

The Astronet roadmap

Jean-Marie Hameury

Astronet coordinator, CNRS/INSU

(plus many others)



What is ASTRONET?



ERA-NET, funded by EU FP6 and FP7 since Sep 2005)

–Coordinator: CNRS/INSU (Jean-Marie Hameury)

–Board Chair: Johannes Andersen (NOTSA)

Ronald Stark (NWO) since 2011

Contractors

STFC (UK), CNRS/INSU (France), INAF (Italy),
NWO (Netherlands), PT-DESY & BMBF (Germany)
MEC (Spain), NOTSA (Scandinavia), NCBIR (Poland),
CAS (Czech Republic), ESO (International)





Associates

MPG & DFG (**Germany**), **ESA**, **Estonian** Science Foundation, **Swedish** Research Council, **Hungarian** Academy of Sciences, **Lithuanian** Academy of Sciences, **Greek** National Committee for Astronomy, **Swiss** State Secretariat for Education & Research, **Slovak** Academy of Sciences, **Austrian** Science Foundation, **Estonian** Science Foundation, **Romanian** Space Agency, Academy of Science of the **Ukraine**, **Slovenian** Research Agency, **Bulgaria** academy of sciences, Ministry of Science, **Croatia**, FNRS & FWO, **Belgium**, Fundacao para a Ciencia e a Tecnologia, **Portugal**, **Israel** Space Agency, Institute of Astronomy - University of **Latvia**

Forum Members

Natural Science Research Council of **Denmark**, Academy of **Finland**

Astronet objective : Towards a Strategic Plan for European Astronomy



- Comprehensive and long-term plan, adapted to European and global political realities
- Initiated by ``the same'' agencies that fund ESA, ESO, and the 'national' facilities
- Include all aspects in a coherent picture (including present and future facilities, education, training, human resources, ...)
- Establish this approach as a permanent feature in Europe



Coordination Action
ASTRONET



Activities

1. Agree on a common Science Vision for the next 20 years (**published September 2007**)
2. Establish a Roadmap of Infrastructures to match the Science Vision (**published November 2008**)
3. Implementation Phase: the tough part...
4. Launch a common call for proposals
5. Networking: new participants; Report on the Management of European Astronomy

Science Vision Key Questions

A: Do we understand the extremes of the Universe?

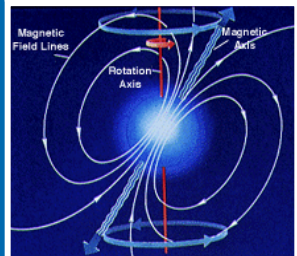
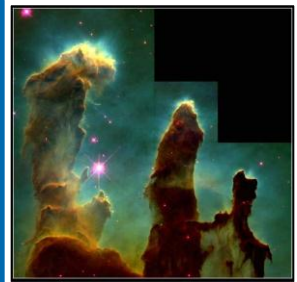
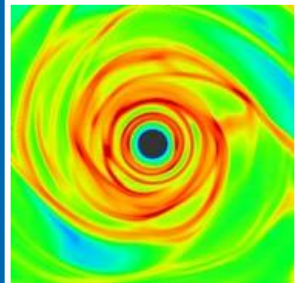
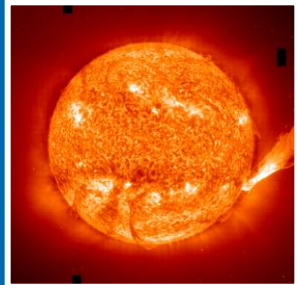
B: How do galaxies form and evolve?

C: What is the origin and evolution of stars and planetary systems?

D: How do we fit in?

Developed in sufficient detail to allow identification of generic capabilities needed to deliver the Vision

WP leader: T. de Zeeuw (Leiden)



“A Grand Vision for Astronomy”

A Science Vision for European Astronomy

*What is the origin and
evolution of stars and planets?*

How do galaxies form and evolve?

