

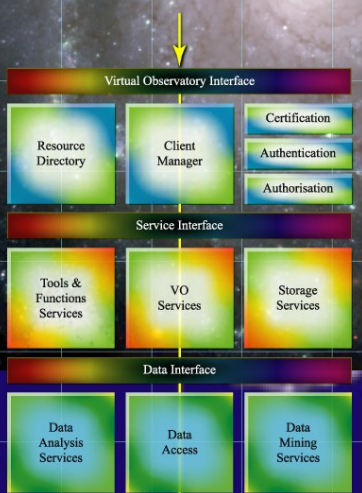
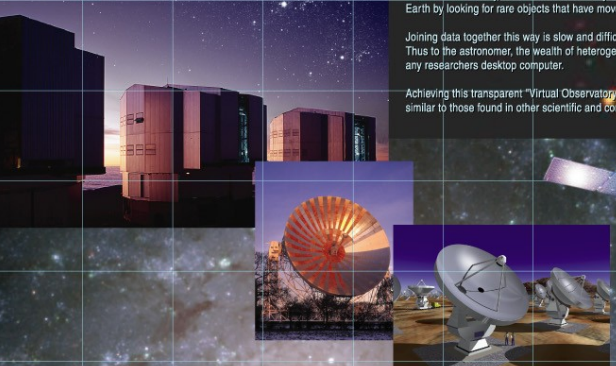
Creating the UK's Virtual Observatory

Astronomers routinely analyse data measured by telescopes and space observatories which is held in on-line data stores.

But modern astronomy increasingly requires the federation of data from many observatories e.g. having found a distant luminous galaxy in an Infrared survey, to look for it in an X-ray database in case it is a "hidden quasar", or looking for asteroids that might collide with the Earth by looking for rare objects that have moved between pictures taken by different telescopes in different years.

Joining data together this way is slow and difficult or impossible today. AstroGrid aims to make on-line data resources fully inter-operable. Thus to the astronomer, the wealth of heterogeneous data that they need to access appears as one uniform resource accessible through any researchers desktop computer.

Achieving this transparent "Virtual Observatory" involves solving complex technological and sociological problems, many of which are similar to those found in other scientific and commercial realms.



What is the Grid?

The Grid is the next step in Internet computing. Just as the World Wide Web is distributed information, the Grid is distributed computing power. The user will not need to work out which computers to use, just as someone using a hairdryer does not need to know how the electricity is generated in a giant power station hundreds of miles away.

AstroGrid is exploiting the idea of a data grid, because it will enable both the federation of the hundreds of databases around the world, with volumes of data growing at an ever increasing rate and give the ability to run complex calculations on the data in those distributed archives.



Euro-VO DCA

Board Meeting #1
Oct 2-3, 2006

Nic Walton for Mike
Watson

CDS
Strasbourg



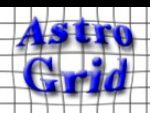
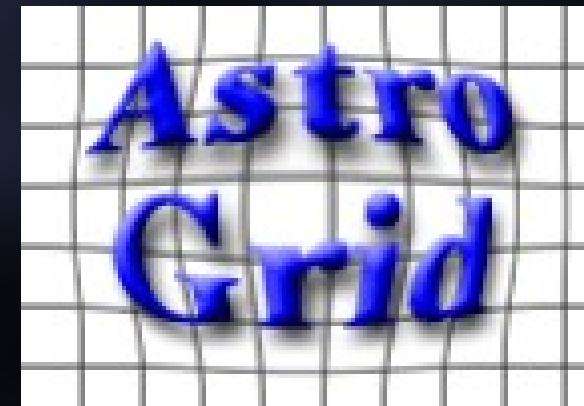
AstroGrid

AstroGrid: UK's Virtual Observatory

Empowerment of scientists

- Improve the quality, ease, speed and cost effectiveness of on-line astronomy
- Make comparison and integration of data seamless
- Removing barriers to multi-wavelength astronomy
- Enable access to very large data sets

Project: 2001-2007: ~£10M: key data and resource providers in consortium



AstroGrid History

- Proposal 2001
- AG1 Phase-A 2002
 - design study
- AG1 Phase-B 2003-4 £3.7M 7 instns
 - infrastructure build
- AG2 2005-7 £4.0M 11 instns
 - initial deployment
 - first users, continued build
- AG VO service 2008-12 £8.0M 7 instns
 - operations

AstroGrid3: Operational Service

- AstroGrid UK VO system
 - the UK partner in the European-VO and IVOA
- User Support – c.f. Observatory Support
- Community Research
 - peer (SAG) reviewed calls
- Maintain VO Software
 - core task – must be resourced – not left to chance
- Continued VO system development
 - c.f. observatories – the world did not stop with a 4-m
- MetaData Curation, Registry Services
- Data/ Service Provider Coordination
 - c.f. Current DAG
- Community and Security

