

Space 2013: The Exploration Imperative

By Rod Pyle

NASA and the American space program are in a state of remarkable flux. While we currently have a very Buck-Rogers space station passing overhead every 90 minutes, we may only send our own people to it via the use of the Russian Soyuz spacecraft, a design dating back to 1963. Our space shuttles fly no more, but rather adorn wings of aerospace museums on both coasts. The follow-on programs promised by two presidents named Bush – the most recent of which was well into development before it was cancelled – are now just a memory. And our current space policy, which sends hundreds of millions to current and up-and-coming private launch providers and has vague plans to visit an asteroid sometime after 2020, is ill defined and open to interpretation.

These are not inspiring times in space exploration, at least where NASA is concerned. For while the agency still fulfills many laudable scientific missions with great skill, these are old news and primarily inward-looking (as in Earth-centric). The few bright lights are commercial orbital operations and unmanned missions to Mars and a handful of other bodies outside Earth orbit.

While commercial efforts in space are exciting in their own right, most are not exploration in the classic sense. They are private industry doing what it does very, very well: taking a vast and technically competent database left behind by NASA's decades of experience and transforming it into a more affordable and robust commercial presence in low Earth orbit. And that is how it should be... but it lacks "sex appeal," to put it in blunt terms.

Pining for the "Golden Era" Of Exploration

Those of us fortunate (and old) enough to have lived through the years of the space race and the moon landings have a unique – and sometimes conflicted – view of the history of space exploration. A few in the younger generation have studied this era and may share some of these thoughts. But nothing fires the imagination quite like the memory of "being there."

Central to this was that July night in 1969 when ghostly B&W images fluttered across our 19-inch TV screens as Neil Armstrong stepped onto the lunar surface and into history. It was a culmination of a magic time and unparalleled adventure. The future seemed limitless.

Apollo was the pinnacle of space exploration fueled by intense curiosity, a hunger for scientific knowledge, and a limitless drive to explore, right?

No chance. Let us take a look at what drove the space race and the quest for the moon, then the shuttle and ISS, and where we are today.

The Cold Reality of a Cold War

Much has been written of the origins of the space race, so I will not dwell upon historical minutiae (though it makes for fascinating reading). Notables such as John Logsdon have examined this in great detail. But a broad look at the origins of NASA's "Golden Age" is informative when looking ahead.

After the shock and embarrassment of Sputnik and the flight of Vostok 1 and Yuri Gagarin, the new president, John Kennedy, knew he needed to act. He had inherited a new civilian space agency from President Eisenhower along with a struggling Earth-orbital program called Mercury. Historical evidence indicates that Kennedy wished that both would just go away, especially the Mercury program. When the NASA administrator, James Webb, met with Kennedy about NASA's role, he was not optimistic. While a pragmatic man and a consummate politician himself, Webb could see clearly that priorities had changed and not for the better with regard to NASA. As lukewarm towards space as Eisenhower had been, this was a new low. And Kennedy's science advisor, Jerome Wiesner, was downright hostile to manned space.

Of course, this was all before the Bay of Pigs incident. The Kennedy administration supported a secret CIA-directed attempt to overthrow Castro's regime in Cuba. As the invasion rapidly went sour, Cuban "freedom fighters" were trapped on the beaches by troops loyal to Castro, so Kennedy and the US military decided to sit this one out. It was one more embarrassment and a huge one. It was one thing to be second best in space; altogether another to look weak and indecisive in the great struggle against the Red threat.

Of course, all this was played out against the backdrop of a Soviet Union that had caught up with us in terms of nuclear weapons, which supported Castro's Cuba just 90 miles from American shores, which traded openly with the Communist Chinese who had ousted "our" man, Chiang Kai-Shek just a decade before, and which had just beaten us in the race to orbit. In performing this final act, the USSR also showed the world not just that it was first, but that it could loft extremely heavy objects (such as, say, hydrogen bombs) into space and drop them, where it chose. Sputnik 1 had weighed almost 200 pounds... Sputnik 2, almost 1200. The US responses, Explorer one and Vanguard, had come in at 30 pounds and four pounds respectively. And even though the outgoing Eisenhower administration secretly knew that our guidance and control was miles ahead of the Russian efforts, the public relations battle had been lost. America was beginning to smell like a loser. Many other countries were beginning to have second thoughts, their citizens if not their governments, about whom they had sided with in the aftermath of WWII. The new era might be a Communist paradise after all.

So Kennedy gathered his science advisors and key NASA personnel and grilled them: what can we do in space that will guarantee us a win? That became the impetus for Apollo, not any grand sense of adventure or destiny. He was

informed that the Soviets could beat us in launching large masses into orbit; hence a space station was not going to achieve his aims. And they might also be able to beat us to a loop around the moon (everyone assumed an Apollo 13-style free return trajectory for this; making orbit is much more difficult). No, the only way to be sure that we could beat them – which was really another way of saying that this was an area in which both countries were sufficiently weak – would be a manned landing.

