AVO Science Working Group Meeting

20-21 January 2003: Jodrell Bank Observatory, UK

Draft Minutes: NAW 22 Sep 2003

Present (for all or part of 20/21 Jan 2003):

Mark Allen	MA	AVO-CDS	
Salim Ansari	SA		
Anthony Banday	AB		SWG
David Barnes	DB	Aus-VO	
Piero Benvenuti	PB	AVO-ESA	SWG
Thomas Boch	TB	AVO-CDS	
John Brooke	JB		
Laurent Cambresy	LC	AVO-CDS	
Lars Lindberg Christensen	LLC		
Luiz Da Costa	LdC		SWG
John Keith Davies	JD	Opticon	
Richard de Grijs	RG		SWG
David De Young	DdY	NVO	
Phil Diamond	PD	AstroGrid-JBO	
Markus Dolensky	MD	AVO-ESO	
Mike Edmunds	ME		
Jim Emerson	JE		
Pepi Fabbiano	PF	NVO-CfA	SWG
Simon Garrington	SG	AstroGrid-JBO	
Neil Geddes	NG	PPARC	
Francoise Genova	FG	AVO-CDS	
Gerry Gilmore	GG	Opticon	SWG
Ana Gomez de Castro	AC		SWG
Tim Goodwin	TG	AstroGrid	
Preben Grosbol	PG		SWG
Robert Hanisch	BH	NVO	SWG
Neal Jackson	NJ		
Florian Kerber	FK		SWG
Vagelis Kontikas	VK		
Mary Kontizas	MK		SWG
Michael Kramer	MiK		
Andrew Lawrence	AL	AstroGrid	
Patrick Leahy	PL		SWG
Bruno Leibundgut	BL		SWG
Marco Leoni	ML	AVO-ESO	
Tony Linde	TL	AstroGrid	
Jonathan McDowell	JM	NVO	
Yannick Mellier	YM	AstroGrid-IAP	SWG
Alberto Micol	AM	AVO-ESO	
Panayotis Moschopoulos	PM	EU Research-DG	
Tom Muxlow	TM		
Tom Oosterloo	TO		
Patricio Ortiz	PO	AstroGrid	SWG
Benoit Pirenne	BP	AVO-ESO	
Timo Prusti	TP		SWG
Peter Quinn	PQ	AVO-ESO	
Anita Richards	AR		
Peter Thomasson	PT		
Gerard Tissier	GT	AVO-IAP	
Wolfgang Voges	WV		SWG
Nicolas Walton	NW	AstroGrid	SWG
Andreas Wicenec	AW	AVO-ESO	

Agenda: 20 Jan 2003

13:45 SWG Demo: Lecture Room

- 13:45 Welcome (Piero Benvenuti)
- 14:00 Demo
- 14:30 Q&A

14:45 Hands-on demo: Computer room (Markus, Mark, Nic, Anita)
15:30 tea/coffee in Science Centre dining room
16:00 Hands-on demo: Computer room (continued)
16:30 Feedback and comments for development of Demo

Agenda: 21 Jan 2003

09:15 Welcome and Breakout Group Signup
09.30 Review of Previous Minutes & Outstanding Action Items
10.00 AVO Update - including:

- 10.00 AVO WA0 Quinn
- 10.15 AVO WA1 Benvenuti
- 10.30 AVO WA2 Genova
- 10.45 AVO WA3 Walton

11.00 Coffee

11.30 Update on Science Requirements Capture Process
12.00 Breakout groups:

Focus of these will be to identify science topics in these areas and note capabilities required to speed the science discovery process.

Aim to set a range of priorities for AVO in these areas.

- A: Cosmology
- B: Galaxy Structure & Formation
- C: Stellar and Planets

13.00 Lunch

13.45 Breakout groups:

- A: Cosmology
- B: Galaxy Structure & Formation
- C: Stellar and Planets

14.15 Reporting Back

15 min presentations from representative of each group.

- 14.15 A: Cosmology
- 14.30 B: Galaxy Structure & Formation
- 14.45 C: Stellar and Planets

15.00 Implications for Future Capabilities

15.30 Meeting Closes

Coffee

Minutes: Meeting 21 Jan 2003

1. Welcome and Breakout Group Signup

PB welcomed the SWG to the meeting and outlined the major aims of the meeting:

- Update SWG on the AVO current status
- Demonstrate the AVO 1st Light prototype
- Allow SWG use of, and feedback on, the AVO prototype
- Identify science drivers for future extensions to the AVO

2. Review of Previous Meeting Notes and Action Items.

The meeting noted from the 12 June 2002 SWG meeting held at ESO, Munich, were read and agreed. (see http://www.euro-vo.org/internal/Avo/SwgReports/swg1206.txt)

NW noted that the requirements document resulting from the SWG sub group (chaired by Walton) (determining the functionality required by the AVO 1st Light demonstrator) were made available on the web at http://www.euro-vo.org/internal/Avo/SwgReports/AVO_Sci_Req.pdf

3. The composition of the work groups (see 6, 7, below) were decided.

4. AVO Work Area Reports to the SWG

Brief presentations were made to update the SWG on the current progress with the project,

4.1 AVO WA0 - Management

4.1.1 Programme

PQ reported that the project had been running for one year, and that the end date was November 2004.

