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DEVELOPMENT (D3)Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and
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IS THE DEEP SPACE GATEWAY IN THE RIGHT PLACE?

Abstract

NASA's plans for a Deep Space Gateway (DSG) in cis-lunar orbit have attracted a lot of attention across the industry over the past few years. However, its ever-changing conception from a staging-post for human missions to Mars, to a facilitating architecture for a renewed presence on the Moon, and the increasing uncertainty over the project's funding, have perhaps detracted from a far more critical question: is it in the right place?

In spite of the Moon-Mars destination dilemma, we should nevertheless note the significant advantage in that the proposed DSG is positioned outside Earth's gravity well, and thus a good place for manufacturing spacecraft for ongoing interplanetary missions. However, the proposed location in orbit around the Moon also introduces a series of issues, such as the intermittent tele-communications as the station circles the Moon and astronaut-return safety concerns. Another, more fundamental issue, however, is that the proposal does not take advantage of the traditional and highly successful Earth-centric space businesses (satcoms and potentially space tourism) as a possible source of funding and logistics support.

It would seem therefore that consideration should be given to re-locating the Deep Space Gateway to a location in or near Earth's geostationary orbit (GEO), which would also be at the edge of Earth's gravity well. GEO would provide an equally good start point for future Moon landings as the energy requirements for such a mission would not differ much between the two potential locations. By encouraging the development of commercial partners who would find a logistical train between LEO and GEO to be advantageous for their existing businesses, would also help underwrite the capability to the advantage of the proposed governmental operators (and their limited budgets).

Such a "Gateway Earth" station could be a far more realistic prospect, as it combines maximum utility with favourable business conditions for a public-private partnership. This solution is also far more in tune with the concerns about the democratisation of access to space, as well as issues surrounding the sustainability of the future space exploration and utilisation architectures, in particular, since it offers benefits in attempting to deal with some of the challenges of space debris, as described in the paper.

This paper analyses some of the key premises of the DSG and the Gateway Earth proposals, and puts forward a new, more holistic, vision of the future space access architecture through orbital space stations beyond LEO.