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Obama's giant leap for mankind: Exploration through the public and private space programs

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INTRODUCTION

On July 8, 2011, the Space Shuttle Atlantis launched from the Kennedy Space Center at 10:49 am, Central Time, the final flight for Atlantis, and the final mission for the Shuttle program. In the same week, The Economist prominently featured the retirement of the Space Shuttle, with the cover of the magazine proclaiming "The end of the Space Age." Within its pages, the provocative leader article explained the Saturn-like ring surrounding Earth, comprised of artificial satellites, which seemingly expanded the reach of Earth atmosphere to 36,000 kilometers, indicating that anything beyond that ring no longer mattered. "The vision being sold in the 1950s and 1960s, when the early space rockets were flying, was of adventure and exploration… Other planets may or may not have been inhabited by aliens, but they, and even other stars, were there for the taking. That the taking would begin in the lifetimes of people then alive was widely assumed to be true. No longer. It is quite conceivable that 36,000km will prove the limit of human ambition. It is equally conceivable that the fantasy-made-reality of human space flight will return to fantasy. It is likely that the Space Age is over" (Economist 2011, 8).

Indeed, the space exploits of the United States fifty years ago seem but a dream compared to what the American space program has become. The last thirty years have been spent in Lower Earth Orbit (LEO), with the Space Shuttle servicing the International Space Station, the "biggest waste of money, at $100 billion and counting, that has ever been built in the name of science" (Economist 2011, 7). The Shuttle was touted by NASA as the next step in space travel, a reusable, reliable transportation system capable of making the process of putting people into orbit as routine as a plane trip across the country. "Instead, it has been

nothing but trouble. Twice, it has killed its crew… But the pretence was maintained that the shuttle was a workaday craft" (Economist 2011, 7).

Following the success of the Apollo missions of the 1960s, culminating with the moon landing in 1969, visions of continuing to other planets still captured the imagination of the truly hardcore space enthusiasts. There were those within the National Aeronautics and Space Administration (NASA) that had plans for human expansion; on the horizon was a lunar base, and then perhaps even a manned mission to Mars. There were some who called for a continued investment in space exploration, and plans were drawn up to continue on the path of humankind's progression into outer space. However, the winds had shifted, even as Neil Armstrong was taking a small step for a man, and a giant leap for mankind. There was opposition at home from those who felt that the ultimate goal had been reached – Americans had sent men to the moon – and now it was time to focus on the needs of the nation that had continued unabated, in areas where the billions of dollars that had been spent on the space program could be put to better use. The justification for a publicly funded space program was called into question.

The swell of public approval that had given birth to the moon goal, and had sustained the "Space Race," had ebbed and flowed during the Apollo program, but once the Eagle had landed, the public's interest had faded, consumed by the turmoil of the Vietnam War, the emergence of a student-led rebellious counterculture, and the upheaval of the Civil Rights movement. There had been a shift in American culture, which ultimately led to a space program that did not reach "Higher, Farther and Faster," but "Faster, Farther, Cheaper." This is the space program that has lasted into the 21st century.

The Shuttle program was the result of a compromise that satisfied no one. The lunar base and manned missions to the far reaches of space were scrapped in favor of an option that was designed to be a reusable, multipurpose ship that would service both commercial and government cargoes. The Shuttle was designed in tandem with an orbiting space station, but due to budgetary concerns the space station was put on hold, with the intention being that the Shuttle fleet would still have enough uses for the growing need for satellite launch, repair and recovery. Design implementation proved to be too difficult to make the Shuttle fully reusable, and the added constraints of a manned ship coupled with an inflexible design proved to be the downfall of the many payloads NASA had assumed would appear. Following the *Challenger* accident in 1986, questions were raised about the need to risk the lives of astronauts for commercial satellites, leading President Reagan to order NASA to only accept government payloads. After *Columbia* burned up during its return to the atmosphere in 2003, George W. Bush unveiled a new U.S. space policy that included, amongst other ambitions, a call for the Shuttle to be retired by 2010.

Bush's plan would bring an end to thirty years of few successes, two major disasters, and a slew of humdrum flights that barely registered on the public consciousness. "Disasters apart, the shuttle generally succeeded in at least one aspect of its mission: its regular launches made space travel seem routine, almost mundane – which helped to dampen public interest" (Economist 2011, 67). Protests to continue the shuttle were few, and some even went so far as to argue it was past due. Former NASA administrator Michael Griffin insisted that the shuttle had cost so much money and time that it had actually served to hold back innovation and exploration for decades (Economist 2011).

In early 2010, having assessed the state of NASA's plan to implement the plans proposed by Bush, Barack Obama outlined a new plan for the American space program. Working with newly-appointed NASA Administrator Charles Bolden, Obama reiterated the plan to retire the Shuttle, and also put an end to the other aspects of Bush's Vision for Space Exploration that included a return to the moon, and an eventual mission to Mars. Echoing the sentiments of Griffin, the Obama Administration had found NASA's plan for implementing Bush's plan to be "unexecutable," as well as "over budget and behind schedule" and "lack[ing] innovation and pioneering approaches due to a longstanding failure to invest in critical new technologies" (National Aeronautics and Space Administration 2010). In order to rectify what the Obama Administration has classified as a "technology shortfall," the new plan for the American space program focuses on vigorous new technological development, increasing robotic missions, a renewed emphasis on science and aeronautics programs that had been neglected, increased education to inspire the younger generation, and – perhaps most interestingly – a partnership with the private space industry to be used as the primary mode of transport to the International Space Station and to increase its role in LEO purposes. "Pursuing this approach will allow NASA to focus on the hardest challenges for which it is singularly suited – advancements in technology, scientific discovery, and exploration of new frontiers" (Bolden 2010). The purpose of private industry, within this new plan, is to harness the entrepreneurial spirit of competition in order to create jobs and capitalize on the ability to access space. With this move, the Obama plan has given NASA the means to re-orient itself toward exploration, giving the private industry the approval to pursue a new market, while NASA reaches towards the unknowns of outer space.

Critics of this proposal are numerous, even amongst manned space enthusiasts. However, this aspect of the plan comes to fruition thanks to an already active private space industry. The most recent report on private satellite launches shows that overall, the private launch industry grew 18 percent in 2009, with U.S. launch revenues up 78 percent, totaling $1.9 billion, despite the most recent economic downturn (Satellite Industry Association 2010). Illustrative of this emerging industry is SpaceX, a private space company founded in 2002 by PayPal creator Elon Musk. SpaceX has been one of a handful of companies devoted solely to the private space enterprise, and has successfully developed and tested the Falcon series of expendable launch rockets, as well as a free-flying, reusable spacecraft. With the retirement of the Shuttle fleet, SpaceX has already been contracted by NASA to use the Falcon 9 launch vehicle along with the Dragon spacecraft for future re-supply services to the ISS. Using the substantial financial resources of Musk, the company has pursued the concept that "simplicity, reliability and low-cost" can go hand in hand, and have pursued the new niche for LEO transport, building on the knowledge gained by half a century of spaceflight. "As the first rockets developed in the 21st century, the Falcon series takes advantage of the latest technologies, as well as 50 years of 'lessons learned' in the aerospace industry" (Musk 2011). Capitalizing on the knowledge gained from NASA, private industry will not take on the role given to it by the Obama policy, one that pursues economic goals.

The reasoning behind elevating private industry is a simple one – allow private companies to take over the "humdrum task of ferrying people and equipment to low-Earth orbit," thus allowing NASA to focus on "loftier" goals (Economist 2011, 67). The new plan allows NASA to develop new engines, propellants, life-support systems and other new technologies. Essentially, the Obama space vision asks NASA to return to the basics for

which it was created: to engage in "aeronautical and space activities… as may be required for the exploration of space," to innovate and explore, "for the benefit of all humankind" (National Aeronautics and Space Act 1958). Rather than relegating the space program to the doghouse of political policy, the new vision for U.S. space policy from the Obama Administration gives the space program a chance to rejuvenate, and move forward, rather than continue to revel in the bold programs of the past. "Critics of the Obama plan point to vagueness and lack of detail, contrasting his speeches unfavourably with John Kennedy's clear and specific demand in 1961 for a moon mission before the decade was out. Such references to past glories are symptoms of a broader problem. Space enthusiasts, politicians and the public are, almost half a century later, still living in the shadow of the magnificent achievements of the Apollo programme – achievements which seem all the more incredible as the years pass" (Economist 2011, 67).

Indeed, there are symptoms present of a broader problem, but holding on to past glories is only a small part. What was present during the Apollo days was a connection between the American people and the space program. Far from an inwardly focused plan to remain close to home – as was implemented with the Space Shuttle and then the ISS – NASA served as a technological arm of the will of the nation. Comparisons to Kennedy's challenge to reach the moon are unfair to Obama in this context, because the specific plan Kennedy proposed was based on public will, and while the motivations for the moon goal were an amalgamation of security, peace, science and technology, prestige and pride, the means for each of these motivations was the same, thus making it a coherent – and inherently public – policy. Currently, the sentiment coming from the American people does not clearly outline the desired means to satisfy any of their end-goals. While the 1960s seemed to "raise the

question whether America knows its on mind," (van Dyke 1963, 178), an analysis of the era shows that even though there were several purported end goals for the space program, the national goals were all striving towards the overarching public purpose of national pride. Rather than following the bureaucratic model of "muddling through" set down by Charles Lindblom (1959), the ends and means were intertwined in a way that allowed a plurality of viewpoints to argue for their own personal self-interest, but as truly public policy the end result was a means that was agreed upon by all, making the goal for NASA a goal for the entire nation.