Some voices in the administration declaimed the idea, others were more supportive. Webb himself was on the pro-landing side, but alarmed at the speed of the schedule.

Shortly after Al Shepard's flight on May 5, 1961, Kennedy spoke before a special joint session of Congress, committing us to the goal of landing a man on the moon and returning him safely to the Earth. This speech, and a later one at Rice University, served its purpose. He had informed the nation that we were essentially on a wartime footing to achieve this difficult goal and he informed the world that we would not take a back seat to the USSR in any meaningful area (the Cold War, already being fought by proxy in small regions worldwide, was a further and unspoken proof of that). The US was reaching high. We would prove, through technology and not bullets that free enterprise, Capitalism, and self-determination were superior to the "New Soviet Man." And, of course, it helped to bury the embarrassment of the Bay of Pigs and the fact that we were vastly behind in public perception of space accomplishment.

This set the course for NASA for the rest of the decade. It did not assure, however, that the technology could be developed, that the resolve would not wane, and that the funding would continue. From the outset there were contrary voices, but their volume would shortly be squelched.

Then the possibly most pivotal moment in the history of the US moon program occurred on an awful November day in 1963. Kennedy was dead and with him could have gone the dream for the moon. But his successor, Lyndon Johnson, was no fainting violet and along with other programs such as the war on poverty and civil rights legislation, LBJ bullied anyone with a contrary voice into submission. In short, there was for some time not a single politician who would dare question the destiny of a martyred president and Apollo's trajectory was as secure as it would ever be.

Of course, later in the program events such as the Apollo 1 (204) fire and other program delays caused some, Walter Mondale key among them, to decry the race to the moon. But it was too little, too late and the program soldiered on to become a resounding success.

The Post-Kennedy Decade Doldrums

And then it was over. The final three missions, Apollos 18, 19, and 20 were scuttled before the first crew returned from the lunar surface. And it was not just Richard Nixon; voices within NASA, including the redoubtable Chris Kraft, felt that we were pushing our luck with the existing technology and that it was time to back down before we lost a crew in space. The Nixon presidency was all too happy to oblige. Other than the wonderful Skylab project and the PR-driven Apollo/Soyuz linkup, Apollo was dead. The Apollo Applications program, always underfunded but brilliantly developed on paper, drifted into the shredder of history.

Of course, the Space Shuttle went through its slow, challenged evolution and eventually flew in 1981. This was not, however, what anyone had originally conceived for a reusable spaceplane and it had been compromised to the point that it was both more dangerous than predicted and slower and more expensive to operate. Further, with the shuttle shoved into the forefront as the only crewed program within NASA, real crewed exploration was now blunted. We would continue to “explore” the near-reaches of low Earth orbit, as had Mercury and Gemini, and increase flight duration and research conducted (though nothing came close to touching Skylab and Mir for flight duration until the ISS was operational). But this was a far cry from the vision of people like Wernher von Braun, who had envisioned huge space stations as waypoints for departures to a lunar colony, and later, missions to Mars.

That part of the exploration dream was over.

The shuttle ground through its 30-year life with moderate competence and safety. Two failures of the system cost the program far more lives than all of Mercury through Apollo, including astronauts who died of unrelated non-mission incidents such as plane crashes. With the shuttle came a wonderful, if overfunded, space station. But the dream of interplanetary exploration and adventure seemed further out of reach than ever.

Constellation Consternation

July of 2011 saw the final flight of the shuttle and the orbiters were decommissioned and sent off for static display in museums, just like the remaining Saturn launch vehicles of the program that preceded them. The shuttle program had cost, when amortized, about \$1.5 billion per flight.

As the shuttles flew and aged, two presidents, both named Bush, announced bold new visions for space exploration, neither of which stuck. The latter plan involved a replacement launch system and capsule that were designed and begun, but only the capsule survived the congressional budget axe in 2009. Besides the Orion capsule, little remains of Constellation program except for bills to pay contractors *not* to build the system. No matter how hard they tried, Ronald

Reagan, George H. W. Bush and George W. Bush seemed unable to conjure up a “Kennedy moment.” Why?

