SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Novel Concepts and Technologies to Enable Future Building Blocks in Space Exploration and Development (3)

Author: Dr. Emmanouil Detsis
European Science Foundation (ESF), France, edetsis@esf.org

Dr. Jean-Claude Worms
European Science Foundation, France, jcworms@esf.org
Prof. Jean-Pierre Swings
European Science Foundation, France, swings@astro.ulg.ac.be
Mr. Jean-Jacques Tortora
Eurospace, France, pierre.lionnet@eurospace.org
Mr. Paul Kamoun
Thales Alenia Space France, France, paul.kamoun@thalesaleniaspace.com

TECHBREAK - TECHNOLOGY BREAKTHROUGHS FOR SCIENTIFIC PROGRESS IN SPACE

Abstract

We report on the outcome of the European Science Foundation's Forward Look activity "TECHBREAK". The TECHBREAK project, equally funded by ESA and ESF, was created to leverage potential connections between the space sector and European Key Enabling Technologies (KETs). The concept of Key Enabling Technologies (KETs) was chosen to maximise commonalities between ESA technology development and European Union (EU) development programmes. The goal of TECHBREAK was not to serve as a definitive guide on which exact technologies should be developed for future space missions. Rather, it was prepared to inform on and flag up the main developments in various technological and scientific areas outside 'space' that might hold promise for use in the space domain. We have identified the current status of multiple research areas for each KET domain and the development horizon for each technology.

Additionally, we define the concept of "Overwhelming Drivers" for space research and exploration, i.e. long-term goals that can be transposed into technological development goals. These drivers represent the main areas where technological improvements are needed in order to be able to generate breakthroughs in space capabilities. The drivers served as a brief introduction to the space environment and space operations for the non-space experts and acted as a stimulant for the identification of potential helpful technologies during the TECHBREAK process. Beyond this goal, it is believed that these five Overwhelming Drivers could also be used as a novel categorisation of programme concepts and useful red thread to guide the reflection about future missions and related technological maturation.

We present in this article the main technological areas within the European KETs (nanotechnology, advanced materials, micro/nano electronics, photonics and metamaterials and biotechnology) that might have potential applications in the main Space 'Overwhelming Drivers', which are also presented in the article.