

Becoming a True Spacefaring America

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It's now less than two years until a new president will be inaugurated. Probably, you have also started to wonder if anything will change with respect to American space activities with the new president.

Will the next president share a sense of America's destiny as a true spacefaring nation by expressing an understanding of the importance of space to the United States' prosperity and security in the 21st century? Will the next president see new "American space enterprises" as the means to address important national problems and challenges of technological and industrial leadership, economic growth, and world leadership raised during the campaign? Or, will we end up disappointed ... once again?

It's easy to be cynical about the prospect for significant changes in the overall American space enterprise with the next presidential administration, and it's easy to point fingers at politicians as the cause of our cynicism. On reflection, however, the root cause lies closer to home with the ineffective actions by the American pro-space community. We have not yet identified and effectively communicated proposed American space enterprise initiatives that have elicited strong public and political support.

I view the early months of the new presidential administration in 2009 as the **only true opportunity** to significantly alter the direction of America's space enterprise through the changed policies and new programs needed for the United States to become a true spacefaring nation. The purpose of this commentary is to explore what types of changes are needed, why these changes are vital for the United States to undertake, and how these changes can be advocated to the American public and political leadership. Let's start by looking ahead to what we should aim to achieve.

January, 2009: *I've taken a couple of days to drive to Washington, D.C., to listen to the inaugural address of the new President. The pro-space internet websites, blogs, and chat rooms are buzzing with anticipation that a new, major space initiative will be included in the President-elect's inaugural address. Meeting friends, we join the crowds converging on the National Mall to find a convenient location where we can, at least, hear the President-elect's address. Despite the cold temperatures, the sunny winter skies reflect our upbeat mood. We're sure that today is the day! The coordinated efforts of the American pro-space community over the last year appear to have paid off.*

Now: What exactly are we missing? To start, we need to reflect on what the politician's role in our political system is with respect to solving problems and undertaking new challenges. Politicians are not engineers; they do not create new technological solutions to problems or create new national opportunities through innovative technology advancements. Their role is to catalyze public policy and government programs to apply public and private resources to solving problems and addressing challenges of importance to the American public.

Politicians, particularly those of the political stature to be president, are very interested in proposing solutions to important issues and challenges. This is, after all, a primary currency of presidential campaigns. There are, however, criteria that must be met if a proposed solution is to be adopted.

- 1. Can the problem or challenge be perceived by the public as important?**
- 2. Is the time for change clearly evident?**
- 3. Have reasonable solutions been identified?**



4. Are the needed resources available?

5. Is the cost on par with the public's perceived importance of solving the problem or undertaking the challenge?

6. Will the implementation of the solution sustain needed public support?

7. Will the solution draw sufficient political support to be enacted and funded?

8. Is the solution likely to succeed?

Proposing answers to these questions, through proposed updates to U.S. space policies and new space enterprise initiatives, is what the American pro-space community now needs to undertake to positively influence the next president.

January, 2009: *In the last couple of weeks, the mainstream news media started to pick up the scent that something was brewing with respect to space. The Middle East, terrorism, health care, and taxes were certain to be main topics of the President-elect's inaugural address. Certainly, everyone was interested in the first two. But, there was a sense of surprise in the news media that in the face of major on-going international problems, such as terrorism, the President-elect was expected to place significant emphasis on reshaping American technological policies and national priorities. Strengthening American scientific, technological, and industrial leadership in the face of growing, world-wide competition was a major campaign theme. However, while the space program had been briefly mentioned a couple of times in national debates, now there was a new word popping up in the media reports and they were still, to our amusement, having some difficulty in getting their arms around it. The word was "spacefaring." The rumors were that a key policy element of the President-elect's speech would be to establish the priority for America to become a true spacefaring nation. The news media was struggling to explain what this meant and what would be different. One commentator had asked rhetorically, "Hadn't the United States been a spacefaring nation since the 1960s?"*

Now: So, what is first that the pro-space community needs to change? We need to move the public discussion of America's future space activities from the tactical level to the strategic level. Commercial suborbital human spaceflight; space hotels; planetary robotic exploration; space-based solar power; the return of humans to the Moon; the human exploration of Mars; and, even, defense against impacting comets and asteroids are examples of tactical operations that logically follow from the strategic issue of the need for the United States to become a true spacefaring nation.

