ESA's TRP and GSTP Technology Programmes

A General Overview

REACH Workshop, 22 April 2015

European Space Agency

CONTENTS

- ESA Technology Programmes
- TRP – Basic Technology Research Programme
- GSTP – General Support Technology Programme

ESA TECHNOLOGY PROGRAMMES

European Space Agency

How ESA works: PROGRAMMES

All Member States participate (on a GNP basis) in activities related to space science and a common set of programmes (**Mandatory** programmes).

In addition, Member States choose their level of participation in **Optional** programmes.

Mandatory

- General Budget: Future studies, technological research, education, common investments (facilities, laboratories, basic infrastructure)
- Science: Solar System science, astronomy and fundamental physics

Optional

- Human Spaceflight
- Telecommunications & Integrated Applications
- Earth Observation
- Launchers
- Navigation
- Robotic Exploration
- Space Situational Awareness

TECHNOLOGY PROGRAMMES: OBJECTIVES

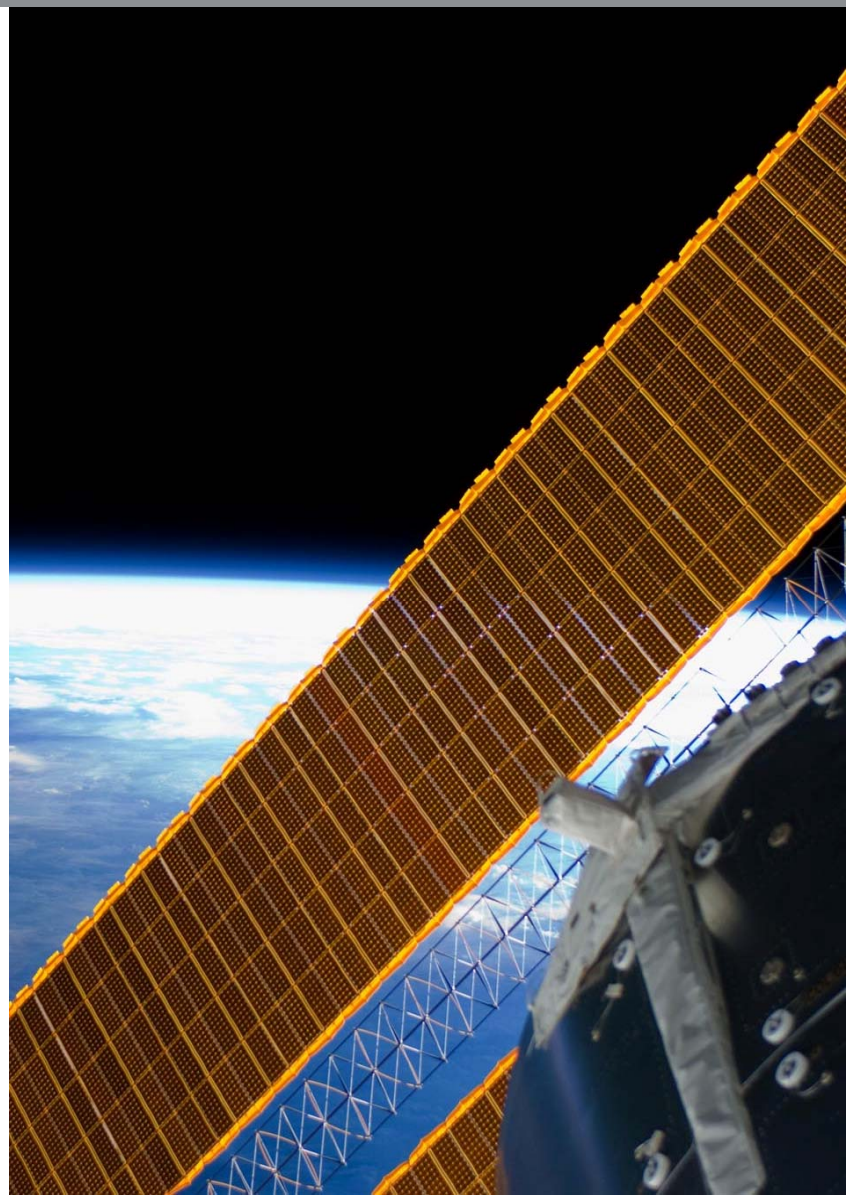
- **Enabling** missions of ESA and national programmes by developing technology

- Fostering **innovation** by creating new technologies and products

- Supporting the **competitiveness** of European industry

- Improve European **technological non-dependence** and the availability of European sources for **critical technologies.**

