

The 2006 ESO Science Archive Survey

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We present the results of the 2006 ESO science archive survey aimed at improving services to the astronomical community. Future archive development plans will be based on user feedback.

The ESO Science Archive Facility

The ESO Science Archive Facility (SAF) has been operational at ESO Headquarters in Munich since 1991. It contains data from ESO telescopes located at the La Silla, Paranal and Chajnantor observatory sites. Since June 2005 it also contains data from the UKIRT Infrared Deep Sky Survey taken with the Wide Field Infrared Camera. The SAF is operated by ESO in collaboration with the Space Telescope European Coordinating Facility and also provides access to Hubble Space Telescope data for the HST user community. Except for a few special cases, all ESO science observations have a proprietary period of one year. After this period the archival data sets and abstracts of the successful ESO proposals are available worldwide to the general astronomical community. All calibration data are public immediately after the observations. The ESO archive also contains high-level science data products packaged and delivered to the community via special releases: e.g. VLT Commissioning and Science Verification data, ESO Imaging Survey, Advanced Data Products.

The 2006 ESO Science Archive Survey

The survey was an initiative of the Virtual Observatory (VO, Padovani and Quinn 2005) Systems department at ESO. It focused on the ESO part of the ESO/ST-ECF SAF only. It was designed to determine which services and interfaces are best suited to the user needs and which features they would like to see added. This short on-line survey was issued on 1 March 2006 and ran for one month. The announcement for the survey was sent by e-mail to all registered archive users. A further announcement was posted on the main archive web page. The participation rate of the community was very good. 558 participants returned the questionnaire out of 1600 active users. The survey contained questions addressing four main areas: user profile, current ESO archive services, publications based on ESO data and future of the ESO SAF. All the survey responses for each question, including various graphics, can be accessed on-line at http://archive.eso.org/archive/stats/survey/survey_results.html.

Composition of the user community

The scope of the first questions was to characterise the ESO archive user community. Basically, 84 % of the survey respondents are not affiliated to ESO, 60 % are Principal or Co-Investigators of some ESO observing programme(s), 61 % are professional or post-doc astronomers and one fourth are students. Amateur astronomers account for a non-negligible part of the user community (7 %) whereas teachers, educators and journalists account for only 1 %. A majority of respondents (58 %) use the ESO archive a few times a year and 29 % of the respondents use it several times a month.

ESO archive services

The ESO SAF offers a number of on-line information services (Rossat et al. 2005) relevant to ESO users and to the community at large, among which are: several archive browsers (for observations, observing programmes and scheduling, user publications), access to the ambient conditions database, and to the Digitized

Sky Survey and catalogue servers (GSC, USNO-A2.0, astrometric catalogues). The main ESO archive query form is widely used (91 %). It was re-designed last year for the worldwide opening of the ESO archive on 4 April 2005 (Delmotte et al. 2005). It is intended to aid first-time users of the ESO archive and astronomers with no previous experience with ESO instruments. See Figure 1 for a more detailed usage of the various ESO archive services. The primary reasons for using the ESO archive services are scientific research (86 %) and planning of future observations (51 %). Satisfaction levels for interface, documentation and operation related matters are already quite good, if not excellent (Figure 2).

Publications based on ESO data

63 % of the survey respondents have published papers based on ESO data and 72 % of those respondents actually published papers based on genuine archival data, that is, not belonging to their own observing programmes. This is a noteworthy trend for a ground-based observatory. As already noticed by other astronomical data centres (Walsh and Hook 2006), archive-based research is indeed becoming prominent. However, the size and variety of data are rising fast, meaning more complexity for the end users of the ESO archive. Thus, to improve the scientific return of the archive, the ESO VO Systems department is actively involved in producing and publishing Advanced Data Products (ADPs), i.e. highly processed ESO data products, ready for immediate scientific use, e.g. the GOODS/ISAAC data release (Retzlaff et al. 2005). The largest fraction of ADPs will be provided by the astronomical community, e.g. the Garching-Bonn Deep Survey/WFI data release. Public Survey data products from VISTA and from OmegaCAM at the VLT Survey Telescope will also populate the SAF. In addition, as of Period 75, Principal Investigators of ESO Large Programmes are required to return their data products to the ESO archive at the time of publication of their scientific results (Pirenne and Quinn 2004). The survey analysis revealed that already one third of archival papers are based on high-level data products (ADPs, EIS, Science Verification, Commissioning data),

