spaces

- Shared filestores
- Arbitrarily defined access lists
- Automated link to appropriate apps
- Editable shared objects - notes, tables, images etc



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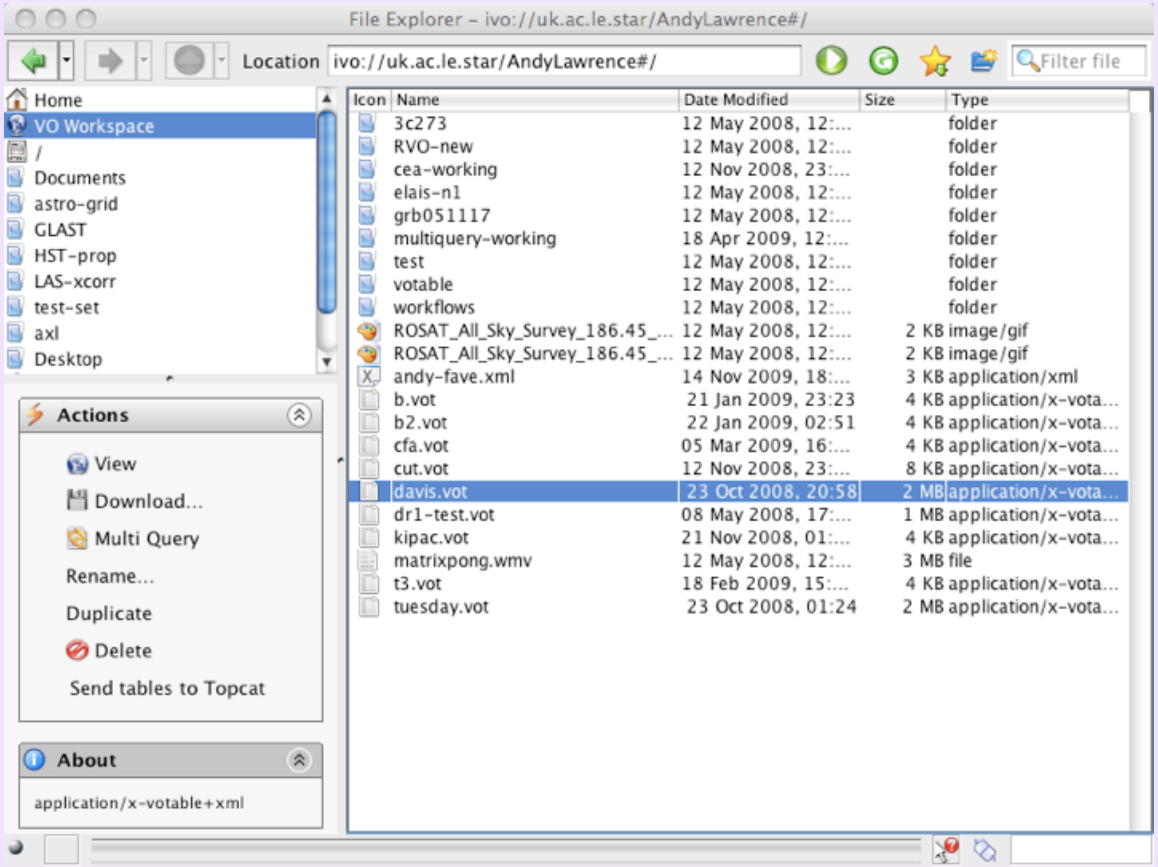


This is almost ready ...

Self Publication

- I have 300 FITS files from my VLT run
- How do I put them in the VO ?

- Needs publication tools that automate compliance to VO standards...

- ... and probably data centre hosting

Blogs as public notebooks

- Astroblogs so far one of three things :
  - Outreach magazine
  - Political discussion forum
  - Vanity Press
- Scientists in other disciplines are using them as online Lab-books
- Does that make sense for astronomy ?