- Facilitate **spin-in** from outside the space sector



TECHNOLOGY PROGRAMMES
Results oriented

Mandatory Programmes

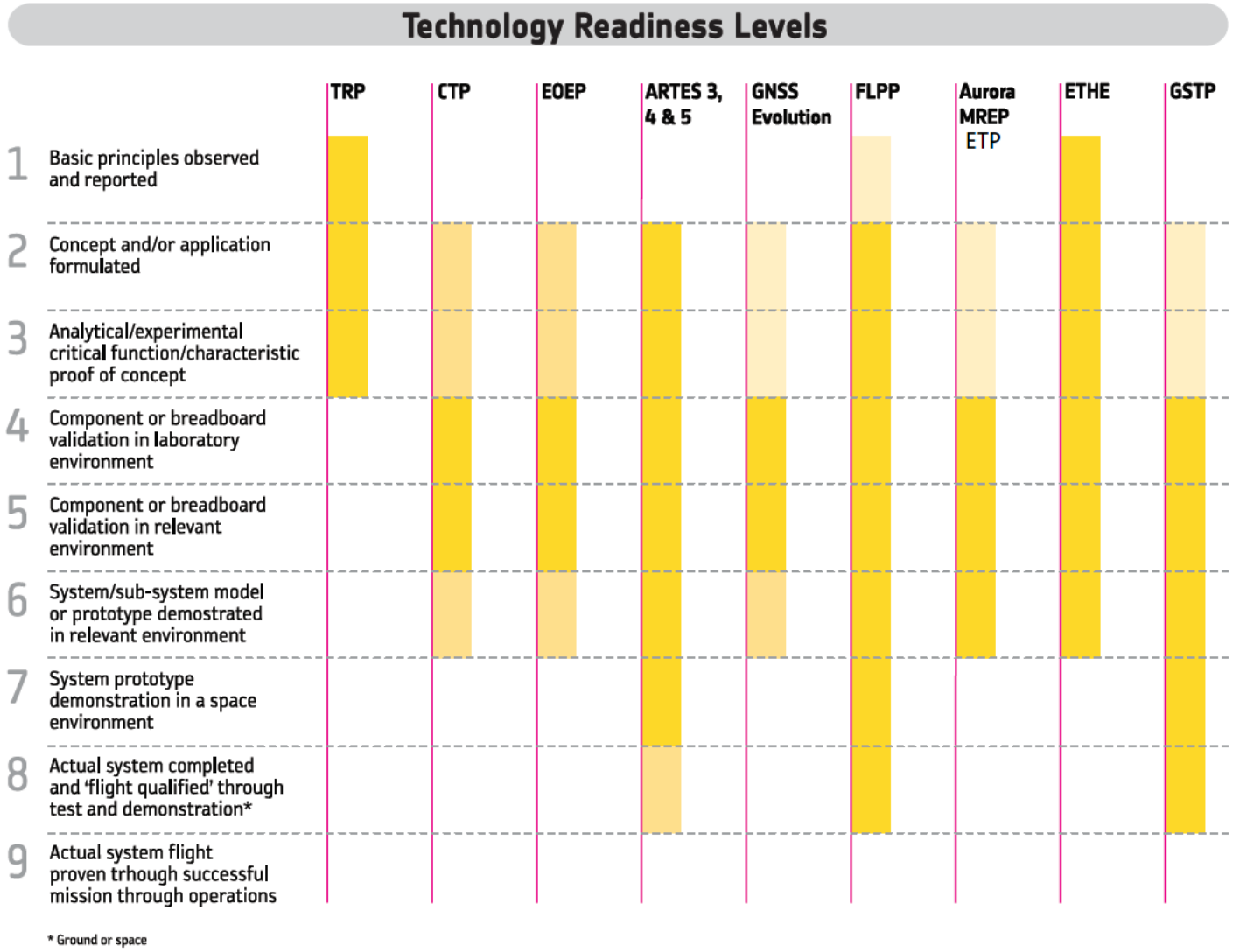
- Science Core Technology Programme (CTP),
- **Basic Technology Research Programme (TRP)**
- **European Components Initiative (ECI)**

