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Viewpoint

A significant moment for the space age

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Abstract

Anniversaries offer not only opportunities to celebrate and commemorate a significant event, but also to reflect on larger meanings and consider the place of the events and their actors in the larger fabric of modern society. On 4 October 2007, the world will commemorate the 50th anniversary of the launch of Sputnik 1, the first spacecraft placed in orbit. What has this 50-year history brought us? This essay reflects on this event and its meaning. It suggests that humanity may appropriately conclude that this Earth is not a cage and that humanity may venture beyond it. It also invokes the possibilities of both living more fully on this small and precious world we call home, and of leaving it behind for other planets beyond.
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The USSR launched a spherical orbital satellite, about two and a half times the size of a basketball, to usher in the 'Space Age' on 4 October 1957, and the 50th anniversary which we commemorate in 2007 offers the opportunity to reflect on this important event in human history and to explore its meaning. Sputnik 1, a mere 183-pound "hunk of iron almost anybody could launch," as US Navy Rear Admiral Rawson Bennett called it, carried on its orbital trajectory a symbolism far beyond its size [1]. For one it reversed the image of the USSR as a technological backwater, and placed it on a footing equal to that of the USA. It also established spaceflight as evidence of progress and forward thinking among the nations of the world. It represented a first step beyond this planet, and we have never known a time since when there has not been some human-made object in Earth orbit. Finally, it suggested that the destiny of humanity rested in the cosmos rather than on Earth, and for all of its elusiveness that destiny motivated many to embrace the Space Age.

Sputnik elicited a broad response in the USA. Scientists and engineers congratulated their Soviet counterparts, politicians fear-mongered that Sputnik signaled an inferiority of US technological know-how, and some, such as 14-year-old Homer Hickam, were thrilled. "I saw the bright little ball, moving majestically across the narrow star field between the ridgelines," he recalled. "All my life, everything important that had ever happened had always happened somewhere else. But Sputnik was right there in front of my eyes in my backyard in Coalwood, McDowell County, West Virginia, USA. I couldn't believe it" [2]. It inspired a generation of young people like Hickam to reach for the stars.

Raised on visions of the human colonization of the Moon and Mars, great starships plying galactic oceans, and the prospects of a bright, limitless future beyond the confining, overcrowded, and resource-depleted Earth, such individuals as Homer Hickam threw themselves into the quest for space. Thousands of them heeded the siren call of space, and they became in the poetry of Mary Jean Holmes the 'Everyman' who enabled the astronauts to explore the Moon. Holmes writes of them:

> For I'm the man who took up tools and laid out the designs.
> Of starships, I'm the one who built their sleek and burnished lines.
> I'm everyman who ever fashioned cold refined steel.
> Into the dreams of spaceflight, I'm the one who made them real [3].

Politically, a full-scale crisis resulted in the USA from the launch of Sputnik, creating an illusion of a technological gap and providing the impetus for increased spending on aerospace endeavors and on technical and scientific

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educational programs, and for the chartering of new federal agencies such as the National Aeronautics and Space Administration (NASA). In addition, the USA launched its first Earth satellite on 31 January 1958, when Explorer 1 documented the existence of what became known as the Van Allen Radiation Belts encircling the Earth. The USA also began a series of scientific missions to the Moon and planets that culminated in the spectacular lunar landings of the Apollo program between 1969 and 1972.

The first 15 years of the Space Age proved some of the most exciting of any lifetime. From the tentative first steps into space with satellites and suborbital chimpanzee and astronaut flights through the breathtaking orbital missions of Mercury, Gemini and Apollo, the decade of the 1960s offered a vicarious thrill ride to Western Civilization igniting the imagination of millions. But, it never proved easy; perhaps that is why the term 'rocket science' entered our lexicon to measure difficulty. Early on the rockets failed repeatedly; as a child at the time I was probably four or five years old before I realized that rockets were not supposed to explode during launch. I thought NASA put on really fine fireworks displays; fortunately it lost none with astronauts aboard. Other problems and disasters demonstrated the extreme adventure that spaceflight offered, as the crew of Apollo 1 perished in a flash fire during ground tests in 1967 and only heroic efforts by all involved saved the crew of Apollo 13 en route to the Moon in 1970.

