Lessons learnt from building the astronomical Virtual Observatory

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Astronomy has historically been at the forefront for providing the scientific community with on-line, networked, very diverse resources, such as observatory archives, compilation databases, and now also theoretical services, including also rich links to academic journals. The next step has been an international effort to provide seamless access to the resources through the so-called astronomical Virtual Observatory (VO). The concept emerged around 2000, the first projects were funded in 2001, and the International Virtual Observatory Alliance, an alliance of the national (and continental) VO projects which establishes a common roadmap and defines the required interoperability standards, was created in 2002. The IVOA standards definition follows a formal process inspired from the W3C one, and Working Groups are in charge of the different aspects (data access layer, data model, registry of resources, semantics, …). The standards take into account disciplinary needs, but also use when possible generic bricks: for instance, the VO registry of resources is OAI-PMH compliant (with extensions allowing one to describe the astronomical resources), which makes it compatible with the registries of the digital library world. A description of the IVOA, the IVOA standards, the Working Group web pages and email discussions are available from the IVOA web page: **http://ivoa.net**. The VO is incrementally made accessible to the community, and it is in transition towards an operational phase, including an assessment and update of the way IVOA is working to adjust at best to the community needs in this new phase. The VO is a rare example of a heterogeneous, distributed, world-wide data grid, widely used by the scientific community. Some of its elements are re-used in similar projects in nearby disciplines. Lessons learnt will be discussed.