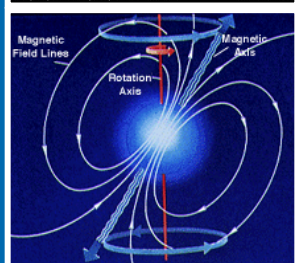
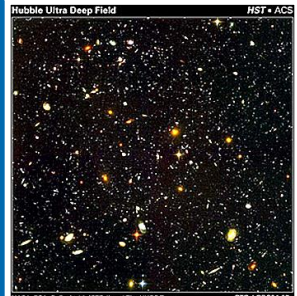
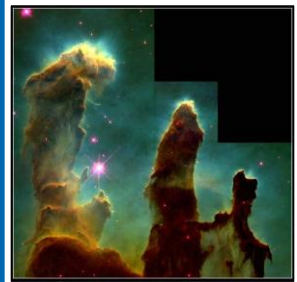
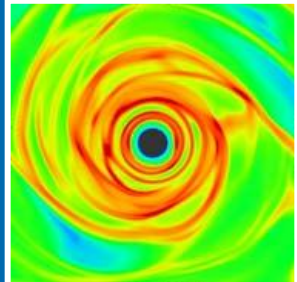
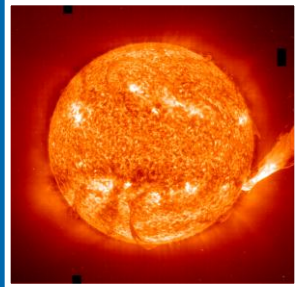
*Do we understand the
extremes of the Universe?*

How do we fit in?

**Symposium in Poitiers
(January 2007)**

Published 28 September 2007

**Available as a PDF file at:
<http://www.astronet-eu.org/>**

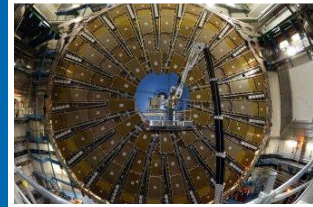
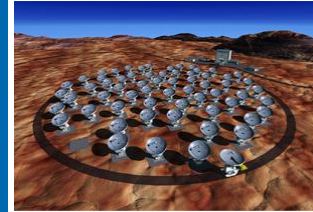
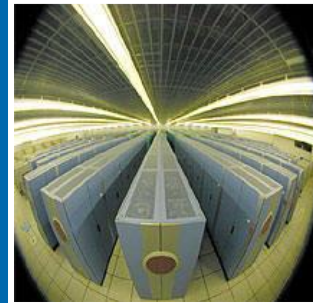


Developing the Roadmap

Brief: To assemble a plan for the development of the infrastructures that will enable European Astronomy to deliver the Science Vision

- **Taking the Science Vision as the point of departure**
- **Covering both ground & space-based facilities**
- **Including AVO, (super)computing, theory, HR issues, outreach, education and training, industrial links**
- **Incorporating existing ESO, ESA (etc.) plans as far as possible, and having a global perspective**
- **Fitting within reasonable budgetary envelopes & schedules!**

WP leader: M. Bode (JMU Liverpool)





The ASTRONET Infrastructure Roadmap:

A Strategic Plan for European Astronomy



- **Symposium in Liverpool (June 2008)**
- **Published 25 November 2008**
- **Available as a PDF file at:**
<http://www.astronet-eu.org/>

