AVO Science Demo – Draft Implementation Plan

Background.

During the telecon of 1/7/02 the AVO Executive Team discussed the paper "science requirements for the AVO Earky Demonstrator", prepared by the AVO SWG Subgroup chaired by N. Walton and decided the following priority list for the science cases to be the subject of the 1st AVO Science demo:

1. GOODS – tools for SED extraction and analysis with the aim of selecting objects for follow-up spectroscopic studies
2. Magellanic Clouds – tools for analysing the time variation of stellar color-color diagrams
3. Orion – multiwavelength (including radio) analysis of structures (proto-planetary disks, compact HII regions, etc.)

The possibility to include radio data in the GOODS data-cube should be further explored, both for the Chandra South FOV and for the HDF-North and independently from the requirements of the GOODS Team.

On the basis of the scientific requirements for the 1st case (GOODS), the following section outlines the functionalities that have to be implemented.

Assumption on the data-cube.

It is assumed that the existing X-ray/optical/infrared images that constitute the GOODS data-cube have already been astrometrically registered and "mosaic-ed" by the GOODS team. From discussion with L. Da Costa this is indeed the case (at least for the optical-IR ESO data). The role of the AVO (Work Area 1) is to ensure that the homogeneity of the data-cube is preserved with the addition of new data-sets (e.g. ACS images). The final aim of the exercise is to define a set of standard AVO procedures for the astrometric registration and photometric cross-calibration to be applied in the future to other data-cubes. The issue of consistency with similar NVO procedures should be addressed.

Functionalities to be implemented

1. Visualizer for pre-viewing the data-cube

- A tool should be available for browsing through the data-cube, with the aim of inspecting it and selecting areas of interest.
- It could be derived from the Aladin screen, possibly with the addition of a (limited) scrolling/zooming capability
- The pre-view images of the data-cube will have to be prepared in advance, by suitable combining multicolor images. Experience and feed-back will tell if it is desirable to provide more than one preview RGB image (e.g. optical/IR, X-ray/optical, etc.)

- The possibility for displaying, while browsing, the multiwavelength coverage in different areas of the data-cube, should be considered. This tool will be very important for future, non-GOODS data-cube where the multiwalength coverage may be patchy.

2. Cut-out service for field selection

- A tool should be available for selecting a portion of the data-cube for further analysis (SED extraction and color-color analysis)
- Initially it could be a set of predefined (e.g. 3) FOVs of different sizes. Later it should be interactively definable by the user.
- Before "cutting-out" the desired FOV, the information about the WL coverage should be detailed (issue to be addressed: how to deal with existing spectra)

3. Selection – loading data

- When the cut-out is selected, this FOV becomes the user workspace. It is important to stress that only at this moment the data-cube becomes accessible to the user, while the previous image was only a pre-view representation of the data-cube. This distinction is particularly important for the future, when the actual data that belongs to the data-cube, will be remotely distributed.
- Adopting the Aladin paradigm, at this point the various "layers" that constitute the data-cube are automatically down-loaded. Initially they download in a well defined central site, later "downloading" might mean simply opening a GRID link with the various data-holdings.
- Together with the "pixel" data, an AVO pre-extracted object catalogue for the selected FOV will be downloaded in one of the layers. This catalogue can be seen as the "pre-view" SED information of the objects in the field.
- A tool should be implemented for visualising the pre-view SED of each object in the FOV – could be an interactive "slider" that calls up a spectral window when passing over the object of interest.
- There should be the possibility of "marking" objects of interest for further analysis (see below)

4. Re-extraction of the SED

- The user should be able to re-extract the SED for the "marked" objects by accessing the original "pixel" data.
- This functionality should "call-up" the menus/forms of the relevant extraction packages (e.g. Sextractor for the optical/infrared).
- This functionality should be kept relatively "open", since different users may want to follow their own procedure.
- Experience and feed-back will tell us if it is more convenient to re-extract the objects SED from the entire FOV or for the marked objects only.

5. Additional functionalities

Although these may be beyond what can be achieved by January 03, it is important to foresee some additional useful capabilities to be implemented later.

- A fitting capability for the extracted SED
- Capability to display a color-color or color-magnitude diagrams of the objects in the FOV, highlighting the one under inspection.
- Capability to display, together with the SED, a series of postage-stamp cutouts showing the object under investigation in the different available images.
- Capability to compare the extracted SED with SED Atlases
- Capability to identify, within the selected FOV, objects with given SED characteristics
- Capability to identify a "training set" of objects with similar SED to be used (e.g. by a neural-net program) to identify classes of objects within the selected FOV or in the entire data-cube.