  - **Generic**
  - **Application specific**

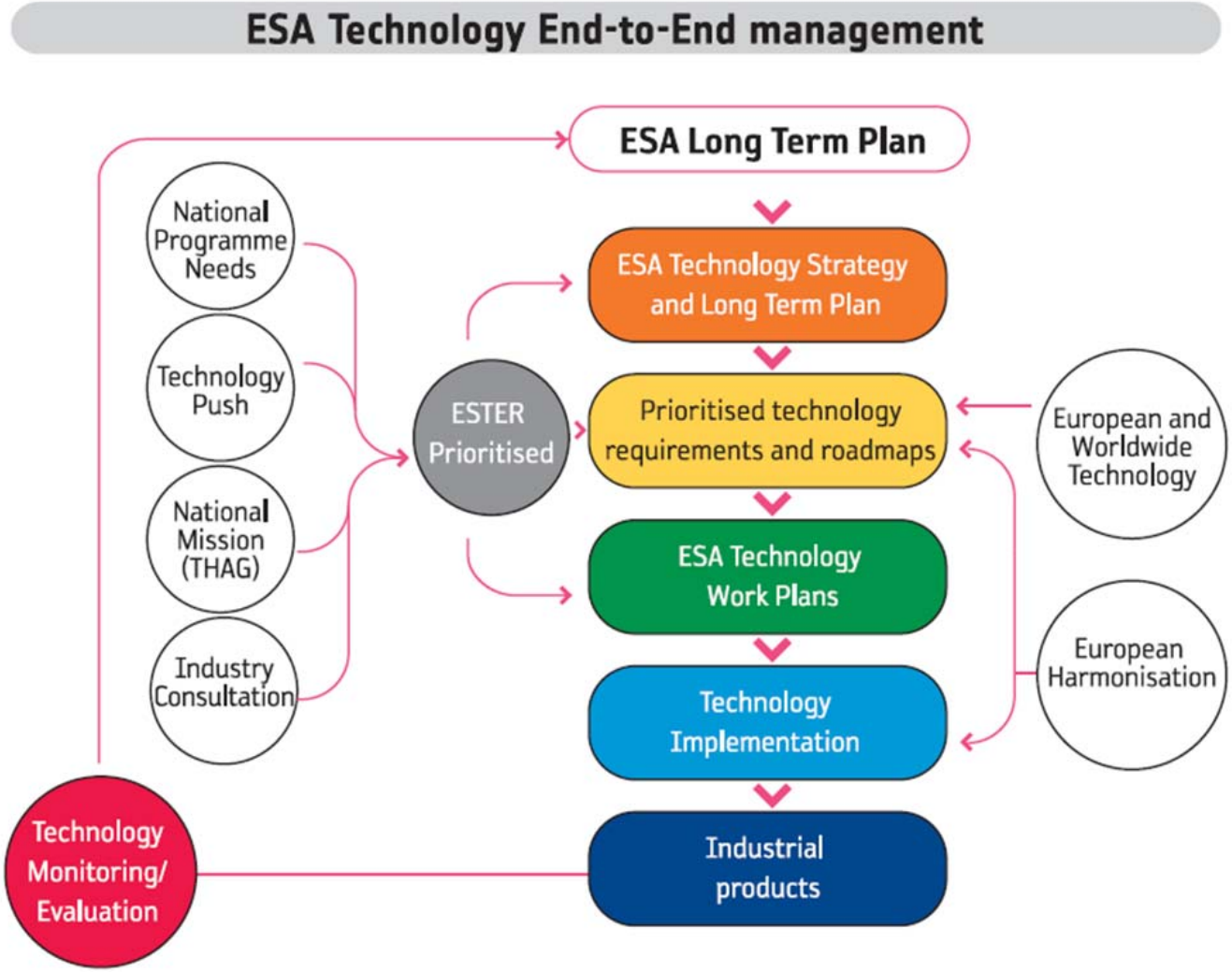
Optional Programmes

- **General Support Technology Programme (GSTP)**
- Earth Observation Envelope Programme (EOEP)
- Advanced Research in Telecommunication Systems (ARTES 3-4, 5)
- European GNSS Evolution Programme (EGEP)
- Future Launchers Preparatory Programme (FLPP)
- Mars Robotic Exploration (MREP)