Profound Realities

This is far from a complete list of why we have not continued to explore; these are simply the broad strokes. The reasons behind our loss of drive to send crews beyond Earth orbit are myriad and can be debated for years. But the major elements are:

- 1) Lack of “Target Celebrity”: The moon was a localized and easily understood goal. Anyone could look skyward and see the pockmarked face of the body and it thus became real and tangible. Mars is simply a winking red dot to most folk and far too distant to seem as meaningful or compelling. The sense of “Why bother” is a major challenge within the lay public, despite recent polls that indicate real motion towards more positive attitudes.
- 2) Economics: While America’s fortunes ebbed and flowed during the Apollo program, it was easier to garner support for a crash program such as the lunar landing initiative. Perhaps it was the relatively recent memory of WWII and the mobilization attendant to that conflict; perhaps it was the deeply-rooted fear of Communism. But whatever the cause, money was made available – at times, up to 5% of the federal budget. Current levels hover at a tenth of that.
- 3) A Profound Enemy: The drums of war were beating, albeit dully, around the time of the announcement of the lunar landing program. The Bay of Pigs, the Cuban missile crisis, and early stirrings of conflict in places like Vietnam and the recent armistice in Korea all pointed to a life-and-death struggle with Communism. Today we have a “frienemy” relationship with China, with whom we trade ourselves into economic oblivion. They are not, and are unlikely to become anytime soon, the kind of lever needed by an administration to fire up another major space exploration initiative.
- 4) A Cause Célèbre: As awful as it is to consider it thus, the death of President Kennedy galvanized NASA and its supporters and probably more than any other single factor set the fate of the program in stone. It was simply unpatriotic and an affront to the memory of JFK to impugn the Apollo program and its primary goal.

Unsustainability

Unfortunately, the very goal that JFK selected for NASA in the 1960s became the undoing of sustainable exploration of space beyond Earth orbit. In fact, there is a reasonable argument to be made that we should be grateful that we even had a shuttle program. With the single-point goal of “landing a man on the moon and returning him safely to the Earth,” Kennedy capped Apollo’s supportable aims and the crash-program nature of Apollo precluded the build-up of a sustainable space exploration architecture. Skylab, an extension of an already strained

Apollo follow-on program, was as far as it got. And it's not as if those in charge at the time were not aware of this limitation. Senior figures from James Webb to von Braun had argued for a slower but far more robust development of space capability from the very beginning.

The Space Station's Role

It's often forgotten by the lay public that an enormous space station is whizzing over their heads every 90 minutes. Unfortunately, great PR is not a part of NASA's charter. The media has done what it will do, with a few specials on the Discovery Channel and a couple of well-produced IMAX films. Beyond that, unless there is a crisis or a visit to the ISS by one of the Kardashians, we should not expect much more.

The ultimate fate of the ISS is uncertain. Various dates for a controlled de-orbit have been considered and the present date of 2020 has been set by an ever-fickle Congress. Let us hope that whatever the decision, it is better considered than the shame of Skylab's uncontrolled descent to Earth. The space station is America's sole remaining icon of crewed spaceflight. Without it, we have little to show for a half-century of grand achievement.

Old Goals, New Contenders

When asked on frequent radio and TV interviews to offer-up an argument as to why America should be in space at all, I have a well-used response which goes something like this: the dollars spent on spaceflight are not shoveled into capsules and shot into space. That money is spent here, on Earth, and in the US. It is one of the few things we do better than anyone else and one of the few areas of endeavor in which the funds expended stay in our own country. The money spent on both crewed and robotic spaceflight goes to support the best of innovative tech industries and tech and science education (NASA is still a huge supporter of academia). The images of US space prowess have inspired generations of young people to go into tech fields and continue to do so at a time when by most measures we are falling desperately behind the rest of the developed world in these areas. And so forth. The wrap-up is usually something about our innate need to explore, to have new adventures, to reach above and beyond to keep our culture healthy and vibrant. And that last part is, of course, the hardest to rationalize... or sometimes even believe.

Privateers and Danger

So where do we stand in 2013? NASA has recently scored a brilliant success in unmanned exploration by landing the Curiosity rover on Mars. The mission has, so far, performed wonderfully, making discovery after discovery just as it was hoped it would. JPL's reward? Thanks very much, and we are cutting your budget by \$100 million (it had earlier been projected at \$300m, but congressional stalwarts put some of it back).

The greater NASA trundles onward. Development on the Orion capsule continues. The question is: on what will it fly? Perhaps the Space Launch System will be completed and the whole stack can start testing in 2017. Of course, we will then need a destination and that has continued to be a vexing decision for the current administration. LEO? The moon? Mars? Recent polls show public support for a journey to an asteroid very soft (the Russian meteor drama notwithstanding) and at the same time over 50% of those polled are in favor of a crewed Mars mission. A reassessment is in order.

And then there are the privateers. While most of the private sector is working to attain some version of LEO (I am including the space tourism companies in this), and with some COTS support from NASA where possible, a few brave souls are tackling grander ventures. And while there is a great and viable need for the private sector to service LEO and activities there such as the space station, it is arguably not exploration, at least not in the classic mold. We have been in LEO in one form or another for over 50 years. While it may be new territory for the private sector, that does not make it exploration.

