ASTRONET: Towards a Strategic Plan for European Astronomy

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Establishing a comprehensive long-term plan for the development of European astronomy – optical and radio, ground and space – has been discussed for many years, but still waits to be done. Also, European astronomy would benefit much from better-coordinated actions among countries. A consortium of European funding agencies is now launching ASTRONET, a four-year ERA-NET initiative to achieve these goals.

European astronomy has achieved many successes in the second half of the twentieth century, especially by pooling its previously scattered efforts into multilateral partnerships. The most important of these are ESO for ground-based optical astronomy and ESA for space astronomy.

If we wish to be at least as successful in the future, we need to reinforce these joint efforts and expand them to all domains of astronomy. This requires a shared *Science Vision* throughout Europe and an agreed roadmap for infrastructures in astronomy. We also need to identify the barriers which impede collaborative projects among countries and make proposals to overcome them.

Why invent ASTRONET?

First, the "European astronomy" referred to above is essentially confined to the member states of ESO and ESA. Astronomers in the new member states of the European Union have largely been left out of this development. And they represent an intellectual capital no less valuable than that of their more fortunate colleagues.

Second, while long-term plans are being prepared by ESO and ESA, they do not cover the whole field by any means. Apart from ALMA, planning for radio astronomy is not integrated with these plans, and little if any coordination exists between the plans for ground- and space-based astronomy. Surely, if European astronomy is to overcome the funding limitations restricting our future development, we must prove able to transcend our own mental barriers and present a unified front to the outside world.

Motivated by the clear and urgent need to bring European forces together for the development of astronomy at the European level, funding agencies and ministries from France, Germany, Italy, the Netherlands, Spain, the United Kingdom, plus ESA, ESO and NOTSA, decided early January 2005 to propose a programme to coordinate a strategic planning exercise for European Astronomy.

This so-called ASTRONET initiative was submitted to the European Commission (EC) early March 2005 under the ERA-NET Instrument of Framework Programme Six (FP6). The proposal was accepted by the EC, and ASTRONET started September 1, 2005. It involves a human effort of 299 person-months, and the total budget is 3.9 M€, including an EC contribution of 2.5 M€. The duration of the programme is four years.

ASTRONET objectives

ASTRONET *covers all astrophysical objects* from the Sun and Solar system to the global structure of the Universe, as well as every observing approach, in *space and from the ground* and from the detection of photons at *any wavelength to astroparticles and gravitational waves*. It addresses the whole scientific "food chain" from infrastructure and technology development to observation, including the virtual observatory, modelling, and theory.

The ASTRONET project is divided into four main activities (work packages):

1. Networking

This work package deals with exchange of information between ASTRONET and other relevant partners in European astronomical research. As a prime goal of ASTRONET is to establish regular coordination between programme managers throughout all of European astronomy, two important tasks are to integrate new participants early in the life of the project, and to define mechanisms to maintain the Europe-wide, cross-disciplinary coordination initiated by ASTRONET on a permanent basis.

2. A Science Vision for European astronomy

This work package aims at developing a global census of European astronomical resources and national strategies, followed by a science-oriented Strategic Review for the next 15–20 years. The Review is to be conducted by a Science Vision Working Group with input from, and endorsed by, a wide European astronomical community by March 2007.

