

Preface

In hindsight, the year I was born – 1972 – can be considered to have been a pivotal year for spaceflight. It was the year of the last manned lunar landing, Apollo 17, ending the hectic and exciting era of the Space Race. It was also the year that Wernher von Braun, the main architect of U.S. human spaceflight development, retired from NASA, frustrated that the space agency was no longer progressing in accordance with the vision he had laid out way back in the 1950s. This was exemplified by the discontinuation that same year of the development of NERVA, the nuclear rocket engine meant to enable human spaceflight forays further into the solar system. In January 1972, President Nixon instead announced the Space Shuttle as the next major goal of the agency, effectively limiting NASA's astronauts to low Earth orbit to this day. And 1972 also saw the fourth and final attempt – and failure – of the Soviet Union to launch its N1 moon rocket, thus ending their Space Race manned lunar landing ambitions.

Influential in another respect was the publication in 1972 of the *Limits to Growth* report, the first widely publicized warning of the consequences of unbridled economic growth. Disregard for the environment, climate change and abuse of our planet's limited resources were getting out of hand, the report stressed, and without drastic measures our life on Earth would quickly become unsustainable. General concerns about pollution, overpopulation, urbanization, nuclear energy, the arms race and other problems on our home planet increased, ironically symbolized by the pictures sent back by the Apollo lunar astronauts that showed our planet as a little, vulnerable island in the hostile blackness of space.

Whereas confidence in the improvement of life through technical and scientific progress, including spaceflight, had been high in the 1950s and 1960s, people now started to be uncertain about their future and ever more skeptical towards technology. In the U.S., the 'Watergate' scandal further eroded confidence in the government. To make matters worse, economic growth started to slow down worldwide, especially when the 1973 oil crisis triggered a recession.

However, 1972 also saw the launch of Pioneer 10, the first spacecraft to leave the solar system, and the first successful landing on the surface of Venus of a robotic space probe, by the Soviet Union's Venera 8. The launch of the Copernicus Orbiting Astronomical

Observatory, a collaborative effort between NASA and the UK's Science Research Council, paved the way for later astronomical observatories in space, such as the Hubble Space Telescope. Not all was doom and gloom.

As I grew up in the 1980s, the era of the Space Shuttle, I admired the variety of missions the Shuttle accomplished, but also became increasingly frustrated about the seeming lack of progress, especially in comparison to what I found depicted in books written before and during the Space Race. Mars missions now always seemed to be 20 years in the future; true spaceplanes remained forever on the drawing board. And while the 1970s sales pitches for the Shuttle had promised routine access to space for an increasing number of people with a variety of backgrounds, the optimism that I might grow up to visit a space station myself gradually decreased, especially after the *Challenger* disaster of 1986.

In my mind, something had clearly gone wrong around the time I was born. Up till 1972, humanity had been gloriously expanding its presence in the solar system; first reaching Earth orbit and then landing on the Moon. But after that point, we had become stuck in low Earth orbit. I started to read books about space colonization, and soon understood that was another dream that was going nowhere fast.

Around the time that I went to study aerospace engineering, I started to realize that while progress in human spaceflight might have stagnated, in robotic exploration things were not all that bad. Voyager 2 flew past Uranus and Neptune; ESA's Giotto flew past Halley's Comet; Galileo went into orbit around Jupiter; the first rover landed on Mars; and the Hubble Space Telescope returned spectacular views of the universe. In the meantime, while not flying very far, astronauts still fixed satellites and cosmonauts lived in space stations for extended durations. The Soviets launched a new super heavy-lift launcher and their own version of the Space Shuttle.

I nevertheless retained my interest in many of the original, far more ambitious, "dream missions," such as human landings on Mars, routine spaceplane flights, nuclear space-ships, lunar bases and vast orbital habitats. Why was it that at one time these projects seemed inevitable, while a few decades later they appeared hopelessly naïve and optimistic? What had changed? What could we learn from this? Could any of them still become reality, one way or another? I was not alone in such musings; towards the end of the 20th century, at the approach of the new millennium, there was much reflection on the overall accomplishments of spaceflight in comparison with the expectations of the 1950s and 1960s. The supposedly realistic depictions of the 1968 movie, *2001, A Space Odyssey*, contrasted sharply with the real year 2001, which saw only a tiny stub of a space station, and lacked both lunar bases and giant nuclear spaceships carrying their crews to Jupiter.

After touching on the topic of unrealized projects in my previous book on rocketplanes and spaceplanes, I wanted to expand my view to the wider scope of spaceflight in general. Initially, my idea was a book about 'the greatest missions that never happened', but the publisher rightly felt this too negative an angle that would likely result in a melancholic book about might-have-beens. Writing such a book could have easily turned into a depressing experience; maybe not to a historian, but certainly to a space enthusiast engineer like me. We thus decided on a more positive approach, focusing not on what didn't happen, but rather on why things did not follow 'the plan', and what may eventually still make new and old "dream missions" a reality.

Nevertheless, writing this book proved to be a somewhat thought-provoking experience, with me having to face the fact that several favorite grand projects are unlikely ever to come to fruition because of serious technical and financial issues, or merely because the whole idea is now hopelessly outdated.

Somewhat naively delving into the subject, I quickly found out how much material there really was. The number of abandoned spaceflight ideas, concepts and projects far outweighs the number that have actually flown. Researching one concept inevitably led to another idea; the rabbit warren seemed to go on forever. Where to stop? When does science forecasting become science fiction? When does technological possibility become technology fantasy and thus beyond the scope of this book? How many abandoned manned Mars mission concepts would I need to describe to make a point? I decided not to strive to be all-inclusive, focusing on a more general narrative with examples of concepts that have been seriously considered and that appeared reasonably credible at one time, if not today.

Unlike many books on the subjects I touch on, I do not offer any clear solutions or strategies that will lead to a glorious continuation of humanity's expansion into the cosmos. I wish I had any, really. The observations, predictions and opinions I describe in this book are my own, and you are welcome to disagree. In fact, I would be very grateful if anybody could manage to convincingly revive the idea of the giant space colony, a childhood favorite. I would love to visit one, just like it was depicted in those stunning NASA artists' impressions of the 1970s.

Dream Missions

Space Colonies, Nuclear Spacecraft and Other
Possibilities

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