Does Manned Space Flight Have a Future in America?

by Marsha Freeman

The picture-perfect landing of the Space Shuttle orbiter, *Atlantis*, on July 21, brought to a close the three decades of NASA's post-Apollo manned space program. While it is unlikely there will ever be another space vehicle as capable, versatile, or elegant as the Space Shuttle, at the current moment, there is *nothing at all* in the U.S. to replace it.

The Space Shuttle program did not end because it was too expensive to operate, nor because it was unsafe, or technologically obsolete. Its demise is the fruit of four decades of failed White House policies, which a compromising and cowardly Congress refused to reverse. Based on promises that some sacrifice now would lead to greater things in the future, our elected representatives have abdicated their responsibility to ensure that our leadership in space—in which lies the future of the nation—is not compromised.

The Space Shuttle program cannot be restarted. The factories that manufactured its components have been shut down, and the workers sent home. But the teams of thousands of scientists, engineers, and technicians who managed, operated, maintained, and used the Shuttle fleet—many of them, over the full 30 years of Shuttle missions—are only now being dispersed. They can still be redeployed to carry out the Moon/Mars exploration mission that has been on the agenda since the end of the Apollo lunar program.

What this will require is not incremental increases in the NASA budget, pronouncements from the White House, or feel-good votes in the House and Senate. There must be a *fundamental* change. During a hearing before the House Science & Technology Committee in 2010, soon after President Obama proposed ending the Constellation Moon/Mars program, Rep. Ralph Hall (R-Tex.) raged at the idea that the country could spend "trillions of dollars to bail out the banks," but could not find the $1 billion that NASA needed to continue the Constellation program. But Congress has done nothing to end the bailouts, or the casino economy that created the current crisis.

Now, the budget compromises between the Congress and the White House that are on the table will not only end the manned space program, but cut back medical care for the infirm and elderly, an assured food supply, and the income our most vulnerable citizens depend upon to survive.

The nation must decide what its priorities are. President Franklin Roosevelt did that in 1933, when he declared a bank holiday, shut down the financial system that had become a gambling casino—looting the wealth of the nation, its citizens, and their future—and signed the Glass-Steagall bill into law. Then, the U.S. could return to a Constitutional credit system, empowered to mobilize the resources to end the Depression, through great infrastructure projects like the TVA.

No action short of that today will enable the exploration of space to continue.

What Will We Lose?

On the immediate chopping block are some 40,000 positions in engineering, science, and high-precision skilled jobs; whole manufacturing industries, needed for both civilian and military space applications; unique infrastructure in industry and at the NASA centers; the skills necessary to train the next generation of astronauts, the explorers of the future; and the inspiration for young people to reach for the stars.

Although the original mission for the proposed Space Transportation System in the 1970s was a cargo- and human-carrying space "truck," it took on tasks never originally envisioned. The Mars rovers were expected to carry out a 90-day mission on Mars, yet are still sending back scientific data seven years later. In the same way, scientists and engineers, given only half the

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Over the course of its 30-year mission, the five-orbiter Space Shuttle fleet became a universally recognized symbol of mankind's drive to explore. Here, the Space Shuttle Atlantis lifts off on Nov. 16, 2009, to take cargo to the International Space Station.

funding NASA needed to create the Shuttle system, have accomplished more than anyone could have imagined.

The Shuttle orbiters provided laboratory space and resources for experiments, particularly in the life sciences, to help lay the basis for travel beyond Earth orbit, to develop potential new vaccines and pharmaceuticals. On-board experiments opened a window, unobtainable on Earth, into answers to some of the most fundamental questions in biology.

Orbiters carried aloft great observatories, to allow multi-spectral observations of the universe. Astronaut crews, anchored to the Shuttle, repaired the otherwise useless Hubble Space Telescope to correct its blurry vision, and captured and repaired other errant satellites.

Planetary probes were sent to the outer reaches of the Solar System from Shuttle payload bays, and experimental Earth remote-sensing instruments, such as imaging radar, were tested by astronauts in orbit.

The Space Shuttle fleet and its crews assembled, repaired, and serviced the International Space Station, making use of the experience of nine missions docking Shuttle orbiters with the Russian Mir space station in the 1990s. In addition to teaching NASA how to carry out long-duration missions in space, the Shuttle-Mir program helped save from ruin the precious former Soviet manned space program.

What is truly remarkable about the Space Shuttle, however, is not any one, or combination, of these accomplishments: It is the fact that it was built at all; that without receiving the level of resources required, it carried out 133 successful missions, with only two catastrophic failures; that it flew 355 people from 15 nations, most of whom would never otherwise have had the opportunity to fly in space; that over 2,000 scientific experiments were conducted with the help of crew members on board; and that it built a space station with components and scientific laboratories from more than a dozen nations, which assembly required an "orbital ballet" that had to be, and was done, perfectly.

Every aspect of the Space Shuttle program that has come under criticism, or was a genuine shortcoming, has been a result, not of faulty design, or lackadaisical engineers and technicians, or inflated NASA egos. They were *all* a result of compromise.

The Evil of Compromise

When the Apollo program ended, President Nixon had on his desk a proposal to build a reusable transportation system, and an Earth-orbiting space station, and to establish a settlement on the Moon, all with the ultimate goal of manned missions to Mars. In January 1972, Nixon announced that the nation could afford to build only the transportation system. NASA agreed to

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Soon after it was discovered that the Hubble Space Telescope, launched from the Shuttle in 1990, had blurry vision, NASA planned a repair mission. In all, five missions to repair and upgrade the telescope were completed. Here, astronauts Andrew Feustel and John Brunsfeld work on the Hubble, May 16, 2009.

the compromise, because without the Shuttle, there would have been an end to manned space exploration altogether. NASA estimated that designing, building, testing, and flying a reusable space transportation system would cost more than $13 billion. The space agency ended up with half that amount, in a compromise with the budgeteers.