The lack of detail decried in the Obama proposal is not the result of a shortcoming of the administration but it is symptomatic of a shift in America culture. The goal for NASA that was set down in 1961 was a policy with an overarching political connection to the public. The newest plan is still cognizant of the public will, and there is no specific challenge because the American people have shown no interest in one. The public purpose of NASA following the moon landing evaporated, and in its place came a focus on the goals and challenges of individual problems on the surface of the planet. As history will show, rather than a continuation of the public policy of space exploration, the people of the United States, as reflected through the cultural and political context, took more interest in individual, economic considerations. Following the moon landing, the Nixon administration gave no public purpose to the space program, but unlike the criticisms coming from space enthusiasts of him having sacrificed space exploration to the gods of fiscal responsibility, Nixon was simply a representation of a shift that is most evident in retrospect: there was no public call for a bold, well-defined space program because there was no public will for one.

Manned space enthusiasts have seen the death of a manned space program spelled out in Obama's proposals, as well as the abandonment of space exploration, and while manned missions will now be left to the purview of private industry, the new policy should be seen as an opportunity for the public space program. Private industry has had the luxury of riding on the shoulders of giants, with fifty years of knowledge gained by NASA to work with, and it now has the capacity to carry the torch for LEO missions for the remaining years of the ISS, and for the lucky few who are able to afford the newest travel option of space tourism. The niche created by the American people for LEO benefits – satellites, new technology that can be used for personal or economic benefit, knowledge of the environment, increased communications – can be filled by private industry, one that is growing and will continue to grow in the new market proposed by the Obama policy. This will allow NASA to once again serve a public role, to advance science and technology in a way to reinvigorate and re-energize the agency so as to once again embark on projects that can recapture the excitement and imagination of the nation.

Contrary to what critics have claimed about the new policy, the space policy of the Obama Administration does not abandon exploration any more than it abandons commerce; in fact, it expands both, by removing the need for immediate material gains from NASA to the private sector, allowing NASA to expand its reach to encompass innovation and discovery. What is important to understand about the Obama policy is that rather than creating a new exploratory program, this simply changes NASA's focus. How it pursues its new exploratory mission remains to be seen, but it will be determined as it should be - by political forces. That mission can include a mix of aeronautical and space technology research, scientific research, and manned and unmanned exploratory programs. By changing

the focus of NASA, it is likely that in the long run, by directing NASA's energies to the basic research necessary to support it, the potential for exploration will improve. It is also likely to improve the commercial potential in the long run as well, by opening up new frontiers of potential technological development and commercial markets. By changing NASA's orientation, and including private industry, the Obama policy has changed its scope and timeframe. NASA's activities are being reoriented to the largest (public and human) purposes which have historically distinguished the agency and its accomplishments. Its activities can now focus on longer range ambitions, unfettered by the requirement to show immediate commercial potential in its activities; unfettered as well by a narrow focus on large, singular manned space projects that have monopolized NASA's resources for so long.

THEORY

Politics and Economics

Benjamin Franklin has often been quoted as asking "What is the good of a newborn baby?" The answer of course is implied in the question itself, and the purpose of an exploratory orientation that is focused on both long- and short-term goals is much the same – the good lies in the potential for achievement. The Obama policy gives NASA the potential to achieve greatness: by not limiting its scope, it has the chance to achieve benefits in the short term, and to pursue the long-term benefits that come as the result of greatness. By creating a public space policy oriented towards exploration rather than purely economic pursuits, it expands the potential for exploration and commerce by placing emphasis on the latter for the private space industry, and on the former for the public.

The pursuit of particular economic concerns is not consistent with public policy because of the nature of both politics and economics. A policy that is public has the characteristic of being open to all, one that is shared by everyone and not constructed in a way that limits who it encompasses. Policy that focuses exclusively on economic concerns cannot be public, because of the inherently private nature of economics, which gives preferences to particular viewpoints over others in order to deliver on the particular economic goal that has been targeted. Focusing on economic gains to the detriment of public purposes creates policies that are at best unsuccessful, and at worst, dangerous. The Obama plan for space policy relieves us of this problem, by creating a policy that focuses on larger, more inclusive goals for space exploration, rather than on immediate material benefits, because even though economic considerations can be part of the exploration of space – and in fact, are, as economic considerations are an objective listed in the National Aeronautics and Space

Act, to “seek and encourage, to the maximum extent possible, the fullest commercial use of space” (National Aeronautics and Space Act 1958) – the primary goal of exploration cannot be confused with the immediate goals of commercial pursuits.

The Obama space policy solves a problem that has been evident since the end of the Apollo program: by seeking immediate economic gains, we short-circuit all other possible gains. By focusing on an orientation towards purely economic purposes, the space program has limited its ability to pursue exploratory gains in the process.

The incorporation of private industry into current space policy gives the economic purposes of space the means to be achieved, but private industry alone cannot provide a program that is oriented towards exploration. In the realm of private research and development, a certain amount of risk is considered acceptable, but the risk involved in exploring the unknown areas of space is too large to be taken on by a private company – both in financial resources and risk to human life. The unknown elements of space do not offer any immediate, obvious payoffs, nor are profitable ventures certain. Even in the realm of high venture investments, some sort of payoff must be assured, and in the exploration of space the constraints of guaranteed payoffs in a designated time period do not allow for setting the basic foundation and allowing various pursuits to lead where they may. Private industry is expected to focus on short-term pursuits, but when this is done at the expense of long-term gains, it eventually hurts both.

The Political Character of Exploration

Exploration for the sake of human knowledge, by its very nature, is a political concept: embarking on the unknown with the desire to gain distinction, especially in the context of an open form of exploration that is shared by a public which has accepted it as a purposeful venture (very much in the way of the space program) contains the basic elements of political action. This was a concept that was obvious to the earliest Greek political philosophers, and has been re-discovered by philosophers of the 20th century such as Hannah Arendt (1998), John Dewey (1927), and Jurgen Habermas (1989). What they have striven to explain is that the public realm is intrinsically political, and any enterprise that has public characteristics is also political. The political life, as shared by all citizens in a space of action, was the pinnacle of individual achievement. By coming together in this space of action, citizens interacted and shared the challenges and unknown circumstances of the political realm, because each of them carried a stake not just in the outcome, but also in the process. Through the sharing of ideas colored by the unique traits of each individual, the give and take of political interaction led to the intangible benefits that resulted from the ongoing process of political interaction.

This concept of political action sometimes works in tandem with, but is distinct from, the concept of the tangible benefits on which economic considerations are based. In order for individuals to have the potential for action in the public realm, the necessities of life (including economic sustainability) must be satisfied, but are still secondary to political achievement. This can be illustrated by considering Abraham Maslow's (1943) hierarchy of needs: physiological being the lowest on the hierarchy but also the first that must be satisfied, followed by safety, love, esteem, and finally, self-actualization. Once a need is satisfied, it is

then taken for granted, and the next need is sought. Depending on circumstances, a person's attentions shift between whichever need requires attention (Maslow 1943). The shifting needs of an individual correspond to the shifting circumstances of the political realm: a value only comes to the forefront when it is in jeopardy, and when that threat recedes, so does that value, and a new value will come to the forefront, or perhaps a completely new value will come into existence.

The concept he speaks of boils down to the classical concept of the political sphere. The Greeks believed in the ability of all men to come together, with the same potential for greatness, and through their actions and interactions, politics was made. The shifting aspects of reality created a space in which the same situation never arose twice – there were always new and emerging considerations, contexts and actors that had to be responded to, and when they had passed, new considerations, contexts and actors had to be considered. When the needs at the base of the hierarchy are satisfied, especially economic stability and safety, political action can be achieved. "What a man can be, he must be" (Maslow 1943, 91), and in the political realm only those who are truly political, who have reached the highest point on Maslow's hierarchy and achieved self-actualization, have become the man they are supposed to have been.

The Obama policy gives the space program the ability for the political enterprise of exploration to work in tandem with the economic enterprise of commercial interests. Private industry now has the means to pursue an area that has already been explored, that has had the risk of the unknown removed through the efforts of the public space program, and thus given private industry the opportunity to expand the profitable area of Lower Earth Orbit, while also shifting NASA's focus to an orientation that suits it better. The exploratory orientation is

best suited for NASA because of its role as a public agency. While the private sector must focus on specific projects with assured outcomes, as a public agency NASA is able to embrace an orientation that does not focus on a particular exploratory project, but is free to let research and development lead in whichever direction seems to have the most potential.

By taking on the risk involved in exploration, NASA's role as a scientific agency can be fulfilled in a way that private industry cannot achieve. Scientific information, such as understanding the expansion of our universe, or knowing what makes up the rings around Saturn, does not bring any sort of economic benefit, but it is a public good – something that belongs to everyone. In this way, NASA fills the niche for human knowledge in a way that is not profitable in a tangible form, but in the intangible form of increased knowledge that can be shared and used by all.

The Frontier

Recently, Barack Obama used the analogy of the frontier to characterize the new approach to U.S. space policy: "While the measure of our achievements has changed a great deal over the past 50 years, what we do – or fail to do – in seeking new frontiers is no less consequential for our future in space and here on Earth" (Obama 2010). By using the frontier analogy, Obama has indicated the direction for U.S. policy as one that seeks to re-engage the uniquely American values it encompasses, as a means for exploration and commerce. Using the private space industry to supply the economic means for a sustained space effort, the public space program can pursue long-term goals that will benefit the American people, in the form of national pride and in the form of material benefits down the road. By encouraging private industry, Obama is investing in space exploration much in the way that

any private business needs investment in order to thrive and grow. By doing so NASA serves its original purpose of expanding human knowledge through the exploration of space, and promoting the commercialization of space for the benefit of the nation, creating a national sense of achievement in the process.

