



Astrophysical Virtual Observatory

Science Working Group

DRAFT

**Minutes of the 1st meeting
(Garching, February 7th, 2002)**

Minutes of the 1st meeting of the AVO Science Working Group.

The 1st meeting of the AVO SWG took place on February 7th, 2002, at ESO, Garching. The list of members attending the meeting and of observers is attached, together with the Agenda.

Welcome. Introduction. Purpose and scope of the AVO Phase A Project

After a welcome address and an introduction on the scope and goal of the meeting, P. Quinn gave a short summary of the AVO Project. The opening of AVO jobs at the different AVO Partners Institutes was highlighted and members of the SWG were encouraged to publicize the opportunity and to suggest suitable candidates.

SWG terms of reference

P. Benvenuti introduced and commented the terms of reference of the SWG. He explained the concept of “principal members” and “members at large”, the latter being invited to contribute via electronic means to the discussion. The SWG will be asked to define the scientific requirements of the AVO, therefore will help shaping the main characteristics of the AVO. The main items on which the SWG will be asked to discuss are

- The scientific “quality “ of the data and its description in the AVO
- The limits of the scientific “accountability” of the AVO – i.e. how far can the AVO go in taking scientific decisions on its data, beyond those taken by the holders of the individual archives
- What are the new analysis tools that will be needed in the AVO context

The SWG will also be asked to regularly review the progress of the AVO and of its capabilities. In doing this, we have to keep in mind that “this” AVO Project is a “Phase A” or “pilot” implementation, therefore it will be somehow limited in scope and functionalities wrt a full-fledged AVO. However, the SWG will be asked to help in defining the latter, in particular for what concerns its operation (e.g. should the AVO be just a “system” to be accessed by the community or should its also offer human expert assistance? In the latter case, should the access be controlled by peer-review?)

AVO Science Reference Mission

The subject of the AVO Science Reference Mission was then introduced for discussion: should the AVO define a SRM in the similar way as other major astronomical projects are doing or is it better to follow a different approach? Members of the NVO Science Definition Team commented that the matter was still being debated within their Team without reaching consensus yet. The main difficulty being the identification of compelling/convincing scientific cases that are unique, i.e. that can only be achieved if a VO exists. It was commented that, since AVO is already funded and has defined (limited) scope and goals, it could afford not to be convincing by designing hypothetical high-level science cases. It is more important to convince the consistent fraction of our colleagues that are somehow skeptical about AVO that its implementation can indeed open new, essential research capabilities. After

extensive discussion it was agreed that the AVO approach to the SRM should move in two directions:

1. A definition of what “ideally” AVO should be in its full implementation. This definition can take shape during the AVO Phase A and will be part of the Phase B implementation plan.
2. A definition of a small number of test science cases that AVO should implement and offer to the community as “examples” of the AVO capabilities. These cases should be scientifically appealing as well as sufficiently representative of the AVO final goals (in particular in terms of multiwavelength coverage).

As for point 1, an initial definition of the “ideal” AVO was sketched as a multidimensional data cube whose “axes” were the celestial coordinates, wavelength, spectral/photometric resolution, time, time resolution, polarimetry. AVO should provide efficient (to be defined) tools to operate on this hyper-cube for browsing, fetching and analyzing the data.

SWG members were invited to elaborate and expand this initial definition.

As for point 2, the discussion initially focused on two existing projects, GOODS and ELAIS, that seem to be represent reasonably good test cases for a limited but significant implementation of AVO capabilities. It was concluded that indeed GOODS and ELAIS are good candidate. The SWG members were asked to analyze them in more detail and to make specific recommendations. It was commented that both GOODS and ELAIS are extragalactic/cosmological projects, therefore it would be useful to add a “galactic” test case. No existing specific science project was mentioned, but there was consensus that a multiwavelength data-hypercube in the direction of the “Orion” region would be a suitable choice. It was then noted that the two cases so far discussed were both limited in sky coverage and it was proposed to include a third test case with the main characteristic of extending over a sizeable fraction of the sky. Alternatively, it was proposed to include the Magellanic Clouds as a test case linking galactic with extragalactic astrophysics. The discussion on a third case did not converge and the SWG members were asked to propose specific cases, based on well-identified scientific goals.

For all the proposed cases, the observational data should be linked to theoretical models and simulations (when available) and to the existing literature.

For all the proposed cases, the SWG members were asked to describe how and with which scientific aims they would use these pilot AVO implementations. This initial scientific use of the pilot AVO will help in defining a “data model” for the multi-wavelength characterization of different objects as well as the requirements for new browsing and analysis tools.

A clarification was asked about the actual archives and databases to be included in the pilot (Phase A) AVO implementation: should they be limited to the data holdings of the AVO partners or can they be extended to “external” archives? It was concluded that, by default, all the archives of the AVO partners will be used; external archives will be added if feasible.

