

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

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## DESIGNING THE DESIGN AT JPL'S INNOVATION FOUNDRY

**Abstract**

NASA is a dynamic and living organization. Looking at it through the optics of cybernetics, we can describe it as an autopoietic system. It has to sustain itself, and compete successfully to be viable. Its organizational elements have to interact with the broader environment by maintaining and improving its processes that generate the means for future sustainability. It also needs to bring up a follow-on generations who are not simply aligning with the status quo, but also improve the system's viability. For government-run programs, organizational, programmatic and project management practices are often rigidly linear. They can be characterized as observed first-order cybernetic systems, where the paradigm is bound by well-established requirements. At the implementation level this does not readily accommodate flexibility and change. To address this, broadening the system's worldview is needed from the strategic level. This corresponds to an observing second-order cybernetic system, where strategic leadership can overwrite the rules of a first-order system. Changing the worldview of an organization can be complex and face much resistance. Still, with the appropriate strategic-level support, it can be achieved by introducing novel languages, new perspectives, and adding new disciplines to the existing ones. In effect, this helps to broaden the organizational paradigm, and subsequently influence its mission, impact the culture, and open up its core processes. These changes can be effectively introduced through design dialogs in the early formulation stages, when new ideas are conceived. Within NASA's Jet Propulsion Laboratory, early-stage concept developments are performed at a specially formulated environment, called the Innovation Foundry. Within this office, a continuous effort is being made on designing the design processes, which helps to broaden the variety of the option trades. It is achieved by an added focus on dialogs and the inclusion of non-engineering disciplines, such as industrial and graphic design, human centered design, and even art. Communicating the information more effectively through dialogs and symbolic means benefits from the skills of human centered designers and artists. In this paper we will discuss how design is being designed at JPL's Innovation Foundry, by focusing on novel languages, storytelling, dialogs, boundary objects in support of improved communications both externally to stakeholders and sponsors, and internally within the design teams. We will also highlight how these new design driven approaches provide a strategic strength for the organization when competing for funding in a resource constrained environment.