At the same time, the delight of those early years in space enlivened the imagination. Novelist Ray Bradbury captured the emotion of that early heroic era of spaceflight best when he commented: "Too many of us have lost the passion and emotion of remarkable things … Let us not tear up the future, but rather again heed the creative metaphors that render space travel a religious experience. When the blast of a rocket launch slams you against the wall and all the rust is shaken off your body, you will hear the great shout of the universe and the joyful crying of people who have been changed by what they've seen" [4].

The Apollo missions to the Moon caused that type of experience both for me and for millions of others. The world paused in July 1969 when Neil Armstrong first set foot on the Moon. One 7-year-old boy from San Juan, Puerto Rico, said of the first Moon landing: "I kept racing between the TV and the balcony and looking at the Moon to see if I could see them on the Moon" [5]. His experiences proved typical; as a 15-year-old I sat with friends on the hood of a car on the night of 20 July 1969, looking at the Moon and listening to the astronauts on it. "One small step"—hardly; Neil Armstrong nailed it with the second phrase of his famous statement, "one giant leap for mankind."

The Moon landings represented a watershed in human history. Capping the decade of the 1960s with the first Moon landings offered a seemingly collective catharsis for humanity, representing our first tentative baby steps toward becoming a cosmic species. Certainly, Apollo was a cold war initiative; it was a surrogate for war—the primary goal of the program when first envisioned in 1961. At the same time, spaceflight conjured the best in the human spirit and served, in the words of journalist Greg Easterbrook, as "a metaphor of national inspiration: majestic, technologically advanced, produced at dear cost and entrusted with precious cargo, rising above the constraints of the earth." It "carries our secret hope that there is something better out there—a world where we may someday go and leave the sorrows of the past behind" [6].

The future dazzled as broad expectations stretched our imaginations. The Moon landings demonstrated that anything we set our minds to we could accomplish. Opportunities in space appeared boundless and broad expectations stretched our imaginations. "If we can put a man on the Moon, why can't we…" entered the public consciousness as a statement of unlimited potential [7]. We expected to see the physical incarnation of spaceflight depicted in the classic 1968 science fiction movie, 2001: *A Space Odyssey*, wherein Stanley Kubrick showed a human race moving outward into the Solar System. A great space station orbited the Earth, serviced by a reusable, winged spacecraft traveling from the globe's surface. Activities in low-Earth orbit had become routine in this film, with commercial enterprises carrying out many of the functions seen in the film's first segments. The shuttle to the space station was flown by Pan American, a Hilton hotel was located on the station, and communications came from AT&T.

This did not take place, although it appeared at first as if it would. Instead we got the Space Shuttle, and it suffered in comparison. It confined us for the rest of the 20th century to low-Earth orbit. Many would agree with Leo McGarry, the White House Chief of Staff in the fictional *West Wing* television series when asked about NASA's activities: "Where's my jet pack, my colonies on the Moon? Just a waste" [8]. But challenges and opportunities still abounded for the future.

This sense of betrayal after Apollo is present with a space shuttle that was never about exploration, it merely sought to provide reliable and inexpensive access to space, alas it failed there as well. After two tragic accidents—*Challenger* during launch on 28 January 1986 and *Columbia* during re-entry on 1 February 2003—many agreed when NASA administrator Mike Griffin branded the program a 'mistake' in autumn 2005. No wonder that, after the second accident, a consensus emerged to retire the vehicle by 2010. Had an International Space Station not been half-completed, and the Shuttle necessary to do that work, it might not have returned to flight at all.

