

Habitat Demonstration Unit Project: Leadership and Management Strategies for a Rapid Prototyping Project

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ABSTRACT

This paper gives an overview of the National Aeronautics and Space Administration (NASA) led multi-center Habitat Demonstration Unit (HDU) project leadership and management strategies being used by the NASA HDU team for a rapid prototyping project. The HDU project team constructed and tested an analog prototype lunar surface habitat/laboratory called the Pressurized Excursion Module (PEM) during 2010. The prototype unit subsystems were integrated in a short amount of time, utilizing a “tiger team” rapid prototyping approach that brought together over 20 habitation-related technologies and innovations from a variety of NASA centers. This paper describes the leadership and management strategies as well as lessons learned pertaining to leading and managing a multi-center diverse team in a rapid prototype environment. The PEM configuration went from a paper design to an operational surface habitat demonstration unit in less than 12 months.

The HDU project is part of the strategic plan from the Exploration Systems Mission Directorate (ESMD) Directorate Integration Office (DIO) and the Exploration Mission Systems Office (EMSO) to test destination elements in analog environments. The 2011 HDU-Deep Space Habitat (DSH) configuration will build upon the PEM work, and emphasize validity of crew operations (remote working and living), EVA operations, mission operations, logistics operations, and science operations that might be required in a deep space context for Near Earth Object (NEO) exploration mission architectures. The 2011 HDU-DSH will be field-tested during the 2011 Desert Research and Technologies Studies (DRaTS) field tests. The HDU project is a “technology-pull” project that integrates technologies and innovations from multiple NASA centers. This project will repurpose the HDU 2010 demo unit that was field tested in the 2010 DRaTS, adding habitation functionality to the prototype unit.

This paper will describe the strategy of establishing a multi-center project management team that put in place the key multi-center leadership skills and disciplines to enable a successful tiger team approach. Advocacy was established with key stakeholders and NASA Headquarters (HQ) by defining a strategic vision, mission, goals and objectives for the project and team. As a technology-pull testbed capability the HDU project was able to collaborate and leverage the Exploration Technology Development Program (ETDP) and individual NASA center investments which capitalized on their respective center core competencies and skills. This approach enable the leveraging of over \$7.5m of value to create an operational habitat demonstration unit 2010 PEM configuration.

Key words: Habitat Demonstration Unit, analog, management, leadership, rapid prototyping, tiger team

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