TECHNOLOGY PROGRAMMES
TRL based



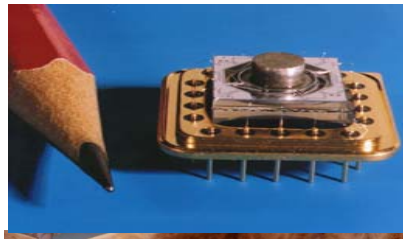
END-TO-END ESA TECHNOLOGY MANAGEMENT PROCESS



TRP – BASIC TECHNOLOGY RESEARCH PROGRAMME

TRP - OVERVIEW

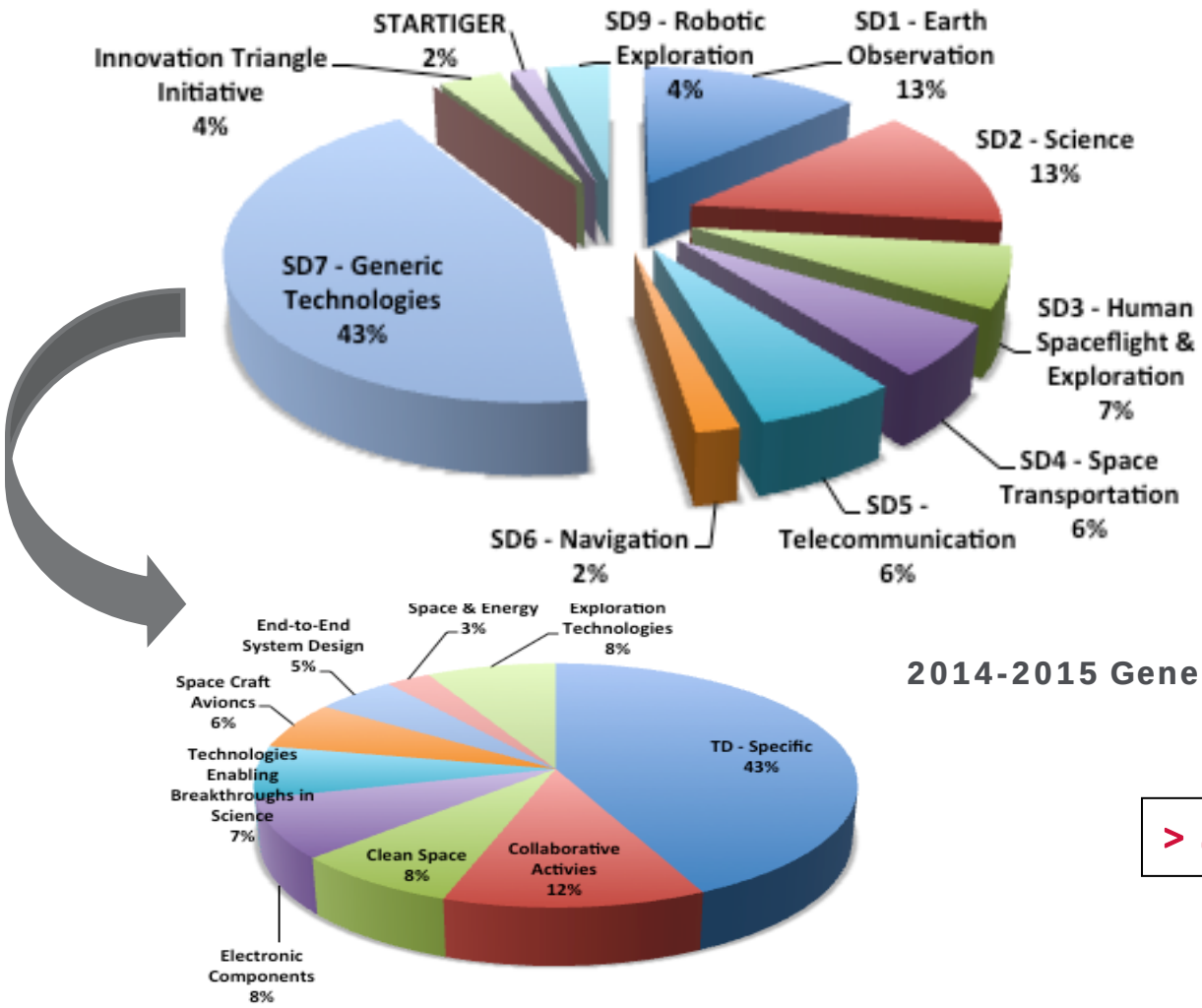
- Part of ESA's Mandatory Basic Activities
- All technology disciplines & applications
- Based on 2-year Workplans, with yearly updates (2014-2015)
- About 50 M€ in industrial contracts per Year
- About 150 contracts per year



The TRP is the backbone of ESA's innovation effort covering up to proof-of-concept TRL 3

TRP Budget dedications 2014-2015

2014-2015 Budget Perspective

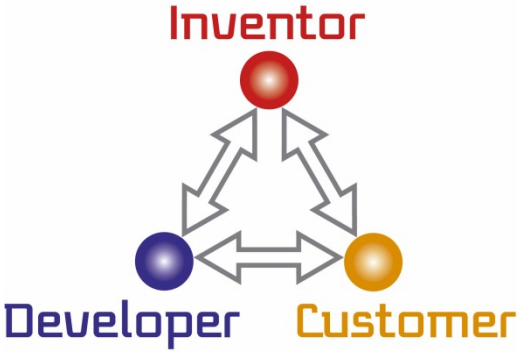


	M\€
SD1 - Earth Observation	14
SD2 - Science	14
SD3 - Human Spaceflight & Exploration	7
SD4 - Space Transportation	7
SD5 - Telecommunication	6.5
SD6 - Navigation	2
SD7 - Generic Technologies	44
SD8 - Space Surveilance	0
SD9 - Robotic Exploration	5
STARTIGER	1.6
Innovation Triangle Initiative	4

2014-2015 Generic Budget Breakdown

> 80% are in competition

TRP: Innovation Triangle Initiative



ITI is based on the "Innovation Triangle" concept requiring the collaboration of 3 different entities: an INVENTOR, a DEVELOPER and a CUSTOMER.

https://iti.esa.int/
AO8200 on ESA's EMITS

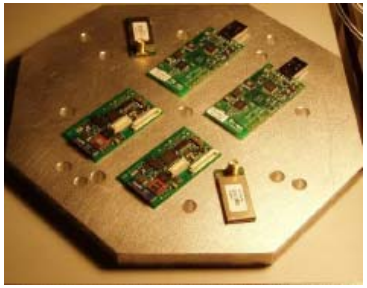
Three types of activities aimed at the different elements of the triangle:

(A) Proof of Concept (for INVENTORS): fast validation of new ideas

(B) Demonstration of Feasibility and Use (for DEVELOPERS): component and/or breadboard development up to validation in the laboratory

(C) Technology Adoption (for CUSTOMERS): development up to validation in a relevant environment,

Pressure sensor, Oxensis



Wireless sensors, SSTL

Documents to IPC: Illustration

ESA Unclassified
For official use

ESA/IPC(2013)107
Paris, 19 Sept 2013
(English only)

EUROPEAN SPACE AGENCY

INDUSTRIAL POLICY COMMITTEE

Information Note

BASIC TECHNOLOGY RESEARCH PROGRAMME

Preliminary Selection of Activities for the TRP 2014-2015 Work Plan

SUMMARY

The purpose of this document is to:

- present the preliminary selection of TRP 2014-2015 activities in compliance with programmatic needs
- support bilateral meetings with Delegations
- summarise the process and logic which have led to the selection

REQUIRED ACTION

IPC delegations are invited to take note.