Priorities: ground

Ground-based, Large Scale

1. E-ELT and SKA (phasing important)

Ground-based, Medium Scale

1. European Solar Telescope
2. Cherenkov Telescope Array
3. KM3NeT

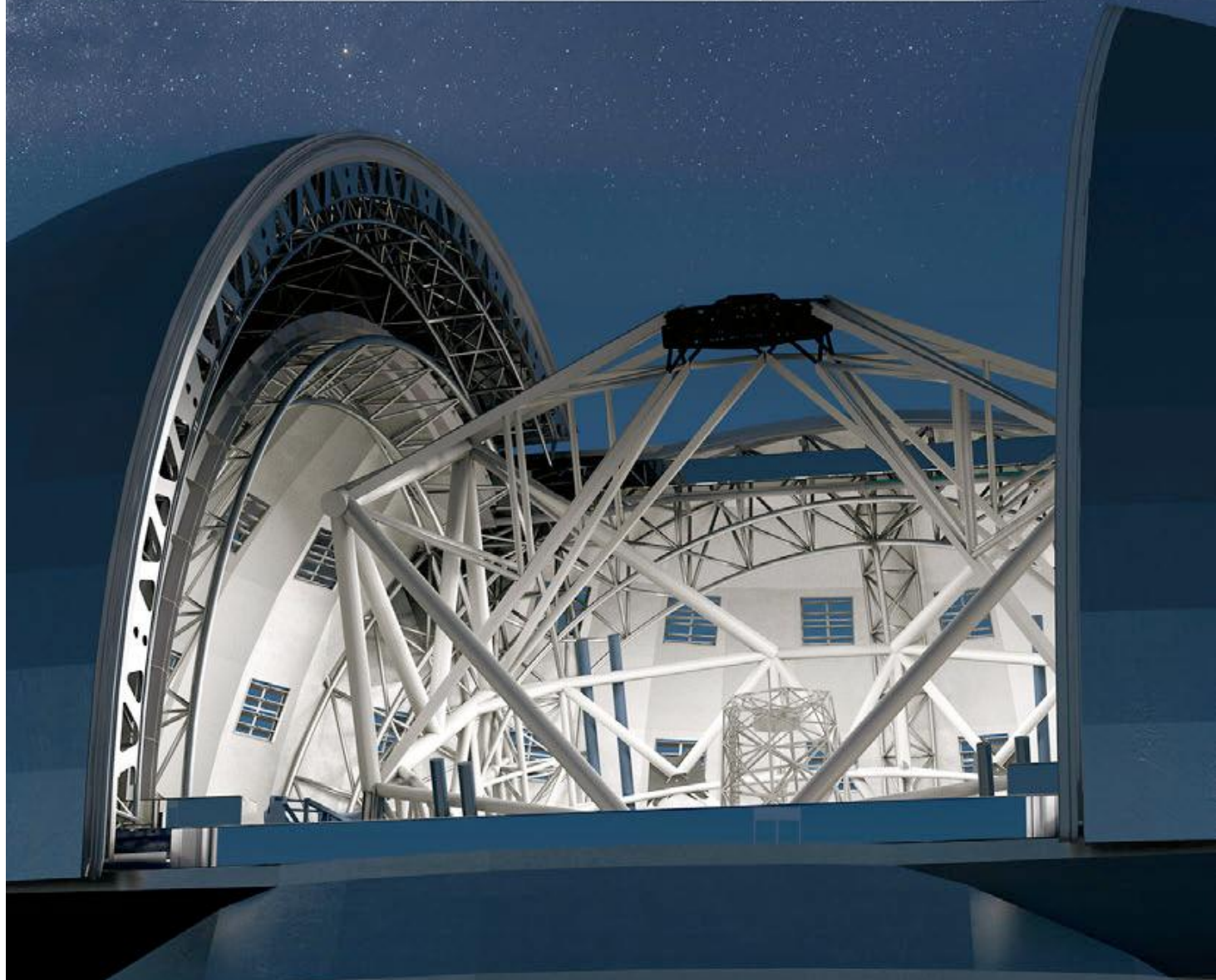
Ground-based, Small scale

1. Wide Field, Multiplexed Spectrograph (8-10m tels)

(+ Optimisation of access to existing telescopes: Solar, 2-4m and 8-10m optical/IR, radio and mm-submm)



