

SPACE SYSTEMS SYMPOSIUM (D1)
System Engineering - Methods, Processes and Tools (1) (3)

Author: Mr. Matthew Bullock
European Space Agency (ESA/ESTEC), The Netherlands, matthew.bullock@esa.int

Mr. David Binns
European Space Agency (ESA), The Netherlands, david.binns@esa.int

Dr. Marc Heppener
European Space Agency (ESA), France, marc.heppener@esa.int

Mr. Eike Kircher
European Space Agency (ESA), The Netherlands, eike.kircher@esa.int

Mr. Serge Flamenbaum
France, serge.flamenbaum@airbus.com

THE FTAP PROCESS TO IDENTIFY ENABLING TECHNOLOGIES FOR SCIENCE

Abstract

Space systems for a broad range of scientific objectives (e.g. Earth Science, Fundamental Physics, Life Science, Space exploration, Astrophysics...) build on enabling technologies. These technologies make new types of missions possible and allow for major evolutions between generations of space systems.

In the evaluation of future mission proposals, missions are often not retained due to the lack of maturity of specific enabling technologies. In a reciprocal manner, technology research and development activities for these technologies are also not pursued due to the lack of mission opportunities.

The Future Technology Advisory Panel (FTAP) is a transverse and multidisciplinary advisory body that initiated by ESA in order to help circumvent this vicious circle and to foster the development of selected enabling technologies. FTAP, part of ESA's science advisory structure, is composed of external technology experts, selected for their broad technical knowledge, and ESA scientific advisory structure representatives. The panel is responsible for making recommendations to ESA on enabling technologies for science, beyond missions currently being studied for implementation. It builds on ideas generated by its members and those provided by the working groups (e.g. Solar System Exploration Working Group).

This aim of this paper is to provide insight into the context, the role of the FTAP and how it functions, the results and recommendations of FTAP's first cycle.

It will describe the FTAP process that involves four phases: the identification of enabling technologies, pre-selection, assessment and provision of recommendations. It will provide information regarding the results from the first cycle, that included the collection and screening of an initial list of 64 enabling technologies for future science missions and the pre-selection of 6 technology lines for further assessment.

These technology lines, including cold atom devices, ultra-stable deployable structures, large monolithic mirrors, IR detectors, lasers, and formation flying and autonomous rendezvous technologies were assessed with respect to their future scientific breakthrough potential, the current state-of-the art and on-going and planned developments at ESA.

Building on the findings from the above mentioned phases, FTAP made recommendations for R&D actions for cold atom devices (optical clocks & atom interferometers) and Large Ultrastable Structures (bringing together ultra-stable deployable structures, large monolithic mirror, and nanometer metrology). Technology challenges that would be 'game-changers' were also identified. They include radiation protection and 'In-Space' propulsion.