

## Have We Lost the Will?

By Walter Cunningham

Except in wartime, there has never been, and likely never will be, another government program that produced as much technological innovation as the U.S. space program. No other program has so successfully infused the economy, rallied the nation, inspired youngsters toward academic achievement or established the U.S. as the world leader in technology.

In spite of this, on 1 February of this year, President Obama announced the cancellation of the Constellation Program of exploration. That announcement, putting NASA's future in doubt, triggered heated discussion. It is as if President Ford had cancelled the Space Shuttle Program in 1975, just as the last Apollo mission was being flown. The Shuttle Orbiter development was well underway at the time, but that did not save us from a six-year gap before the next American was launched into space.

Today, there is no realistic successor for human space flight waiting in the wings.

Our biggest loss from that first gap was the best and brightest of the NASA engineers and scientists who left to seek more challenging jobs. It took years to rebuild the professional team that eventually launched over 130 shuttle missions and constructed the most amazing engineering project in history—the International Space Station.

The Space Shuttle program not only maintained our preeminence in space, it raised our technical expertise and further increased our prestige among the developed nations of the world—precisely the same reasons why the Chinese are now working toward landing a man on the Moon.

Congress is our last hope of putting a stop to the dismantling of a once great agency. They are concerned about job losses and the economic impact, but in the long run, they are not near as costly as the loss of NASA as an inspirational vision for the next generation of space scientists, engineers and explorers.

While NASA and some administration supporters are trying to put the best positive spin they can on the budget proposal, the negative fallout continues to grow. The personnel requirements for NASA's new "vision" will do little to mitigate the huge losses from this foolish cancellation without a replacement in hand. The real loss, as in the 1970s, will be those trained and experienced engineers who are already leaving for more inspiring pursuits.

Administration spokesmen along with others are trying to rationalize the debilitating cut in the agency's programs. They claim the "\$6 billion increase over the next five years demonstrates President Obama's strong commitment to space exploration." That is just over one percent a year and \$2.5 billion of it is committed to the shutdown of Constellation, the same amount proposed for research on how global warming is affecting the Earth.

The \$19B for 2011 is less than 0.5 percent of the proposed Federal Budget, one-ninth of what it was at its peak in the 1960s. The \$300 million increase eliminates the one program that could drive human space exploration and sentences NASA to the same

starvation diet it has existed on for several decades. It is about one-tenth of what the agency needs to continue operating a viable human space program.

NASA spin is touting "new technology development programs to expand the capabilities of future explorers"—in-orbit fuel depots, rendezvous and docking, closed-loop life support systems, heavy lift research and development of new engines, propellants, materials and combustion processes. These may sound new to someone unfamiliar with what NASA has been doing for 50 years, but (with one exception) they are pursuits for which NASA already has an unmatched reputation. Each would have played an essential role in the now cancelled Constellation program. Without the focus of a specific program, the *raison de tras* for these technologies is now "to advance the field of space science."

These supporting technologies have been retained, but the central hardware, Ares and Orion, have been cancelled. In their place, we now have increased spending on education, increased support for the discredited global warming hypocrisy and subsidies to several new "commercial" rocket companies. And, oh yes, don't forget a new outreach program to Muslim countries without established space programs.

In cancelling Ares/Orion/Constellation with nothing to take its place, the President is saying the U.S. should not have its own human space program and is directing funds to the COTS (Commercial Orbital Transportation Services) program. If NASA wants to participate in human spaceflight, it will have to be through contractors.

NASA has always contracted most of its hardware and service needs. Some of the contractors were successful in private industry, and sometimes the government was the sole customer. A company dependent solely on government grants, contracts and guarantees, is not a free market, private enterprise.

To succeed in the private sector a company must raise capital, develop a product, sell it at a profit and show a return on investment commensurate with the risk within a reasonable time frame. Unfortunately, space will not be an attractive commercial opportunity for the foreseeable future. Space exploration is a costly precursor to uncovering commercial opportunities, and it will be decades before a private investor can expect a return commensurate with the risk of exploration.