If the human spaceflight effort seemed moribund at the end of the 20th century after the ambitious effort to reach the Moon, a robust robotic science program provided continual excitement. Since the dawn of the Space Age flights to every planet of the solar system have expanded them from points of light in the night sky to unique worlds

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of remarkable variety and complexity, the stunning missions to explore the outer solar system—Pioneers 10 and 11, Voyagers 1 and 2, Galileo and Cassini—have yielded a treasure of knowledge about our universe, how it originated, and how it works. Exploration of Mars has shown powerfully the prospect of past life on the red planet. Missions to Venus and Mercury have harvested knowledge about the origins and evolution of the inner solar system. The stunningly successful Hubble Space Telescope coupled with Chandra, COBE, and other spacecraft have transformed our understanding of the cosmos. Most importantly, we learned that, as in Goldilocks and the three bears, Earth is the only place we know of where everything necessary to sustain our life is 'just right'.

For all their accomplishments, these robots have not replaced the dream of human movement beyond Earth that astronauts flying to the Moon engendered. Their activities provide a powerful motivation for spaceflight, whose advocates insist that humanity has only a finite period of time to colonize other worlds before resources on Earth are unable to sustain human migration. They believe resource depletion—and perhaps environmental degradation, climate change or nuclear war—could soon close off this opportunity. *Carpe diem*! They believe that if we do not seize this opportunity while circumstances on Earth permit, interplanetary travel will too soon become impossible. A limitless future for humanity in space remains the critical but elusive goal of the space age. Humanity, space exploration advocates insist, must not allow the Easter Island syndrome to be repeated on this island Earth; we must not let the depletion of resources strand us on this planet as the ancient inhabitants of Easter Island were.

Whether or not it proves attainable in the future, President George W. Bush's call on 14 January 2004 to reach the Moon and Mars during the next 30 years makes clear that a belief in a limitless frontier in space still motivates us. Legendary journalist Walter Cronkite captured this sense of possibility in a reflection written at the turn of the 21st century. "Yes, indeed, we are the lucky generation," he noted. In this half-century we "first broke our earthly bonds and ventured into space. From our descendants' perches on other planets or distant space cities, they will look back at our achievement with wonder at our courage and audacity and with appreciation at our accomplishments, which assured the future in which they live" [9].

The first 50 years of space exploration were motivated by fantastic dreams and a compelling sense of destiny in space, and this thrill of exploration continues into the next half century. The second 50 years of the space age offers the expectation of transforming discoveries that will alter the course of the future. Spaceflight is full of achievements, disappointments and surprises; it is also full of promise. That promise sustains and motivates. It motivated Walter Cronkite at age 90 to tell me recently that he was ready to fly into space and especially to walk on the Moon. It motivated 40-year-old Iranian-American Anousheh Ansari to spend millions of dollars to realize her dream of moving beyond Earth, if only temporarily. It sustains the efforts of thousands of others who believe that humanity has a destiny in space. Russian spaceflight pioneer Konstantin Tsiolkovsky said it best: "The Earth is the cradle of mankind, but we cannot live forever in a cradle" [10]. Most of all, the space age of the past 50 years has taught us that this cradle is not a cage and that we can leave it.

Who knows what transforming discoveries will be made during the second 50 years of the Space Age that will alter the course of the future? Only one feature of spaceflight is inevitable. The unexpected will occur. At the time of the commemoration of the first 50 years of the Space Age perhaps we can appreciate anew all that has gone before and recognize that space provides interlinked opportunities for humans first to learn how to live more fully on a small and precious world and second to leave it behind for others.

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[7] To determine how widespread this question is, in 2001 I undertook a search of the DowJones database, which includes full text of more than 6000 newspapers, magazines, newswires, and transcripts. Some of the publications go back to the 1980s but most have data only from the 1990s. Except for perhaps Lexis-Nexis, DowJones is the largest full-text database available. There are more than 6,901 articles using this phrase, or a variation of it, in the database. Among them was a statement by former White House Chief of Staff, Mack McClarty concerning Mexico on National Public Radio's "All Things Considered," entitled, "Analysis: President Bush to visit Mexico and its President." Maria Elena Salinas, co-anchor at Miami-based Spanish-language cable network Univision, used this phrase when discussing her decision to list the Apollo Moon landings as first in the top 100 news events of the twentieth century. Levinson A. Atomic bombing of Hiroshima tops journalists' list of century's news. Associated Press, February 24, 1999.
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