

# A Trajectory to Nowhere

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There is quite a bit of discourse over the future of NASA's Exploration Program. As one who has participated in the Shuttle Program and the Exploration Program and spent a good deal of time in the sixty-four square mile logic-free zone (Washington DC), I would like to try and clarify some of the myths surrounding the current debate.



**Myth 1:** The current debate is about technical and programmatic issues with NASA's Constellation Program.

The current debate has nothing to do with technical/ programmatic issues; it is completely politically motivated and being driven by a few people in the current administration (Lori Garver, NASA Deputy Administrator, Jim Kohlenberger, Office of Science and Technology Policy Chief of Staff, and Paul Shawcross, Chief of the Science and Space Branch at the Office of Management and Budget). Their objective is to cancel the "Bush" program and punish the states (Alabama, Texas) that "didn't vote for us anyway".

**Myth 2:** The Constellation Program is on an "unsustainable trajectory". This of course is the administration's entire platform (excuse) for wanting to cancel the Constellation Program. They used a simple 3 step process to create this catch-phrase.

- Immediately reduce the Constellation Budget by 20% in the FY 2010 budget when the new administration took office.
- Gather a commission to study the program populated with as few people that know anything about real development programs as possible and have agendas aligned with the desired outcome.
- Produce a report with "options", but insufficient data to support recommendations and pick the ones that cancel the current program even though there is no data supporting any "sustainable" alternatives.

So what the Augustine Commission found out was that the Constellation Program was underfunded (didn't need a commission to tell us that), but more importantly, it was well managed and capable of dealing with technical issues expected in a program of this magnitude. In fact Norm Augustine testified before Congress that:

"We did review the program, its management. We believe it to be soundly managed... We saw no problems that appear to be unsolvable given the proper engineering talent, the attention, and the funds to solve them."

The commission also used data provided to them by the Aerospace Corporation to come to the conclusion that the Constellation Program was on an "unsustainable trajectory".

The commission took the budget estimates for the Constellation Program and added 50% to the costs. While this may be appropriate for a brand new program in the early formulation stages, this is completely inappropriate for a program that has passed its early milestones and has a very detailed basis of estimate appropriate for having completed its Preliminary Design Review (PDR). So the combination of a reduced budget (FY 2010) and an inflated cost estimate produced the desired result (the program would take forever to complete). The fact is, that with the FY 2011 top-line budget submit (the best top-line budget NASA has had since the inception of Constellation) there are plenty of funds available for NASA to complete Ares I/Orion by 2015 and to return astronauts to the moon by 2022 using the Ares V as a first step to moving further out into the solar system (NEOs, Mars, LeGrange Points, etc.) The president's FY 2011 NASA budget request doesn't save the taxpayers any money; in fact, it increases NASA's budget and proposes to spend it on technology development projects, robotic missions, and increased earth-science missions. While these are worthy endeavors, they are not "sustainable". Every time NASA has gone down the "technology development" path without a clearly defined mission to focus "technology development", the result has been the same: no operational system gets developed, and NASA's top-line budget becomes a target for OMB and Congress and gets reduced by 25%.

**Myth 3:** The Commercial Orbital Transportation System (COTS) is capable of safely transporting our astronauts to the ISS sooner and for significantly less money than the government developed system.

**Safety:** Basically, the Augustine Commission chose to ignore all of the data that showed that Ares I/Orion were significantly safer than any other alternatives. The Valador report commissioned by NASA to support the Augustine Commission stated: "the Ares I launch vehicle... is clearly the safest launch vehicle option, and the only one having the potential to meet a target of 1 in 1000 probability of LOC (Loss of Crew)." "The simplicity of the Ares I design makes the mature Ares I clearly superior to all other vehicles, no matter what choice of quantification method..." It also determined the Probability of a Loss of Crew (LOC) for the Ares I rocket is 1 in 1,918, which is more than ten times better than the Space Shuttle and over twice as good as any other alternative even with "human-rating" modifications.

**Schedule:** I am a big fan of commercial space. I "wrote the check" to RpK and SpaceX for \$500M to provide seed money that initiated COTS. Unfortunately, RpK failed to meet their milestones and had their Space Act Agreement terminated. The original SpaceX manifest included six test flights of the Falcon 9 rocket to be completed by September 2009. Currently their first test flight is scheduled for May of 2010 (this rocket stuff is more difficult than it looks). All of the reviews of alternative methods to deliver a crewed capsule to ISS estimate that the earliest operational date would be 2016.

**Cost:** The COTS providers (Orbital and SpaceX) were awarded firm fixed price contracts totaling \$3.5B to deliver approximately 40MT of cargo to the ISS. This plus the \$500M already invested in COTS results in a cost of \$100,000/kilo (\$45,000/lb) to deliver cargo to ISS. If the Ares I/Orion were flown at a similar rate (6 flights/year) the fully-burdened government cost for delivering cargo to ISS would be about \$70,000/kilo (\$32,000/lb)!

While it is my hope that the “commercial” providers will be able to reduce costs and stimulate the market place, to date there is no data to indicate that this is the case, and as I have learned over the years “hope is not a management tool”. As hard as it is to make a business case for transporting cargo to orbit, making the case for transporting humans is even more difficult. In fact the White House advisor on Science and Technology Policy, John Holdren, testified that there was no real research or verification done on the viability of the approach for the commercial market to sustain America's space future. The only source this Administration can cite is a 2002 Futron study that has proven to be overly optimistic. This study was based on a survey of affluent individuals that predicted that 33 commercial passengers would have flown by 2010 (only 8 tourists have paid Russia \$20M each to date) and as many as 60 passengers per year would be flying in 2021.

In summary this administration has been trying to come up with a plan for the last year and a half and after hearing all of the testimonies and reviewing all of the facts it has become obvious to me (and to the Congress) that the leadership team at NASA has decided that they simply do not want to do Constellation, at any cost, and are willing to cede US leadership in space. The facts show the current real program is safer, more affordable, timelier, and making better progress towards our nation’s exploration goals, than this faith-based initiative “trajectory to nowhere” the current administration is trying to sell us.

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