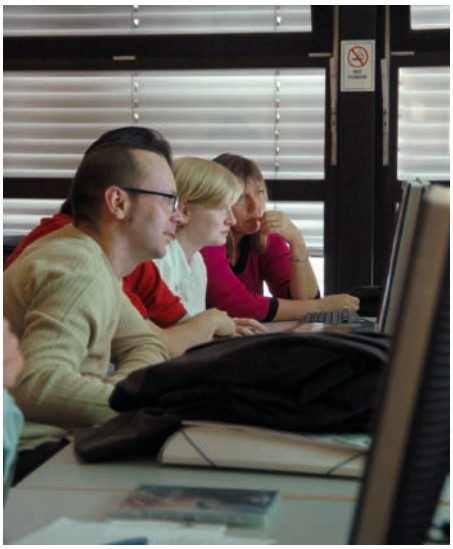
experiment and see the changes to the final image product through different techniques within Photoshop.

Lisa Frattare and Robert Hurt extended this theme with two workshops on more advanced image processing 'tips & tricks' for how to clean and correct the colour images as well as make a better composition. Greg Bacon (NASA/STScI) presented a session on how to undertake simple animation studies. Finally in this theme, Martin Kornmesser and Lars Lindberg Christensen hosted a session devoted to producing your own DVD. Govert Schilling gave two sessions devoted to how to write for the media and an interactive discussion on the rights and wrongs of producing a good press release. Terry Mahoney gave an overview of the basic contents of a toolkit for astronomers involved in outreach and the do's and don'ts of a successful programme. There is no doubt that this focused skills-based workshop-style was extremely beneficial and well appreciated by the attendees.

The conference summing-up was undertaken by Professor Paul Murdin (Cambridge) who brought together the various themes, tensions and links and additionally suggested a possible theme for the next conference, which will be in 2007.

One of the "Hands-on Workshops" at the conference.



The meeting was organised by Ian Robson and Lars Lindberg Christensen supported by Scientific and Local Organising Committees. The work of the 'FITS Liberator' team was enormous in making the conference both successful and right up to the minute in terms of technology.

So all those interested in outreach should go to the IAU Working Group web-page: *http://www.communicatingastronomy.org* and enrol on the "Supporters" sign-up sheet so that we can keep you informed of progress and future events. The proceedings of this conference are currently being edited and are planned for publication in September.

The organisers wish to acknowledge financial and infrastructure support from ESO, as well as support from ESA and the IAU.

Photos: L. H. Nielsen, ESA/Hubble (2)

Social event: Visit to one of Munich's many Biergartens.

Report on the ESO Workshop on

Virtual Observatory Standards and Systems for Data Centres and Large Projects

Paolo Padovani, Markus Dolensky (ESO)

The Virtual Observatory (VO) is an innovative, evolving system, which will allow users to interrogate multiple data centres in a seamless and transparent way, to best utilise astronomical data. New science will be enabled, moving astronomy beyond "classical" identification by allowing the characterisation of the properties of very faint sources by using all the available information. The VO requires good communication, that is the adoption of common standards between data providers, tool users, and developers. These are being defined using new international standards for data access and mining protocols under the auspices of the International Virtual Observatory Alliance (IVOA: *http://ivoa.net*), a global collaboration of the world's astronomical communities. At the European level, in addition to seven national VO projects, the European Community funded collaborative EURO-VO is the successor of the Astrophysical Virtual Observatory (AVO: e.g., Padovani et al. 2004, The Messenger 117, 58) and the logical next step from AVO as a deployment of an operational VO in Europe (more on EURO-VO in a future issue of The Messenger).

Data centres lie at the foundation of the VO, as obviously access to astronomical data at all wavelengths is a key requirement. The VO cannot (and does not) dictate how a data centre handles its own archive. All that is needed is a VO-layer

Group photo of the ESO workshop on Virtual Observatory Standards and Systems for Data Centres and Large Projects held from June 27 to July 1 at ESO Headquarters.

Photo: H. H. Heyer, ESO

to "translate" any locally defined parameter to the standard (i.e., IVOA compliant) ones. For example, right ascension can be identified in different ways but the VO user needs to know which of the many parameters accessible through an archive interface is the right ascension. The longer-term vision of the VO is also to hide away any observatory/telescope/instrument specific detail and work in astronomical units, for example, "wavelength range" and not grism or filter name. Data providers are then advised to systematically collect metadata ("data about data") about the curation process, assign unique identifiers, describe the general content (e.g., physical coverage) of a collection, and provide interface and capability parameters of public services. Finally, the VO will work at its best with high-level or "science-ready" data, and data centres should make an effort to provide such data.

To get data providers started in most of the above, the EURO-VO held a workshop at ESO Headquarters in Garching from June 27 to July 1, 2005. The workshop was explicitly designed for data centres and large projects to acquire the knowledge and experience necessary to allow them to become "publishers" in the VO. In tutorials and lectures, participants were instructed in the use of VO analysis tools, libraries, and the existing web service infrastructure to build VO compliant services. The workshop was aimed at software engineers and designers building archive interfaces, writing applications accessing remote data, or designing archive facilities and data flows for future instruments and missions.

More than 120 participants, coming from 47 different institutions and 16 countries, attended the workshop, with representatives from 11 out of 15 IVOA members.

The workshop started with an overview of the EURO-VO project structure. An introduction on the current status of standardisation efforts and international IVOA working groups was then followed by a conceptual approach to the software architectures available to publish data to the VO.

More specific lectures prepared the participants for two full days of hands-on tutorials. Several software demonstrations by various VO projects illustrated the current capabilities.

The seven tutorials took place in parallel sessions and exercises were conducted on the participant's own laptops. Up to 100 laptops were on-line through the wireless Local Area Network (LAN), challenging ESO's excellent internal network infrastructure without actually reaching its limits. The tutorials dealt with the following topics: Data access layer, that is tools and protocols for sharing images and spectroscopic data; Astronomical Data Query Language (ADQL)/Skynode, which is about accessing databases and publishing catalogues; VOTable, the Extensible Markup Language (XML) VO standard format for the interchange of data, and the rich variety of tools and libraries to support it; Metadata, that is how to tag concepts in Astronomy in a machine readable form using a defined vocabulary called Unified Content Descriptors (UCD); Grid and web services, namely Information Technology basics and how to set up a service in order to share it on the local network; Registries, which are places where available resources such as astronomical data collections and software services are described. Participants learned how to set up such a registry as well as how to populate and search it.

Finally, the data centre infrastructure tutorial brought all of the above together and demonstrated a prototype framework supporting the various formats, protocols and concepts.

Judging from the participants' feedback, which was collected through a questionnaire, the workshop was considered "useful" or "extremely useful" by 95 % of the respondents. The tutorial material (see below) is a collection of software which, although still not in a final state, represents a unique and up-to-date snapshot of "state-of-the-art" VO technology.

The workshop agenda and contributions are available on *http://www.euro-vo.org/workshop2005*. The tutorial software was packaged and can also be accessed through FTP from the workshop page. It is mostly in Java and works on the most common platforms such as Linux, XP, and Mac OS.