

ASTRONET

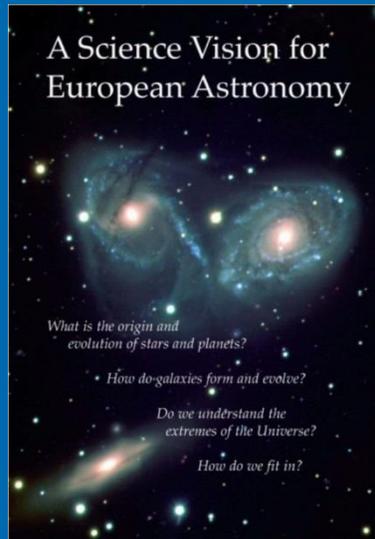
Open Universe Initiative *Expert meeting*

Rome, 11 Apr 2017



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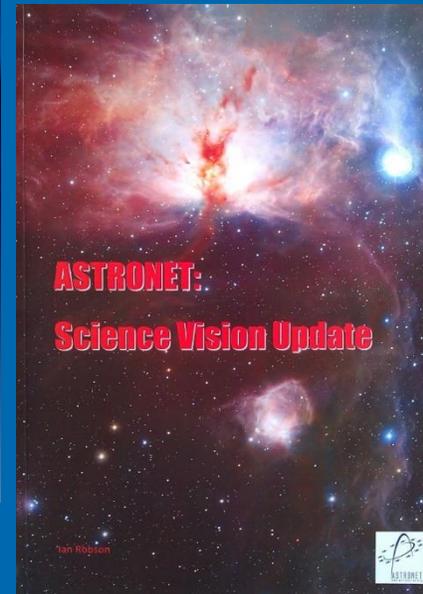
A consortium of funding agencies for European astronomy focusing on strategic planning and coordination



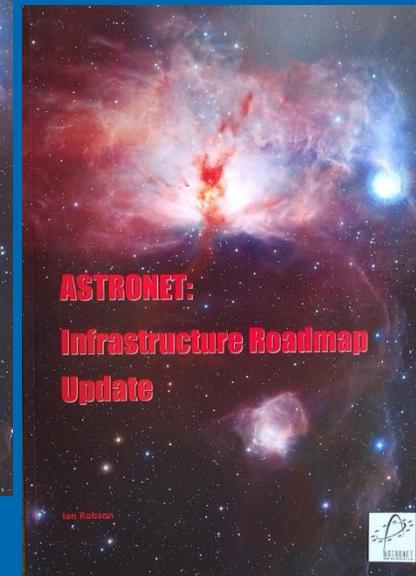
2007



2008



Feb 2013

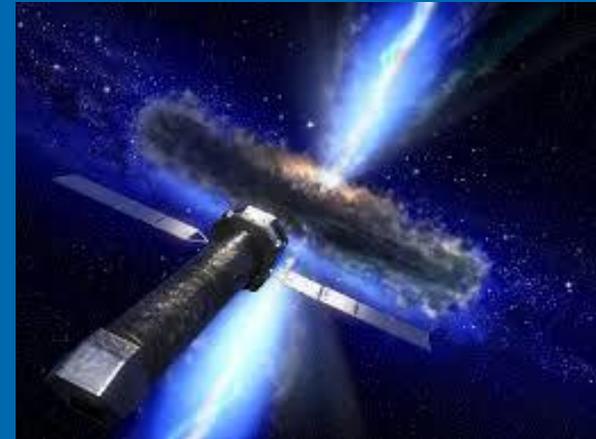
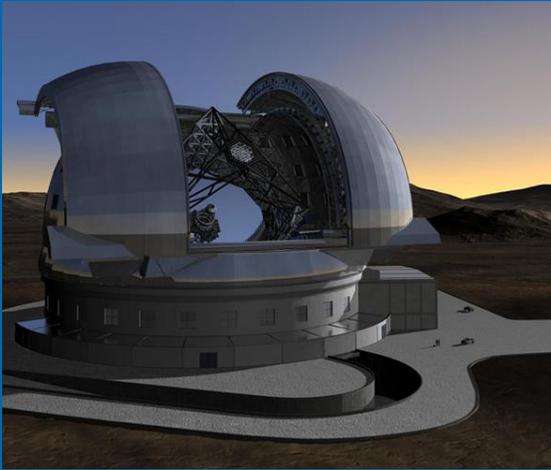


Jul 2014

Key achievement
Science Vision and Infrastructure Roadmap

Implementation and Realisation

ASTRONET initiates, pushes and enables ...



