

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

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WICKED PROBLEMS IN SPACE TECHNOLOGY DEVELOPMENT AT NASA

Abstract

Technological innovation is key to enable future space exploration missions. Technology development, however, is not only driven by performance and resource considerations, but also by a broad range of directly or loosely interconnected factors. These include, among others, strategy, policy and politics at various levels, tactics and programmatics, interactions between stakeholders, resource requirements, performance goals from component to system level, mission infusion targets, portfolio execution and tracking, and technology push or mission pull. Furthermore, these influences occur on varying timescales and at diverse geographic locations. Such a complex and interconnected system could impede space technology innovation in the government environment. Hence, understanding the process through the Planning, Programming, Budget and Execution cycle could benefit strategic thinking, planning and execution. Insights could be gained through suitable models, for example assessing the key drivers against the framework of Wicked Problems. This paper discusses space technology innovation and innovation barriers in the government environment through the characteristics of Wicked Problems; that is, they do not have right or wrong solutions, only improved outcomes that can be reached through authoritative, competitive, or collaborative means. We will also augment the Wicked Problems model to account for the temporally and spatially coupled, and cyclical nature of this specific case, and propose how appropriate models could improve understanding of the key influencing factors and lead to reducing innovation barriers, subsequently stimulating technology innovation at NASA and other government-directed environments.