The political value of this sense of achievement is illustrated through the language and imagery of the mythology of the frontier found throughout the Kennedy years. The ideal of the American West, the original frontier, has been embraced by American culture since the first settlers began to move westward following the Louisiana Purchase, and according to historian Frederick Jackson Turner (1896), "The history of our political institutions, our democracy, is not a history of imitation, of simple borrowing; it is a history of the evolution and adaptation of organisms in response to changed environment, a history of the origin of new political species. In this sense, therefore, the West has been a constructive force of the highest significance in our life."

What can be taken from Turner's writings on the westward expansion of the nation is the intrinsic public purpose of the western frontier. In opening the West to settlement, the actions of the government created a new realm that was open to the American people, a realm in which exploration was considered a good unto itself. The expedition of Lewis and Clark, as ordered by Jefferson, serves as evidence of the plan to promote exploration of the new territory (Turner 1896). Jefferson believed that promoting expansion into the new territory would help maintain the ideals contained within his administration's vision of a republican society, based on self-reliance and agrarian commerce (White 1993). The expedition also serves as evidence of the relationship between the public good of exploration and the element of economic interests. Jefferson charged Lewis and Clark to "explore the

Missouri River, and such principal stream of it, as, by its course and communication with the waters of the Pacific Ocean; whether the Columbia, Oregon or Colorado or any other river may offer the most direct and practicable communication across the continent for the purpose of commerce" (Utley 2007, 137). Jefferson's actions indicate that while promotion of individualism by virtue of westward exploration was a primary goal in urging citizens to set out on their own, he also saw the long-term benefits of commercial expansion. Individuals could explore the western territory and carve out a place for themselves, but in order to sustain this expansion it was necessary to consider the economic interests involved in acquiring the new territory. Taking on such a risk could only be accomplished by relying on the vast resources of government, and Jefferson understood that by funding the Lewis and Clark expedition, by assuming the risk inherent in the new venture on behalf of the nation, the benefits of exploration would continue both through the intangible means of human achievement, and the tangible benefits involved in a new commercial territory (White 1993).

The political purpose in the expansion west corresponded to the action-oriented values of the political realm, and the economic equivalent of this was found in Jefferson's plan for expanding the economic sphere along with its political one, in the form of creating new markets. As settlers moved west, the need for the basic necessities of life moved with them, and the means to deliver those material resources required the expansion of U.S. transportation, seen most successfully in the railroad system that eventually stretched from the west coast all the way to the east. Exploration, as political action, had served as an end in and of itself because of the values it stood for, but it also served as a means to economic rewards that justified the financial risk assumed by the nation.

The image of the rugged frontiersman setting out on his own to carve his way through an unknown and hostile land has percolated through the nation's history to serve as an icon of American values. The continuation of the frontier myth is indicative of the nature of these values, because they serve as "collective expressions or representations of cultural beliefs and values, a form of 'cultural consensus' that can help to shape personal or national identity" (Laing 2008, 128). The journey of the frontiersman is indelibly connected to the concept of the heroic journey of Greek myth, such as Odysseus in Homer's Odyssey or Jason searching for the Golden Fleece. These myths center on the hero leaving his home in search of a greater purpose to be found amongst unknown perils and challenges, ones that will allow him to reach his potential for greatness. The challenges he encounters are rarely the ones he seeks, but in risking his own life he achieves glory. The picture of the frontiersman illustrated by Turner takes up the mantle of the hero, imbued with a thoroughly American flavor, leaving the home he knows in order to explore and tame nature for the sake of freedom, self-reliance, and individuality (Turner 1896). In the American West, part of this journey was based on the economic principles underlying these values. However, the economic aspect of the migration to the West was secondary to that of the values it represented: rather than seeking self-reliance in order to reap material benefits, the mythic frontiersman sought the economic means to achieve his ideal of freedom.

The language of the frontier myth has permeated political rhetoric throughout the 20th and 21st centuries. In his acceptance speech at the Democratic National Convention in 1960, Kennedy harnessed the mythic power of the frontier analogy: "[W]e stand today on the edge of a New Frontier - the frontier of the 1960's, the frontier of unknown opportunities and perils, the frontier of unfilled hopes and unfilled threats… Beyond that frontier are uncharted

areas of science and space, unsolved problems of peace and war, unconquered problems of ignorance and prejudice, unanswered questions of poverty and surplus" (Kennedy 1960).

By committing to space exploration within the context of his New Frontier, Kennedy defined the role of a public space agency, one that would serve as a means to test the courage and initiative of the nation, challenge it to adapt to the new circumstances in the same way settlers had to adapt their ways of life to their new surroundings, and to do it in a way that embodied the American values of freedom and democracy. With his current space policy, Obama has done the same thing. His frontier imagery of space puts into context the underlying economic role of commercial interests in public ventures, and the necessary public risk that must be assumed in order to assure long-term benefits received along with the achievement benefits of national exploration. When viewing the Obama policy in the same way one might view the Louisiana Purchase, it is clear that the Obama policy creates a new frontier for space, one that continues the ideals of the Kennedy era, where exploration was made possible through government action.

OVERVIEW OF LITERATURE

In the months following John F. Kennedy's challenge "of landing a man on the moon and returning him safely to the earth" (Kennedy 1961), the question began to arise of why, exactly, the nation was embarking on this uncharted journey, for which billions of dollars was being funneled from other programs into the untried race to the moon. The decade of the 1960s was not without its other challenges, and some saw this expensive endeavor to be a form of posturing, a childish taunt to the Soviets that anything they could do, we could do better, using resources that could be used more fruitfully elsewhere. Justifications were varied and numerous: national security, the promotion of peace, advancement of science and technology, economic and social progress, and national pride and prestige. The various justifications were bandied about in the press, amongst government officials, and even amongst the employees of NASA, and it was not until 1963 when *Pride and Power*, a book by University of Iowa political scientist Vernon van Dyke, that a systematic analysis of each of the justifications was undertaken in order to uncover the reason for the United States' manned space program and our quest for a moon landing. His book sought to "provide both a conception of the reasons or motives or goals that figure prominently in discussions of the space program and a basis for judging their relative merit and cumulative force" (van Dyke 1963, 31).

At the outset, van Dyke rules out the motivation for national security, because of the capabilities of the military space program directed specifically towards issues of national security. He then rules out the promotion of peace as the reason for a space program, saying "The proper statement is not that we have a space program in order to promote peace and to pursue peaceful purposes, but rather that since we have a space program it is desirable to give

reassurances concerning it and to utilize it to promote goals that we would want to be pursuing in any case" (van Dyke 1963, 85). Similarly, the use of space for gaining scientific knowledge and for promoting technological development, rather than being the *purpose* of the program, is explained as one of the *results* of the space program.

Spin-off technologies and consumer goods were also brought into the discussion of the rationale for the space program, with Congress often focusing on the tangible benefits that would filter down to the average citizen. "I can't think of any other aspect of our space program that could better justify our space expenditures to the average taxpayer than industrial applications. Here is the tangible evidence that he is getting something in return for his investment" (Miller in van Dyke 1963, 102-103). However, even acknowledging the benefits of communication satellites, as well as meteorology and geodesy advances, van Dyke could not point to economic benefits as the true rationale of the manned space program. "The space exploration program stands on its own merits; our nation must occupy a position of preeminence. The benefits from industrial applications are not now – and never will be – the justification for the high costs of this major effort" (Fong in van Dyke 1963, 110).

Having eliminated each of the possibilities of security, peace, science and technology, and economics, van Dyke is able to point to national pride and prestige as the motivating factors for the space program. Between these two, van Dyke puts the most emphasis on the value of national pride. "Security is vitally important, of course, but it was threatened not so much by Sputniks as by missiles. Prestige is important too, but people who think they have a legitimate basis for pride can live without prestige or can live in the hope and expectation that what leads to pride will also give them prestige in time. But we cannot live with

ourselves without pride. We cannot tolerate humiliation without making as great an effort as is necessary to overcome it" (van Dyke 1963, 271-272).

Van Dyke's book explained that the true motivations for a public space program were the political reasons including prestige, and above all, national pride. As it relates to the argument at hand, van Dyke showed that the primary concerns were not economic motivations. Putting pride, prestige and security ahead of other values – including economic values – van Dyke stresses that the others are not even comparable to these three. "We have other values too. We want peace, we want to promote scientific knowledge and technological development, and we want economic progress. But these values are not in the same category as the others. Virtually all who make them goal values assign less urgency or importance to them… and many make them instrumental values, to be assessed in terms of their usefulness in serving more important goals and supported accordingly" (van Dyke1963, 272).

Van Dyke's revelation that pride and prestige served as a determinant of political power directly relates to the role of both values as a component of presidential power as argued by Richard Neustadt in *Presidential Power and the Modern Presidents* (1990). Neustadt argued that because of the separation of powers as dictated by the Constitution, the president cannot simply command that something be done and expect it to be so. Rather, he must balance multiple interests and rely on his own power of persuasion to accomplish his goals. Essentially, he must bargain with others, and persuade them that what he wants is in their best interest. Because the Constitution requires him to execute all laws, but does not give him explicit powers to do so, he must rely on persuasion as well as his professional reputation and public prestige. A positive professional reputation accounts for the personal pride of an individual executive, and directly contributes to the legitimacy of the president's

policies, and his public prestige will help his influence with Congress, because it "counts in power by establishing some checks upon resistance from the men engaged in governing," (Neustadt 1990, 77).

