

SpaceOps 2014 Abstract: COST ANALYSIS IN A MULTI-MISSION OPERATIONS ENVIRONMENT

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Spacecraft control centers have evolved from dedicated, single-mission or single mission-type support to multi-mission, service-oriented support for operating a variety of mission types. At the same time, available money for projects is shrinking and competition for new missions is increasing. These factors drive the need for an accurate and flexible model to support estimating service costs for new or extended missions; the cost model in turn drives the need for an accurate and efficient approach to service cost analysis. The National Aeronautics and Space Administration (NASA) Huntsville Operations Support Center (HOSC) at Marshall Space Flight Center (MSFC) provides operations services to a variety of customers around the world. HOSC customers range from launch vehicle test flights; to International Space Station (ISS) payloads; to small, short duration missions; and has included long duration flagship missions. The HOSC recently completed a detailed analysis of service costs as part of the development of a complete service cost model. The cost analysis process required the team to address a number of issues. One of the primary issues involves the difficulty of reverse engineering individual mission costs in a highly efficient multi-mission environment, along with a related issue of the value of detailed metrics or data to the cost model versus the cost of obtaining accurate data. Another concern is the difficulty of balancing costs between missions of different types and size and extrapolating costs to different mission types. The cost analysis also had to address issues relating to providing shared, cloud-like services in a government environment, and then assigning an uncertainty or risk factor to cost estimates that are based on current technology, but will be executed using future technology. Finally the cost analysis needed to consider how to validate the resulting cost models taking into account the non-homogeneous nature of the available cost data and the decreasing flight rate. This paper presents the issues encountered during the HOSC cost analysis process, and the associated lessons learned. These lessons can be used when planning for a new multi-mission operations center or in the transformation from a dedicated control center to multi-center operations, as an aid in defining processes that support future cost analysis and estimation. The lessons can also be used by mature service-oriented, multi-mission control centers to streamline or refine their cost analysis process.