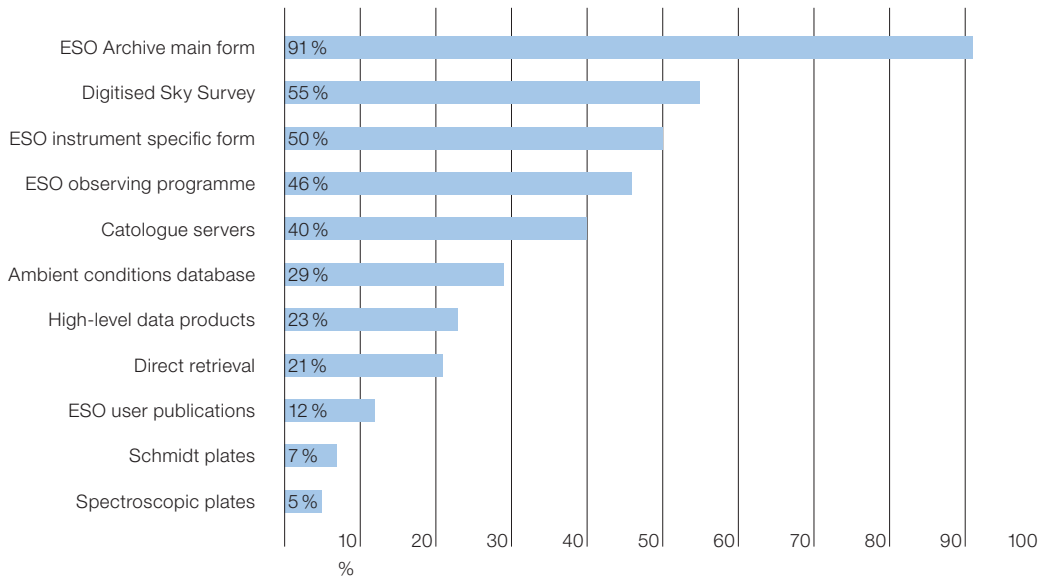


Figure 1: Percentage of usage of ESO SAF services by the survey respondents.

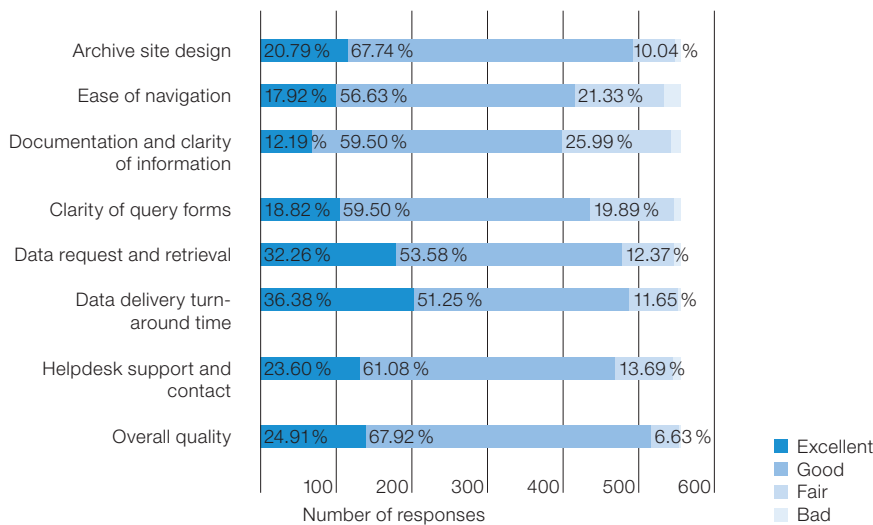


Figure 2: Measures of satisfaction of the survey respondents with the ESO archive.

as opposed to raw data. Given that the ESO archive contains more than 3 000 raw data sets and around 100 high-level data sets, the survey responses in Figure 3 (top) were weighted to better reflect the science productivity based on either raw data or high-level data products. Thus a high-level data set is approximately 15 times more likely to lead to a scientific publication than a raw data set (Figure 3, bottom). Similar trends are apparent from other archive facilities, such as HST. This is one more indication that ADPs are valuable components of the ESO SAF and are likely to foster its scientific exploitation.

ESO SAF development plan

Answers and satisfaction levels gathered from the present survey helped identifying areas needing improvement and this will drive the actual archive development. The analysis of responses, including free input text comments and suggestions, revealed that most users already consider the SAF services satisfactory but indicate areas of improvements. The main user requests are: more complex/powerful query capabilities but still with easy/light interface, more ADPs and data reduction support, easy and direct access to calibrations, and better characterisation of data. In particular, the possibility to

search the ESO archive by input list of coordinates, to quickly access data previews, and the ability to search by object class being the most frequently requested new features (see Figure 4), these will be taken into high consideration. Finally, 41% of the survey participants consider they are not sufficiently kept informed about what is new in the ESO archive. As a solution, regular archive headlines will be published in the ESO Messenger in addition to the news and announcements that are currently advertised on the main archive web page.

