

Remarks to the Review of U.S. Human Spaceflight Plans Committee

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My name is Osa E. Fitch and I am a private Citizen of the United States. I would like to thank the Committee for this opportunity to provide input into their review of the plans for U.S. human spaceflight. As an American taxpayer with a technical and operational background in aerospace I care about the United State's human spaceflight program on many fronts.

I would like to make two major points to the Committee:

- The Vision for Space Exploration (VSE) is fundamentally sound as an underlying mission and rationale for NASA's involvement in human spaceflight; and
- NASA's Constellation program as currently structured is on a path to failure that will not achieve the VSE, and is likely continue to fail until it is fundamentally restructured.

Regarding the Vision for Space Exploration, any United States government-run human spaceflight program needs to be shaped such that it inspires all Americans, and does not compete with commercial enterprises. The VSE, with its focus on moving beyond Low Earth Orbit (LEO) meets this need in both of these areas. I support this vision, and I believe that most Americans also support it if it can be executed in a cost-effective manner. Human spaceflight also inspires people all over the world.

Regarding NASA's Constellation program, there are two basic problems that I believe need to be addressed:

1. The system requirements have been set in a manner that does not account for any of the real-world constraints faced by a government-run human spaceflight program. The largest issue facing the country at this point in history is the current economic crisis. Any government-run human spaceflight program must operate in an environment of fixed or declining real budgets. Picking arbitrary mission requirements, then assuming that the budget will be made available to develop arbitrary systems to meet those requirements in a monolithic architecture is unrealistic in the economic and financial environment we face.
2. The Ares launcher-development program has run off the rails, developing two all-new and unaffordable launch systems. The Ares 1 program, even if successful, fundamentally duplicates existing launcher capability without adding anything new of value, but at great cost to the taxpayer, and that cost is growing by the day. The technical limitations of the Ares 1 launcher have had significant negative impact on other areas of the Constellation program, particularly on the Orion spacecraft, forcing multiple redesigns and the elimination of many important spacecraft systems, including safety features and reusability features. The Ares V has grown into a rocket with little commonality with Ares 1, and almost no commonality with the existing Space Shuttle, including infrastructure. Because Ares 1 and Ares V are two different launchers, the flight rate for each will be lower than if a single launcher were used for both missions, driving up costs. Because of the enormous size of the Ares V launcher, its flight rate will be very low, driving up costs even further.

What are possible solutions to these problems?

- Switch to a capabilities-based approach and leverage systems that already exist, doing minimum development to get to an architecture that can be scaled and grown over time. Given the proven

components and systems that exist today, how can they be put together in a different way to achieve as many of the goals of the VSE as possible? Several of today's presentations, such as EELV, DIRECT, Shuttle Side-Mount Options, etc., may take this approach and I urge the Committee to give serious considerations to these options.

- Focus on cost as an independent variable as a key part of the architecture. Aerospace designers know that new vehicles are developed around engines, and that developing a new engine is at least as difficult as developing a new vehicle. The current Ares launcher programs violate this principle in spades, developing at least four new engines: a 5 segment Solid Rocket Motor (with a different propellant chemistry than the existing 4 segment Space Shuttle Reusable Solid Rocket Motor) for Ares 1; a 5.5 segment Solid Rocket Motor for Ares V; a J-2X upper stage engine for use by both Ares 1 and Ares V; and a regeneratively-cooled RS-68 core engine for Ares V. All four engine development programs add enormous cost and schedule delays to the program. Use of existing facilities and infrastructure also saves cost and time, and the Ares program is also violating this principle in spades. Almost none of the existing Space Shuttle facilities and infrastructure can be used by the Ares program without significant and costly large-scale upgrades. There are many other examples as well. Focusing the architecture around cost as an independent variable could have the following immediate benefits: Orion could be designed around an existing launcher (e.g. any one of the variety of EELV-class launchers), providing immediate program stability; a heavy-lift shuttle-derived launcher (e.g. DIRECT, potentially a Shuttle Side-Mount Option, etc.) would be naturally man-rated or man-ratable, and therefore would be available to carry the Orion spacecraft plus large payloads immediately required for the mission at hand (e.g. ISS replacement modules, Altair for lunar missions, etc.). There are many other benefits as well.

In conclusion, I would like to reiterate my two major points:

- The Vision for Space Exploration (VSE) is fundamentally sound as an underlying mission and rationale for NASA's involvement in human spaceflight; and
- NASA's Constellation program as currently structured is on a path to failure that will not achieve the VSE, and will likely continue to fail until it is fundamentally restructured. Fixing it will require a different approach to architecture and system design, focusing on utilization of existing capabilities in a different way and with a cost as an independent variable (with incremental upgrades if and when we can afford them) as the key.

Again, I thank the Committee for this opportunity to provide input into their review of the plans for U.S. human spaceflight.