NEXT STEPS

Following the presentation of this preliminary selection at the September 2013 IPC, bilateral contacts will be established with Delegations. The procurement plan for the activities to be initiated in 2014 will be presented to the November 2013 IPC.

Multi-year plan

ESA unclassified - For official use

ESA/IPC(2014)3,add.2
Att.: Annexes
Paris, 10th April 2014
(English only)

EUROPEAN SPACE AGENCY

INDUSTRIAL POLICY COMMITTEE

BASIC TECHNOLOGY RESEARCH PROGRAMME

Update of the TRP 2014 Work Plan

The IPC is invited to approve the TRP Work Plan 2014 Update by simple majority of the Member States.
AT+BE+CH+CZ+DE+DK+ES+FR+FI+GR+IT+IE+LU+NO+NL+PL+PT+RO+SE+UK

SUMMARY

This document is an update of the TRP Work and Procurement Plan for 2014.

REQUIRED ACTION

1.- Member States are invited to approve the attached TRP Work Plan 2014 Update.

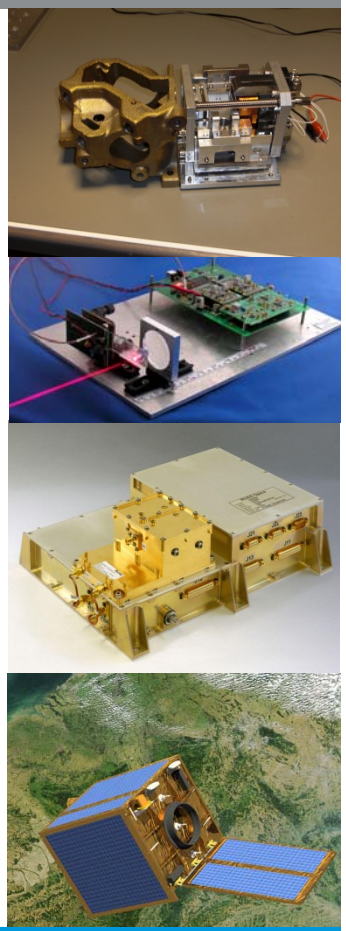
2.- The Industrial Policy Committee is invited to approve the procurement plan associated to the attached Work Plan Update (Activities in Annex I identified with the label IPC), based on the descriptions and justifications provided in Annex II.

Updates as required

GSTP – GENERAL SUPPORT TECHNOLOGY PROGRAMME

GSTP - OVERVIEW

- Part of ESA's Optional Programmes.
- Voluntary participation of all Member States (including Canada as associate Member State)
- Covering all technology disciplines and applications except Telecommunications (covered by the ARTES programmes).
- Five-year Work Plans, with yearly updates, and multiyear activities.
- Budget envelope five years ~ 450 M€
- 45-60 M€ industrial contracts per pear; 60-80 activities



The GSTP ensures the right technology with the right maturity are available at the right time

