## ROUND TABLE DISCUSSION OF THE SESSION: "VO SPECTROSCOPY STANDARDS AND TOOLS"

**Moderators: M.Allen & P.Skoda**

**Introduction:** The main issues emerged during the session, and on which we would like the discussion to focus, can be summarised as follows:

- VO people and "standard" (conservative) astronomers may represent two different communities
- it is reckoned that standards (such as the data models) may be too complicated to handle everything
- stellar astronomy is often dealing with a detailed study of individual stars (searching for timing properties , periods etc.). Is the VO mostly for "one-shot" science? For surveys?
- several spectroscopic applications at different level of evolution and maturity are currently available: `VOSpec`, `SpecView`, `SPLAT`. However, still most of the knowledge on the spectroscopic analysis is in legacy applications such as IRAF, MIDAS, Starlink. VO-enabled applications need to cover several functionalities before they can "compete" with them:
  - dealing with standard file formats: 1-D FITS, tabular ASCII, tabular binary
  - properly interpreting WCS
  - performing operations, which are daily bread for spectroscopic astronomers: over-plot different spectra, transformation from wavelength to radial velocity space, cut-out of line regions
  - ... and handling of Echelle spectra: whether different sections should be merged or not is still an issue
- it should be easy for the user to understand which is the intrinsic accuracy of the data. This may imply checking the original (raw) data
- small telescopes (1–2 m) should be encouraged to publish their data in the VO as well. If we wish to convince them, we need to show them the VO potentialities and capabilities now, and make sure that they are attracted by the possibility of increasing the publication rate, to open new collaborations, and to respect the restricted access to part of their data holding
- a "ToolKit" to publish the data is required, easy to install on our workstations. None of the available solutions now look fully convincing or integrated in the VO
- Will people eventually learn using the VO? Yes, if we can prove its scientific effectiveness.

**Tody**: There is now an IRAF package called `NVO`, which can directly access VO data. It is already functioning, although it has not been released yet.

**Piskunov**: Let's go to an anthropological point. As an individual astronomer, I do not see a strong motivation to share my data in the VO, because I am not ensured that they will be properly referenced.

**McDowell**: The propagation of curation information in the VO is one of the main concern in the discussion at the IVOA level. The current idea is to ensure this through proper keywords (`CURATOR`, `PUBLISHERS`, ...)

**Osuna**: VO applications such as `VOSpec` pop-up windows with metadata if you double-click on the data tree.

**Cerviño**: It is not enough to have curation information in the registry. The problem with the current VO applications is that it is not trivial to reach the metadata. Eventually, the provenance field gets lost if the user is not driven in an easy way toward it

**Richards**: Ultimately the way out this issue is promoting a culture of respect for publication and curation among the journal editors in the VO era. In the long run, publishing data in the VO will be more beneficial for the citation record than sitting on the data and not exposing them to the VO world.

**Allen**: Which should be the directions of the future development of VO spectral applications? Which are the priorities to maximise their usefulness to the science communities?

**Cropper**: We need the three "W"s: Workflows, Workflows, and Workflows. However, they need to be improved, to be able to handle $\geq 10^4$ spectra.

**Genova**: It is already now possible to use `Aladin` via scripts (this has been a "lesson learnt" from the astronom-

ical image community). This evolution boosted the usage of `Aladin`.

**Allen**: Linking the VO with the GRID (or any distributed computing environment) is the way to go.

**Tody**: Eventually, it is a scalability problem. Both desktop and scripting usage are required, depending on the scale of the problem.

**Skoda**: A potential problem for individual astronomers, wishing to export their application in the VO, is to understand whether a given application needs to be implemented on the client or the server side.

**Tedds**: There has been a lots of effort spent on workflows in Astrogrid. However, users were not happy with the outcome, and pushed us to adapt current workflows to `Phyton`. We are now adapting workflows to a standard template. A solution good enough for 80% of our potential users would be a TAVERNA-like graphical interface. A pure scripting for the remaining 20% of the science cases can be envisaged.

**Chiligarian**: Implementing everything on the client side would let the tools grow exponentially. This is not a good solution in the long run.

**Allen**: Are the existing IVOA spectral standards comprehensive enough?

**McDowell**: PRESENTATION ON THE SPECTRUM DATA MODEL

**Genova**: A simple web form could also be used to characterise the data model

**McDowell**: The model may look a bit too complicated. However, the truly mandatory parameters are not many. Astronomers are encouraged to review Tab. 1 in the document, to check if anything is missing.

**Cerviño**: This data model is good, but coordinates should not be mandatory. This would limit its applicability to theoretical spectra

**McDowell**: Good point, the document should reflect this. [And, following some specific questions on the model ...] The model takes also into account the continuous nature of simulated data. And it allows parameterising for raw or calibrated spectra as well.