Folksonomies

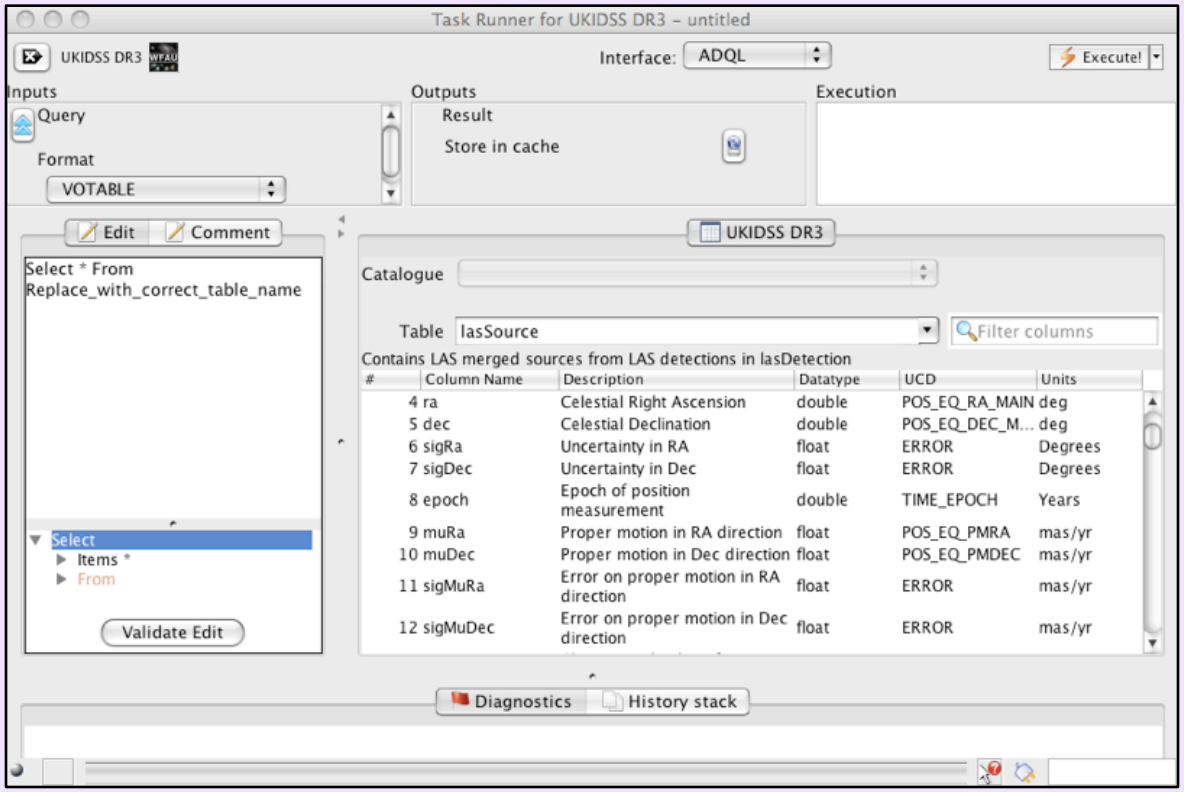
- Much VO effort on *metadata* and *ontologies*
- W2 approach : authors invent their own *tags*
  - Readers can search on these
  - The most popular tags emerge naturally
- Should data centres decide their own metadata ?
- Problems
  - Astro metadata is more structured
  - The metadata is not for people...
  - ...its for applications, so they know what to do with a data object

Annotations

- Users shouldn't *change* public data
- But they can *add value* by annotating it
- Three styles
  - General commentary (cf Google sidewiki)
  - Individual annotations ("this object is a quasar")
  - Mass annotations ("Q13 marks all crossmatches using algorithm-13")
- Annotation service can be detached if contents are standardised

