

57th IAA HISTORY OF ASTRONAUTICS SYMPOSIUM (E4)
Interactive Presentations - 57th IAA HISTORY OF ASTRONAUTICS SYMPOSIUM (IP)

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FORM AND FUNCTION: REFINING HUMAN SPACE EXPLORATION ORGANIZATIONAL
STRUCTURES

Abstract

Since its inception, the National Aeronautics and Space Administration (NASA) has sought to create a human spaceflight framework that maximizes safety, efficiency in technical management, and transparency to stakeholders. However, the organizational structure has adapted over time to meet the evolving goals and priorities of the Agency and, in many instances, of the United States as a whole. A closer examination of the external factors impacting American space exploration – political zeitgeist, Congressional appropriations, geopolitical influences, and the evolution of the private space industry, among others – suggests these factors play a prominent role in the ebb and flow of Agency decision-making. The resulting organizational construct has oscillated between centralized (top-down approach) and decentralized (bottoms-up approach) forms to fit the dynamic functions typical of a federal agency, and substantive functions have also changed as a result. Key functions have included program/project lifecycle management strategies, the roles of independent technical authorities, and the allocation of decision-making authority.

This paper will examine the effects of such constructs and decision-making processes through an ex-post view of NASA's human spaceflight organizations over time, tracing from the Apollo and Shuttle "Return to Flight" periods through the Constellation Program and current state. A major aim is to highlight the drivers causing human spaceflight organizational change and implications of such change for the broader international space community. While NASA's main purpose is to foster the Nation's scientific and exploration goals, Congressional guidance and support have fluctuated based on shifting national priorities – reflecting keen national security interests during the Apollo program, followed by the political benefits of completing the International Space Station, and ultimately the scientific, economic, and diplomatic opportunities arising from creating an international sustainable lunar presence. More recently, the Agency has increasingly transitioned from an "oversight" to an "insight" model in its commercial partnerships, as demonstrated in the Commercial Orbital Transportation Services (COTS) Program, the Space Communications and Navigation (SCaN) Commercial Services Group, Commercial Lunar Payload Services (CLPS), and the Human Landing System Program, which have garnered increasing Congressional interest and support. The transition of space exploration paradigms from being either exclusively public or private to being intentionally partnered will allow for a greater ability of space organizations to achieve shared goals and tackle global challenges.