That drastic cut in funding meant that a fully reusable vehicle could not be developed. Instead of liquid boosters with wings that could fly back to the launch pad and be refueled and reused, the Shuttle used twin solid rocket boosters. Solid boosters had never been used on manned systems, because once they are lit, they cannot be turned off. Many at NASA believed this compromise increased the risk. The malfunction of a solid booster caused the Challenger accident in 1986.

President Carter continued funding for the Space Shuttle program by bringing in the military to use it. To accommodate huge Defense Department classified payloads, the Shuttle orbiters' payload bays were enlarged, and its in-orbit and landing capabilities increased, dictating changes that made the system more fragile and aerodynamically constrained. Another high-risk compromise. Remarkably, the cost of building the Shuttle fleet actually came in only 17% over budget, and, 30 years later, with all the compromises, it is still largely comprised of state-of-the-art technologies.

The space station, announced by President Reagan in 1984, followed the same path as the Shuttle: underfunded from the start, which led to almost-continuous redesigns to lower the cost, and changes in what goals it could accomplish.

In 1989, President Reagan's successor announced, on the 20th anniversary of the first lunar landing, a return to the Moon, "this time to stay," and then a manned mission to Mars. Congress took one look at the cost of George H.W. Bush's plan and shut it down. Not even a compromise.

Falling NASA budgets throughout the 1990s meant that no proposed Shuttle replacement vehicle ever made it past the design stage. George W. Bush's 2004 exploration initiative was a replay of his father's, with one important difference: The next series of vehicles that NASA would build to go back to the Moon and to Mars would not start full-scale development *until the Shuttle was retired* in 2010. Ending the Shuttle flights was supposed to "save" enough money to start something new.

NASA Administrator Mike Griffin, as he explains it, went along with this incredible compromise, because, even though it meant there would be an intentional gap of three or four years when no U.S. craft could carry Americans into orbit, he believed that in the future, it would lead to capabilities to explore beyond Earth orbit, which the Shuttle cannot do. Another bad compromise. Neither President Bush nor the Congress ever appropriated enough funding to keep the nascent Constellation program on schedule.

Since Barack Obama came into the White House, the nation has been faced, not even with a compromise, but with a 180° turnaround in policy: For the first time in the 50-year history of the U.S. space program, the White House proposed that the nation, through its space agency, would not build the next manned space vehicle

at all, not by budget default, but *by intention*.

After months of wrangling with a Congress hesitant to completely abdicate responsibility for space exploration (and, for some, suffer huge job losses in their districts), another bad compromise was reached. Private companies would be given part of NASA's funding, to develop a craft to take crew to the space station, as the White House insisted. NASA would continue to develop a Crew Exploration Vehicle, as the Congress wanted, but not a rocket to launch it on!

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On May 23, 2011, the first-ever photograph of the U.S. Shuttle docked to the International Space Station, was taken by Paolo Nespoli, from an undocked Russian Soyuz capsule, which had just left the space station.

Although there is much hand-wringing, especially on Capitol Hill, over the fact that for the next few years, the U.S. will have to rely on Russia to ferry crews to the space station, the issue is *not* that we are dependent upon Russia, but that we are no longer a world-class space-faring nation.

And the promised exploration program that was supposed to be funded by retiring the Shuttle? To go anywhere beyond Earth orbit requires a rocket capable enough to carry large payloads, on the order of the Saturn V rocket that took astronauts to the Moon. Although the Congress legislated last November that such a vehicle be ready to fly by 2016, NASA Administrator Charles Bolden told legislators eight months ago that this heavy lift vehicle cannot be developed on that timetable with the amount of money NASA has been given by Congress for the project. So much for exploration.

Going Nowhere

The stupidest criticism made of the 30-year Space Shuttle program is that "it cost too much." Relative to what? Bank bailouts? Unnecessary wars?

In fact, it is *irrelevant* what the space program "costs." Every dollar spent returns on the order of ten dollars to the physical economy, in new technology, new manufacturing capabilities, and skilled jobs. What the nation buys for a pittance of the money it spends on space exploration is the *future*. For 50 years, the space program has been an inspiration to young people, to literally reach for the stars. How do you put a dollar figure on that?

There is no project more important for mankind's future than exploring space. Our ability to forecast, and later prevent, the natural disasters—immediate and long-term—that threaten mankind, depends upon it. Our economy, now functioning on a level of technology that has been stagnant since the Apollo program ended in 1972, will condemn millions of people to die if there is not a science-driven forced march to higher-level economic platforms based on new technologies.

Each time the manned space program has been threatened with extinction, its supporters have saved it through compromise. But there can be no "negotiating" with an administration determined to throw the nation back to the Dark Ages. It is past time to take the stand that America will have a space program that befits a great nation.

When President Kennedy announced the Apollo program half a century ago, he told the Congress that it would be costly. If they would not adequately fund it, he said, it were better not to go at all.

Our nation faces an existential crisis. The policy we adopt regarding our space program is a litmus test for whether or not the nation has the uncompromising will to move forward. That means reviving FDR's Glass-Steagall Act to create the credit needed to fund nation-building programs, and removing the most anti-science President in U.S. history, Barack Obama, from office.