Once Again, Mars

Then along came Dennis Tito and inspiration Mars. Seeding the new foundation with his own hard-won cash, Tito and his partners have set a brave goal of sending a crew of two in a looping trajectory around Mars with a 2018 departure date and a flight duration of just over 500 days. The spacecraft is slated to consist of a commercial capsule (SpaceX's Dragon has been mentioned), a Bigelow-style habitation module, and possibly a radiation vault. The flyby would last 10 hours.

Make no mistake: if this mission somehow makes it into space, it is fraught with danger. Besides the young technology of the Dragon (though it should be crew-rated by then), besides the relative unknowns of small-system, closed-loop life support for a year and a half (it has been researched on the space station, but not in the life-or-death setting that this voyage requires) and besides the risks of radiation both from our own sun and from beyond the solar system, there are several human physiology and psychological unknowns. They are not likely to be ironed out completely by 2018.

What does this all mean? It means that this journey entails *risk*. It is somewhat dangerous. And for those reasons alone it is a bit of a hot potato for NASA to support. If it all goes well, the agency would share the glory with the private sector. If someone dies, the agency takes another hit in the eye and Mars is off the table for a decade or more.

And yet, what are our other choices? If we wait for a national space agency – be it NASA, ESA, or the Russians or Chinese – we will be waiting a long time. These agencies are highly risk-averse, underfunded (with the arguable exception of China), and not currently discussing any real plans for a crewed

Mars flight (again, with the possible exception of China). China has discussed the moon and is currently moving through its own Gemini-era learning curve to attain that goal. Other than that, LEO is the domain of a spectacular but aging space station and occasional crew and consumables resupply flights. Hardly the stuff of dreams.

So it would seem that it is in the lap of the private sector. There are no arch-enemies against whom the US government can angle. There is no martyred president whose vision we must uphold. There is no great question of “can it be done,” because for all intents and purposes we, along with the Soviet Union, long ago showed that we are very capable in space. And there would appear to be no real perceived benefit to many minds.

Back to the exploration imperative. And I do not mean the dusty, creaking old adage “Man Must Explore.” I mean the real, burning need to do new things, go new places, and stand on them that has always motivated such efforts. With the struggles of the Golden Age of Apollo behind us, and the hard lessons about the difficulty of ongoing operations we learned from the shuttle, we know that space is hard to do. It is expensive and the returns are often intangible (except for the obvious boons to aerospace and education).

So that leaves the exploration imperative. It is worth remembering that much of the exploration of this planet was done by people who were at least to some degree private operators. Ernest Shackleton’s Antarctic voyages come to mind, as do a number of attempts on the Northwest Passage. The involvement of Great Britain in India began as a private venture. In some cases government funds were involved, in others only some in-kind assistance. But these particular great explorations were primarily the result of one person, or a small group of like minds, who got together and decided that this was a venture worth undertaking. When asked why, their answers were myriad, but always some version of “Because it is there.” And while the new private explorers of space may not have the (often fictional) financial lures that drove explorers of centuries past, they do have the assurance of a place in history and, it must be mentioned, a substantial take of media dollars upon their return.

If this path is followed there will be malfunctions, accidents, and deaths. Risks will be taken and many will be ones that NASA would eschew. But as private operators, these explorers will have certain freedoms from the rules, regulations, and general aversion to risk that can hobble the national space agencies. And that is a good thing, for our current space exploration ennui needs to be lifted. We need, as a culture, to see brave men and women departing these Earthly shores for points unknown. We need to return to the journey we have barely begun through those vast, dark spaces between planetary bodies, well beyond LEO. And if it takes an 18-month flyby of Mars or some other “stunt” to kick-start it, then so be it.

It is time to return to what we as a culture have done so well: dream, innovate and explore.

About the Author: On Rod Pyle's website, www.rodpilebooks.com, he tells us about his motivations for Space: *"Like many of my generation, I was enthralled by the flights of Mercury, Gemini, and especially Apollo. As those ghostly images came down from the moon, improving on each flight, I stayed home from high school to savor every moment the networks aired. As I grew older and matured into a career and family life, fond memories of NASA's 'Golden Years' stayed with me. Since then the opportunity to write numerous books about the space program, as well as to create many documentaries and short media pieces about Apollo and the US Mars Program have provided me with countless hours of fascination and enjoyment. It is my deepest hope that I can impart some of the thrill and enchantment I have experienced to you."*



Editor's Notes: Rod Pyle is a communications expert. Media Consultant, TV Producer, Space enthusiast and author whose *Destination Mars* was recently added to *Scientific American's* Book Club. In this issue of *The Journal of Space Philosophy*, he articulately covers the history of Space Exploration right up to 2013 – including where and why it has succeeded and where and why it has stalled. Thank you for sharing your expertise, Rod. *Bob Krone, Ph.D.*