3. A roadmap for the development of infrastructure for European astronomy

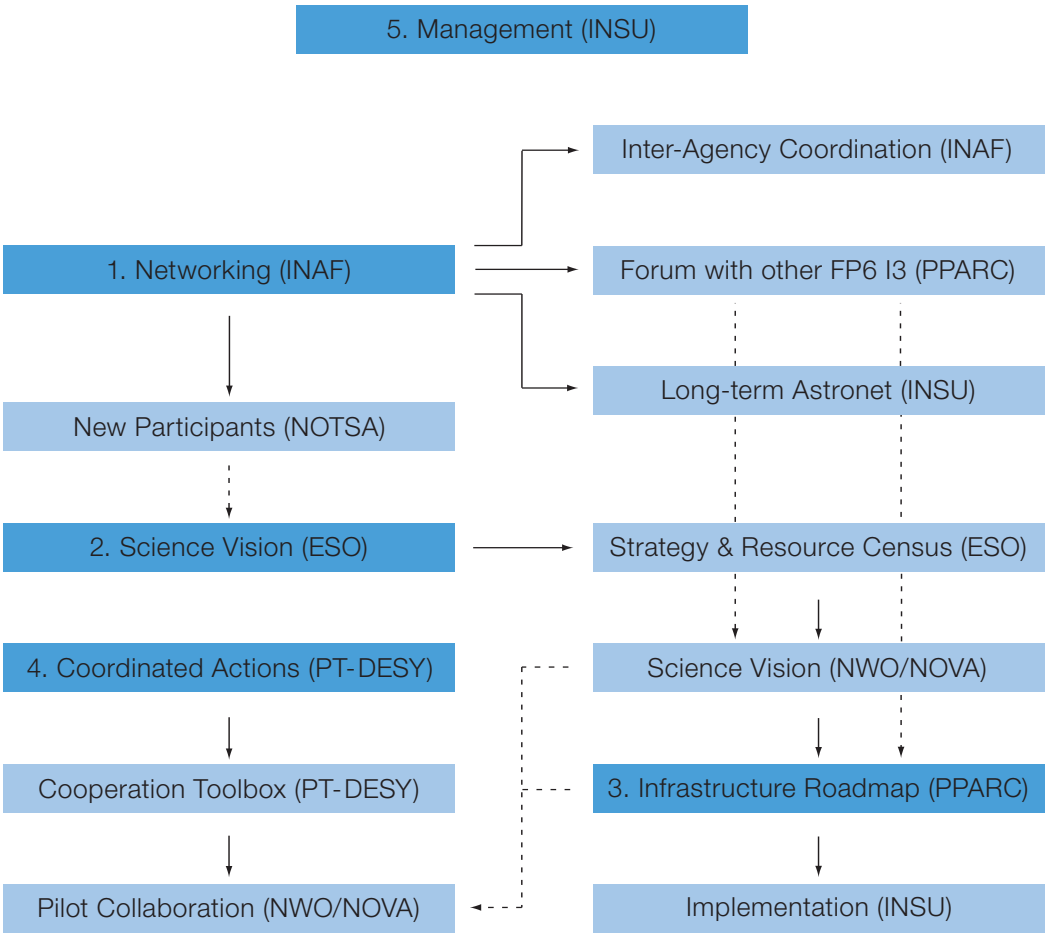
Based on the recommendations of the "Science Vision", this third work package will produce a strategic plan for the coordinated development of space- and ground-based astronomy in Europe, including the identification of key enabling technologies, by December 2008. It will also identify and initiate concrete mechanisms to implement this roadmap.

4. Targeted coordinated actions to strengthen astronomy and astrophysics in Europe

This work package will identify formal barriers to the further development of Europe-wide cooperation and initiate coordinated actions to strengthen astronomy in Europe, through the development of common evaluation procedures and the launch of a specific multi-agency research programme.

Who is ASTRONET?

ASTRONET has, so far, two levels of involvement, participants and associates. Participants are responsible for fulfilling the ASTRONET programme. Associates participate fully in the work programme, but, contrary to participants, do not lead any task and do not manage EC funding.



The five work packages (deep blue) and their sub-tasks (light blue), with the corresponding work package and task leaders in parentheses. The interaction between the various tasks is shown schematically.

As of the start of the programme, participants are: (1) Institut National des Sciences de l'Univers du CNRS (CNRS/INSU, France); (2) Bundesministerium für Bildung und Forschung (BMBF, Germany); (3) ESO; (4) Istituto Nazionale di Astrofisica (INAF, Italy); (5) Particle Physics and Astronomy Research Council (PPARC, United Kingdom); (6) Nordic Optical Telescope Scientific Association (NOTSA); (7) Ministerio de Educación y Ciencia (MEC, Spain); 8) Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO, the Netherlands) and (9) Projektträger DESY (PT-DESY, Germany). Associates are currently: (1) European Space Agency (ESA) and (2) Max-Planck-Gesellschaft (MPG, Germany).

Present ASTRONET membership represents about 80 % of the total astronomical resources in Europe. One of the goals of ASTRONET is to involve other countries who may wish to join, at the most appropriate level. If necessary, a third level of involvement will be introduced.

How will astronomers contribute?

Full participation from the European astronomical community at large is essential to ensure the quality and validity of the output, in particular of the Science Vision and the Infrastructure Roadmap. A number of panels are being established, in the first case organised by (broad) scientific themes, in the second case by observational technique.

The panels will develop draft reports, to be amended and validated through dedicated symposia addressing the whole community. These will be held around December 2006 for the Science Vision, and March 2008 for the Infrastructure Roadmap. Careful attention will be given to avoid unnecessary duplication, e.g. through close contacts to other relevant FP6 activities like the ELT and SKA Design Studies. With ESA participating fully in the exercise, an important objective is to achieve better coordination between the plans for ground- and space-based astronomy. For further information on ASTRONET status, goals and objectives, see our web site at *http://www.astronet-eu.org*

ASTRONET will be a true success if it helps to join the forces of all funding agencies towards the development of the future, large and expensive research infrastructures that European astronomy will need to keep abreast, and to develop true collaborations between all European astronomical communities. The enthusiastic contribution of the community in this effort will be essential for reaching this goal.