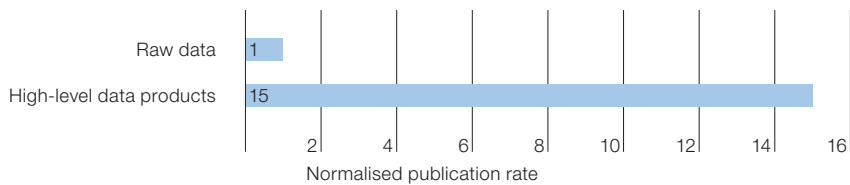
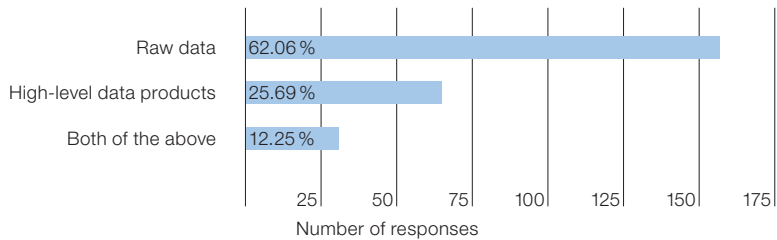


Figure 3: Top: Nature of the data used in ESO archival papers. **Bottom:** Scientific productivity of raw versus high-level data sets, given a quantity ratio of raw to high-level of 3000 : 100.

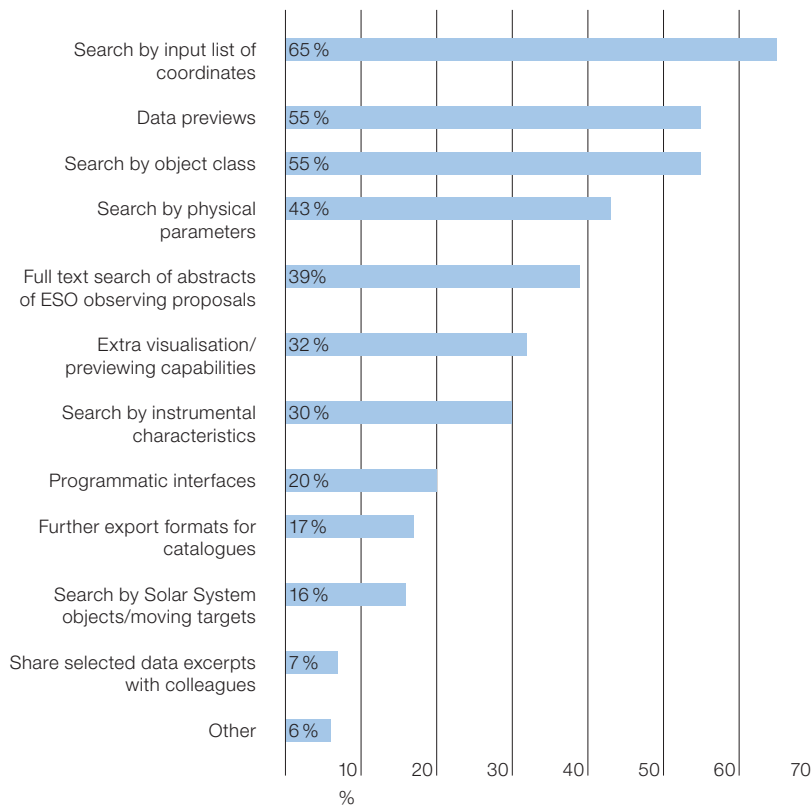


Figure 4: List of features the survey respondents would like to see in the ESO science archive interface.

Latest News

After the completion of the survey, a number of improvements have already occurred at the ESO SAF. The possibility to upload a list of both coordinates and object names has been added to the main ESO archive query form. The first APEX-2A Science Verification data were released and the APEX instrument specific query form is now available. Finally, the VO Systems department has already

started to implement services compliant with the VO access methods and formats. As a way to receive more feedback and to ensure that the ESO SAF continues to address its user needs, more surveys will be issued in the future. New survey results will help focus efforts to develop and enhance the ESO SAF services to the astronomical community.

Acknowledgements

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