

NEWSPACE: AN ERA OF ENTREPRENEURIAL BRANDING

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ABSTRACT

With the rise in space entrepreneurial companies like SpaceX and Blue Origin, the modern day space sector paradigm appears to be much different than that of a NASA-led past. In the mid-90s with the rise of frustration over NASA's perceived inability to return to the Moon or pursue a Mars mission, a number of space frontier advocates decided to take the ambition into their hands under a so-called "alt.space" turned NewSpace movement, which positioned NASA and its aerospace partners as slow-moving and uninspiring "OldSpace." This thesis unpacks the rhetorical origins of this terminology and the actionable differences between the two camps, ultimately to find that NewSpace is a continuation of the traditional public-private partnership framework that NASA and the U.S. Government has pursued since before the days of Apollo. Despite this reality, so-called NewSpace companies are certainly taking over part of the messaging around how society ought to be expanding into the space frontier away from a government agency. In observing how NewSpace companies manage to rhetorically, but not effectively, brand themselves as different this research posits a question of whether there are serious implications to the intrinsic individualistic and ultimately profit-seeking motives of space entrepreneurs influencing the public's perception of what ought to be happening in space in the place of a cautious government agency intended to serve public welfare.

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Chapter 1: The Emergence of NewSpace and OldSpace

Outer space is weird. It's both unfathomable and somewhat tangible at the same time; we can peek at the Moon just outside our bedroom window or look up at the stars in the backyard with a sense of comfort, knowing these lights in the sky will always be there. But, there's also a wild sense of trepidation surrounding this endless expanse — the violent activity of suns larger than our own exploding in the distance, the massive destruction of black holes, the fiery tail of an asteroid hurtling toward a planet. These types of thoughts have occupied the minds of great men and women since the beginning of human history, so much so that there's almost no citation required for such a statement. Space, as a concept, is and will always be a part of the collective imagination — and not just the stuff of dreams, but truly the human body itself, as famous popular American space astronomer and cosmologist Carl Sagan observed when he said, “the cosmos is within us. We are made of star-stuff. We are a way for the universe to know itself.”¹

1.1: Setting the stage

But of course, the intrigue surrounding space doesn't stop at the environmental level. The great astronomers of the past weren't just looking at Jupiter's circling Great Red Spot and merely considering the phenomena of weather patterns or observing the cloudy atmosphere of Venus and thinking about water vapor— they were also thinking about the potentiality of life beyond the Earth, as well as the possibility of finding a new home in the solar system. As historian Howard McCurdy writes in *Space and the American Imagination*, the question of whether there is life in the greater galaxies has inspired science fiction writers, scientists and, of course,

¹ *The Shores of the Cosmic Ocean*. By Carl Sagan, Ann Druyan, and Steven Soter. Directed by Adrian Malone. Performed by Carl Sagan. Los Angeles: PBS, 1980. Television Series.

laypeople for ages², all wondering: Is space the final frontier for humanity? And if so, how do we get there? Communications specialist Linda Billings explored the historical rhetoric of discussions around space, and found that empirically this environment has always been advanced as a frontier, one that's "associated with images of pioneering, homesteading, claim-staking, and taming," and where spaceflight advocacy made "the idea of the frontier" a "dominant metaphor," often times in association with "a position of leadership or authority."³ And often, the entity entering this frontier is often considered alongside an image of the "explorer" and "a moral missionary, telling others and his sustaining civilization who they are and how they ought to behave."⁴ In other words, those entering this realm are considered to be in some sense a type of pioneer leading civilization into the next chapter of existence.

And, throughout the Cold War this type of symbolism was at the forefront of the emergent space age, where competing governments weren't as much interested in settling humans into this new domain, but rather sought to send a signal to the rest of the world that it would be their nation to conquer this new realm in a demonstration of formidable prowess and leadership. Historian Roger Launius explores this idea in an article for Space Policy, writing that the Apollo mission was often considered from the idea of "concentrated institutional power," where the mission showcased the battle of "military-industrial complex and the scientific-technological elite of the USA," against the evil Communist-dominated Soviet Union. In another aspect, it also represented the United States' quest to promote a narrative of the American "grand visionary concept for human exploration," that would enable Americans to "become a truly

² McCurdy, Howard E. *Space and the American Imagination*. 2nd ed. Baltimore, MD: Johns Hopkins University Press, 2011.

³ Billings, Linda. "Overview: Ideology, Advocacy, and Spaceflight—Evolution of a Cultural Narrative." In *Societal Impact of Spaceflight*, by Steven J. Dick and Roger D. Launius, 483-500. Washington, DC: National Aeronautics and Space Administration, Office of External Relations, History Division, 2007.