Data model market

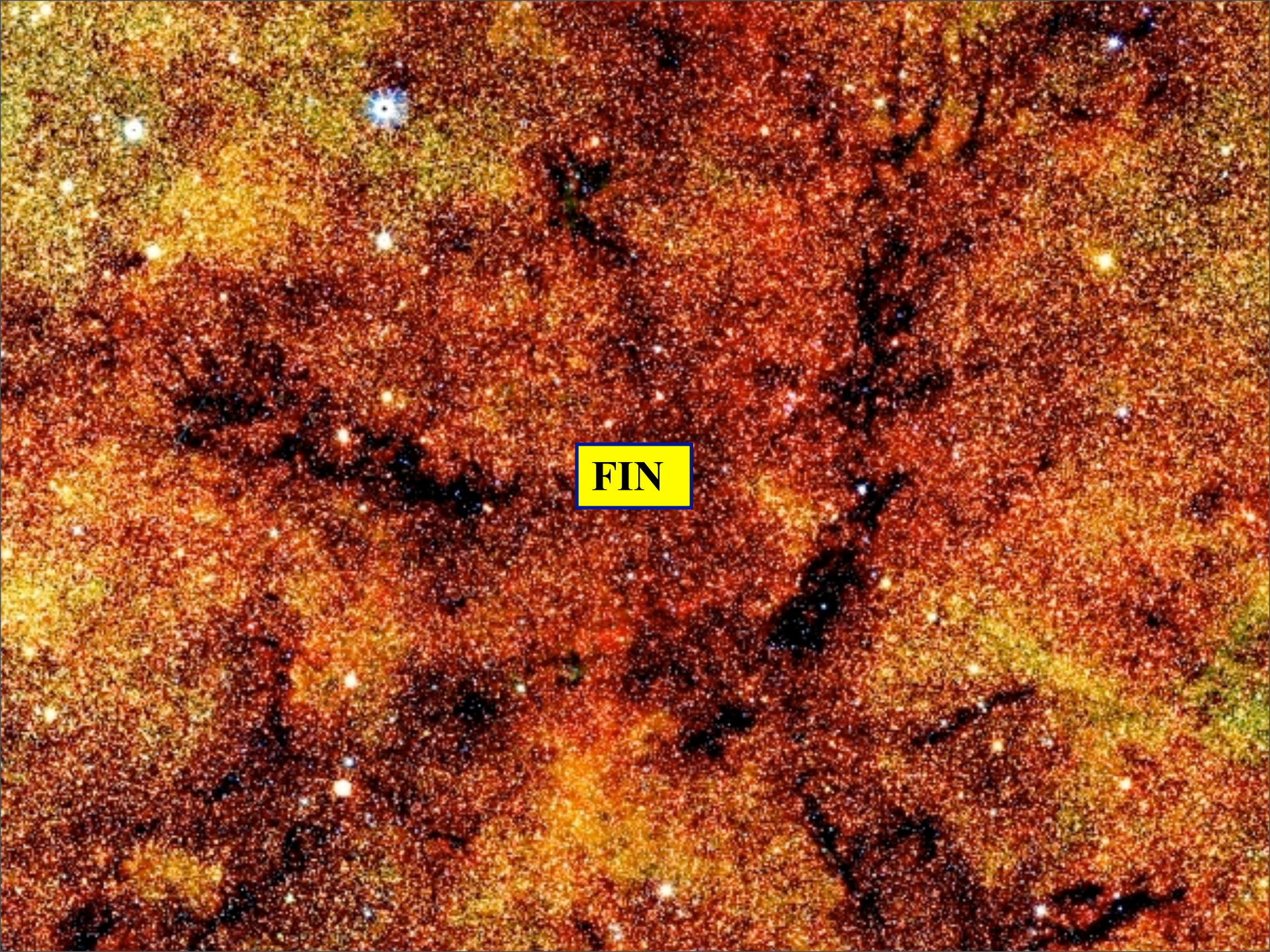
- QueryBuilder picks up column names automatically from database
- But user has to look up what they mean
- Can be automated for applications if database follows a known *data model*



- Current approach is for IVOA to define standard data models
- Alternative is for a *free market of data models* to emerge and database to point at the one it is using

Community Tool Market

- Useful VO tools written by smart grad students
- Key components already there :
  - protocol for apps to play nice with each other (SAMP)
  - library of pre-packaged VO-service routines (Astro Runtime)
  - VO service call handling middleware (Astro Runtime)
- Needs to be much easier
- Needs a publishing framework
  - cf Mac widgets, Google gadgets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