

# **National Strategy and the Civil Space Program**

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Good morning. I want to thank the Space Foundation for sponsoring this 23<sup>rd</sup> National Space Symposium, giving many of us a good reason to leave the confines of Washington, DC for the foothills of the Rocky Mountains. Although, now that I think about it, I would be willing to utilize pretty much any reason to leave DC. But anyway, I am happy to be here.

Today I want to discuss in a bit more detail a theme to which I have alluded in many talks, and that is the strategic importance of the civil space program to our nation. This is not a topic that receives a lot of attention. It is considered obvious to all that the space activities of our military forces and the intelligence community are “strategic”. We talk about “strategic missiles” and “strategic reconnaissance”, and the Russians make no bones about it with their “Strategic Rocket Forces”. But civil space? Isn’t that simply about scientific discovery, or human exploration, or practical applications such as weather monitoring, navigation, and communications?

I think it’s not “simple” at all, actually, so let’s talk about it.

Prominently featured in the Denver International Airport is a statue of a space-suited Apollo astronaut, the late Jack Swigert, a Denver native. A similar statue occupies a place of honor in the U.S. Capitol, one of the two allocated to

each state to honor great men or women who represent the history and ideals of their home state. When people tour the Capitol, this is a statue at which they stop for a moment. Other exhibits represent our nation's past, and the present is captured by the view of our nation's current leaders hustling past, on their way to cast votes or attend hearings. But when tourists see this statue, they are arrested by the realization that they are glimpsing the future, not only that of our nation, but of the human species.

Jack Swigert grew up in Colorado, earned a mechanical engineering degree from CU-Boulder, joined the Air Force, and flew combat in Korea. He left the Air Force to earn a master's degree in aerospace engineering, and became a test pilot for North American Aviation. He was selected for the astronaut corps in 1966, in the group that, somewhat tongue-in-cheek, Apollo 11 astronaut Michael Collins dubbed the "Original Nineteen". This group was selected at a time when it was thought that we would be conducting many more Apollo missions than regrettably turned out to be the case; several had to wait to fly for the first time on the Space Shuttle.

But in April 1970, Jack replaced command module prime pilot T. K. Mattingly when the latter was exposed to German measles, and flew his only space mission, Apollo 13, with Jim Lovell and Fred Haise. Both the flight crew and the ground controllers demonstrated their bravery, perseverance, and quick thinking again and again as they struggled to survive and return to Earth. This is the kind of thing that has caused me to say that those of us in the space business must live by a creed of excellence, or die from the lack of it.

The Apollo 13 mission was dramatized in a movie a few years ago. I am sure that most of you saw it. Jack Swigert was portrayed by actor Kevin Bacon. Unfortunately, in our culture today far more people recognize the actor than the

man he portrayed, and far more people will flock to a movie depicting dramatized bravery than can recognize the real thing.

Anyway, a few years after the Apollo 13 mission, Jack left NASA to become the staff director for the House Science & Technology Committee, and then returned to Colorado and was elected to Congress in 1982. He died of cancer before he could take office, at 51 years of age.

Now, Jack was not known as a perfect person, his time on the national stage was brief, and that little was suffused with professional disappointment and personal tragedy. So why did the people of Colorado choose him to represent them in the Capitol?

Today, Colorado remains one of the most beautiful of the states, which, a century and more ago, were on the western frontier. In many areas it is unchanged from that time, a land that in places can still be seen as the mountain men saw it. The American West is no longer a frontier, but the people who live here can still see it from where they stand. Certainly the people who sent U.S. Army Captain Zebulon Pike west to Colorado, where he discovered the peak to the west of town that bears his name, fully understood that the exploration and development of the western frontier was a strategic issue. And I believe that westerners today, more than most, understand viscerally that our nation's next frontier lies 200 miles above our heads.

So I think that the choice of a statue of Jack Swigert to represent Colorado in the halls of the U.S. Capitol was perfect. I believe it was because those making the choice understood the real reasons why we're in the space business. They understood that, for America, exploration is a matter of national strategy.

So, out of respect for the people who recognized the strategic importance of opening the American frontier, or those who built some of the great feats of engineering we enjoy today, let us ask ourselves some fundamental, and

disconcerting, questions: Do we really understand the importance of what it is that we choose to do, or not, in space? If our great-great grandparents accepted the challenge of expanding the frontier of their time, will our generation do less? And if so, why?

NASA is a nearly unique government agency in the sense that it enjoys enormous name recognition and immensely positive public approval, consistently 65-75% as measured in professional surveys. This is a level of popularity that any public figure would envy, a level of “brand loyalty” about which most commercial product marketers could only dream. However, only about 50% of the people surveyed believe NASA to be relevant to their lives. So, in effect, the same people who resoundingly approve of NASA are not sure why. But when those being questioned are informed of even some of the more prosaic contributions of the space program to their daily lives – things like the development of integrated circuits, medical monitoring equipment for hospital patients, navigation and weather satellites, materials used in joint replacement surgery – their assessment of our relevance shoots above 90%. Collaterally, the approval rating for space exploration jumps from 70% to 80%.