Until we find a way to make a profit in space, governments and countries are the only institutions able to afford space exploration and live with the extremely long term returns. That is why NASA must continue to develop the next generation human space system, whatever form that system may take. Human space systems cannot be evaluated solely on the basis of scientific return per dollar spent. Dominance in space gives our country credibility or leverage in so many ways other than economic gains; scientific discovery, understanding of the universe, international prestige, military stature and being seen as a country that can do anything we set our minds to.

The COTS program—companies selling services to NASA—made some sense with NASA still in the exploration business, doing the research and expanding the envelope of space travel beyond the Moon. It would be very difficult for private companies to replicate the singular competence NASA has developed, and even if COTS created

vehicles are successful, they will be woefully inadequate for near term needs and will do nothing for exploration.

Only government programs—regardless of country—will get humans to the Moon and beyond. Space exploration is an environment from which a profit cannot be generated, leaving contractors supplying government sponsored programs that do not have to show a profit. After 50 years in space, how many lunar or interplanetary space probes have been launched by commercial space companies?

We have been told by the agency that future exploration programs, such as returning to the Moon or going to Mars, will be a global effort, not an American one. That may sound appealing with respect to sharing costs and other resources, but it virtually guarantees those programs will take longer, cost more and render them vulnerable to political bickering—like the ISS. As a result of the political decision to make the Russians a full partner, the ISS cost the U.S. \$10 billion more, was two years late, and required that the station be placed in an orbit unacceptable for most alternative uses.

Has our country really degenerated to the point where we can no longer handle our own exploration? Did we spend \$460 billion becoming preeminent in space, only to voluntarily surrender it? What does our new dependence on other countries to send Americans into space say about our culture, society and prospects for the future?

Americans need a frontier. Exploration is in our blood and we should be proud of it. Look at America's westward expansion, the Lewis and Clark expedition, Armstrong and Aldrin landing on the Moon.

NASA was always considered in a class by itself. Now, at a time when we are becoming increasingly dependent on space based systems, we seem bent on slipping back into mediocrity. How do you rationalize surrendering our preeminence in space? The last time a country voluntarily gave up their preeminent position in exploration was when the Ming government recalled the Chinese fleets in 1433. That critical error condemned China to worldwide stagnation for centuries.

NASA has always been a mission-driven agency that attracted a particular kind of individual. They focused on the objective, determined the obstacles, solved the problems and, in the end, accomplished the impossible. We all benefited from the technological fallout to our economy and our growing stature in the world. Continuing NASA's program of exploration requires three things: the technology, the resources, and the will to do it. We have plenty of the first two, but have we lost the will.

## Trading American Preeminence for Mediocrity—or Worse

Walter Cunningham  
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President Obama's budget proposal may not be a death knell for NASA, but it certainly accelerates America's downward spiral toward mediocrity in space exploration. Now it's up to NASA's leaders to put the best face possible on this nail that the administration is trying to hammer into their coffin.

This proposal is not a "bold new course for human space flight," nor is it a "fundamental reinvigoration of NASA." It is quite the opposite, and I have no doubt the people at NASA will see it for what it is—a rationalization for pursuing mediocrity. It mandates huge changes and offers little hope for the future. My heart goes out to those who have to defend it.

NASA has always been a political football. Their lifeblood is money, and they have been losing blood for several decades. The only hope now for a life-saving transfusion to stop the hemorrhaging is Congress.

It is hard to be optimistic. President Obama has apparently decided the United States should not be in the human space flight business. He obviously thinks NASA's historic mission is a waste of time and money. Until just two months before his election, he was proposing to use the \$18 billion NASA budget as a piggy bank to fund his favored education programs. With this budget proposal, he is taking a step in that direction.

NASA is not just a place to spend money, or to count jobs. It is the agency that has given us a better understanding of our present and hope for our future; an agency that gives us something to inspire us, especially the young people.