The connection with the necessity of pride and prestige and public policy can be seen when applying this same reasoning to national pride and prestige. The two values are intertwined as part of presidential power, with the pride of an individual leading to the ability to accomplish goals on many fronts, have confidence in his own ability, and seek the new challenges of the political realm By projecting this sense of pride, and by meeting (and surpassing) the expectations of others, he is able to wield his political power in a way that makes it part of a political cycle – his confidence in his ability leads to taking initiative and responding to challenges, his prestige gives others confidence in his abilities and convinces them to be persuaded, which allows him to accomplish the goals set forth, thus leading to increased pride as well as an increased level of prestige. Just like national pride as defined by van Dyke, a president's pride serves purposes far beyond selfish interests. "If skill in maximizing power for himself served purposes no larger than the man's own pride or pleasure, there would be no reason for the rest of us to care whether he were skillful or not. More precisely, there would be no reason except sentiment and partisanship. But a president's success in that endeavor serves objectives far beyond his own…" (Neustadt 1963, 153), and his abilities are, in fact, of the utmost importance "to the energy of government and to the viability of public policy" (Neustadt 1963, 154).

Van Dyke discusses Lindblom's models of decision-making in his analysis of the motivations for the space program, and in doing so helps define what can be considered good public policy. Explaining the space program as the result of a policy created contrary to the

process Lindblom found to be standard in government, called “muddling through,” van Dyke argues that the success of the Apollo program was the result of treating the many justifications given as being intertwined with the end goals contained therein. The important aspect of this model, which Lindblom called the “method of successive limited comparisons” for policy creation, is the somewhat paradoxical idea that in forming public policy, we can actually ignore the consequences of the policy. He argues that doing so may actually lead to better policy, rather than “through futile attempts to achieve a comprehensiveness beyond human capacity” (Lindblom 1959, 204).

Because of the pluralistic nature of politics, coming to a consensus proves very difficult, if not impossible. However, in the political structure of the United States, even though policy makers may use a strategy that works to achieve their own individual goals, with power dispersed amongst the many representatives and the separate branches of government, the result of many voices contributing creates a policy that can be agreed upon by all involved. Policymakers are able to create good public policy, specifically because in agreeing upon a means to achieve their individual goals, the overarching goal that may not even be realized is achieved. In understanding this, van Dyke’s reasoning for prestige and power being the ultimate motivation for the space program becomes that much clearer. The arguments made for national security, peace, economics and science and technology may serve the individual needs of some, but the means to get there serves the political needs of all.

With this understanding of what constitutes good public policy, we can also understand the value in both van Dyke and Neustadt’s conception of pride and prestige as a politically renewable cycle. When policy comes to fruition as the result of a plurality of

viewpoints, the overarching political goal is one that can be constantly renewed through the means dictated by many groups. When the ultimate goal of policy is ignored, whatever is at the heart of it comes through, and the continued debate of the proper means to meet individual goals will continue to add to the political goal that is contained within the policy. Even when it seems questionable whether the American people know their mind, what van Dyke and Neustadt show is that even if this is the case, policy can still be formed that is a reflection of the nation as a whole. The plurality that makes up the American political process is one that is illustrative of the classic concept of political action, where individuals are able to come together to consider the challenges that present themselves in the mercurial circumstances of the political realm, bringing their own unique perspectives, in order to interact with others to work towards the common good. "While all aspects of the human condition are somehow related to politics, this plurality is specifically *the* condition – not only the *conditio sine qua non*, but the *conditio per quam* – of all political life" (Arendt 1998, 7).

In characterizing the difference between public and private, John Dewey distinguished the public realm as one which contained individuals with the desire to gain some control over the consequences of "transactions in which they are not directly affected," i.e. public policy (Sturm 1978, 17). He took issue with the uni-dimensional conception of politics that some contemporary political scientists had adopted, as one solely concerned with the interests of the individual. Rather, in forming a political public, individuals "communicate their concerns with each other, to shape plans for the future, and to cooperate in the effectuation of those plans" (Sturm 1978, 18). Specifically, in a technologically-oriented society, "the public good calls for the subordination of modern technology and

technologically oriented organization to public inquiry and political control" (Sturm 1978, 18). This relates directly to the Lindblom concept of public policy formulation, and supports the benefit of a plurality of viewpoints being considered, regardless of the individual goals being pursued. Within the political realm, it is possible for individuals to come together for political action that satisfies what Dewey and Jurgen Habermas conceived to be the public good. "Here the public sphere connoted an ideal of unrestricted rational discussion of public matter. The discussion was to be open and accessible to all; merely private interests were to be inadmissible; inequalities of status were to be bracketed; and discussants were to deliberate as peers" (Fraser 1990, 59). Through political action within the public sphere, a collection of individuals "can decide what is and what is not of common concern to them," and "in the process of their deliberations, participants are transformed from a collection of self-seeking, private individuals into a public-spirited collectivity, capable of acting together in the common interest" (Fraser 1990, 71-72).

The ideas of Dewey and Habermas, when combined with Lindblom's policy formulation, are directly applicable to the U.S. space program as analyzed by van Dyke. NASA, guided by public policy that was formulated through the interaction of many political voices, was given a goal that cut to the heart of the will of the American people.

The public nature of the space program of the 1960s is clearly linked to the political goal of national pride, but it is important to realize that van Dyke's book is titled *Pride and Power*. The fact that pride and prestige are highlighted in the political context of public policy and presidential leadership is indicative of the public role of NASA, and the two factors can be understood as the root of political power. With NASA serving as the technological extension of American public policy, political power was wielded through the

use of soft power, as defined by Joseph Nye (2006). Rather than using Nye's "hard power," influencing with brute strength or economic coercion, U.S. space policy took the form of "soft power," where political influence seeks to co-opt rather than coerce. Approaching it from the point of view of Neustadt, as an individual, a president is able to influence others through his ability to project his pride as a politician and collect on the prestige that is afforded him because of his political abilities. As a nation, the underlying values expressed through the space program of openness, freedom, and equal opportunity for greatness "looms even larger than its economic and military assets. U.S. culture… radiates outward with an intensity last seen in the days of the Romanian Empire – but with a novel twist. Rome's and Soviet Russia's cultural sway stopped exactly at their military borders. America's soft power, though, rules over an empire on which the sun never sets" (Joffe in Nye 2006, 712).

Vernon van Dyke explained that the precedent had been set at the very outset of the American space program that it was a program with a political orientation. The motivations of pride and prestige encompassed political and public attributes (Neustadt 1990; Arendt 1998; Dewey 1927; Habermas 1989), and were expressed through the formation of good public policy (Lindblom 1959). These political attributes contribute to the political power of a nation (Nye 2006). They also correspond directly to the idea of exploration as it has already been described: a new area for action, in which individuals can pursue achievement in an arena of unknown circumstances in a way that is open to all. The Obama space policy now continues the political orientation of the space program through its pursuit of an exploratory orientation. Just as the initial purpose of the space program was not solely commercial, the purpose for the re-orientation of NASA brings it back to that which was the original purpose – using commercial considerations as instrumental values to serve the larger political purpose

of exploration. By designating economic concerns as an issue to be dealt with by private industry, the new plan brings exploration to the forefront of policy, and designates the political motivation of exploration a public purpose.

ANALYSIS

Robotic versus Human Missions

The advancement of space science has progressed over the years. Robotic missions to other celestial bodies have brought back new information about dark matter, asteroids, solar winds, and the makeup of nearby planets; telescopes have given new information as to the makeup of the universe; satellites have brought back new information about climate change, weather patterns, and atmospheric composition; and experiments on the International Space Station have given scientists new information on the effects of zero gravity on the human body, energy use, and food production. This is despite a lack of financial resources, which speaks to the quality of the scientific arm of NASA. It also raises the question that has been asked by many, about whether NASA should focus on human or robotic missions.

Stephen Hawking has been a vocal proponent of human space exploration as the primary focus for expanding mankind's reach into the universe (Kazan 2009), as have others, including Jim Bell, an astronomer from Cornell University, and Mike Griffin, former NASA administrator (Mirsky 2007). They argue that only with the human component can we full understand what robots are finding in their flights through our solar system, specifically because they are not programmed for the unexpected.

This is a debate that has been raised as a significant question in how the U.S. space program should explore, but it is one that presents a false dichotomy. Whether NASA chooses to pursue missions using robots or humans for the purpose of exploration is not an issue. Rather than this being a debate about robots versus humans, the debate is in fact about robots or humans versus commercial interests, because whether it is using robots or humans, exploration is still the primary focus. The Obama plan has given NASA the flexibility to

choose its means of exploration, because there has not been a demand for one, primary program that requires the full focus of the agency. Instead, as the political realm and technological ability intertwine, NASA will explore using the means necessary for the challenge at hand.

Space versus Aeronautics

"As the old saying goes, 'Remember, the first 'A' in NASA is for aeronautics," says Arthur M. Hingerty of the MagLifter Research Consortium, "and here, perhaps, lies [the] problem. The time is ripe to reexamine this adage and question whether aeronautics should be the responsibility of an organization dealing with space exploration" (Hingerty 2008, 4). The problem to which Hingerty is referring is the role of aeronautics and the debate on whether NASA can achieve its exploratory purpose with aeronautics as one of its concerns. Hingerty proposes removing aeronautical research and development from NASA's purview, and instead re-establishing an organization like the National Advisory Committee on Aeronautics, which existed prior to NASA's creation. He claims that the inclusion of aeronautics creates competition for funding, and as such "aeronautical budgets are negatively affected by resources funneled to human spaceflight; space science must compete with both human spaceflight and aeronautics; and human spaceflight is requesting funds for programs that are poorly justified" (Hingerty 2008, 4).