Science quality

It was stressed once again that the quality of the data that are offered via the AVO is of paramount importance for the success of the project. The concept of “data quality” is relative to the scientific aim, therefore what is important is “how” the data quality is described in the AVO context. A typical example (taken from the requirements of some ASTROVIRTEL proposals) is the image quality and how this is described for a specific frame: ideally, for some science applications, the actual PSF and its variation across the field of view should be provided. If this information is not available in the original data, AVO should either provide it or offer tools to evaluate it.

The following “elements” of the data quality were introduced and discussed:

- astrometry
- photometric quality
- spectral extraction
- psf/image quality
- instrumental properties
- links to catalogues and published data

Concerning astrometry, it was concurred that if AVO succeeds in providing a solution to the WCS issue in different archives, it will be very favorably received by the community. AVO should define a standard procedure (or a toolbox) for solving the “astrometric interoperability” issue among different archives, possibly based on the experience of cross-identification of objects in different archives (e.g. Class-X for the identification of X-ray sources). It was mentioned that CDS is already addressing this issue.

An action was assigned to P. Leahy and W. Voges to analyze the problem, in coordination with NVO, and to draft a proposal.

The importance of a “standard” description of the photometric characteristics of the data was also addressed. To start with, the actual band-pass of the instrument should be linked to the data in tabular form. The VOTables, that are currently discussed by the AVO Interoperability Working Group, may offer the proper tool.

An action was assigned to M. Kontizas and A. Micol to analyze the problem and to draft a proposal.

The increasing availability of multi-object and objective prism/grism spectroscopic data is posing the issue of how these data should be extracted and presented within the AVO. It was concurred that an automatic spectral extraction capability should be available. Its scope of applicability and its limitations should be clearly indicated to the user.

The requirement for a link between the data and the existing relevant literature was stressed. It was noted that there is already an extensive experience on the matter (e.g. at CDS, the ISO Archive, etc.) and AVO should capitalize on it.

Scientific accountability

The issue of “scientific accountability” was introduced. At the moment each Observatory is responsible for its own data holdings/archives. AVO will federate these different archives. Should AVO remain “neutral” in the process or should it take responsibility for some, well defined, scientific added value products? E.g. should AVO always leave the cross-identification of objects in different wavelengths to the user or should it, in some cases, provide the identification as an AVO science product (an AVO Catalogue)?

The discussion on the matter was extensive, but did not converge toward a specific resolution, although the majority of the Group was suggesting a rather cautious approach in taking scientific decisions within AVO. The possibility of offering the AVO as a “host” for individual science results was also discussed, but, given the inherent difficulties, it was suggested to postpone any decision on this point when the pilot AVO has taken shape.

Items for future discussion

There was no time left to discuss the possible items for future meetings. An action was assigned to everybody to propose them to PB.

Summary of actions – date of next meeting

1. Provide feedback on the choice of test cases (GOODS, ELAIS, “Orion”, “large sky coverage”, Magellanic Clouds) (Everybody)
2. What type of science would I like to do when the “test cases” are available in the pilot AVO? (Everybody)
3. Assess the “astrometry” issue in the AVO context and prepare a draft proposal (P. Leahy, W. Voges)
4. Assess the “photometry” issue in the AVO context and prepare a draft proposal (M. Kontizas, A. Micol)
5. Propose additional topics for discussion (Everybody)

It was proposed to hold the next face-to-face meeting during the AVO Conference in June. Details will be communicated once the Conference Programme is available.

AVO Science Working Group – 1st meeting

ESO, Garching, February 7th, 2002

Council Room – 9:00 –17:00

Draft Agenda

1. Welcome. Adoption of the Agenda.
2. Introduction. Purpose and scope of the AVO Phase A Project
 - a. Science
 - b. Interoperability
 - c. GRID and storage technology
 - d. The AVO Conference (June 2002)
3. SWG terms of reference
4. AVO Science Reference Mission
 - a. Is a SRM the right way to go?
 - b. Possible alternatives?
 - c. Is it possible to define AVO science now?
 - d. SRM by “examples”?
 - e. Short and long term goals
 - f. Assignment of actions and homework.
5. Science quality
 - a. What is meant by “quality”?
 - b. “absolute” and “relative” quality – different definition in different wavelength ranges,
 - c. Description of quality – ancillary data.
 - d. Minimum acceptable levels (in different wl ranges and for different science applications)
 - e. Requirements to the “Interoperability” area.
 - f. Assignment of actions and homework.
6. Scientific accountability.
 - a. Raw data vs. science products – where to draw the line?
 - b. Customized on-the-fly processing?
 - c. The HST HDFs and GOODS paradigm – applicability to AVO.
 - d. Scientific decision traceability
 - e. Users contributed products
 - f. Assignment of actions and homework.
7. Items for future discussion
 - a. Data analysis issues
 - b. Distributed S/W tools
 - c. ...
8. Summary of actions – date of next meeting