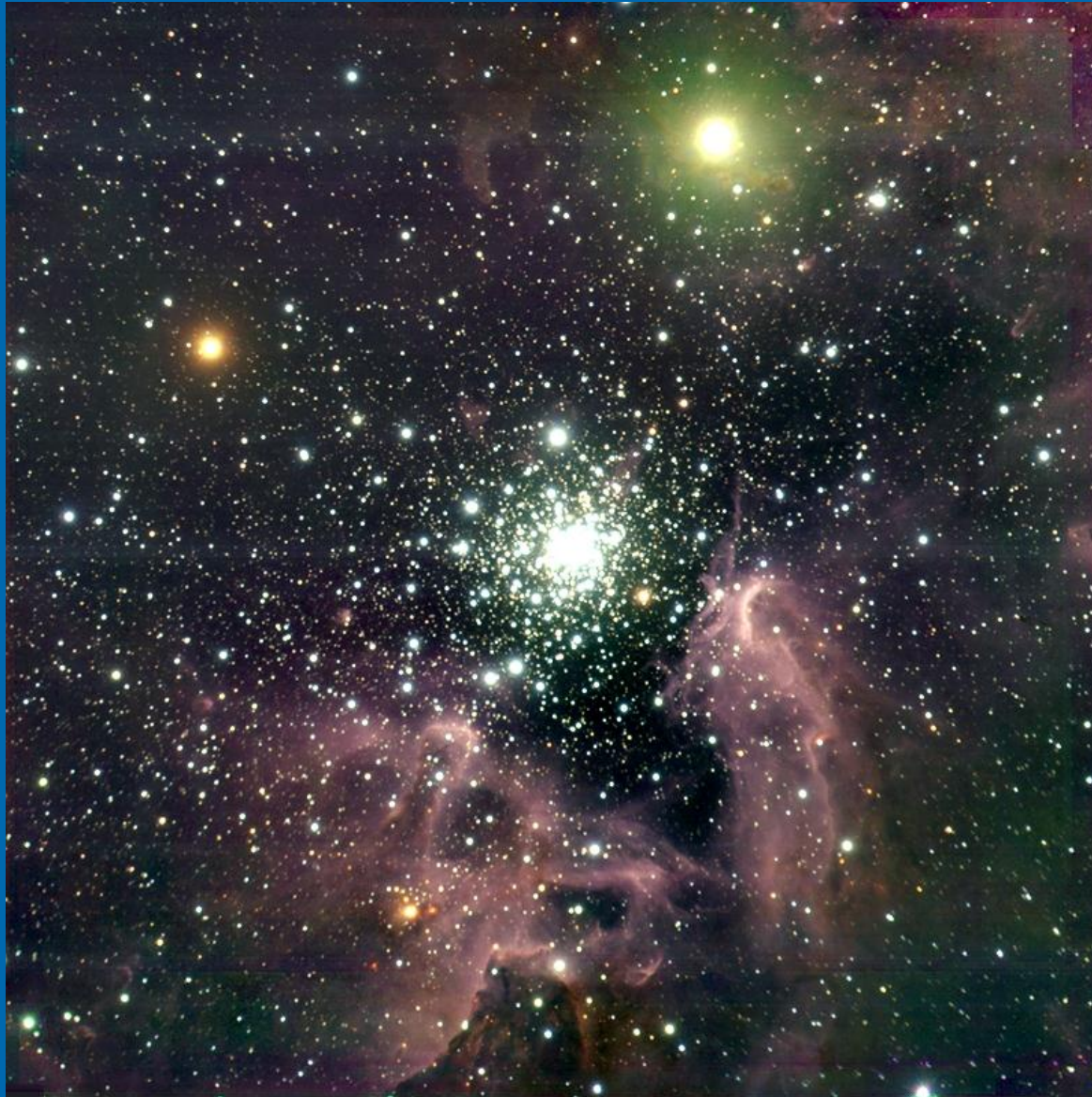
THE E-ELT CONSTRUCTION PROPOSAL



Spatial resolution is as important as the collecting area: the case of stellar populations in distant galaxies



1 arc second



E-ELT

Priorities: space

- Space: large scale
 1. XEUS/IXO and LISA
 2. Tandem/Laplace
 3. ExomarsDarwin, FIRI, Phoibos post-2020

- Space: medium scale
 1. GAIA: data analysis
 2. Euclid
 3. Solar Orbiter
 4. Cross-scale, Simbol-X, Plato, Spica
 5. Marco Polo

(Plus continued European contribution to operation of XMM-Newton, Integral, HST, Cluster, STEREO, Hinode over specified terms)

- **Lab. Astrophysics; computing; theory; virtual observatory**
 - Pan-European (Virtual) Astrophysical Software Lab
 - Further development of the Astrophysical Virtual Observatory
 - Enhanced laboratory astrophysics
- **Wider impact**
 - Improvement in communications to the public
 - Greater interactions with European industry
 - Provision of adequate numbers of highly skilled people
 - Measures to enhance science and technology education
 - Enhanced exploitation of results

Status of the projects in the roadmap



- Top-priority ground-based ASTRONET projects same as ESFRI list
- Top-priority ASTRONET astroparticle projects same as ASPERA Roadmap (ranking sometimes differ)
- Top-priority ASTRONET (larger) space projects same as ESA Cosmic Vision initial list
- Large projects prioritised, placed in scientific and financial context of the entire field, and schedules proposed
- Agreed European strategy and priorities now defined for global-scale projects (SKA, others, ...)
- Europe considered as a major partner in the US decadal survey

This was declared impossible, but HAS BEEN DONE !