With the re-orientation of NASA towards exploration, this debate also becomes a false dichotomy. When the immediate commercial applications are no longer the primary concern, as is the case with the new space policy plan, there is no longer a question of whether to maintain focus on aeronautics. With the additional funding being funneled to

NASA, and a blank slate from which to work, there is room for innovation in both aeronautics and astronautics, in a way that will produce exploratory missions as new innovation dictates.

Public Mood

Sputnik was launched by the Soviet Union on October 4, 1957, causing distress and alarm for the citizens of the United States. However, in addition to fear, the country had also been struck with a sense of wonder at the first man-made object to finally reach areas outside our earthly bounds. The sense of fear that had gripped the nation coexisted with a new sense of curiosity. The sales of books and magazines concerning both space and rockets rose exponentially, and memberships in clubs that were tied to similar subjects grew as well (Callahan 1997). Sputnik had shown the nation that reaching into the depths of space was possible, and the American people's agenda was dominated by an enthusiastic call for a national foray into space.

The enthusiasm that marked the early days of the space program started to abate following the Apollo 11 landing on the moon. With the moon missions that followed the historic first, fewer Americans tuned in to watch the launches, and even fewer took time out to watch the live feeds coming from the astronauts in space. Prior to the explosion on Apollo 13, none of the major networks even opted to show the video coming from the crewmembers on their way to the moon, due to a lack of interest (Lovell 1994).

This dwindling interest was indicative of the shift in the public's mood, from one interested in feats of exploration, to one more interested in the problems close to home. Apollo 11 was followed by six more moon missions, with a total of twelve men walking on

the moon, but the Vietnam War, the civil rights movement, student protests, political assassinations and White House scandals served to dampen the interest of the American people in space successes, especially by an agency that was a part of a government that citizens had less faith in (McCurdy 1997).

The economic downturn of the 1970s gave rise to a fiscally-conscious nation, concerned more with the immediate benefits of government programs than the long-term possibilities. The overall reception to manned space excursions continued to be lukewarm through the close of the 20th century, and that tepid response has persisted into the beginning of the 21st. In a national phone survey in 2009, respondents were asked their opinions on several aspects of the space program, from funding considerations to ideas for future missions. The overall sentiment that came from the survey was that with the economic recession being experienced at the time, it was not in the best interests of the nation to pursue a major mission. Most respondents preferred that the space program's resources be used to help solve terrestrial problems rather than extraterrestrial ones for the time being, until there was a reason to shift priorities. In general, Americans have asked for a space program that can directly affect their lives through tangible goods, in a way that benefits themselves as individuals and the economy overall, especially during a time marked by fiscal uncertainty (The Everett Group 2009).

What critics of the Obama policy don't recognize is that the current plan for NASA actually best suits the current public mood. While immediate tangible benefits are at the forefront of the American conscience, these needs can still be generated by the marriage of private industry with the public space program. The tangible commercial benefits of innovation within the private sphere can satisfy the immediate needs of the American people,

while NASA invests its resources in research and development that will bring long-term commercial benefits to the American people, even as it works towards exploratory purposes, which has the potential to help shift the mood of the American people back to one engaged in space exploration. There is no one, specific mission that is being called for, which is something the American people do not want, and instead NASA can focus on research that will benefit the citizens of the United States, as well as the economy, in the short- and long-term.

Presidential Role

As a political actor, the role of the executive is to act as neither the leader, nor the follower of American politics, but as the conduit for political action. The role of the presidency is one built on the ideals of the public political sphere – an actor that willingly meets the unknown challenges of the political realm, interacts with others to answer these challenges, and does so in a way that recognizes the larger implications of his or her decisions in the context of the greater good of the public they represent. As such, the role of the president serves as the mover of public policy, an office that serves to create space policy in a way that takes into consideration the concerns of the American people, as opposed to NASA, a governmental agency, that is not set up to do so. When the president takes on this role in the way described, good public policy is formed. This is evidenced by the most recent space policy out of the Obama White House, which recognizes the will of the people to have a space program that is exploratory, but that also generates short-term tangible benefits in the process. However, in the history of space policy this has not always occurred.

The political context that shaped NASA in the 1960s began in 1957 with the successful Soviet launch of Sputnik. The U.S. had been monitoring the Soviets' progress in their missile and rocket capabilities for months, so Sputnik came as little surprise to the Eisenhower administration. Eisenhower and his advisors within the executive office were already aware that the Russians had been pursuing advances in rocket-based technology, but had dismissed their progress because they were still far behind the advances of the U.S. in its pursuit of intercontinental ballistic missiles (ICBMs). What did surprise Eisenhower was the response of the American public. When news of Sputnik reached the American people, the reaction was one of alarm. The fact that the Russians had been able to launch a satellite with the capability of flying over the United States ignited people's fears of the implications of such a technology. Many saw this as an indication of Russia's military superiority: surely if they could launch something as large as a satellite, they must have the capabilities to attack the United States (Callahan 1997).

Eisenhower was stunned by this reaction, seeing this most recent development as a Soviet stunt and dismissed the idea that the nation was now in a race for space, chalking it up to a ridiculous attempt by Kruschev to instigate a propaganda campaign. He considered national prestige to be a minor factor in the perception of Western strength, and so addressed the public's fears purely in the context of national security. He tried to calm the nation, and assured them that the strength of the U.S. military was far beyond that of the Russians - in fact the military had also been working on the launch of an American satellite. He tried to dismiss the idea of a race to space, stating quite frequently that "our satellite program has never been conducted as a race with other nations" (Eisenhower in Callahan 1997, 28). Eisenhower believed advances in space were important, but the matter of who achieved them

first was incidental (Callahan 1997). Eisenhower, instead of listening to the many viewpoints that were being raised amongst the citizens of the United States, took the view that these viewpoints were based on an illogical hysteria. Rather than treat this event as an opportunity to harness the strong emotions backing these viewpoints to create a public space policy, Eisenhower took an approach that appeared to him to be more practical.

Despite Eisenhower's continued assurances that the U.S. was not behind the Soviets, and that there was no race, there was still a great deal of pressure to enhance the country's efforts to put a satellite in space. For some time Eisenhower continued to resist this demand. His presidency had been built on the premise of small government, and he had cut government spending considerably. His policy on national security included the belief that the nation's security would not be enhanced simply by expanding the defense budget. He believed in fiscal responsibility as being just as important to the security of the country as its military, and worried that the creation of a new agency for advancements in space would simply add to the current bureaucracy. His initial plan was to keep the space program within the Defense Department in order to restrain the growth of government (Callahan 1997). He worried not just about the increased spending for a new agency, but also about the rise of a technocratic bureaucracy (McDougall 1985). He saw the "crash" program that was being advocated to hasten the country's advance in space as putting too much emphasis on a technical problem that he saw as just one of many areas where the competition of superiority lay (Callahan 1997). He did not want to see a country governed by technocracy instead of democracy, and so resisted the creation of a new agency (Callahan 1997). In one aspect, Eisenhower was correct – the competition of superiority was not based solely on space superiority – however he assumed that emphasis on space would be a drain on the capacity to

tackle other areas of competition and need, rather than an invigorating force to harness the capabilities of the many publics that comprised the American people.

As part of his "New Frontier," John F. Kennedy campaigned for the 1960 election with the promise of accelerating the efforts to put a man in space. As a proponent of a bold space program, his election seemed to assure NASA of its ability to continue its endeavor to eventually reach the moon. This goal was brought quite swiftly to the forefront in 1961, when after the successful flight of Russian cosmonaut Yuri Gagarin and in the wake of the embarrassing outcome of the Bay of Pigs, Kennedy went before Congress in a special State of the Union address to set forth the goal of putting an American on the moon within the decade. Gagarin's flight had been yet another example of what seemed to be the continuously superior achievements of the Russians (Beschloss 1997).

Kennedy understood it was his responsibility to set the course for the American foray into space, and he knew that in order for it to be successful he would need the backing of not just Congress, but of the American people as well. In his address he asked the country to commit to "achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth" (Kennedy 1961). He challenged the nation to pursue this goal, but also explained that it would not succeed without the full effort and backing of the American people and the government. He made the goal not just about beating the Russians, but about proving that as a country, unified in this new challenge, we could pursue this goal to prove that we could do it. "We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win"

(Kennedy 1962). This comment is indicative of the multifaceted nature of the "New Frontier" Kennedy used to challenge the nation – rather than only focusing on the space race, he also saw this test as a barometer for the nation's ability to tackle many challenges. This began the era of a truly public policy for the space program – one aimed towards new realms, with unknown trials, that was being taken on by the nation as a whole to fight for their position in the international political realm, and for their own pride. Kennedy succeeded in doing exactly what Eisenhower had tried to avoid: politicizing space.

An important aspect of Kennedy's moon goal was his ability to specify the means the nation would take to reach what was a rather nebulous goal. His challenge was not to achieve national security; it was not to promote peace, nor to reap the technological and economic benefits space had to offer. It was to do it simply because, as a nation, we could. He gave a space for political action – within the decade – and a process by which to set the compass of national achievement. However, this was not an executive command from on high. This was to be the space policy of the citizens of the United States, not of John F. Kennedy. He did not try to convince them that his plan was the right plan, but instead challenged them to take up this new goal on their own, as a means to confront the crisis in a way that best suited them. The moon goal came from a knowledge of the public that urged them to use the sense of fear and wonder that had taken hold to work towards a solution for achieving excellence. Kennedy showed the characteristics of a true politician; a challenger of the people, and not a guardian of the status quo.