4.1.2 Euro-VO

The AVO was funded under the EU FP5 programme (see http://dbs.cordis.lu/fep-cgi/srchidadb?ACTION=D&SESSION=163912003-9-23&DOC=8&TBL=EN_PROJ&RC as as pilot study for a future European Wide Euro-VO.

The Euro-VO would be funded through the EU FP6 programme, the 1st round of these calls close Apr/May and Oct 2003. Proposals were currently being formulated.

The Euro-VO was being constructed to have three major strands: The Data Centre Alliance, the VO Technology Centre, and the VO Facility Centre.

4.1.3 International Coordination

The AVO is a founder member of the International Virtual Observatory Alliance (see http://www.ivoa.net). All major VO projects from around the world are participants in this, including representative projects from the US, UK, Russia, China, Japan, France, Germany, Italy, and so forth.

This coordinating forum is primarily focused on agreeing interoperability standards. Currently it as active working groups in the following areas:

Content Description (UCD)

VOTable
Data Access Layer (SIA)
Data Model
Registry
Astronomical Query Language (AQL)

Discussion lists have been set up for each (see http://www.ivoa.net/forum). Participation and input from the SWG is welcome.

The next major meeting of the IVOA will be held at the IAU General Assembly in Sydney - 23 July 2003.

4.2 AVO WA1 - Science [ppt]

PB noted that the SWG has 31 members with an additional 20 'members at large'

This was the third meeting - paperwork from these being available from http://www.euro-vo.org/twiki/bin/view/Avo/SwgReports

The SWG terms of reference had been agreed and are located at http://www.euro-vo.org/internal/Avo/WorkAreaZero/AVO_SWG_ToR.pdf. PB noted the important role that the SWG was having in defining the science mission of the the AVO, from which the technical capabilities are being derived.

TP noted that the SWG welcomed the opportunity to explore the functionality present in the AVO 1st Light Demonstrator product.

4.3 AVO WA2 - Interoperability [ppt]

FG reported that significant work was under way in a number of 'interoperability' areas. Current 'hot topics' included:

- UCD's: should there be one/ a few / many? See http://vizier.u-strasbg.fr/UCD/ for background on this.
- Data Models, Web Services ('Sesame', a name resolver)

4.4 AVO WA3 - Technology [ppt]

AL noted that the AstroGrid was leading the technological aspects of the AVO. Relevant components are listed on both the AVO and AstroGrid wiki sites.

5. Update on Science Requirements Capture Process

NW reported on development of the AVO science requirements. Activity was concentrated in a number of areas:

- input from the AVO SWG
- activities in AstroGrid and its science requirements
- activities at both the CDS and Jodrell Bank.

This meeting would begin the progress of setting priorities on the next steps in the development of AVO technical capabilities.

6. Breakout groups:

NW informed the SWG that the focus of these working groups would be be to identify science topics in these areas and note capabilities required to speed the science discovery process.

The aim was to set a range of priorities for AVO in these broad areas, with each group lead by a group convenor.

- Cosmology :convenor: Dave De Young
- Galaxy Structure & Formation :convenor: Pepi Fabbiano
- Stellar and Planets :convenor: Timo Prusti

These groups met in breakout sessions before and after lunch.

7. Reporting Back

Short presentations were given to the plenary session of the SWG by the convenor of each of the working groups.

This group included, amongst others: Nic Walton, Yannick Mellier, Tony Banday, Bruno Leibendgut, Francoise Genova, Luiz Da Costa, Wolfgang Voges, Dave De Young (convenor).

7.1 Cosmology

DY reported that the group had split the cosmology area into a number of prime driver areas.

7.1.1 CMB

Need:

- Full Sky Data
- Large scale correlations
- Covariance Matrices
- Global data sets
- Numerical simulations

Issues:

- Characterisation of pixels
- Use VO for component analysis
  e.g., pt source removal; object variability
- Combine multiple datasets: Planck, MAP, CMB, ROSAT all sky

7.1.2 Cosmic Shear

Need:

- 5000 sq deg; I = 24.5 - 22.5
- Photo z’s (UVRIJK)
- 0.2"-0.25" pixels
- PSF < 1"
- Followup on specific objects

Issues/VO role:

- Exposure time calculators
- Mosaic/stack faint surveys
- Optical plus NIR data
- Query: recover raw data or do reprocessing via algorithm upload?
- Catalogue generation
- Return a VOTable
- Enable Astrovirtel

7.1.3 Large Scale Structure

Need:

- X-ray/optical/radio cross correlations
- Cross correlations with numerical simulations
- Use theory as simulated data

