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PROJECT GEMINI – AN ENGINEERING AND MANAGERIAL ASSESSMENT: WHAT YESTERDAY TEACHES ABOUT TOMORROW

Abstract

To fully understand an object, questions must be asked and answered. The reporter asks "who, what, when, and where." The philosopher asks "why." The engineer asks "how." These are crucial questions, to be certain, but until the "so what" question has been asked and answered, one has a partial understanding of an issue at best. This paper addresses the "so what" question for Project Gemini, the second manned space program of the United States. Elsewhere there exist solid technical and historical accounts of Project Gemini, but an assessment of the true importance of Project Gemini for future space programs has been sorely needed.

Tsiolkovsky famously said that "earth is the cradle of man." This being the case, in terms of human space flight Project Mercury served as the kindergarten and Project Apollo was the doctoral program. It was Project Gemini, however, that took spaceflight through the elementary school, high school, baccalaureate, and Master's Degree levels, all in in just five years, yet the implications of Project Gemini and its relevance for tomorrow's space programs is little understood. This paper addresses this gap.

Projects Mercury and Apollo were planned from the outset by NASA, with Project Apollo landing man on the Moon "sometime in the 1970s." Once the length of the time gap between the final Mercury flight and the first Apollo flight was realized, and given President Kennedy's challenge to reach the Moon within the 1960s, it became obvious that something heretofore unique would be necessary, hence Project Gemini.

Project Mercury, as important as it was, took America into space, but it was "Spam in a can" as the astronauts themselves said. The astronauts has essentially no control over the space capsule, only able to alter its attitude. To be able to rendezvous, dock, precisely re-enter, and be assured that man could truly live and work in space, a program, based on new engineering and managerial approaches was required. The management systems that later made Project Apollo such a success were developed under Gemini. The engineering methods that created the then-world's most complicated system were developed, tested, and implemented in Gemini. And the key questions facing the success of Project Apollo were identified and addressed by Gemini. This paper documents the engineering and managerial approaches that were implemented in Project Gemini and lays out the lessons learned from the critical tasks and their accomplishment for future space programs.