Following the success of Apollo, NASA struggled to find something within its long-term plans of space stations and manned missions to Mars that would find enough political support to obtain governmental approval. With the fiscally conservative Nixon

Administration being its target audience, NASA engineers focused on the economically attractive idea of a space transportation system that would replace all existing launch vehicles with a more economical system, one that would also serve as a supplemental vehicle for national security missions with the Department of Defense. NASA clung to this justification for the Shuttle, even as problems with its design and manufacture caused it to balloon in expense, and exist without any clear meaning.

With the moon goal achieved, President Richard Nixon applauded the efforts of NASA, but went no further with an overarching plan for U.S. space policy. He did not issue any challenges, or put forth a public, political purpose for the engineers to work towards. The policy of government throughout the 1970s pervaded the next two decades as well, giving space the domain of ancillary policy rather than the place of primary policy it had enjoyed during the 1960s. Primary policy is characterized by big-ticket items which set out to solve well-defined national problems, ones that garner a high agenda status, dominate the attention of public officials and private citizens alike, and are given the funding necessary to complete them, a process that speaks to the concept of political action. This sort of policy was favored by first the Kennedy Administration, and then the Johnson Administration, even as other policy problems and objectives gained prominence later in the 1960s. The ancillary policy position took hold initially during the Nixon years, and continued with both Ronald Reagan and George H. W. Bush, wherein space programs were not designed as a response to an identifiable national problem, but as a program of continuing government commitment, with low agenda status, limited attention, and limited funding. Rather than bold initiatives guided by presidential challenges, space policy became a political tool that was given notice when convenient, but overall was subject to the values and rivalries of the administration currently

in power, with NASA visions complicated by the necessity for incrementalism and the challenges of institutional conflict. The space program became a part of government that needed to be maintained rather than actively pushed and directed. “In making an incremental decision, policy makers begin from an established base (generally defined as what the agency did in the previous year) and direct their attention not to the overall goals of the program but to incremental changes within it. By moving forward or backward from an established base, policy makers can change public policy without making final decisions about the long-term direction they are taking” (McCurdy in Ragsdale 1997, 136).

Early in the 1980s, President Reagan proposed NASA begin plans for a space station, and his proclamations of “follow[ing] our dreams to distant stars, living and working in space for peaceful, economic, and scientific gain” (Reagan in Ragsdale 1997, 156) were met with an underwhelming response. The ultimate purpose of developing a space station was lost on most scientists, with the chair of the Space Science board of the National Academy of Sciences saying “If the decision to build a space station is political and social, we have no problem with that. But don’t call it a scientific program. The Board sees no scientific need for this space station during the next twenty years” (Donahue in Ragsdale 1997, 159). What meager response was seen from Congress in favor of the space station was the result of economic motives, based on the jobs brought to constituents in various space-centered districts. “Although Reagan had boldly proposed a space station in 1984, he in fact had much less influence than the Congress on this space initiative. Indeed, the Congress continued to play a major role in this ancillary policy, doing what it does best – protecting local interests, offering jobs to constituents, and claiming credit for both” (Ragsdale 1997, 161).

When George H.W. Bush proposed a new space initiative at the beginning of his administration, there were few objections from Congress, which NASA officials took to mean “a rare confluence of support, the result of promoting space exploration to the point that it had become ingrained in American culture” (Ragsdale 1997, 163). However, this was actually indicative of the problem space policy continued to run into: had it been primary policy, it would require the full commitment of support and financing in order to meet the proposed goal; conversely, ancillary policy is left deliberately vague, so that those receiving it will not realize that their various interpretations of it are irreconcilable, and the potential to create public policy from these many interpretations is completely absent. Bush urged a policy that would set up a base on the moon, and then proceed from there to Mars. However, no additional funding was directed to NASA, no public outcry for a means to accomplish these goals was evident, and little came of the goal other than disappointment from NASA when it seemed it would not come to fruition.

After the Space Shuttle *Columbia* disintegrated during its re-entry into the atmosphere in 2003, President George W. Bush unveiled the Vision for Space Exploration (VSE) in a speech the following year, unveiling a plan that called for the completion of the International Space Station and retirement of the Shuttle fleet by 2010, and then, reminiscent of the policy the first President Bush had advocated during his term, a manned project to return to the moon and eventually Mars (Bush 2004).

Bush’s VSE has been likened to Kennedy’s moon challenge, but under closer inspection it appears to yet again share the characteristics of the ancillary policy of an economical era, rather than those of the primary policy of the Kennedy years. The VSE was a reaction to the *Columbia* disaster, and was seen as an effort to renew the public’s faith in

NASA and American space exploration. Bush saw *Columbia* as a blow to NASA's reputation and wanted to put forth a policy that would give NASA the justification necessary to continue its planned path, but with a new direction for manned space missions. His plan to return to the moon, and use that as a base in order to send a manned mission to Mars, was given no official price tag, but his proposal made it evident that the whole program would proceed slowly and cheaply. His plan included an additional $1 billion to be allocated to NASA over the following five years, but the rest of the funding would be reallocated from existing NASA projects, once again placing emphasis on a core program while neglecting other areas (Bush 2004). Bush called for a return to the moon by 2020, but did not provide a timeframe for a manned mission to Mars, which contributed to a lack of a sense of urgency. The original moon challenge had received a sense of urgency because of the additional challenge Kennedy offered to complete it within the decade, a goal close enough on the political horizon to make it seem a tangible goal. The timeframe that was detailed as part of the VSE for the return to the moon placed the new moon goal and the return of the United States sixteen years in the future, a long-term goal difficult to comprehend

The problematic aspects of ancillary policy ring true with the Vision for Space Exploration. It did not issue a challenge or create a public goal for a well-defined problem, and did not have any measure of enthusiasm from the American people. Instead, as with the presidential goals of Reagan and George H.W. Bush, it was a large, specific mission constructed by Bush, who then turned it over to NASA to implement in a way it thought best. Unlike Kennedy's moon challenge, the project did not come from the public, and did not captivate the interest of the nation because it was not created through a public policy through political action. Indeed, the VSE did not seem to even captivate the interest of Bush himself:

one week after presenting the plan at NASA Headquarters, he addressed the nation for his State of the Union address and made no mention of the new goals for NASA. Bush took on a role of presidential leadership much more similar to Eisenhower than Kennedy, trying to convince the nation as Eishenhower had that his modest, methodical, low-cost plan for advances in space was the best course of action, and that in fact there was no "space race" to be concerned about. According to Bush himself, "The vision I outline today is a journey, not a race" (Bush 2004). A new, unforeseen circumstance had arisen that could have turned disaster into opportunity, but the course of action being taken included incremental steps to achieve the pre-set goals, without any thought of the views of the public.

The Kennedy moon goal was created in the political context of the Space Race with the Russians, and there have been some who have raised the question of whether a bold, exploratory program is possible without a threat of equal measure. The answer to this lies in the nature of politics: the Space Race was born out of the unique circumstances of the time, and served as an impetus for exploration, and new circumstances that come in the guise of threats or otherwise can now serve as the impetus for an exploratory program in the current political context. It is not the Soviets who spurred our quest for achievement in the new frontier of space, it was the ability for the American people to reach out for a means to meet a challenge in a way that distinguished themselves as individuals and as a united public. The executives that have followed Kennedy have each had the chance to use the political circumstances of the moment to reach for an exploratory orientation towards space travel, but none have managed to do so.

The Obama policy does not set forth a large project for NASA to turn inwards with to find the means to accomplish. Instead, it calls on NASA to reach in many different directions

in a way that will serve the exploratory purposes of the public at large. Far from being the presidential mandate of Reagan or either Bush, Obama has acted in the most political way, by seeing how the economic concerns of the American people can be used to fuel a program that brings achievement in the long-run.

The Failure of Purely Commercial Orientations

When long-term goals are sacrificed in favor of short-term benefits, the result is a failure for both. This is true for private and public ventures, and is illustrated by the American aerospace industry, and NASA's commercially-oriented missions including the Space Shuttle, and Constellation. NASA's emphasis on economics over exploration has been self-defeating. The Shuttle was designed and launched during decades marked by economic recessions and fiscal uncertainty, and targeted towards a public whose interest in space had dwindled. Rather than helping to stimulate the economy through investments in new markets, the economic equivalent of new spaces for political action, the space program slid into obscurity. Disasters caused a temporary blip in the interest of the American people, but rather than a renewed effort to press on to new, exciting ventures through innovation of new technology, in a way that would boost not just the aerospace industry, but would also create new circles of space for innovation, NASA retreated into that which was known and predictable, thinking that by doing so it was responding to the desires of the American people for economic benefits and reliable space travel.

The Apollo era of space exploration and the space race in general was fueled by the aerospace industry. "Apollo opened a network of conduits by which technological and managerial knowledge moved with new facility among NASA, industrial companies, and the

military" (Bromberg 1999, 74). Companies competed for NASA contracts, often using their own money to research and develop new innovations and new technology in order to advance the space effort. Before Sputnik was even launched, many companies had studied technology that had the potential to be used in space, and had actively lobbied the government for an acceleration of space exploration. The industry saw itself as willing to take risks and extrapolate beyond the data to create new technology. When the plans for Apollo were announced, companies from all over the United States jumped at the chance to compete for contracts. As a fairly new area, space technology was an opportunity for the many smaller aerospace companies to create a relationship with NASA, and all were given equal opportunity to bid on the many systems necessary to get man to the moon (Bromberg 1999).

