

The **ASTRO-WISE** (**A**stronomical **W**ide-field **I**maging **S**ystem for **E**urope) programme will provide an astronomical survey system by creating the tools necessary to reduce and mine the data produced by the new generation of wide-field sky survey cameras. The programme consolidates the common expertise of the partners and co-ordinates the development of software tools including an exchangeable computing infrastructure with which users can calibrate, analyse, and extract sources from wide-field images. Astro-wise has ambitious goals in terms of on-the-fly-reprocessing, parallel processing, data-basing of very large data volumes (several 10's of Tbytes), designing and creating dynamic archives, and federating data volumes over the various national data centers involved. Astro-wise will become one of the first operational Virtual Observatory systems.

Wide-field Imaging of the Sky

The recent, rapid development of large digital CCD detector devices allows deep and ultra-sharp imaging on previously unheard of scales, in a multitude of different filters. At ESO's Paranal (Chile) site a new telescope is nearing completion which will be entirely dedicated to the wide-field imaging of the sky—the VLT Survey Telescope (VST). Its dedicated wide-field instrument OmegaCAM will, in a single image, map an area of the sky as large as 4 times that of the full moon (1m°) in an array of $16\text{k} \times 16\text{k}$ pixels (256 million pixels) with an unprecedented combination of field size and image quality.

The enormous data volumes produced by this wide-field imager brings astronomical research to the edge of modern information technology. For OmegaCAM, an annual rate of about 30 TB of raw science image data is expected, which after reduction will deliver about 10 TB/year of image data ready for scientific research. **Each** OmegaCAM image will contain about 10^5 astronomical objects and the estimated yearly production of source-list tables describing the properties of these objects (position, brightness, shape descriptors, colour, etc.) will be of the order of 1 TB/year. This new branch of observational astronomy is now well on its way: the VST and OmegaCAM will be operational in the summer of 2005, while its counterpart camera in the Northern hemisphere, MegaCAM, has already begun observing. By late 2007, VISTA, a wide-field telescope optimized for near infrared wavelengths, will also be operating on Paranal.

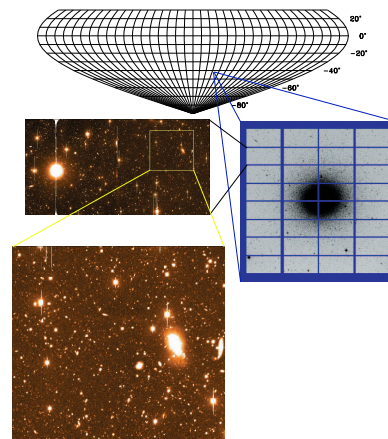
Astronomical Wide-field Imaging System for Europe

In the context of Astro-wise, national data centers in Germany (München), Italy (Napoli), France (Paris), and the Netherlands (Groningen), will support their users' community and provide the infrastructure for the processing, storage, and distribution of these enormous data volumes. The centers will operate high performance, multi-node computer clusters and provide many TB's of direct access storage.

The specific objectives of Astro-wise are:

- to develop, maintain, and provide access to a computational environment to process wide-field imaging data; the EU-wide shared environment will house both up-to-date calibration data and pipeline software.
- to develop and disseminate software tools needed to access the wide-field image data (e.g. TB regime search and visualisation tools).
- to provide infrastructure for the production and dissemination of survey data to be accessed by virtual observatories.

The implementations of these objectives in the TB regime differ from the current approach in which raw data is processed with a standard pipeline to deliver a static catalogue. Instead, with Astro-wise's dynamical approach a given user can query this system, re-derive the results, and optimize them to his particular scientific goals. The system would provide a first step towards the building of a Virtual Observatory.



An Illustration of the volume of data expected from an OmegaCAM sky survey. Top: The Southern sky with a 10×10 degree raster (a public surveys will be about 1000m°). A single OmegaCAM exposure is shown as a small square. Right: A Simulated OmegaCAM exposure, with the 32-CCD mosaic clearly visible. Left: An actual CCD image, covering the same amount of sky as each OmegaCAM CCD to a similar depth. The lower image is a sub-section at the resolution of this poster.

Web page: <http://www.astro-wise.org/>