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Lessons Learned in Space Systems: Achievements, Challenges, Best Practices, Standards. (5)

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BROADENING JPL'S MISSION FORMULATION PARADIGM WITH HUMAN CENTERED DESIGN

Abstract

Within NASA's highly competitive environment for funding, Human Centered Design (HCD) and cybernetics could provide advantages to proposers during the mission formulation phase. Opportunities are limited when it comes to funding new science missions. Proposers are challenged to make a compelling case about the scientific desirability, technical feasibility, and resource viability of their concepts. Organizations follow established processes for proposal development using teams that typically include scientists, engineers, and managers. These team members are highly experienced subject matter experts (SME) in their own disciplines, and can respond to requirements from the solicitation. However, they are typically not trained as designers and communicators. Their approach is rooted within NASA's science and technology paradigm. How can we improve the proposal development process, refine workflow between team members, and deliver clear and appealing offerings to the stakeholders and evaluators? These questions have been addressed by today's most innovative companies (e.g., Apple, Google, 3M, Dyson), where the design process is not limited simply to engineering and management, but involves an all-encompassing approach drawing from fields such as social sciences, design, and the arts. Like these commercial enterprises, NASA currently employs systems thinking and integrated design, but can benefit further by moving beyond its current practices, which are mostly driven by rigid engineering, technology, science, and project management considerations. At JPL's Innovation Foundry and through the Solar System Mission Formulation Office, we broadened this paradigm by including HCD in the mission formulation workflow. Our goal was to create a proposal with improved clarity and appeal, thus helping our team to communicate its message and aid evaluators with their work. In this paper we provide examples and lessons learned from our recent proposal development effort using HCD. We discuss touch points where we infused non-linear designerly approaches and cybernetic circularity into the workflow. Implemented design topics include operational design for team building; process design throughout distinct phases of the proposal development and writing process; communication design for streamlined exchange of information within the team and to stakeholders; interaction design; graphic design; and creating boundary objects. While these approaches may feel new or foreign to SMEs and managers in the aerospace community, they produced significant benefits in this mission formulation effort. We will describe how such approaches can be used to broaden NASA's technology-driven paradigm through design, thus creating an environment which fosters innovation, improved communication, and strategic advantage for proposers and their organizations.