

Lessons learned in Concurrent Mission and Systems Design at NASA Glenn Research Center: Almost Fifteen years of the Compass Team

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1. Introduction

Established at NASA Glenn Research Center (GRC) in 2006 to meet the need for rapid mission analysis and multi-disciplinary systems design for in-space and human missions, the *Compass* team is a multidisciplinary, concurrent engineering group whose primary purpose is to perform integrated systems analysis for space-based missions. The team was established to assess spacecraft & space systems concepts and represents a logical extension of GRC's long history of design & analyses of space systems concepts and missions.

2. Team Origin

With a focus on the applications of NASA's advanced technologies, the *Compass* team is capable of designing any system that involves one or more of the disciplines present in the team. The authors have been involved in both the initial development of the *Compass* team and its design process as well as throughout its fifteen-year existence. The team draws some of its current collaboration process and tools from work done in the early 2000's as part of an effort between NASA GRC in Cleveland and the Jet Propulsion Laboratory (JPL) in support of the multi-center collaborative JIMO (Jupiter Icy Moons Orbiter) spacecraft design. *Compass* was officially launched in 2006 as part of NASA's lunar landing studies during the Constellation program. After this initial design, the team found an ongoing purpose and identify with a focus on designing reference missions of the application of technologies in order to drive NASA agency technology development programs.

3. Team Lessons Learned

This paper is a look back at the lessons learned along the years of the *Compass* concurrent mission and systems design team at GRC, documenting how it evolved from a group gathered to perform a single study and examining the things that have been key in to making it the sustained and successful *Compass* team it is today. The team is a matrixed group of experts from various technical backgrounds and personalities. They gather together either physically in a single meeting space, or virtually using NASA's various virtual meeting applications and using a data exchange tool, design a space system (Spacecraft, stage, science package, etc) in two weeks. Over the years, because of the rapid nature of the design studies, the team leadership has iterated on the optimal team member personality makeup, facility elements and tools as well as NASA GRC center management support necessary to lead to sustained success.

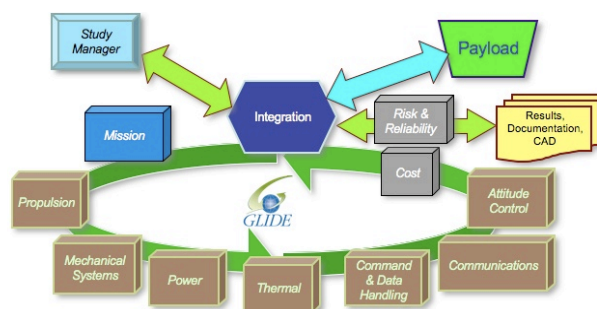


Figure 1: Notional *Compass* Design Study Process.

4. References

- [1] McGuire, Melissa L, Steven R Oleson, Timothy R. Sarver-Verhey, "Concurrent Mission and Systems Design at NASA Glenn Research Center: The Origins of the COMPASS Team," Space 2011 Conference and Exposition; September 27- 29, 2011; Long Beach, CA, NASA/TM-2012-217283, AIAA Paper 2011-06396, 2011.
- [2] McGuire, Melissa L., Matthew R. Kunkel and David A. Smith, *Global Integrated Design Environment (GLIDE): A Concurrent Engineering Application*. NASA/TM-2010-216909, 2010.