VO Role:
- Tools to find outliers, etc.
- Theory metadata
- Tools to extract data from theory cubes and do instrumental convolutions

7.1.4 Strong Lensing

Frequency of strong lensing will give insights into:
- Mass profile of DM halos
- Galaxy evolution
- Dark (non-baryonic) clustering

Need:
- Morphology search tools
- Transient search - time critical
- Time domain datasets

VO Issues:
- Lensing search results create the database for transient searches
- Time critical response

7.1.5 Chemical Evolution: Z(z)

Need:
- Keck, VLT archives
- Automatic redshift determinations
- ALMA data for dust, CO searches vs z
- UV photon tracking - reionization epoch

VO tools;
- Redshift finding machine
- issues; aperture corrections, area on sky, spectral libraries

This case was the major initiative based on spectral data

7.1.6 Universe at z=3 (other than emission lines)

Need:
- NGST data
- Cross correlations with ALMA, NIR, UV data
- Cross match with all other archives

VO tools:
- Appropriate filters
- Option to re-reduce data

7.1.7. Evolution of the fundamental plane with z

Need:
- Automated rotation curve measuring machine
- ALMA data
- SKA data
- Optical and IR data
- About 1 million objects with spatial and velocity resolution

Data are now sparse and will be for 10 years; this is a good test project with current smaller datasets

7.2 Galaxy Structure & Formation

PF reported on this groups activities.

The group consisted of: John Brooke, Gerry Gilmore, Mark Allen, Mary Kontizas, Patrick Leahy, Pepi Fabbiano (convenor), Peter Tomasson, Preben Grosbol, Richard de Grijs, Salim Ansari, Tom Oosterloo, Vagelis Kontikas.

Three major themes emerged from the discussion.

7.2.1 Analysis of very large data sets

Analysis of very large data sets applies both to survey data (e.g. SLOAN) and detailed analysis of high resolution observations of nearby objects.

Scientific objectives include:

- near field cosmology/galaxy structure/mapping/colors
- Population studies for nearby objects
- Large area correlation studies
- Colour-spatial cross-correlations.

The group identified the need for statistical analysis and cross-correlation tools. In particular, the following points were made:

- Access to sample characteristics and biases to aid in selection of unbiased/complete multi-wavelength samples.
- Use of limits in all quantities when detection is lacking
- The ability of getting feedback from the data point to the data cube. E.g. selects a subset of points via appropriate filter in a colour-magnitude diagram, and display /use images (postage stamps; adaptive zooming with remote data sets)
- Ability of define metrics for axes being displayed in an IDL-like language.
- Fuzzy cross-correlation for extended/complex objects
- Time axis

7.2.2 Multiwavelength analysis of ‘pointed’ data

Multiwavelength analysis of given galaxies requires:

- Metadata and data model

  - to handle image data , spectra (e.g. fiber datacubes), PSF/possibly varying, WCS, non-linearities. Sky coverage, mosaic-ing.

- Apertures need to be documented in spectra.

- Ability to extract point sources and their properties (e.g. SED, spectra), but also extracting properties (e.g. SED) of extended regions selected by user.

- User must be able to select SED model to flux data.

7.2.3 Theory data/ model comparison

Observing the Virtual Sky. Both for large set analysis and single galaxy studies there is need to have access to models, either from a reference library or user provided.

- Capability for user to input own models

- Models should be considered as a Virtual Sky, i.e. represent the 'truth' or the theoretician view of the truth.

The VO must give users the ability to observe these models, by convolving them with the appropriate telescope and instrument responses so that they can be directly compared with different data sets.

Finally, use of VO for definition of new instruments. For example, one can derive SEDs of a class of important objects and from this define the optimal photometric bands.

7.3 Stellar and Planets

TP reported on the stars and planets groups' activities.

This group included: Timo Prusti (convenor), Patricio Ortiz, Florian Kerber, Ana Gomez de Castro

The group noted that a stellar area project is required as a driver for future developments of the AVO demonstrator. In particular one exploiting spectroscopic observations of for instance the Orion nebular cloud.

Key demands from the stellar area included:

- Comparison tool for different kind of data from different sources
- Cross-correlation tool
  - Few sources (demo)
  - Large samples statistically
- Connection/collaboration with theoretical data (atomic/molecular lines)
- Connection to standards/templates and reference objects
- Handling of stacks of images of a single sky position (including different instruments)
  - Variability, proper motion, faint standards
- Stellar spectral classification

8. Implications for Future Capabilities

In the plenary session a number of areas for future capability were highlighted as of importance:

- access to photometric tools (e.g. redshift determinations)
- access to spectral data sets ability for
- user upload of data/models
- integration of model data (e.g. evolutionary tracks)
- access to theoretical data (e.g. atomic line data)
- access to statistical techniques (e.g. fuzzy cross-correlations)

Meeting Closed at 17.00