The ESA Challenge
Space Science roadmaps for
the Cosmic Vision plan
2015-2025

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From Horizon 2000 to Cosmic Vision

The Mandatory Science Programme is at the end of the 20 year Horizon 2000 plan (launch of Herschel/Planck)

The goal is achieved 3-4 yrs after original target – but with budget now running 25% below maximum level (planned and achieved in 1996)
Missions selected in Horizon 2000+

- Lisa Pathfinder
- GAIA
- BepiColombo
- JWST
- Solar Orbiter
- Lisa
Horizon 2000 + Horizon 2000 + has given:

Cosmic Vision 2005-2015
Cosmic Vision

2009-2015

Astrophysics
Mission suite in preparation

- Herschel-Planck (2008)
- Lisa-Pathfinder (2009)
- Chandrayaan (ISRO-ESA) (2007)
- Gaia (2011)
- Solar Orbiter (2015)
ESA’s new long term plan for space science
Grand themes

1. What are the conditions for life and planetary formation?

2. How does the Solar System work?

3. What are the fundamental laws of the Universe?

4. How did the Universe originate and what is it made of?
The context: Science

- Very successful response to Call for Ideas issued Summer 2007

- Exciting array of missions under study
  - Dark Energy, Blackholes + Cosmology, Earth-like Exoplanet Search, Asteroid Sample Return, NextGen Infrared Observatory, Sun-Earth interactions, Jupiter or Saturn system exploration

- International Cooperation
  - Negotiations opened with NASA, JAXA, RSA, ISRO, CNSA
  - « Orchestrating world space science »

- Concern
  - How achievable are the targets set by scientists?
Proposals Overview

• Total of 50 proposals, often of high quality

• Astrophysics: 19 proposals
  – 4 ‘L’ and 15 ‘M’ class.

• Fundamental Physics: 12 proposals
  – 1 ‘L’ and 11 ‘M’ class.

• Solar System: 19 proposals
  – 5 ‘L’ and 14 ‘M’ class.

• About half include potential collaboration with NASA, JAXA, CNSA, Roscomos.
CV selection outcome

Seven missions selected for assessment over 2008-2009

- Five M-class missions (ESA cost < 300 ME)
  - Goal: Down-selection end 2009, launch 2017
- Two L-class missions (ESA cost < 650 ME)
  - Compete with LISA
  - Goal: Down-selection end 2009, launch 2018
- A number of science mission themes (~10) highly ranked, requiring technology developments for enabling readiness for the next Call for Missions
<table>
<thead>
<tr>
<th>Fields</th>
<th>M Class</th>
<th>L Class</th>
<th>Mission of Opportunity</th>
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<tbody>
<tr>
<td>Solar System</td>
<td>Space Plasmas (CROSS-SCALE)</td>
<td>Giant planets (TANDEM – Saturn)/LAPLACE – Jupiter</td>
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<td>Neo sample return (MARCO POLO)</td>
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<td>Astrophysics</td>
<td>Dark Energy (DUNE/SPACE)</td>
<td>X-ray astronomy (XEUS)</td>
<td>IR astronomy (SPICA)</td>
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<td>Astero-seismology/Exoplanetets (PLATO)</td>
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L class missions

Tandem
mission to Saturn/Titan

Laplace
mission to the Jupiter system

Xeus
X-ray observatory

LISA
Gravitational Wave observatory
CV 1 selected missions

The chosen science targets fit well with:

- 4 Major themes – established through wide consultation in the Science Community
  - What are the conditions for life and planetary formation?
  - How does the Solar System work?,
  - What are the fundamental laws of the Universe?
  - How did the Universe begin and what is it made of?
Conclusion

- Cosmic Vision is based on a portfolio of missions of various sizes selected from successive calls allowing to progressively develop a plan achieving continuity and balance in the implementation of the scientific priorities embedded in the Cosmic Vision themes.

- The new plan will be implemented via a set of successive selection cycles of mission proposals for launching space missions in the 2015-2025 time frame.

- It provides the flexibility needed to adjust the pace of implementation to the evolution of the financial situation of the programme.