AstroGrid Achievements

- genuine working VO system
 - workbench, astro-runtime, DSA, CEA, Workflow, SSO
- leading role in standards and protocols
- complete backend infrastructure
- methods for data publication
- methods for application integration
- acknowledged technical leadership in Europe
- proven track record in distributed management

UK-VO Dissemination

- Workshops
 - Science – bi-monthly (Cambridge, Sussex, Durham, Imperial ...)
 - Technical – annual and pre science meetings
 - External workshops – Russia, South Africa
- Science Tools Call
 - 6 month user defined projects
- Teaching
 - VO courses
 - Summer Schools
- National Meetings
 - NAM, UKSP, MIST



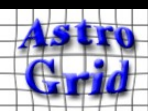
Euro-VO: VOTC Technology Centre



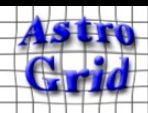
€6.6M: 2005-2007



Infrastructure, new tools, resource discovery, data mining+visualisation



AstroGrid: WorkPackage Interest



WP3-2: Technical Feedback

[AG:14sm]

- inputs (feedback) from:
 - data centres: in context of VO-deployment of data sets
 - other implementers: developers using VO infrastructure elements (eg tool builders)
 - users (in general, in context of workshops and demos ...)
- targets for outputs
 - infrastructure developers, standards developers (... software engineering staff in general)
 - within
 - VO-TECH project
 - other European VObs technology groups
 - IVOA Interoperability working groups

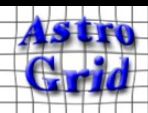
WP3-2: Technical Feedback (cont.)

- WP3-2: Technical feedback activities (continued)
 - key requirements
 - formal and properly supported feedback and reporting mechanism
 - possibility of informing originator of action taken
 - possible approaches
 - web-based reporting system
 - technical workshops and other outreach

Other WPs

- WP2: strategic input
- WP3: participation in Workshops
 - national level lead
- WP4 – Theory [AG: 2sm] : involvement
 - UK Theory – Cambridge, Durham, Leicester, UCL groups
 - IVOA Theory Interest Group
 - OGF: Astro-RG leadership
- WP5 – Grids : involvement
 - NGS gateway (to EGEE)
 - Campus Grids
- WP6 – wider Europe [AG: 2sm] :
 - Links to Russia, Ukraine

UK Data Centres



Main UK Astronomical Data Centres

Data holdings, pipelines & services

AstroGrid

Optical & IR data

- CASU: Cambridge
- WFAU: Edinburgh

Radio data

- Jodrell Bank

Solar/STP
data

- MSSL
- RAL

High Energy
Astrophysics data

- LEDAS: Leicester

Cambridge: CASU

- Data Pipelines
 - ESO: VISTA , VST
 - UKIRT: WFCAM
 - ING: WFC + WHT
 - ESA: GAIA
 - WFMOS (provisional)
- Data Holdings
 - WFCAM
 - ING
 - UKIRT
 - AAO
 - Planck (provisional)
 - Gaia (provisional)

Edinburgh: WFAU

- SuperCOSMOS Science Archive (SSA)
- AAT 6dF-z
- UKIRT WFCAM Science Archive (WSA; UKIDSS +)
- USNO-B
- SDSS DR1-5
- 2MASS
- VISTA Science Archive (VSA)
- Various ESO-VST surveys
- GAIA (provisional 2012 -)
- WFMOS (under consideration)

Leicester: LEDAS

- Data Pipelines
 - XMM-Newton
 - Lobster (planned)
- Data Archives
 - Einstein, EXOSAT, Ginga
 - ROSAT, ASCA
 - Chandra
 - XMM-Newton
 - SWIFT
 - SuperWASP (optical survey data)
 - Lobster (X-ray survey data) (planned)

Manchester: Jodrell Bank

- Merlin
- Interferometric
- e-Merlin
- ALMA (planned)

UCL: MSSL

- Solar-B
- SDO
- SOHO
- ReSIK
- Yohkoh
- SMP/XRP
- RGO Solar

RAL:

- EISCAT
- Ionosonde
- SOHO
- TRACE
- CHIANTI
- Cluster
- STEREO
- Solar-B
- SDO
- NGS: Gateway to large compute and EGEE

Wider UK Data Holdings

- AstroGrid Deployment Group
 - representatives from other major UK groups
 - Glasgow (Grav Waves)
 - Oxford (Gemini)
 - Liverpool JM (Liverpool Telescope + Faulkes)
 - Lancaster (STP data)
 - UKATC (Future instrumentation)
- AstroGrid provides key link point to ALL UK data holdings
- AstroGrid links to distributed compute: Campus Grids, NGS, EGEE