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17th 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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RETHINKING UNCERTAINTY IN THE DESIGN OF SPACE SYSTEMS

Abstract

One of the most important challenges in the design of space systems is to manage uncertainty at the early stages of the process, where the level of information available is not sufficient to converge towards a robust solution. By definition, uncertainty is "the state of being uncertain... not known or defined". This suggests that uncertainty has an epistemic origin, relying on human judgement and reaction to the unknown or unclear.

We propose the use of design thinking (DT) as a way to manage uncertainty stemming from different human actions and judgements during the development of space systems. We explore the three pillars of DT (desirability, viability and feasibility) and redefine the DT strategy in the context of space systems design. We separate theoretical and practical dimensions of engineering design and, identify, analyze and evaluate the epistemic uncertainties in both dimensions. Finally, we discuss the implementation of the strategy, with an early proof of concept application for a satellite design research project.