15th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Space Technology and System Management Practices and Tools (4)

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LEVERAGING OPEN INNOVATION FOR COMPLEX SYSTEMS: GUIDANCE FOR SPACE AGENCIES

Abstract

In recent years, NASA and other federal agencies have invested substantially in leveraging the potential of open innovation tools to solve their toughest problems. In fact, since 2010, there have been more than 700 challenges run by US agencies alone. While, many of these efforts have lead to substantive successes, there remains skepticism, particularly among engineers, about whether these "open" tools can be productively applied to solve complex systems problems, like those at the core of NASA's mission.

In this work, we address that concern directly, synthesizing results from two related studies: In the first, we use field experiments on a NASA robotic system to characterize the relationship between system complexity and problem solving capability by the crowd. We show the mediating affect that problem complexity can have on who chooses to contribute, and as a result, the quality that seeking agencies should expect from the crowd. In the second, we use an interview-based field study of contributors to NASA's Centennial Challenge Program to understand what motivates potential solvers to contribute to complex systems challenges. We show, how in the context of technically meaty solutions, some solvers neither develop de-novo solutions nor match existing capabilities to the seeker's problem. Instead they often view the (large) prize as an alternative funding mechanism, to further their ongoing objectives.

Combined these studies provide important insights for how agencies, like NASA, should conceptualize open innovation tools (including prize competitions) as one of their options for encouraging RD.