9th SYMPOSIUM ON STEPPING STONES TO THE FUTURE: STRATEGIES, ARCHITECTURES, CONCEPTS AND TECHNOLOGIES (D3)
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TOWARD ENABLING NASA'S FUTURE INVESTMENTS IN TECHNOLOGY: A SET OF SPACE TECHNOLOGY ROADMAPS

Abstract

NASA's Office of the Chief Technologist (OCT) has embarked on the development of a set of Space Technology Roadmaps (STR) to identify and emphasize technologies that provide substantial enhancements in NASA mission capabilities and where significant technology investments are anticipated to be needed. The set of draft STRs introduces a proposed taxonomy of fourteen Technology Areas (TAs), identifies top challenges in each TA, establishes time-phased mission pull and technology push strategies, and ultimately offers a range of potential paths to advance the nation's capabilities for scientific discovery and exploration of space.

Some common themes emerge from the draft STRs, including:

1. There is a great need to invest across the entire Technology Readiness Level spectrum;
2. There are extensive inter-dependencies between TAs; for example, multi-functional materials are sought by many TAs in order to save on required mass to orbit. Similarly many TAs (and missions) seek less mass and increased performance from their power sources and communications systems. Fortunately, there are identified paths to obtain large improvements in these cross-cutting areas.
3. In the distant future, virtual development and test can occur for many materials and technologies

to forecast how they would perform in locations far from Earth; such forecasting and assessment could occur before the physical manufacturing of these materials and technologies, and

4. Benefits from the technology developments extend far beyond NASA and the aerospace community. Diverse areas such as manufacturing, energy, health, agriculture, mining, pharmaceuticals, aviation, education, construction, entertainment, environment, and national security were cited as beneficiaries.

The set of draft STRs are a cornerstone to re-establishing and maintaining robust and sustainable space technology development programs within NASA. NASA developed these draft STRs as a starting point for the National Research Council (NRC) to provide the Agency with its independent recommendations on the most valuable future technologies for NASA as well as their potential contributions to meeting other national needs. Through an open process of community engagement, the NRC will gather public input and integrate it with the findings of its own selected subject matter experts. Because it is difficult to predict the wide range of future advances possible in these areas, NASA plans updates to the set of roadmaps on a regular basis. The full paper will document the motivation for the space technology roadmaps, present the processes used to develop them, and highlight the progress completed to date.