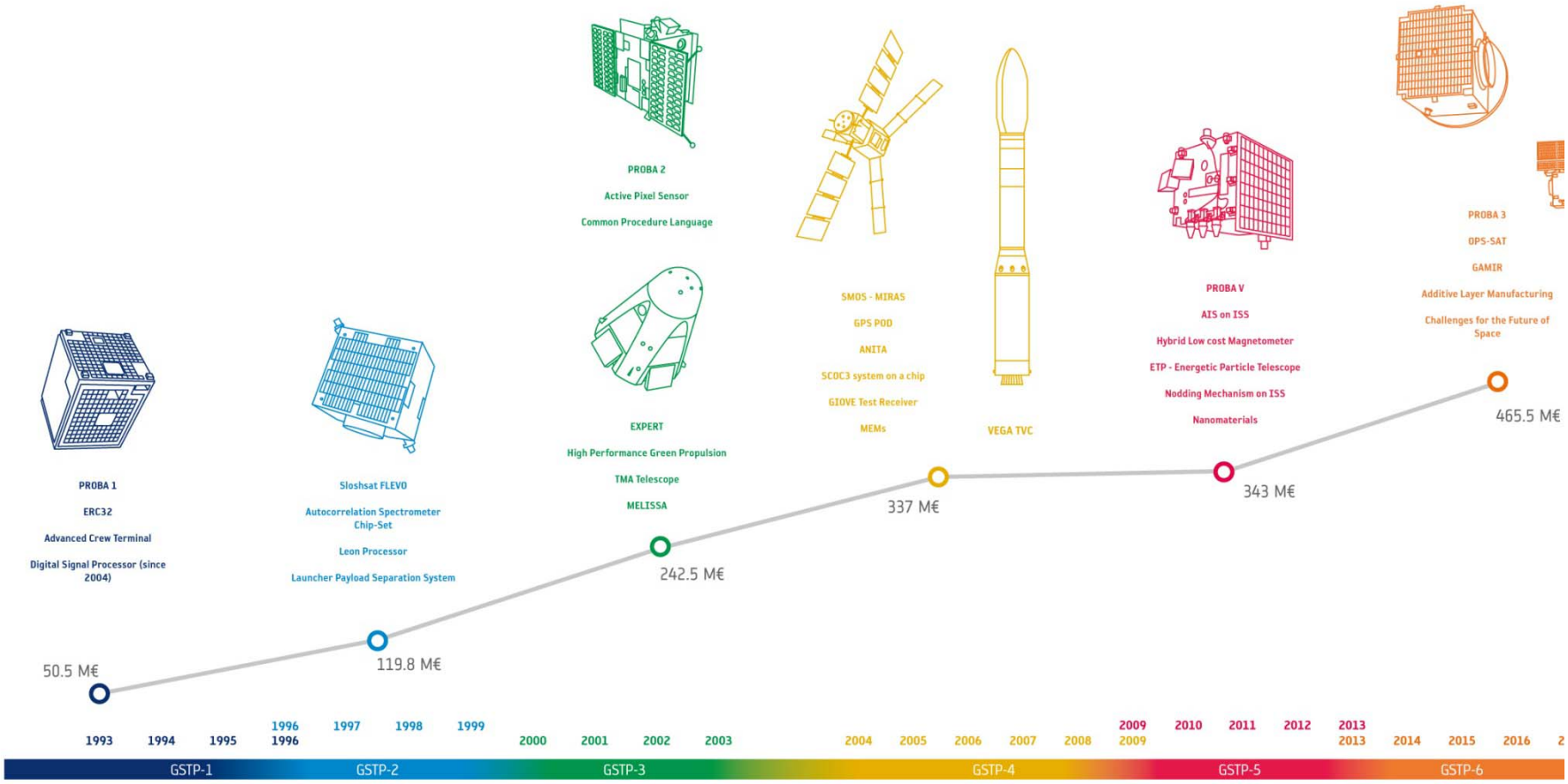
GSTP HISTORY

- GSTP Programme was initiated in 1993, with the objective to **ensure the necessary continuity in the development of identified technologies**.
- Initially established in 3 years periods:
  - GSTP-1 – 1993-1995 (50.5 MAU)
  - GSTP-2 – 1996-1999 (119.8 MAU)
  - GSTP-3 – 2000-2003 (242.5 M€) – extended 1 year
  - GSTP-4 – 2004-2010 (389.5 M€) – extended 3 years
- Some changes were introduced to the programme in the fifth period, GSTP-5:
  - 5 years period: 2009-2013 (350 M€ initial subscription; Declaration & Implementing Rules subscribed by **all** ESA Participating States)
  - The creation of 4 elements
- ESA Ministerial Conference in 2012: GSTP Period 6 (GSTP-6), 2013-2017, structured in Elements.
- The Declaration and Implementing Rules subscribed by all ESA Participating States