Priorities: ground

Ground-based, Large Scale

- **E-ELT**: descoped to 39m after Phase B studies, decision in the coming months
- **SKA**: EC PP, entering preconstruction phase, creation of a legal entity this week

Ground-based, Medium Scale

1. EST: EC DS, not in ESFRI list
2. **CTA**: EC PP
3. KM3NeT

Ground-based, Small scale

1. Wide Field, Multiplexed Spectrograph: ESO phase A studies, WEAVES (4m tels).



Priorities: space

- Space: large scale

1. XEUS/IXO => Athena, candidate L1; LISA => NGO, candidate L1;
2. Tandem/Laplace => JUICE, candidate for L1
3. Exomars : still on track, but financial and programmatic difficulties

Darwin, FIRI, Phoibos post-2020

- Space: medium scale

1. **GAIA**: data analysis
2. **Euclid** : selected as M2
3. **Solar Orbiter** : selected as M1
4. **Cross-scale, Simbol-X** (but LOFT candidate for M3), Plato, (candidate for M3 ?) Spica
5. Marco Polo: candidate for M3

New projects: ECHO (exoplanets), STE-QUEST (Space-Time Explorer and Quantum Equivalence Principle Space Test)

Implementation of the Roadmap



- 2-4m class telescopes
 - Conclusions of the WG available on Astronet WEB site
 - Reassess the science cases
 - Specialisation of some facilities, coordination (e.g. telescopes on the same site), time swapping
 - Common Time Allocation Committee ?
 - Report being considered by agencies owning telescopes for implementation
- Wide field spectroscopy
 - Of major importance for (1) galactic archaeology, (2) evolution of galaxies, and (3) cosmology
 - ESO call for proposals selected 2 phase A studies
 - WEAVES for WHT on Canary Islands
- WG on radio observatories; ongoing
- WG on Astrophysical Software Laboratory; ongoing
- WG on laboratory astrophysics; ongoing
- Virtual observatory: not started yet
- Optimisation of 8-10m class telescopes: not yet started

Common call



- First call on “Common Tools for Future Large Submillimeter Facilities”, launched early 2008
- Participating agencies: BMBF (D), CNRS (FR), FWF (AT), MEC (SP), NWO (NL), VR (SE)
- Budget 3.5 M€ (virtual pot model)
- 11 proposal received; 5 funded
- Positive evaluation of the process by applicants (especially the successful ones) and by the agencies

- Second common call under discussion; probably linked to wide field spectrographs
- Future calls may rather take the form of common actions

Other Astronet-2 work packages



- WP 1 - Networking
 - Networks to external stakeholders
 - A data base of resources and best practices for European astronomy
 - Coordination with other, discipline or project-oriented stakeholders
- WP 2 - Self-sustainable coordination of European Astronomy
 - Survey models for self-sustainable coordination of science areas, from within the European and global community
 - Discuss options for sustainable coordination models for Astronomy
 - Refine leading models for sustainable coordination to ensure funding agencies have sufficiently robust business plan to consider for adoption
 - Attempt to implement the proposed model
- WP 3 - Integration of new Member States in the future of Europe astronomy
 - Analysis of the key research areas to be developed
 - Identify the key financial needs
 - Help in developing national roadmaps

Revision of the Roadmap



- No need to restart the whole process during the next 4 years
- Ensure that the science vision is still up to date: reconvene the SV WG, and update the scientific priorities (mid-2012)
- Update the infrastructure roadmap, on the basis of the updated SV, of project evolution, and of programmatic changes: reconvene the roadmap WG (mid 2013)

Conclusions



- What was thought to be impossible has been done
- the most difficult part is ahead of us and the next years will be crucial
- Having a common strategy for astronomy shared by all European countries is a major asset for Europe. Was key for e.g. E-ELT