ESA Innovation Triangle Initiative / European Technology Harmonisation

Edmund Williams (edmund.williams@esa.int)
Head of Technology Harmonisation Section, European Space Agency

London
20 April 2010
ESA Innovation Triangle Initiative
European Space Technology Harmonisation
European Space Technology Master Plan
ESA Technology Transfer
ESA Innovation Triangle Initiative (ITI)

(contact: marco.freire@esa.int)
What is ITI:

A mechanism, originally set-up by ESA in 2004, to support the introduction and fast validation of innovative concepts or technologies for space applications.

ITI main characteristics:

- Implemented through a continuously opened Call for Ideas with a standing Evaluation Board meeting periodically
- Proposal submitted through simple online templates
  - Short “time to contract”
- Aims specifically at technologies novel to space
The “Innovation Triangle” concept states that a rapid and successful introduction of disruptive innovations in Industry requires the collaboration of three different entities: an INVENTOR, a DEVELOPER and a CUSTOMER.

**Inventor**: an R&D entity that is not necessarily involved in space already

**Developer**: An entity that has the know-how to develop the idea to “space” standards

**Customer**: an entity that can actually use the idea in “space products”
The ITI contains three basic types of activities aimed at the different elements of the triangle:

- **(A) Proof of Concept** (for INVENTORS): fast validation of new ideas and demonstration of its advantages (<= 50 K€)

- **(B) Demonstration of Feasibility and Use** (for DEVELOPERS): component and/or breadboard development up to validation in the laboratory or in a relevant environment (<= 150K€)

- **(C) Technology Adoption** (for CUSTOMERS): component and/or breadboard development up to validation in a relevant environment, with the final objective of including the technology developed in the Customer’s services, products or processes (<= 2 M€ (50% Co-funded))
The ITI Web-Site **http://iti.esa.int/**

- a) Provides information to participate in the ITI
- b) Describes concepts and objectives of the ITI
- c) Supports the submission of proposals according to templates
- d) Displays summary information of past activities supported by ITI
- e) Allows searching for proposals (by keyword, status, TD, etc)
- f) Supports the technical evaluation of the proposals
- g) Supports the management of on-going activities
A new issue of this brochure is published once per year in order to cover the ITI activities concluded in the last 12 months

Aim: to enhance visibility on the expertise and innovation capability of the organizations supported by ITI and to foster the use of their technologies
European Space Technology Harmonisation

(contact: harmo@esa.int)
Mandate

Ministerial Resolution: The Ministerial Council Meeting, in Edinburgh, on November 2001, invited the ESA Director General and the Member States, together with the other players in the space sector, to:

- Pursue the programmatic coordination and harmonisation of technology programmes in Europe and prepare the European Space Technology Master Plan (ESTMP)
- Define roadmaps and harmonised implementation schemes for the development of critical technologies, involving industrial funding as appropriate

Extract from the European Space Policy:

- “The ESA led- process of harmonising technology development programmes provides transparency on research across Europe and paves the way for improved coordination.”
European Harmonisation process

ESA E2E Technology process

ESA National Agencies Industry

ESTER

ESA Technology Plans
National Agencies Technology Plans
European Union Plans
Harmonised Roadmaps
Harmonisation
Technology Observatory

European Space Technology Harmonisation process

ESA Technology Plans
National Agencies Technology Plans
European Union Plans
Harmonised Roadmaps
Harmonisation
Technology Observatory

European Space Technology Master Plan (ESTMP)

Technology Monitoring

R&D Activities

Selection of technologies to harmonise (for the year)
- Harmo. WORKPLAN-

Tracking of Implementation
Conclusions & Proceedings
Road-map Meeting (ESA, Member States, EC)
ESA/Eurospace Meeting

Technical Dossier
Mapping Meeting (open)
Proposal Road map

European Harmonisation process

ESA ITI / Technology Harmonisation  |  E. Williams | London | Page 11
Main Objectives

- “Fill strategic gaps” and “Minimize unnecessary duplications”
- Consolidate European Strategic capabilities
- Achieve a coordinated and committed European Space Technology Policy and Planning
- Ensure continuity and coherence between Technology and Industrial Policies
How Technology Harmonisation works

- Participants are ESA Member State Delegations (THAG), European Industry, Eurospace and ESA directorates. EC, EDA, PECS countries, SME4Space are invited.
- Space Technologies are addressed one at a time (typically 8 per year – 2 semesters)
- The Harmonisation is based on 2 meetings:
  - Technology Mapping
  - Technology Roadmap
- Agreed Conclusions are endorsed by IPC
- Complete Proceedings are issued after meetings
- Implementation monitored
- Aim to revisit Technologies every 3 to 5 years
Harmonised Technologies 2000-2009