In late 2002, the Congressionally-chartered *Commission on the Future of the United States Aerospace Industry* (Aerospace Commission) expressed its primary conclusion about America's future in space. "The Commission concludes that **the nation will have to be a space-faring nation to be the global leader in the 21st century**—our freedom, mobility, and quality of life will depend on it. America must explore and exploit space to assure national and planetary security, economic benefit, and scientific discovery." (Emphasis added)

What is a spacefaring nation? The dictionary definition is a nation that launches vehicles into space. An increasing number of nations have the ability to launch vehicles/satellites into space. The vision of a 21st century spacefaring nation is far more than simply launching rockets into space. I believe that it now needs to be defined in terms of a capability to operate in space, safely and routinely. Hence, **a true spacefaring nation is one that has command of space through technology, enabling its citizens, as spacefarers, to readily access and work in space to reap knowledge, wealth, and security from space.**

Neither the United States nor any other nation has yet become a true spacefaring nation. None, yet, has the practical capabilities that enable their citizens to readily access space for research, commerce, exploration, settlement, or for the simple enjoyment of being there (as we are frequently told by those lucky few who are given the opportunity to travel to space.) By extending this line of reasoning, the benefits of becoming a true spacefaring nation are clear. America will be able to do what no nation has yet accomplished—have the ability to fully tap the knowledge, wealth, and security from space and to be among the first to do so.

January, 2009: *As we expected, the inaugural address was not overly specific in terms of what the new administration will be undertaking. It touched all of the international and domestic issues, raised during the nearly two-year long presidential campaign, to establish the bond of trust needed by the president to effectively wield national power. Towards the end of these speeches, each new president usually seeks to frame a vision for the new administration. Kennedy ended with "And so, my fellow Americans: ask not what your country can do for you--ask what you can do for your country."*

The new President chose to turn to space to establish his vision for a nation being transformed. "One thing that we have come to realize is that, striving as we have, the residual challenges of the 20th century that are important and must be addressed, do not have easy 20th century solutions. We are now in the 21st century and we must seek, identify, and implement new 21st century solutions for these 20th century problems."

The President continued. "At the beginning of the 19th century, the handful of states that was then America turned west, becoming a continental, industrial nation. At the beginning of the 20th century, we turned to the frontier of flight, establishing our aeronautical motto of 'higher, faster, farther' that created the basis for a true global society where Americans can easily travel almost anywhere in the world to do the business of America. Now, we must, as a nation, stretch our wings farther to become a true spacefaring nation. We must provide Americans with the ability to travel to space and within space so that Americans can conduct the business of America in space to seek the knowledge, wealth, and security that space offers for solving the important 20th century problems as well as the 21st century challenges we will undoubtedly face."

Now: The American public and its political leaders seek paths to reestablish our national confidence and optimism that has been severely stressed these past years. Historically, America has turned to building new national logistics infrastructure as a primary means of moving the nation forward. After the War of 1812, we quickly began to build the roads, canals, steamboat lines, and eastern railroads that truly opened the western territories to settlement and

industrialization. After the Civil War, we built the first transcontinental railroad and the Brooklyn and Eads Bridges—all challenges that many thought technically impossible. After the Spanish-American War, we built the Panama Canal. To help end the Great Depression, we built the Tennessee Valley Authority's dams and waterworks, the Hoover Dam, the Golden Gate Bridge, etc. After World War II, we tremendously expanded our cities and universities to provide homes and education for the millions of returning veterans. After the Korean War, we built the interstate highway system and, through the introduction of jet-powered commercial transport, led in establishing the global air travel infrastructure. After the Gulf War, we built the Internet and wireless communications.

Throughout our history, we have used building new infrastructure as the key to unlock new frontiers and foster economic growth. Not only does the construction of the infrastructure provide new capabilities that physically open the new frontier to settlement and commerce, but it establishes a new industrial mastery of operations that provides the products and services needed by government and private enterprises to effectively participate in opening new frontiers. It is this public-private partnership approach—sometimes formal, sometimes informal—that has been very successful throughout America's history.

In 2001, the *Commission to Assess United States National Security Space Management and Organization* (Space Commission) noted the importance of creating such operational mastery in space: "The first era of the space age was one of experimentation and discovery. Telstar, Mercury and Apollo, Voyager and Hubble, and the Space Shuttle taught Americans how to journey into space and allowed them to take the first tentative steps toward operating in space while enlarging their knowledge of the universe. **We are now on the threshold of a new era of the space age, devoted to mastering operations in space.**" (Emphasis added) ... "Mastering near-earth space operations is still in its early stages. **As mastery over operating in space is achieved, the value of activity in space will grow.**" (Emphasis added)

March, 2009: *Responding to the public's expectation for rapid action, the new administration acted promptly to further define the specific policies and actions*

that will be undertaken. Emphasizing that the new administration would not be single-issue focused, as the Middle East continued to dominate American foreign affairs and news reports, the President chose to make revamping the American space enterprise a priority with specific proposals for establishing new public-private partnerships to better harness America's aerospace technological capabilities.