⁴ *Ibid.*, 488. Citing space historian Stephen Pyne.

spacefaring people” and “set the USA apart from the rest of the nations of the world.”⁵ In terms of this perspectives’ sticking power, Launius contends this “exceptionalist perspective has dominated the historiography of Apollo from the beginning to the present.”⁶

Truly, the activity of extending into outer space — due to its particularly difficult, risky and expensive nature — has empirically always served as a venue for sending a message to others that the entities sponsoring these extraterrestrial activities possess a particular and special kind of value. And, this signaling power has not only been the purview of governments. Launius writes that space has been the site of power struggles not only between nations, but also “classes, genders and other groups,” where the Apollo program wasn’t just an international showdown, but also a time of “federal agencies, corporations and interest groups,” professing their elitist versions of how humanity ought to explore the new frontier.⁷ This messaging around space and the notion that whoever goes into this realm — whether it is a nation or groups or individuals — possesses a particular kind of significance is part of a long history that continues to this day, posits Alexander MacDonald in his book *The Long Space Age*.

MacDonald argues that while it might seem like the emergence of rich billionaires — such as Elon Musk, Jeff Bezos and Richard Branson — to the private sector within the space industry seems like a new phenomenon, it actually continues a tradition of entrepreneurs and private equity investors dipping their feet in the sector since the 80s, for the sake of “credibly conveying information about an individual or group’s health and resourcefulness.”⁸ MacDonald draws upon Thorstein Veblen’s signaling theory of “conspicuous consumption,” — where

⁵ Launius, Roger D. "Perceptions of Apollo: Myth, Nostalgia, Memory or All of the Above?" *Space Policy* 21, no. 2 (May 2005): 129-39. Accessed April 22, 2018. doi:10.1016/j.spacepol.2005.02.001.

⁶ *Ibid.*, 133-5.

⁷ *Ibid.*

⁸ MacDonald, Alexander. *The Long Space Age: The Economic Origins of Space Exploration from Colonial America to the Cold War*. New Haven: Yale University Press, 2017., 7.

“agents can choose to invest — with time, money, or other resources — in order to differentiate themselves from others” to argue that investing in going to space, as extremely expensive and risky move, has not only served as a way for nations to demonstrate their importance and wealth, but also for private individuals of means to send a message to those around them that they are important, because they are getting involved in the industry:

“As a highly visible, expensive luxury activity, space exploration can be understood as a form of conspicuous consumption — for nation states as well as individuals — not simply because it lends a nebulous sense of prestige or pride, but because it fulfills a communication function with regard to status and capability. This notion of the credible transmission of information from one party to another through costly action is the essence of signaling.”⁹

MacDonald, in charting investments into astronomical observatories, which “employed new technologies — requiring expensive imports and engineering contracts — and mobilized significant capital expenditures,” finds that a significant portion of their funding came from wealthy individuals. He finds that individuals’ decision to spend money on this costly infrastructure is an analogue to modern day private entrepreneurship around spaceflight. He ultimately explains that just like modern expenditures into businesses like space tourism and space hotels — or even ambitious rocket and satellite companies— private investment into observatories was historically a venue for signaling of “political and cultural importance that outweighed their scientific significance,” moreso as “objects of community pride and ... national development.”¹⁰ And even while the individual decision to invest in such types of space-related projects may be motivated by a number of factors, MacDonald shows that especially in the field

⁹ Ibid.

¹⁰ Ibid.,12-13.

of space development “parties entering into an economic exchange around space exploration,” frequently match those intrinsic interests to “a perception that the activity is worthy of resource allocation,” which is often driven “by a desire to signal.”¹¹ In charting how specifically the “source of funding” has changed throughout investments into the space industry — specifically astronomical observatories — MacDonald shows that a number of those decisions were made by wealthy individuals for the explicit desire of sending a signal to the public that they had the resources to make such an achievement happen. He posits that the current wave of entrepreneurial investment is a continuation of this history.

This research draws upon this extensive literature surrounding the messaging power of the space age, as well as MacDonald’s argument that the current age of private sector development is really not a new phenomenon. However, this thesis adds a layer to this argument to contend that the signaling has come through a form of branding via the growing popular use of the term “NewSpace.” This thesis will show the use of the term NewSpace has served a dual purpose of not only sending a message to the public of individual wealth and prestige, but also to diminish the value of past participants in the space industry by positioning the current wave of investment as a new era. A basic Google search of the term NewSpace will yield numerous results — including media articles, formal scholarly journal articles, as well as references to space industry events, like the NewSpace conference — all demonstrating not only the formal adoption of the term to describe the current wave of entrants into the space industry, but also a reference to a new kind of vision around how space development should occur. For instance, an April 20, 2018 article in popular industry news website Via Satellite uses the term NewSpace to refer to an entire industry sector, with a headline that reads, “Captive Markets: Can NewSpace

¹¹ Ibid., 11.