... focusing on efforts underlying the big facilities

Supporting efforts

Preparing for a sustainable Virtual Observatory in Europe



ETFLA: European Task Force Laboratory Astrophysics



Astrophysical Software Laboratory Working Group



ERTRC: European Radio Telescope Review Committee



European Optical/IR Telescopes



ASTERICS H2020, cluster of infrastructures



Education and public outreach report



ASTRONET today

FP7-ASTRONET ended on June 30th, 2015

Signature of Lol in June 2015 in the direction of a MoU preparation

Signature of the MoU in December 2016



Dec. 2016 – ASTRONET MoU

- SIGNED by ESO, CNRS, STFC, NWO, FWO, INAF
- Accession document received from Bulgaria, Sweden.
- Observer status requested for ESA, Ukraina
- Expression of interest from: Greece, Spain, Germany, Czech Republic, Portugal, Denmark
- The process of accession is open

- Permanent invitees: EAS (S. Feltzing), APPEC (A. Maserio).

Strategic objectives

A **discussion forum** for the coordination of European astronomy;

Develop and update common **long-term strategies** (e.g. a Science Vision and Infrastructure Roadmap for European Astronomy);

Participate in general **European scientific strategy** development with organizations such as the EU, Science Europe and ESFRI;

And develop closer **links with organizations** representing the European astronomical research community, and with European organizations involved in global projects.

Framework of future developments

Growth of the **multimessenger/multiwavelength** approaches

Growth of the **trans disciplinary** aspects

With particle physics

With fundamental physics

With chemistry

With biology

Transverse activities

Theory, simulations, high performance computing

Big data management, archives and science through the VO

Laboratory astrophysics

Coordination, **education**

Panel A - High Energy Astrophysics, Astroparticle Astrophysics and Gravitational Waves

- ESA and national agencies need to plan for the retention of key skills and key teams for the **long lead-time missions** of Cosmic Vision.
- Strengthen **multiwavelength** collaborations through dedicated programmes and grants.
- Continuing R&D technological research activities remains of paramount importance to maintain European leadership in the field of high-energy astrophysics.
- In view of the excellent health of the XMM-Newton and INTEGRAL missions, this panel feels confident to strongly endorse, yet again, their continuation. Moreover, this panel welcomes the outcome of the recent NASA Senior Review, which has approved the continuation of SWIFT and Fermi operations for between 2 and 4 years.

PANEL B Ultraviolet, optical, infrared and Radio/mm Astronomy

- ESA, the EU and national agencies should address the potential for a more coherent funding arrangement for the **exploitation of scientific data** from space missions.
- it is important that the determination of Gaia's precise position from ground-based observations should be secured for the total lifetime of the mission.
- it is vital that national agencies ensure that **adequate funding is provided for data analysis** to ensure that Europe is best placed to maximise scientific return from the Gaia mission
- long-term missions usually require considerable study and technical development and it is important that adequate funding needs to be provided by ESA and National Agencies to support the preparatory R&D activities in the future. Areas that require special attention are e.g. the development of large, low-noise detector arrays, and the development of techniques that will allow high precision formation flying.
- the future optimization of the 2-4m class optical/IR telescopes in Europe requires further and ongoing work in order to maximise overall efficiency and cost effectiveness.
- A coherent long-term plan should be established under the auspices of ESO and the European Initiative for Interferometry during the coming two years. It should be built on the realizations of Gravity and MATISSE and prepare the future plans for enhanced high angular resolution capabilities in the ELT era and in complement to exoplanets and stellar physics space missions.
- a coherent long-term plan should be established under the auspices of ASTRONET and RadioNet during the coming two years. It should outline the scientific role of each of the facilities mentioned above in the ALMA era, develop an access strategy beyond the current Trans National Access (TNA) scenario, and it should define the future investments to be made on the basis of the scientific excellence of the projects that can be carried out. This is very urgent as the future funding for some of these facilities is currently under discussion/threat.
- before considering in any systematic manner perceived gaps and technology developments, it seems desirable to consider the creation of such a database, e.g. through ASTRONET. This should cover **developments both for instrumentation and for software**.
- the preparatory studies for new projects should include a verification of an advanced stage of technical readiness (TRL). This will help to reduce the risk of significant cost-overruns during the construction phase.
- it is critically important that these technology developments needed for the future in terms of key parameters (e.g. large-scale detector arrays) and high-tech solutions are explored in close collaboration with industry.