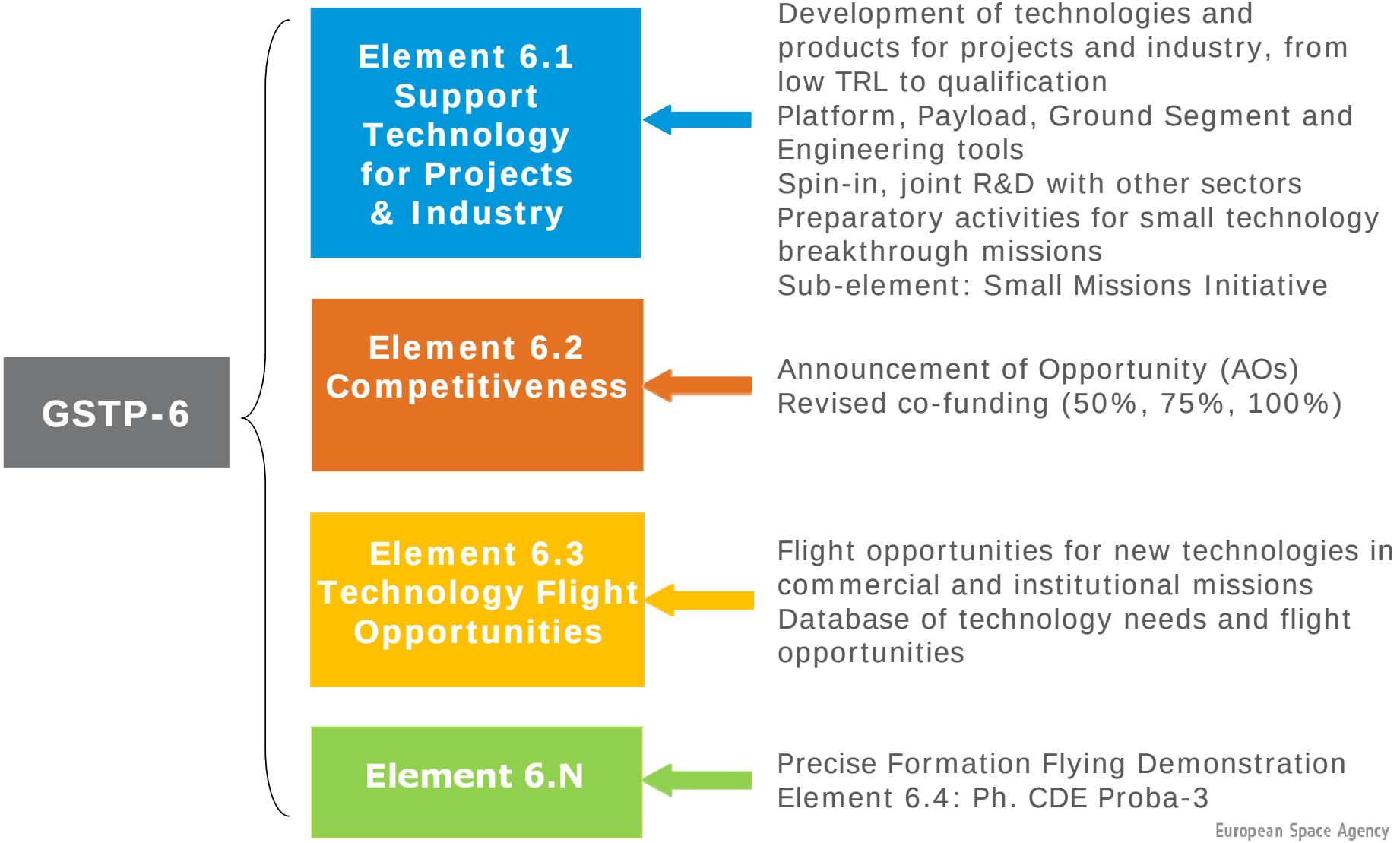
GSTP HISTORY

20 years of GSTP 1993-2013

GSTP Technology Highlights and Subscription levels for each Period



GSTP – STRUCTURE FOR PERIOD 6



GSTP IMPLEMENTATION

- Work Plans / Procurement Plans presented to Participating States in IPC for approval; Workplan updated every IPC (~6 times per year)
- Participants Delegations have two months to declare **support** to the activities approved during IPC.
- Invitation to Tender (ITT) to Bidders in Participating States having confirmed their support to the activity
- Flexibility to transfer funds among the elements. Participating States might increase their contribution or transfer the funds at any time
- Procurement Policy: C Open Competitive Tender; DN Direct Negotiation

Workplan Process

Activity Proposals ⇨ Internal Selection Processes (Tecnet, etc) ⇨ AC

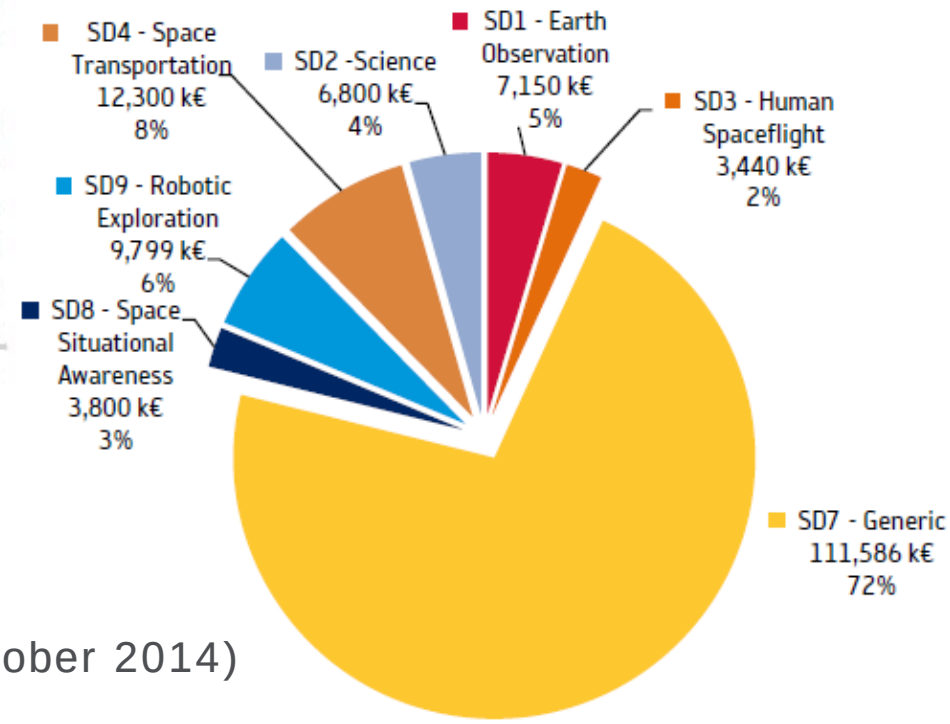
IPC WP/PP (approved & support) ⇨ Invitation to Tender (ITT) on EMITS / RFQ