When at last this was accomplished in 1969, the aerospace industry was starting to break down. The de-escalation of the Cold War caused many companies to suffer financially due to fewer defense contracts, and following the successful launching of the Apollo missions there was no immediate demand from NASA. Even the commercial side of the industry had begun to decline, with commercial flight orders leveling off with the stabilization of the market. At about the same time, Europe and Japan were emerging as challengers to the American dominance in aerospace technology, and new economic questions started to arise. When NASA proposed the Space Shuttle in the early '70s, the struggling aerospace companies saw the Shuttle contracts as a source to stay in business, and so took measures to receive whatever contracts they could.

Aerospace companies became so dependent on NASA that they were willing to do whatever was asked of them, without offering any ideas of their own. In order to cut down on costs, they tried to find uses on the Shuttle for technology that already existed. Even with the

Shuttle contracts, many firms still struggled to exist, and so several were put in a position where they either merged or were forced to sell off their air and space units entirely. The major companies that remain, Northrop Grumman, Lockheed Martin and Boeing, leave no trace of North American or McDonnell Douglas, two of the most respected and well-known companies of the early space program (Bromberg 1999).

The relationship that evolved between the aerospace industry and NASA caused an erosion of research and development on new, better technology. Companies were forced to give up new projects in order to keep their NASA contracts, and this led to a dearth of new innovations in the area of aeronautics. Most of the research done within the aerospace industry is program-driven, with little done on basic research to discover new technology (Bromberg 1999). While aerospace companies were able to produce the necessary technology for the Shuttle, it became their only reason for existing, and without the drive to create new, innovative technology to be used for other purposes, their ability to operate in the long-term vanished, leaving them with no purposes to lead to short-term benefits, and so no ability to continue to function.

After the technological “can do” attitude of the Apollo project, NASA turned to what it saw as the next logical step in space exploration: the Space Shuttle. The concept being approached by NASA engineers was one of reusability. The expendability of the Apollo missions was seen as a technological “cost,” and inefficient in the amount of resources used up for each launch. The complex components had to be reproduced, reassembled and retested before each launch, leading engineers to focus on a reusable space vehicle for the next set of missions. The design of the Space Shuttle was based on both reusability and economy. The initial design had a fully reusable Shuttle flying in Low Earth Orbit, as a means to travel to a

proposed space station, and to service both commercial and military satellite needs. In marketing it as such, NASA tried to make the Shuttle all things to all people – and in the process, pleased none of them.

Decisions on the Shuttle's design and technology were based on hypothetical payloads, and meeting requirements from the Department of Defense for all military and intelligence payloads, plus the ability to transport and service commercial satellites, all while housing a crew of up to seven astronauts. Because it was also supposed to be an economical, reliable means of space transport, all of these requirements for potential payloads had to be done within the budget constraints defined by the Office of Management and Budget of the fiscally-conscious Nixon administration. In order to contain costs, the original Shuttle design for a completely reusable spacecraft was scrapped, and external fuel tanks and expendable launch rockets were substituted for their reusable components in order to keep development on schedule and lower the overall costs. The design was inflexible, having been based on hypothetical payloads rather than any military or commercial specifications, and its LEO purpose made it impossible to place satellites in geosynchronous orbit. The design also included a space lab that was included with the assumption that there would be a scientific requirement for one, but such a requirement never appeared.

With economy and reliable, "down to Earth" space travel as the goal, the Shuttle was a self-defeating technological advancement. Far from producing bold new technologies, the Shuttle relied on technology already available in order to fulfill its economic destiny, and its science capabilities were designed without any sort of need from an exogenous source, simply the assumption that part of the mission of NASA was to produce science and technology. By basing its design on the perceived need for economy and reliability, NASA

re-oriented its priorities, putting economic benefit over the goal of exploration. By doing so, it restricted its own potential, turning what was a politicized sphere of unknowns in the realm of outer space into a means focused on the sustainability of economic benefits. What made this even worse was the fact that the economic benefits were never realized. NASA's engineers used circular logic to create a new technology that no one had asked for, and no one really knew the purpose of. It was created for promised payloads that NASA assumed would be used, but that never actually materialized. It's capabilities allowed it to go 100 miles above Earth's surface and no farther, and this was only made possible by abandoning the concept of a fully reusable (and thus cost-effective, by NASA's logic) booster and orbiter that never lived up to expectations. One of the most telling features of the Shuttle is that it had originally been part of the plan to build a space station in Earth orbit, which was suggested by NASA engineer Werner von Braun as a step that should be taken *prior to* going to the moon. The political context of the time created a void that NASA sought to fill with economical promises for cheap, reliable transportation, a far cry from the leaps of faith required to make Project Apollo feasible.

As the result of trying to reconcile big ideas with small bureaucratic minds, NASA sought to implement the Shuttle program, which embodied the spirit of ancillary policy. It requested a program for manned spaceflight with no obvious destination (particularly when there was to be no space station for the foreseeable future), it touted the Shuttle as the "next logical step," a verbal cue for incrementalism, it used the Shuttle as justification for building a space station, then used the concept of the space station to justify existence of the Shuttle, and emphasis was put on it being capable of economical, routine spaceflight. With the emphasis on "routine," the agency gave it the quality of being something to warrant

continuing commitment from the government, and also removed one of the identifying qualities of American space exploration that had managed to hold the attention of the American people: the excitement of the new and unknown. Lacking a political vision or public enthusiasm, the newest effort of NASA continued to be relegated to ancillary policy, because "What was fundamentally missing was any consensus on the Shuttle's primary purpose: it continued to be all things to all people" while simultaneously being nothing to anyone (Ragsdale 1997, 146).

In 1972, the promise from NASA was a five-orbiter fleet that would be developed for $5.15 billion, plus $300 million for facilities. Each orbiter would cost $250 million, with the capacity to hold 32.5 tons at a cost per payload pound of $100. The first flight was set to occur in 1978, with fifty flights per year thereafter for the whole fleet. By the time the first Shuttle flew in 1981, it was apparent that NASA's estimates had been far off the mark; development had ballooned to $12.6 billion, with each orbiter costing $580 million. Each orbiter could only hold 24 tons, with the cost per payload pound being $1700. During the period of 1983-1994, the fleet flew less than 70 flights, at a cost of $94 million per flight. Internal problems within the space agency had contributed to problems with the implementation of the program, including the absence of competitive bidding, impractical deadlines, design changes in the middle of construction, and the inability to monitor the work of thousands of contractors. The problem, ultimately, came from its status as ancillary policy – while expectations for the means were low, the expectations for the ends were very high, and the Shuttle failed to meet those criteria (Logsdon 1986).

As John Logsdon has argued, the Shuttle program failed as a political policy because the justification for it was cost-effectiveness, and rather than use it to meet a national need,

neither NASA or the White House were able to gain a mutual understanding of the fundamental reasons the program was approved. “The Shuttle program was not begun in response to any external threat or challenge and did not engage what public interest in space remained after a number of Apollo missions to the moon” (Logsdon 1986, 1104). In fact, as part of an ancillary policy, the Shuttle decision was approved over the objections of the Office of Management and Budget, and because it did not receive high priority from the Nixon White House, OMB was able to slowly chip away at the budget for the program, making NASA have to prioritize the Shuttle while neglecting other programs that could have driven advancement in science and technology. However, “… the fundamental problem with the decision to build a Space Shuttle [was] that the national commitment required to make the program a policy success did not accompany that decision” (Logsdon 1986, 1105). Without a mandate from the American people, the newest projects for NASA revolved around the concept of economy.

After the *Challenger* accident in 1986, the Shuttle fleet was grounded while the cause of the accident was investigated, and when it returned to service it was limited to military payloads only. Only minor changes were made to the hardware or software of the Shuttles, and if anything NASA relied even more heavily on old technology that was already known to be reliable. When yet another accident grounded the fleet, in 2003 with the destruction of *Columbia* upon reentry, George W. Bush announced a new mission for NASA – to retire the Space Shuttle, return to the moon, and eventually to send a manned mission to Mars. NASA’s response to this new direction was Project Constellation.

Having already accomplished sending manned missions to the moon, NASA once again turned to old technology for the new moon venture. Using designs from the Apollo-era

spacecraft and rockets, sometimes literally foraging through museums in order to find the right hardware, NASA had designed a program based on the technology of the 1960s. A reusable rocket was to be used for launch, the Ares rocket powered by modified versions of the J-2 engine used for the third stage of the Saturn V rocket that launched the manned Apollo missions to the moon, and a crew compartment that in almost every way appeared to be a larger version of the Apollo-era Command Service Module. NASA Administrator Michael Griffin went so far as to describe the program as "Apollo on steroids" (Reeves 2006).

This was the vision set in motion by George W. Bush's VSE, one which fits into the category of "symptoms of broader problems" referred to by the Economist, as the new moon goal attempted to serve the same role as Kennedy's challenge to land men on the moon within the decade. In trying to re-capture the glories of the past in a new project, while at the same time aiming "to incorporate the Solar System in our economic sphere," as stated by Bush's Director of the Office of Science and Technology Policy, John Marburger (Wingo 2007), Constellation was yet another mission designed with economics as the main goal, confusing the desire for material benefits in the immediate future with the commercial results that could come in time from an exploratory orientation.