So, clearly, the American people broadly approve of NASA even while admitting that they do not understand the relevance of the space program to their lives, and their approval increases further when we give them concrete reasons for it. To me, this is an extraordinary result. How can it be?

I have begun to believe that NASA’s, and the space program’s, place in the American consciousness lies not in our minds, but in our hearts. The space program embodies in many ways what it *means* to be an American, the things we care about once we’ve dealt with the basics of earning a living and providing for our families. NASA’s endeavors invoke feelings of national pride, what remains of American idealism and hope and innovation and daring, and respect for those

qualities. And, yes, when they don't turn out well, because we are human and therefore flawed, our endeavors also remind us of the need for determination and courage and resilience and toughness and persistence, and of respect for those qualities as well. Feeling for NASA involves a sense of our place in the world, of the need to pass on a legacy for our children and grandchildren, the hope that they will live in a better world, or maybe even on new worlds. Feeling for NASA involves the deep satisfaction of overcoming the most demanding technical challenges known to man. And, yes, feeling for NASA invokes the concrete benefits we obtain for our entire society when we tackle, and learn to overcome, those challenges.

Tom Hanks, who starred in the movie *Apollo 13*, and told the story of Apollo in the TV mini-series *From the Earth to the Moon*, speaks eloquently of what NASA's missions to the moon meant for him and our nation during the tumultuous 1960s and early 1970s with the Vietnam War, the civil rights movement, and the assassinations of John and Robert Kennedy and Martin Luther King, Jr. In a simple, yet fundamentally insightful way, Hanks said of the Apollo program: "If we can do this, we can do anything."

I believe this thought provides more of a justification for our space program than any rational, dollars-and-cents explanation I can ever hope to provide as to what NASA represents to the American public and those of us in the space business. The Apollo program became the standard by which future feats of engineering and the focus of national willpower would be measured. "If we can do this, we can do anything."

However, a dark cloud passes over this bright thought. It has been a long time since we did "this". It has been almost 35 years since man last set foot on the moon. Several of those who made that journey are no longer with us, and more will have passed before we return. While reading a recent story in *The New York*

*Times* on the impending retirement of the Space Shuttle, and its effect upon long-time space watchers in Florida, for whom the Shuttle has become a fixture of daily life, the reporter noted that some young people today actually question whether we ever really achieved the goal of which President Kennedy spoke so eloquently – “landing a man on the moon and returning him safely to the Earth”. One young waitress asked, “Do you think they really went to the Moon?” This dark cloud calls into question our nation’s willingness, maybe even our ability, to dare great things. It raises disturbing questions: Are America’s best days behind us? Will our future be dimmer than our past?

Human spaceflight has been accomplished only by the United States, Russia, and most recently China. India has announced its intention to develop such capabilities. Having visited several space facilities in China and India this past year, and meeting their aerospace engineers, I must say that I am very impressed by the methodical, disciplined approach both countries have taken in developing their space industrial base and capabilities. The national economies of these countries exceed in scale the economy of the United States as it existed in the early 1960s. Thus, if they wish to send their own astronauts into space, it is simply a matter of national will, of choosing to do so. Europe and Japan clearly have the economic and technical wherewithal to do so as well; for either of them, it is again simply a matter of making the strategic choice to do it.

Today is the 46<sup>th</sup> anniversary of man’s first foray into space. That man was a Russian, Yuri Gagarin. Today, a titanium statue of him rises 40 meters above a Moscow square. I will believe that we as a nation truly understand the importance of space to the future of our society when a similarly prominent statue is erected in honor of Alan Shepard, or John Glenn, or Neil Armstrong.

President Kennedy was the first of our nation’s leaders to recognize the importance of U.S. preeminence in space; indeed, it was an electoral issue in 1960,

the last time that this has been so. President Kennedy understood the strategic value of space power when he campaigned on the theme of the “missile gap” between the U.S. and the Soviet Union. While we now know that the actual gap was in favor of the United States, the misperception of that time is not the issue; my point is that it mattered. And when Kennedy saw the respect accorded the Soviet Union following Gagarin’s flight, he understood as well the strategic value of human spaceflight, and the necessity that the United States be in its vanguard, saying “We go into space because whatever mankind must undertake, free men must fully share.”

And human spaceflight *is* a strategic capability for a nation. To me, Kennedy’s appreciation of this matter was similar to the way in which President Theodore Roosevelt recognized the importance of sea power around the turn of the last century as a means to increase the United States’ economic, security, diplomatic, and cultural influence in the world.