PANEL C: Solar Telescopes, Solar System Missions, Laboratory Studies

- the European Solar Telescope (EST) should be included in the ESFRI Roadmap in the current revision process.

PANEL D: Theory, Computing Facilities and Networks, Virtual Observatory

- the ASTRONET Board needs to determine the status of the **Astrophysical Software Laboratory** in the near-future
- there is a **need for continued investment in dedicated data facilities** across Europe to keep pace with the data increase.

A new era for Astronomy data

The end product of all of these missions and facilities is **data** but the explosion in the quantity and quality generates:

- new challenges for **storage, analysis, and distribution**.
- An increased need for an **efficient and interoperable access** to this wealth of data, observed or computed in simulations, and curated by information services.

The **VO** is the Infrastructure for astronomy that provides the framework for seamless, **unified access to standardized astronomy data services**.

Significant progress since 2008:

- development of the VO,
- the continued take-up of VO techniques in astronomy data centres,
- and the current efforts to establish VO as a sustainable component of the astronomy infrastructure.

Software and computing

- **Computing within the VO**, cloud computing, VO interfaces for asynchronous queries and remote job execution.
- Requirement for **supercomputing** to operate some of the big observational facilities.
- Data Networks and Data Grids. Surveys in the petabyte category generate a need for **dedicated data facilities** distributed throughout Europe to provide access.
 - ASTERICS / OBELICS WP
- Astrophysical Software Laboratory:
 - little progresses have been made in this area; a working group has been established in order to make a census of the **codes used by a substantial subgroup** of the community.
 - A plan for a future ASL has been proposed to the ASTRONET board.

ASTRONET WORKPLAN

WP	Tasks	Lead
1	<p>Management activities</p> <ol style="list-style-type: none"> Executive office (CNRS) Treasurer and responsible for collection of the fees (NWO) Coordination office, animation, communication (#B4.8, #B4.9, #B4.10) (CNRS) 	CNRS
2	<p>Implementing the roadmap</p> <ol style="list-style-type: none"> #B4.6: optical interferometry (CNRS) #B4.7: radio astronomy (NWO) Monitoring the European medium and large size O/IR ground facilities (TBD by the Board) Astronomy heritage (dealing with a coordination at European level of the national activities in astronomy historical instrumentation and observatories, archives and libraries) (INAF) #D6.1: Astrophysical Software Library (→ ASTERICS Forum) #D6.2: Data facilities (→ ASTERICS Forum) Space and Ground coordination (#A3.1, #B4.1, #B4.2, #B4.3) (TBD by the Board) Training, schools (#E7.1, #E7.2, #E7.3) (TBD by the Board) Outreach (#E7.4, #E7.5, #E7.6) (TBD by the Board) 	NWO
3	<p>Preparing the future: the next Science Vision and roadmap exercise. Target is 2018 for the period 2021-2030 (parallel/synergy with US-DS)</p>	STFC
4	<p>Wider engagement of the European astronomical community: Including a European Forum of emerging Astronomy communities in coordination with New Member States Working Group at ESO (Remote access to data sets, VO activities, Evolution/Renovation of local facilities, relation to ASTRONET roadmap...) that could be held during yearly EWASS meetings</p>	CAS

Challenges for the Open Universe

- ❖ Support the data and computing challenges of the upcoming facilities
- ❖ Wider and easier access; Education
- ❖ Multi-wavelength and multi-messenger approaches
Key challenges in particle physics and fundamental physics
- ❖ Transdisciplinary
Biology
Chemistry