GALORATH

Putting a Man on Mars: New Technology Requires New Cost Estimates

In the next few decades, NASA plans to implement human missions to Mars. This is an enormous challenge and will require the development of innovative technologies. Two of these are the use of crewed launch vehicles that use nuclear thermal and solar electric propulsion.

The Challenge

The task was to develop an independent cost estimate for a crewed vehicle that uses nuclear thermal propulsion. Due to the lack of historical precedent and a lack of recently-developed launch vehicles, cost estimating is challenging. A NASA team researching this task asked Galorath to use their space cost estimating expertise to develop a credible estimate.

Our Solution

Galorath personnel faced a similar problem when developing cost estimates for the Constellation program a decade ago, which planned to send human crews to the Earth's moon and then on to Mars. Comparable launch vehicle programs were decades old, and there were new technologies and new challenging configurations. For that program, Galorath developed a semi-parametric method that combined analogies with statistical studies of trends in the cost of developing technologies, productivities, types of structures, and other factors to develop credible estimates for the program. Galorath applied the same approach to develop a cost estimate for the nuclear thermal powered crewed vehicle.

The Result

Even though these technologies are a decade away from maturity, the ability to develop credible estimates for challenging problems like these provides confidence that such solutions can be implemented while being affordable. That such technologies are financially viable enables decision-makers to invest in these technologies secure in the knowledge that they are not wasting taxpayer dollars on something that is prohibitively expensive.