NASA's Constellation program was not "over budget, behind schedule, and lacking in innovation due to a failure to invest in critical new technologies." It was due to perennial budget deficiencies for this program. It would have been sustainable for an annual increase equal to the amount thrown away on the "cash for clunkers" program, or just a fraction of the tens of billions of dollars expended annually on Congressional "earmarks."

It's debatable whether Constellation was the best solution to President Bush's vision of "Moon, Mars and Beyond," but it was far better than the vacuum in which we now find ourselves, and without a viable alternative in sight.

Yes, jobs will be lost and the local economy will suffer. This will hurt and be readily measured. In the long run, intangible losses (those on which we cannot put a price tag) will be far more devastating.

The cancellation of Constellation will guarantee several things.

Most important, strategically, is the gap, the period during which we will be dependent on Russia to carry Americans to our own space station. With the cancellation of Constellation, that gap will grow longer, not shorter. American astronauts will not travel into space on American developed and built spacecraft until at least 2016 or 2017.

We are not trying to fix any deficiencies in Constellation; our fate will be in the hands of commercial companies with COTS (Commercial Orbital Transportation Services) program awards. They will attempt to regain our lost greatness with new capsules and new rockets or military rockets, after man rating them. Supposedly, they will do this faster and cheaper than NASA. Cheaper, maybe; faster is not going to happen. These will be companies that have never made a manned rocket and have little idea of the problems they face trying to man rate a brand new launch vehicle and space capsule.

Even under the best of circumstances, humans will not be flying to the ISS on COTS developed vehicles before 2017.

After fifty years and several hundred billion dollars, the accomplishments of NASA and the U.S. space program in science, technology and exploration are unchallenged. They are admired, respected and envied by people and countries around the world. Our space program has provided inspiration to the human spirit for young and old alike. It said proudly to the world that Americans could accomplish whatever they set their minds to. Look at the efforts of China and India in the last 30 years to emulate this success.

Young people have always been inspired with talk of sending explorers to the planets. Do you think they will have the same reaction when we speak of the new plan for "transformative technology development"?

NASA may have been backing away from the real challenge of human space flight for years, but in canceling Constellation and NASA manned vehicles, we are, in effect abdicating our role as the leading space faring nation of the world. America will lose its preeminence in space.

The real economic impact will not be immediate.

The public at large is not fully aware of NASA's role as a principal driver in our economy for the past 50 years. They forget that much of the technology we now take for granted either originated in the space program or was utilized and improved by the space program. That is NASA's real legacy. The investments we made in NASA in the sixties are still paying off in technology applications and new businesses.

The annual investment in NASA is not simply an expenditure; it is an investment—with a payback. The payback is generated because NASA operates at the frontiers of space, exploring the frontiers of our civilization.

At the frontiers of space, be it going to Mars, or constructing the most amazing engineering project in history—the International Space Station—huge obstacles, sometimes considered insurmountable, are encountered. NASA takes these obstacles as challenges that must be overcome to reach their goals. The solution may lie in new technology, or a new application of existing technology. These solutions eventually make their way into the marketplace with applications we never even dreamed of. NASA has tens of thousands of examples of these "spinoffs."

Now, after spending \$11 billion on the development and close out of the Ares 1 launch vehicle and the Orion space capsule, we are eliminating them. Gone! And with them,

most of NASA's human space flight program. In the ongoing struggle for leadership in science, technology and exploration, which was represented by America's pre-eminence in space, we have raised the white flag of surrender.

Who will this proposed budget please? It will please those who have opposed the Constellation Program and have a vested interest in an alternative plan; those who are against human space exploration and for unmanned exploration; and those who will benefit from the COTS Program.

None of this new "vision" sits very well with those of us who have known NASA at its best. From its inception, one of NASA's motivating forces was pride in being the very best, in displaying American leadership in human space flight, and maintaining the preeminence in space that derived from this attitude. It appears this attitude is foreign to a president who believes American preeminence should be avoided at all costs.

Mr. Obama, we do not want a space program that turns us into "just another country" among countries.