Theodore Roosevelt was a mere 24 years old when his book on the War of 1812 was published in 1882. In it, he wrote that for a state as dependent on sea power as America, it was unthinkable that the nation “rely for defense upon a navy composed partly of antiquated hulks, and partly of new vessels rather more worthless than the old”. He went on to say that the United States was rising to world-power status, but it could do so only on the back of a powerful and efficient navy.

As many of you who work in DoD space understand quite well, there is a direct analogy between many of the operating principles between sea and space power. Roosevelt’s work was followed by the influential work of Alfred Thayer Mahan, *The Influence of Sea Power upon History*, published in 1890, and which became the bible for the development of sea power by the United States in the 20<sup>th</sup> Century. Mahan also recognized that the United States was rising to world-power

status, but could do so only with a powerful navy. According to historian Paul Kennedy, Mahan “showed the intimate relationships among productive industry, flourishing seaborne commerce, strong national finances, and enlightened national purpose.” None of these themes has, by itself, any direct connection to U.S. preeminence on the high seas. But none was possible without it.

Mahan’s theoretical principles were one thing, but it took President Roosevelt “to turn the theory of Mahan’s principles of sea power into effective practice, for the furtherance of American interests and values. No U.S. President did that better.” Roosevelt turned Mahan’s vision into reality. In an audacious move, President Roosevelt’s bold dispatch of the Great White Fleet of 16 modern battleships on a 14-month cruise around the world sent a not-so-subtle message that the United States was an emerging world power capable of projecting its influence where necessary. Roosevelt’s experience during the Spanish-American War, when a battleship required over two months to steam around Cape Horn from San Francisco to Cuba, prompted him to lead the negotiation for and development of the Panama Canal. The canal continues to be strategically important to our nation even today.

Fifty years ago, first Sputnik and then Gagarin sent a similar, and not at all subtle, message about the wherewithal of the Soviet Union. President Kennedy recognized that this message must be answered with a move even more audacious than that of Roosevelt’s Great White Fleet. He recognized that the United States was behind the Soviet Union in human spaceflight, and he recognized its significance concerning the world’s perception of leadership, saying: “Those who came before us made certain that this country rode the first waves of the industrial revolution, the first waves of modern invention, and the first wave of nuclear power, and this generation does not intend to founder in the backwash of the coming age of space. We mean to be a part of it – we mean to lead it. For the eyes



of the world now look into space, to the moon and to the planets beyond, and we have vowed that we shall not see it governed by a hostile flag of conquest, but by a banner of freedom and peace. We have vowed that we shall not see space filled with weapons of mass destruction, but with instruments of knowledge and understanding. Yet the vows of this Nation can only be fulfilled if we in this Nation are first, and, therefore, we intend to be first. In short, our leadership in science and in industry, our hopes for peace and security, our obligations to ourselves as well as others, all require us to make this effort, to solve these mysteries, to solve them for the good of all men, and to become the world's leading spacefaring nation.”

With President Kennedy’s focused goal of “man-moon-decade” in mind, our nation dared to do great things. Webb, Dryden, Seamans, Mueller, Gilruth, von Braun, Kraft, Low, Faget, and many, many others were the great leaders of that time. They turned Kennedy’s vision into reality and lifted our nation’s spirits in the achievement. These men created a lasting legacy and were mentors to thousands of engineers who followed in their footsteps.

Apollo helped create the system engineering discipline that spread throughout our nation’s industrial base and found applications in other, diverse fields of the civil and DoD space business, aviation, automotive industry, health care, etc. Like Rickover’s nuclear navy, Apollo moved the state-of-the-art forward throughout all of engineering. What is more strategic than that? The need for precise manufacturing methods and engineering standards for human spaceflight systems created a requirement for industry to develop new manufacturing methods and operate to a higher, more precise standard of excellence. The operation of complex, integrated space systems required revolutionary thinking in their development and management. This revolution in our nation’s systems engineering

discipline was the real spin-off from Apollo, and our nation has benefited immensely from it in many direct and indirect ways.

And while human spaceflight is clearly the most arresting activity any nation can undertake in space, the strategic impact of our efforts in space does not stop there. People seldom recall President Kennedy's breadth of vision, as he also challenged the nation to accelerate the development of communications and weather satellites for world-wide application. Because of that investment, we have a world that is much more connected and safer than otherwise. We have set standards that are followed around the world for the provision of weather data and the distribution of services. And we have greatly extended the goals established in the 1960s. We have two rovers which have provided a continuous human telepresence on Mars for the last three years. We conceived, designed, and built the Hubble Space Telescope. We have carried out the first reconnaissance of the solar system, conducted the broadest and most intensive surveys of Earth's weather and climate, and developed the first global navigation and communications systems.