- Automation and Robotics
- Cryogenics and Focal Plane Cooling
- SAR
- On Board Radio Navigation Receivers
- Thermal Space Environment SW Tools and I/F
- Aerothermodynamics tools
- Chemical Energy Storage (Batteries, Fuel Cells)
- Microelectronics
- Chemical propulsion (Components, Green Propellants)
- Chemical Micropropulsion
- Electrical Motors
- Ground Systems SW
- Data Systems and On-Board Computers
- On Board Payload data processing
- On Board Software
- TTC transponders and Payload Data Transmitters
- Pyrotechnics Devices (within release mechanisms)
- Two Phase Heat Transport Systems
- Power Management and Distribution
- Inflatable structures
- Solar Array Drive Mechanisms
- Deployable Booms
- Upper stage propulsion
- Optical communications for space
- Microwave Power Breakdown Modelling and Characterisation
- Telecommunication Reflector Antennas
- Technologies for Hold-down, Release, Separation and Deployment Systems
- Critical Microwave RF Payload Technologies
- Electric Propulsion Technologies
- Electric Propulsion Pointing Mechanism
- Solar Generators and Solar Cells
- AOCS Sensors and Actuators
- Propellant Tanks and High Pressure Vessels
- Composite Materials
- Radiation Environment Models and In-orbit Monitors
- Radiation Test Facilities and Engineering Tools
- Array Antennas
- Lidar Critical Solid State Components
- Lidar Critical Subsystems
- Frequency & Time Generation (Space and Ground)
- Technologies for Optical Remote Passive Instruments (Detectors, Mirrors,...)
- Technologies for Passive mm and sub-mm Wave Instruments
- System Modelling and Simulation Tools
- Avionics Embedded Systems
- Technologies for Formation Flying Metrology (RF and Optical)
- Position Sensors
Output of Technology Harmonisation

Per Technology addressed:

- **Mapping** of the situation inside and outside Europe, including identification of critical issues. **Technical Dossiers** provide complete overview

- **Technology Roadmaps** agreed at European Level with ESA (TEC and Programme Directorates), National Delegations and Industry

- **Recommendations** agreed with ESA, National Delegations and Industry

- ESA Industrial Policy Committee (IPC) endorses all through **Conclusions** document (1 per Semester)

- All Harmonisation documentation (for all cycles) has been made available on the Harmonisation Document Management System (https://harmostrat.esa.int)
Implemented since 2000, it provides European actors the framework and the key instruments to coordinate Space Technology at European level
More than 50 technologies have been harmonised
Active participation of all Delegations, more than 1000 Professionals from more than 200 entities
Used as basis for EC-ESA-EDA European Non-Dependence process

For further information please contact: harmo@esa.int
European Space Technology Master Plan (ESTMP)

(contact: estmp@esa.int)
The ESTMP provides:

- A one-stop-shop for information for the coordination and harmonisation of space technology in Europe
- A unique reference at European level mapping National, ESA and Community activities and budgets related to space technology, including summaries of Harmonised Roadmaps

After yearly updates since its first issue in 2002, the ESTMP has gradually matured into a true Master Plan for space technology development in Europe

The ESTMP has been prepared in a joint effort together with the European players, including ESA Member and Cooperating States, EC and ESA Technology Programmes
ESTMP - Content

- Space Technology Context
- European Space Technology Harmonisation and Strategy
- Stakeholder and Programmes:
  - ESA
  - EC
  - EDA
  - Eumetsat
  - National Programmes
- Harmonised European Technology Roadmaps
- Appendices: like List of Competencies per Country
- CD-ROM
The 2009 ESTMP has been widely distributed to ESA delegations, European institutions and industry.

To request a copy of the 2009 ESTMP, please send your coordinates (name, company and normal mail address) to the following email address: estmp@esa.int
ESA Technology Transfer

(contact: callum.norrie@esa.int)
Selected Activities of the Technology Transfer Programme Office

Technology Transfer Network

- Broker network overseen by the TTPO to assist in transfer of technologies from space to non-space
- Successfully assisting in transfers for 20 years
- Managed by MST-Aerospace, Germany with STFC Innovations the UK Broker as of 2009.
- Collects space technology offerings and market needs and provides links between technology donors and receivers.

- Contact chris.bee@stfc.ac.uk
- Visit www.technology-forum.com
Selected Activities of the Technology Transfer Programme Office

ESA Business Incubations Centres (BICs)

- Four ESA BICs operational in Germany, Italy and the Netherlands
- Longest Established at ESTEC. As at end of 2008, 49 companies “graduated”
- Selected companies receive technical, managerial and financial support.
- Linked to the European Union ESINET network
- A new ESA BIC is planned for Harwell, UK in partnership with STFC as part of the International Space Innovation Centre. Target of 10 new companies a year.
Selected Activities of the Technology Transfer Programme Office

Transfer Demonstrator Programme

- **Objective** - To support the transfer of technology from space to terrestrial application by enabling companies to demonstrate required terrestrial parameters.
- **Funding** - €40k per company. Matched funding not required.
- **Criteria** – 5 criteria covering space heritage, attractiveness of the market, novelty, project feasibility and likelihood that the project will lead to a transfer or success story.
- **Timescale** – Next call summer 2010, date TBD.
- **Notification** - Contact chris.bee@stfc.ac.uk or callum.norrie@esa.int

UK projects selected 2009

- **SciSys Ltd, UK** – Software developed for automatic mission decision making
- **Imperial College London, UK** – Technology developed for high performance space science magnetometers
Selected Activities of the Technology Transfer Programme Office

Open Sky Technology Fund

- Private/ESA Investment Fund
- First round closed spring 2010 with €15 Million
- Targeting companies using space-related technologies or satellite applications in non-space applications
- Operated by Triangle Venture Capital Group
- Contact b.geiger@triangle-venture.com

ESA Investment Forums 2010

- Opportunity for space originated/related companies to pitch for investment
- 20 May, Stuttgart, Germany
- 5 October, Milan, Italy
- Contact www.e-unlimited.