The new space policy does not create a new project or mission that aims towards a short-term result, nor does it give NASA the carte blanche approval to set its sights based on the ideals it thinks the American people want, rather than the ideals that would actually serve them best. The aerospace industry, the Shuttle program, and the Constellation program were all guilty of putting immediate commercial interests as the top priority, rather than exploratory interests that would cultivate economic industries as a secondary effect.

Prioritizing commercial interests resulted in either failure, or cancellation, while the new space policy has the potential to continue in a way that benefits NASA, private industry, and the American people.

Public Imagination

An element of space policy that cannot be ignored is the role of public imagination. The reason the myth of the frontier has become a core tenet of American culture is because it not only embodies the values of independence and freedom, it is also because it speaks to the underlying desire of humanity to explore. An exploratory orientation for NASA fulfills the frontier ideals of the American people, which have not always been at the forefront of their consciousness, but has always been evident in their views on life, including the space program, even when other circumstances held their concern.

Following the *Challenger* explosion, Ronald Reagan addressed the nation to speak about the disaster. Instead of urging caution in a time of mourning, his speech urged the American people not to give up on the dreams of exploration and discovery. “Sometimes painful things like this happen. It's all part of the process of exploration and discovery. It's all part of taking a chance and expanding man's horizons. The future doesn't belong to the fainthearted; it belongs to the brave. The *Challenger* crew was pulling us into the future, and we'll continue to follow them,” even as they “slipped the surly bonds of Earth to touch the face of God” (Reagan 1986). Using the language of the frontier, Reagan explained that as a nation, we had forgotten that “we’ve only just begun. We’re still pioneers. They, the members of the *Challenger* crew, were pioneers” (Reagan 1986). It was not the promise of

material goods that kept the space program going after such a tragedy, but the promise of expanding the horizons of mankind.

It was not only disasters that captured the American imagination, but feats of technological prowess as well. In January 2004, the Mars Rover Spirit landed, and within 24 hours of landing the NASA website broadcasting the images coming from the rover received 225 million hits, with 6.5 billion hits coming in during the first month and a half (Vericenter 2004), nearly overloading the website's capabilities. Photographs from the Hubble telescope have captured the interest of people worldwide, with images of nebulas, galaxies and black holes becoming iconic images. As Voyager 1, a robotic probe launched in 1977, continues its trajectory, by the end of 2012 it will become the first man-made object to cross into interstellar space, a concept that has sparked interest in what lies outside of our solar system (O'Shea 2011).

The fascination with exploration that makes up an element of the human condition is one that can be seen in popular culture, a medium that both reflects and reinforces cultural norms. The prevalence of science fiction novels and movies has permeated American culture for the past fifty years, and continues unabated: we see this in the enduring fascination with the books of Isaac Asimov chronicling the expansion of humans to other planets, the continued popularity of Stanley Kubrick's *2001: A Space Odyssey*, and the modern television series *Firefly*, which embodied the urge for exploration within the mythic imagery of the frontier ideals.

Americans do not deny their ambitions for exploratory achievement, as shown by 36 percent of respondents in the National Space Survey giving the reason for continued exploration of space as the innate desire of humans to explore (The Everett Group 2009).

However, this desire is often overshadowed by more immediate concerns, as with Maslow's hierarchy of needs, and can only come to the forefront when circumstances allow for it. Nevertheless, when disaster strikes, or a breakthrough is made, as a nation we do not rally around the tangible benefits that have filtered down through NASA. We do not celebrate practical achievements such as Velcro, Tang, or even GPS capabilities – we celebrate the exploratory achievements such as landing men on the moon. The saying so often used is "If NASA can land a man on the moon…," not "If NASA can create a delicious orange drink…"

The Obama policy speaks to this innate desire for exploratory achievement in a way that previous policies did not. It embarks on an orientation that delivers the frontier ideals in a way that allows for the economic needs that still resonate on the American consciousness. Neither Spirit, the Hubble telescope, or Voyager were presidentially-mandated missions, but they were the ones that captured the interest of so many, because of their exploratory nature. By recommending a broad-based approach to research and development, NASA will have the flexibility to innovate and discover in a number of ways, increasing the chances that the public's desire for exploration will be ignited by a new scientific discovery, which can only aid in its goals to expand human knowledge through the exploration of the universe.

CONCLUSION

The many facets of the Obama policy adhere to the exploratory orientation that is being argued for NASA. By canceling Constellation in favor of a politically motivated, broad-based approach, the new plan leaves the habit of relying on past glories behind in order to re-direct resources to a variety of programs that opens up a plurality of options for NASA to pursue. It embraces an approach based on the political wisdom encompassed by innovation and discovery as directed by the public will, in order to have a viable public space agency, thus avoiding the situation where “The strength of the dinosaur, when guided by the brain of the dinosaur, leads to extinction” (van Dyke 1963, 66).

By investing additional funding in the development of robotics, science, Earth observation and aeronautics, the policy permits NASA to experiment in a way that does not constrain: there is not a single, all-encompassing program that is pursued at all costs, but instead a commitment to try a variety of new ideas to see if they lead to new discoveries and new innovations. Once the potentials of these new projects is known, the space agency will have the opportunity to pursue that which makes sense within the political context of the time. The increased funding for new technologies will accelerate the search for new innovations that can serve both manned and unmanned options for potential missions in the future, and embraces the multifaceted approach to exploration that allows flexibility within the political and cultural context. New opportunities and new challenges will arise in the coming years, and the increased emphasis on technological research and development gives NASA the tools to respond to them as they appear.

The investment in new technological innovation will lead to the expansion of our understanding of the solar system and the universe, a goal embraced by the Obama policy

that offers both tangible and intangible benefits in the future. Increasing scientific knowledge will bring immediate, tangible benefits, such as applications to reduce fuel needs, noise, and emissions of air and spacecraft, in addition to the intangible benefits of increased knowledge about the Earth, our sun, and the rest of our solar system. This will serve as a benefit to aeronautics and space-related vehicles, but can also be filtered down to other applications that will "Promote both the economic and environmental health of this country" (National Aeronautics and Space Administration 2010).

The most crucial aspect of the Obama policy is its role for private industry. The purely commercial component of space has been removed from NASA's purview, and been delegated to private industry, thus fulfilling two objectives: first, it creates a new space for the creation of new markets, where private industry can take on risk on a smaller scale by using the technological knowledge gained over the last fifty years within an area that has already been broached by NASA; second, it opens a second new space, that exceeds the bounds of Lower Earth Orbit, and allows NASA to move away from the unsuccessful purely-commercial-oriented goals of the past in order to seek out the new challenges that may meet them outside of the area being opened for private industry. Rather than focusing on a single project within the bounds of space already harnessed by the Space Shuttle era, NASA can now react to new situations, and place priority on new innovations as they appear and as new challenges appear, both within the realm of space technology and in the changing characteristics of the geopolitical realm.

By allowing NASA to focus on exploratory research and development in the outer realms of space, the Obama policy also allows NASA to become a voice amongst many. NASA has been directed to work with private companies, as well as other governments, in

the pursuit of discovery and innovation, which removes the problem seen with the Space Shuttle: that of an agency isolated from ideas other than its own, and so focused solely on a single program that has no public purpose. The Obama plan seeks to give voice to private companies, other governments' space programs, and most importantly, the American people through their political representation, which opens NASA up to a space where many viewpoints are discussed and debated, in order to operate a truly political space agency that is committed to a purpose larger than itself.

Rather than constraining NASA by limiting its focus to a single plan, Obama has served the proper role of a political actor: he has understood that in order to have a successful space policy, the will of the American people needs to prescribe it, and without a specific goal being demanded by the citizenry, there is no need to specify one. As a public agency, NASA is not owned by any one entity, but it is shared by all, meaning that it is a conduit of the American people, and so must be an agency devoted to public purposes. When the people do not know their mind – when they cannot agree on the purposes for a national policy – it is the job of political actors to open up avenues that allow for potential breakthroughs that will draw the will of the American people and harness that will to embark on a shared goal. In the case of space policy, breakthroughs may come in the form of technological innovations that bring to light some new aspect of the solar system that will capture the imagination of Americans the same way Sputnik was able to do in 1957 – perhaps the discovery of life on another planet, or the ability to finally send a manned mission to Mars. Breakthroughs could also come in the context of politics, either in the form of a threat or an opportunity, in a way that once again ignites the desire for pride and prestige – should China land a taikonaut on the moon, or if a state hostile to the United States gains the ability to threaten national

security or the safety of American satellites. In developing a policy for the future of our space program, we cannot foresee how events will play out, and so we must harness our resources and abilities in a way that expands our potential to meet the unknown challenges and opportunities of the future.

NASA has spent the last thirty years trying to portray the Space Shuttle – an exclusively economics-driven project that had no basis in the public will – as a bold, exploratory program. The new version of U.S. space demands that they deliver on the promise of innovation and discovery. The Obama policy recognizes that if we are to have a public space program, one whose purpose was originally to engage in "aeronautical and space activities… and such other activities as may be required for the exploration of space" (National Aeronautics and Space Act 1958), the means must fit the intention. We must think in terms of a lasting orientation towards exploration in order to have a space program that is what it claims to be, or else there is no sense in having a public space agency at all. The Obama plan expands the exploratory orientation of NASA, while simultaneously expanding the commercial potential of the private space industry, through a policy constructed as an extension of the public. This policy will carry the United States through the 21st century in a way that focuses on a public purpose for NASA. This could not be more important in the context of space exploration, because if we do not direct the strength of NASA using the collective wisdom gained through politics, our public space program will in fact go the way of the dinosaur: extinction.

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