So, when we consider the strategic impact of the civil space program, we must ask, what is the value to the United States of pioneering, and leading, enterprises like this, which offer worldwide benefits, and lift up human hearts everywhere when we do them? What is the value to the United States of being engaged in projects where we are doing the kinds of things that other nations want to do, and including them as partners? I would submit that the highest possible form of national security, well above having better guns and bombs than everyone else, well above "speaking softly and carrying a big stick" as President Roosevelt suggested, is the security which comes from being a nation which does the kinds of things that make other countries want to join with us to do them. If this is not "strategic", then what is?

I have said many times that I believe that the most important aspect of the International Space Station is the tried and tested partnership that has been forged among the spacefaring nations of Canada, Europe, Japan, Russia, and the United States. This partnership has endured tremendous hardships, especially with the loss of the Space Shuttle *Columbia*, and stands by itself as a monumental international accomplishment. The Space Station partnership has collectively undertaken the largest task ever performed by the civilian agencies of the United States or our international partners; only military coalitions have undertaken larger tasks. With the Space Shuttle as our primary means for assembly to the Station, this endeavor rivals the Apollo program in cost and complexity. When completed, the Station will be four times larger than the Russian Mir space station and five times larger than Skylab. It is truly one of the great engineering wonders of the world, akin to such feats as the Great Wall of China, the pyramids of Egypt, the Panama and Suez canals, or the sea walls of Venice.

We can learn from our experience with the ISS and expand on its positive aspects as we move forward. My hope is that by maintaining our commitment to the Station, our international partners will view NASA and the United States as good partners through thick and thin, good people with whom to team in future endeavors of space exploration and scientific discovery in exploring the Moon, Mars, and other worlds. We will also help to drive the creation of a new space industry in low Earth orbit and beyond in such a way that NASA becomes a reliable and supportive customer for that industry. This is the space analogy to Mahan's "flourishing seaborne commerce", and it will be a strategic matter for this century and beyond.

At this stage in the development of our plans for a return to the Moon and a lunar outpost, it is important that we at NASA not prescribe roles and responsibilities for future international partnerships. Instead, we have defined a

minimalist Exploration architecture centered around the *Orion* and *Ares* crew- and heavy-lift launch vehicles as the first critical elements, with the hope that international and commercial partners will want to augment these capabilities with their own.

We're already collaborating with other nations on a series of satellite missions to map the resources of the Moon, which one day will be mined to help establish a permanent lunar outpost. More than half of NASA's armada of over fifty robotic science missions involve some form of international participation, and almost two-thirds of our science missions on the drawing board today have an international component. One of the main reasons why these discussions for future collaboration in exploring the Moon together have been so fruitful is that, despite many trials and tribulations, the United States has shown itself to be a good partner. We need to continue that.

Those who think strategically about geopolitical issues measure a nation's influence on world affairs through four fundamental metrics: economic influence such as the size of a nation's economy and the pattern of its trade relations; military influence such as the ability to deploy army, navy, air and space forces around the world; political influence through diplomacy between countries or in coalitions of nations; and cultural influence with regard to how a country projects its values through various arts, media, and language. While some of these influences are easier to measure than others, I think we can see from this discussion that what we do in space contributes to all four of these measures of our nation's influence. What the United States chooses to do in space matters.

"If we can do this, we can do anything."

We could also do nothing. It is a fairly simple choice, really. We could choose to do great things, we could simply sit back and watch, or we could choose to mock those who dare even to try. These are the questions I asked earlier: If our

great-great grandparents accepted the challenge of expanding their frontier, will our generation do less? And if so, why? Are America's best days behind us? Will America's future be dimmer than its past?

I have raised these questions, but it is those of you here who must answer them. They are not only strategic choices for our nation, they are also personal choices. All of us, and each of us, must consider the real reasons why we dare to explore this New Frontier.

In conclusion, I would like to leave you with one final thought. Some people have asked me recently about the changes in leadership of the Congress and how the next Presidential election might change "the Vision". Those questioners are precisely the people who like to be arm-chair quarterbacks on space policy issues, when what we really need is to focus on the tasks before us and the pace of the work to be done, rather than fomenting discord and putting space policy in partisan, political terms. I would like to echo President Kennedy's advice on the day before he was assassinated, when he spoke in San Antonio, saying: "For more than three years I have spoken about the New Frontier. This is not a partisan term, and it is not the exclusive property of Republicans or Democrats. It refers, instead, to this Nation's place in history, to the fact that we do stand on the edge of a great new era, filled with both crisis and opportunity, an era to be characterized by achievement and by challenge. It is an era which calls for action and for the best efforts of all those who would test the unknown."

If we can do this, we can do anything. Let's try.

Thank you.