GSTP-6 E1 – Support technology activities for projects and industry

- Development of technologies and products for projects and industry, from low TRL to qualification
- Target TRL shall be 4-6
- Development of engineering and test tools and methodologies (e.g. TD8)
- Covers technologies for space Platform, Payload, Ground Segment, and Engineering tools
- Open to accommodate specific area work plans or pilot projects, like e.g. technology spin-in and joint R&T
- Preparatory activities for future technology breakthrough missions eventually to be implemented in separate ad-hoc Element (**GSTP 6.n**)
- 1st Work Plan approved by IPC in June 2013

GSTP-6 E1 – Distribution of Activities by Service Domains

Service domains	Number of activities[1]	Budget (k€)	Budget share
SD1 - Earth Observation	9	7,150	4.6%
SD2 -Science	3	6,800	4.4%
SD3 - Human Spaceflight	6	3,440	2.2%
SD4 - Space Transportation	5	12,300	7.9%
SD7 - Generic			
Clean Space	20	14,650	9.5%
Generic	93	76,136	49.2%
SAVOIR	1	800	0.5%
Sabre	5	20,000	12.9%
SD8 - Space Situational Awareness	5	3,800	2.5%
SD9 - Robotic Exploration	5	9,799	6.3%
Grand Total	152	154,875	100.0%



Activities Approved by IPC (Data as of October 2014)

GSTP-6 E2 – Competitiveness

- Objective: offer to industry a mechanism for submitting at any time **unsolicited proposals** for market-oriented technology activities. Realistic business plan to be included – customer well identified (not only ESA projects)
- First step: Outline Proposal
- Revised co-funding schemes

ESA co-funding Schemes			
Technology Maturity \ Nature of the economic operator	SME	Non SME	Research Inst. & Universities
TRL <= 5	Up to 75%	Up to 75%	Up to 100% (if < 30% total budget)
TRL > 5	Up to 75%	Up to 50%	Up to 75%

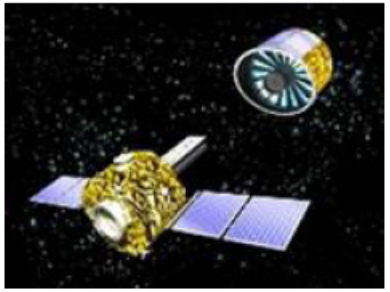
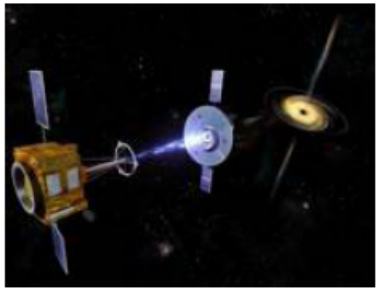
- Target for Evaluation of outline proposals: 10 working days
- After positive evaluation, RFQ is issued to industry
- Call opened April 2013 (AO7499). New call opened June 2014 (AO7935)
- Current Active Portfolio worth 33 M€ ESA funding (contracts, procurements, Outline proposals)

GSTP-6 E3 – Technology Flight Opportunities (TFO)

- Demonstration in-orbit of technology and products
- Target TRL is 7-8
- Essential for technologies spin-in from non-space sectors and for products requiring flight heritage for commercial customers
- Development and consolidation of capabilities in Member States
- Does not include technology development (shall be E1)
- Flight opportunities will be identified with ESA projects and launches, with National agencies and with primes, and with commercial missions.
- Special relation will be established with National programmes with demonstration objectives
- Needs will be identified systematically as part of technology roadmaps

GSTP-6 E4
PROBA – 3 A breakthrough in Space

- PROBA 3 will open the door to a new type of space missions, paving the way for future Formation Flying missions which need maintained large structures (large aperture antennas, long baseline telescope, interferometers, very long gradiometer etc.) as identified a few years ago, Darwin, XEUS, etc. and recalled at every call for mission .proposals


- When implementing a sun coronagraph, AO issued by ESA Space Science, Proba-3 produces the perfect eclipse, observing the sun limb to the lowest tangent point improving significantly the performance of previous missions (e.g. LASCO on SOHO)

TRP/GSTP on the ESA web pages

For more information please visit our websites:

On TRP:

http://www.esa.int/Our_Activities/Technology/About_the_Basic_Technology_Research_Programme_TRP

On ITI:

https://iti.esa.int/iti/index.jsp

On GSTP:

http://www.esa.int/Our_Activities/Technology/About_the_General_Support_Technology_Programme_GSTP

And our GSTP annual reports available on-line:


Thank you for your attention
European Space Agency