

## STPI Report Assesses NASA Human Mission to Mars

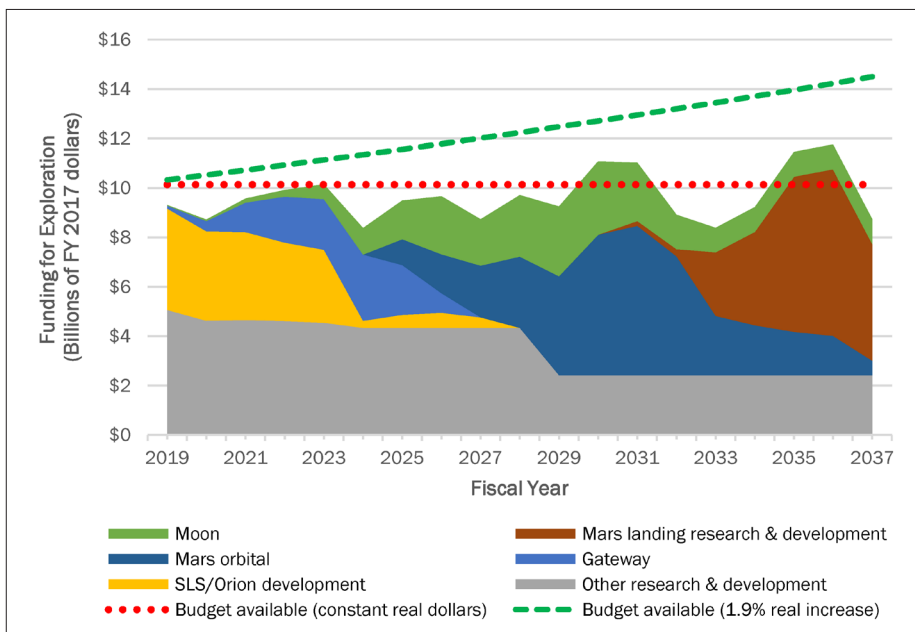
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The NASA Transition Authorization Act of 2017 mandated that NASA “develop a human exploration roadmap” with an expectation of a mission to Mars by 2033. Further, Congress mandated that NASA contract with an independent entity to assess these plans. NASA asked IDA’s Science and Technology Policy Institute (STPI) to conduct the assessment.



Per NASA’s request, **STPI used NASA’s current and notional plans for human exploration as the basis for the evaluation**, rather than independently developing a mission architecture or evaluating a range of architectures. **NASA’s current plans call for parallel progress building a lunar infrastructure, while simultaneously developing a host of new deep space technologies, new and complex system-level capabilities, and new acquisition and institutional relationships.** With such ambitious content and fixed funding, STPI found that the only remaining variable is schedule.

**The major architectural elements necessary for an orbital mission to Mars are the Space Launch System (SLS), the Orion Crew Vehicle, the Gateway, and the Deep Space Transport (DST) supplemented by commercial support on launch and landers.**



At left is a comparison of annual costs to available budget for these and other components of the planned mission. **STPI found that a 2033 departure date for a Mars orbital mission is infeasible under all budget scenarios and technology development and testing schedules, given NASA’s current and notional plans. The earliest a mission could feasibly depart for Mars is 2037, assuming a small budget increase or smoothing budgets over two time**

periods in the 2030s, with 2039 being more realistic if delays or budget shortfalls affect procuring or testing the DST. The 2037 departure date would require a small budget increase or smoothing of budgets over two time periods in the 2030s.

Based on IDA D-10510, *Evaluation of a Human Mission to Mars by 2033*, E. Linck, K. W. Crane, B. L. Zuckerman, B. A. Corbin, R. M. Myers, S. R. Williams, S. A. Carioscia, R. Garcia, B. Lal, February 2019. Research sponsored by NASA. The report is part of a growing portfolio of space-related research at STPI.