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# When We Lose a Shuttle

NASA's grounding of the space shuttle fleet immediately following the discovery of cracks in the engines is an indication of the skill of the agency's professionals and NASA management's commitment to safety. At the same time the cracks in the engines remind us that it is only a matter of time before we lose another shuttle, or perhaps the entire fleet.

Such a loss would not necessarily happen in catastrophic fashion as occurred with the Challenger in 1986; although the risks of spaceflight mean that such a disaster is always possible. Instead, the shuttle will likely lose its spaceworthiness for more mundane reasons much like an old car dies a slow but inevitable death of high-mileage wear and tear. Eventually the costs of repair become prohibitively expensive.

It is easy to imagine a scenario in which the present mechanical problems had proved to be more systemic or difficult to repair. If so, then we might today, out of necessity, be discussing a post-shuttle space program. But even if the shuttle returns to its regular schedule in the near future, we should have this conversation now. Even before the United States focused its attention on terrorism and the economy, in recent years U.S. space policies received little attention in Congress, among policy analysts or in the general public. The lack of attention means that NASA continues to pursue its post-Apollo program approach of next logical steps with little — if any — consideration of alternatives.

The logical steps refer to the shuttle, the international space station and human missions to Mars, an approach to human space flight that NASA formulated as the Apollo program was winding down, and after President Richard Nixon rejected the agency's proposals for a spectacular human mission to Mars. NASA kept its grand vision intact by settling on a more politically saleable series of programs: first the shuttle, then the station, then Mars.

But because of the rejection of the entire set of steps, political realities meant that NASA had to pursue each of the steps on its own merits. Unfortunately, NASA's promises for both shuttle and space station performance have fallen far short of reality, and the various proposals put forward by NASA over the years for missions to Mars have not appeared to have any logical connection to either shuttle or station. Today the U.S. human space flight program is nearing a crossroads. One of the obstacles facing NASA's ability to effectively present alternative human space flight options is of its own making. Under the logical steps strategy, both the shuttle and station were dramatically oversold and each has failed to meet cost, schedule and performance objectives used to secure public commitments to the programs.

For example, the space shuttle was sold on the basis of dramatically reducing the costs of launching payloads into orbit because it would fly 50 flights per year at a cost of $14 million per flight. It has instead averaged about five flights annually, resulting in an average cost of about $1 billion per flight. President Ronald Reagan's 1984 announcement that the United States would build and fly a space station within 10 years and for no more than $8 billion provides a threshold against which to measure the program's schedule changes and ever-growing costs — now estimated at $30 billion.

Some scientists have criticized the program for its meager contributions to research, while others have viewed it as merely a jobs program for the aerospace industry. But whatever one's views are on the shuttle and the station, it is clear that what were once logical steps today do not appear to be leading in any strategic direction, and so NASA's arguments for follow-on steps are viewed with healthy skepticism.

Even so, the U.S. public and their elected representatives have an admirable record of sustained and significant support of human space flight. During the 30-year shuttle-station era Congress has provided more funding — when adjusted for inflation — to its space program than it did for the Mercury, Gemini, Apollo, Skylab and Apollo- Soyuz programs combined.

In the 1970s when the shuttle experienced cost overruns, Congress voted to increase funding above NASA's requests several times. And in the 1980s following the loss of Challenger, Congress voted to replace the lost shuttle with a single appropriation. There is a similar record of support for the space station, with Congress repeatedly approving budgets far in excess of what was originally proposed.

This remarkable level of commitment to NASA over a period of decades totaled billions of dollars per year, surely enough to support a wide range of alternative approaches to human space flight. But to invest wisely, decision makers first need alternatives to choose from. Such alternatives are not readily available. The shuttle's mechanical problems provide an early warning, telling us that inevitably, and perhaps soon, difficult choices will have to be made about the future of the space program. This inevitability means that now is the time to begin a wide-ranging and open discussion about what alternative post-shuttle space programs might look like.

A wide range of perspectives, from inside and outside NASA should be heard, and many alternatives considered. As a result of such a conversation, when a decision point eventually does arrive, the United States will be more prepared to move into the next era of human space flight. Otherwise, when we lose a shuttle — and we will — one of the leading alternatives considered by policy makers might be no human space flight program at all.

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