The President announced that proposed legislation was being sent to Congress to establish a new Federal Government Corporation to be charged with building and managing an integrated spacefaring logistics infrastructure to provide Americans and American enterprises with access to the entire Earth-Moon system. The President emphasized that building the new spacefaring infrastructure would create the new intellectual understanding, technical expertise, and industrial capabilities needed for America to lead in tapping the knowledge, wealth, and security of space.

The President noted that space contributes only about one hundred billion dollars annually to the nation's economy. New infrastructure will significantly expand commercial and governmental use of space; adding high-tech jobs; enabling American space entrepreneurs to introduce new products and services world-wide; and, creating new companies to help build, operate, and make use of the new infrastructure. The President emphasized that infrastructure building, through public-private partnerships, is one way that government primes the economy to produce new jobs and wealth and increase national security. This investment approach has paid off well for the U.S. here on Earth; there is no reason why it will not pay off for the nation in space.

Now: The immediate challenge is that the American pro-space movement must join together to propose a bold new space initiative that will attract broad bipartisan support, both from Congress as well as presidential candidates. ***I propose that building an integrated spacefaring logistics infrastructure is the right proposal for this time and for this presidential campaign.***

Using the criteria discussed earlier, let's evaluate this proposal.

1. Can the problem or challenge be perceived by the public as important?

From the current U.S. National Space Policy: *"In this new century, those who effectively utilize space will enjoy added prosperity and security and will hold a substantial advantage over those who do not. Freedom of action in space is as important to the United States as air power and sea power. In order to increase knowledge, discovery, economic prosperity, and to enhance the national security, **the United States must have robust, effective, and efficient space capabilities.**"* (Emphasis added)

Today, the United States does not have "robust, effective, and efficient space capabilities." This threatens our world leadership, as the Aerospace Commission highlighted, and prevents us from entering a new era of the space age devoted to mastering operations in space, as the Space Commission noted. There is a clear case to be made to the American public that other nations are increasing their national space enterprises to reap the knowledge, wealth, and security of space. If America is to sustain its world-leadership position, it must push forward to establish "robust, effective, and efficient space capabilities." It must lead in becoming a true spacefaring nation or risk being left behind as other nations also gear-up to become true spacefaring nations.

2. Is the time for change clearly evident? America's current human space activities are ineffective and future planned human space operations clearly will not enable America to cross the threshold to achieve "robust, effective, and efficient space capabilities." While human and robotic exploration and discovery should remain a vital part of America's space enterprise, America's space enterprise must now be redirected toward building the spacefaring logistics capabilities—fully-reusable space access, in-space logistics depots, and in-space reusable space transportation—needed to safely open space to routine human and robotic operations.

3. Have reasonable solutions been identified? Building new infrastructure to open new frontiers to American enterprise has been a constant theme throughout America's history. It has been a major reason why and how America became a world-leader with the economic and security strength necessary to prevail against the economic and security challenges of the 20th century. Building

new spacefaring logistics infrastructure will now extend this successful historical model into the 21st century with several important benefits.

First, building new national infrastructure is clearly seen as an important public-private enterprise that broadly benefits the nation by creating new jobs. In the case of space, these are new jobs that emphasize math and science—an important key to world leadership in the 21st century.

Second, building new national spacefaring infrastructure will enable existing companies to expand and new companies to be created. This provides the opportunity for the incorporation of new technologies and innovations—coming from our universities and laboratories—and creates the opportunity for rapid individual advancement through personal initiative to solve the new challenges that building and using the new spacefaring infrastructure will create.

Finally, building new spacefaring infrastructure will send a strong positive message about the nation's future to America's youth. In this case, it will provide the motivation to students in middle and high schools to study the harder topics of math and science so that they can participate in this new national adventure that will be comparable to the opening of the American west two centuries earlier. For students entering college, it will provide their motivation to major in engineering, science, and similar technological studies so that they can fully participate in transforming America into a true spacefaring nation.

4. Are the needed resources available? The primary challenges in building a near-term integrated spacefaring logistics infrastructure are not technological, but organizational and fiscal. Creating a Federal Government Corporation—to lead in establishing the public-private partnerships and the government agency-to-agency agreements that will be needed to build and operate the new spacefaring logistics infrastructure—is clearly within the government's power and has been frequently used for such purposes, e.g., Communications Satellite Corporation and Tennessee Valley Authority. This proposed undertaking is fully consistent with the findings of the Space and Aerospace Commissions and addresses the nation's needs for "robust, effective, and efficient space capabilities" as identified in the U.S. National Space Policy.

5. Is the cost on par with the public's perceived importance of solving the problem or undertaking the challenge? Over the next twenty years, the space gross domestic product (GDP) will contribute, with no growth, over \$2 trillion to the nation's economy. With an effective spacefaring logistics infrastructure, in time, this level of contribution can grow significantly; adding high-tech jobs, creating new businesses, increasing national wealth, and increasing foreign trade.

At current levels of expenditure, the federal government will spend about \$5 billion per year—about \$100 billion over the next twenty years—on just government space access. This is about five percent of the space GDP. Making this level of national investment—\$100 billion over 20 years—to establish fully-reusable, two-stage, "aircraft-like" space access capabilities for passengers and cargo is not unreasonable, especially when this will result in dramatically improved national space access capabilities leading to substantial growth in the space GDP.

A key advantage of using a Federal Government Corporation to build this infrastructure, rather than an existing agency, would be the corporation's ability to use borrowing—perhaps, through Space Development Bonds—to cover the early acquisition costs of the new infrastructure systems and facilities while using future government cost savings to help to retire these bonds. This provides the fiscal means, at the start of the next presidential administration in 2009, to initiate building the improved space access elements of the infrastructure without requiring significant new annual federal appropriations. Hence, for the next president, this will enable the first elements of the spacefaring infrastructure program—focusing on improved, "aircraft-like" space access—to be implemented ***without taking fiscal resources away from other important national programs.***

6. Will the implementation of the solution sustain needed public support? In the 1950's, Wernher Von Braun and his contemporaries, with the help of Colliers' Magazine and Walt Disney, first established the American vision of becoming a spacefaring nation. This is a vision that Americans have not lost. A properly structured spacefaring logistics initiative, focused on near-term tangible

results that motivate the nation's youth, produce jobs, benefit the economy, improve national security, and increase America's competitive position and leadership in the world, will rekindle this enthusiasm for space. ***The fact that we are not seeing such public enthusiasm for current space efforts highlights the need for change in the direction of the American space enterprise.***

7. Will the solution draw sufficient political support to be enacted and funded? This proposal has several elements that, beyond the general public's enthusiasm for space, will aid in gaining the necessary public and political support.

First, it focuses on building infrastructure. Building new and economy-growing infrastructure is generally viewed as a worthwhile and critical government purpose.

Second, it focuses on building aerospace capabilities. The aerospace industry is broadly distributed across the country. Unlike infrastructure investments in new bridges, roads, or airports that create local economic benefits favoring a few Congressional districts, a national investment in building an American spacefaring infrastructure will be broadly distributed across the county, bringing economic benefits to most Congressional districts. The new president and members of Congress will be able to participate in ribbon-cutting ceremonies as companies expand facilities and new business and terrestrial space facilities are built. Space will again become a national enterprise as it was in the 1960's.

Finally, through the use of government-backed bonds, and by focusing on first improving space access, these new national spacefaring logistics infrastructure investments in space can be initiated without requiring significant new federal appropriations during the early years of the new presidential administration. Thus, Congress does not need to give up something now to pay for the new space access systems while they are being developed and produced. When these new systems become operational, toward the end of the next president's administration, government cost savings in space access will enable a shift in appropriated expenditures from operational costs to repaying the bonds over the next 20-25 years. Hence, using this infrastructure-style funding approach

enables the total government appropriated expenditures on government space access to remain about constant while, at the same time, it provides all American space enterprises with the substantial benefit of significantly improved passenger and cargo space access.

8. Is the solution likely to succeed? After careful examination, it's clear that America's aerospace industry has the technological and industrial capabilities needed to begin to establish the logistics foundation for America's transformation into a true spacefaring nation. The first steps are: two-stage, fully-reusable space access systems for passenger and cargo transport with "aircraft-like" safety and operability; permanent space logistics facilities in low Earth orbit to establish a base of operations for government and commercial space operators; and, fully-reusable space transportation capabilities and logistics support services throughout the Earth-Moon system. By establishing a new Federal Government Corporation, a proven approach can be used to organize and fund the needed public-private partnerships to build and operate the spacefaring logistics infrastructure. So my answer to this question is yes—there does not appear to be any substantial reason why this proposal would not succeed.

Conclusion

January, 2009, needs to be a critical turning point in America's future in space. The burden is now with the American pro-space community—the grass-roots organization, the professional aerospace societies, the aerospace industry, the individual aerospace engineers and scientists, and the space operators and customers—to focus on the strategically-important issue of America becoming a true spacefaring nation and to advocate the need for the next president to start building the spacefaring logistics infrastructure needed for America to have "robust, effective, and efficient space capabilities." With a clear voice, we need to tell how and why this needs to be accomplished. We have less than 18 months to reach this goal. This must become THE priority of the American pro-space community. Transforming America into a true spacefaring nation starts with our actions now.