Outmaneuver Traditional Space?"¹² This title in itself is revealing of the current framework under which the space industry is progressing, where a version of a past era of space history is being pitted against a new one.

1.2: NewSpace as a moniker for the emergent industry has grown in popularity, with OldSpace to signify an obsolete set of space actors

A fairly nebulous idea with no official time stamp, the so-called NewSpace age is hard to define but is known throughout the industry to be related to the emergence of privately funded commercial companies, such as SpaceX, that are changing the way space activity happens. This belief has inspired numerous scholarly investigations; for instance, Greg Autry in his PhD dissertation examines the emergence of NewSpace companies, and even catalogues them into a list, writing that NewSpace refers to “a community of private, entrepreneurial organizations pursuing space related business opportunities outside of the traditional NASA-Military-Industrial complex model.”¹³ The seemingly novel emergence of companies operating under the moniker of NewSpace has even inspired media events, like the Economist’s November 2017 conference “A New Space Age: The business case to dream,” where the description of the current age posits that “new capabilities, rekindled dreams and an atmosphere of entrepreneurialism,” has led to a “wave of terrestrial tech [that] has forged a well-worn path now profitably travelled,” which needs to be recognized because “most of the money being spent in space remains with old government programmes and incumbent telecom providers.” The writer behind the event description even argues, this reality means there is “untapped business and economics

¹² Prasad, Narayan. "Captive Markets: Can NewSpace Outmaneuver Traditional Space?" Via Satellite, April 20, 2018. Accessed April 22, 2018. <https://www.satellitetoday.com/business/2018/04/20/captive-markets-can-newspace-outmaneuver-traditional-space/>.

¹³ Autry, Greg. Exploring New Space: Governmental Roles in the Emergence of New Communities of High-technology Organizations. PhD diss., University of California, Irvine, 2013. Accessed April 22, 2018. ProQuest Dissertations Publishing.

opportunities.”¹⁴ In terms of how many companies are expected to be entering the industry under this framework of NewSpace, a space industry analysis group called NewSpace Global claims on its website that in 2011 it analyzed around 125 companies in this “global industry of private companies and entrepreneurs who primarily target commercial customers,” and now tracks nearly 1,000 — with an understanding that “commercialization of space is not just “the future,” it is happening now” and the number of companies is expected to grow.¹⁵

And truly, when observing some of the activities that are happening by companies operating under the name NewSpace it’s hard for the observer not to buy into the idea of there actually existing a new industry. Consider for example private entrepreneur and founder of SpaceX Elon Musk’s launch of his heavy-lift launch vehicle, built for what he says is his long-term ambition of sending humans to Mars. The event is emblematic of the type of activities investors are hoping to create in the sector, and it also demonstrates how the theatrical nature of these activities is leaving a mark on the space sector. Launched on February 6, 2018, the Falcon Heavy test flight, with a payload of a Tesla Roadster carrying a mannequin called “the Starman,” was one of the more widely watched events around the world, with a YouTube advertisement of the launch and the public’s reaction garnering over 3.6 million views by April 2018.¹⁶ And analysis of the video reveals type of messages that new space entrants are trying to promote. All throughout one can see the cars lining up to view a launch; there are crowds of people, showing the public is excited. Images of people working together toward the launch come across the screen, with the reveal of a shiny red Tesla as the all-American car. And just for a moment a picture of NASA flashes in the distance, only to arrive at the scene of a new rocket — the Falcon

¹⁴ "A New Space Age." The Economist. November 9, 2017. Accessed April 22, 2018.

<https://events.economist.com/events-conferences/americas/the-new-space-age-2017/>.

¹⁵ "NewSpace Global." NewSpace Global. 2018. Accessed April 22, 2018. <https://newspaceglobal.com/home>.

¹⁶ Falcon Heavy & Starman. SpaceX, 2018. Accessed April 22, 2018. <https://www.youtube.com/watch?v=A0FZIWabctw>.

Heavy — marked by a rising sun in the background. With the launch of the Starman into space, the company is sending a message to the audience; it is making the necessary moves in opening up the frontier, and the American public is not only going to be witness to this “new” era, but apart of it. Just after the launch, Musk was quick to make a claim about the supposed novelty of the current investment into the space industry:

“We want a new space race. Space races are exciting," he said to reporters after the event. “Hey, if SpaceX, which is a commercial company, and it can do this, and nobody paid for Falcon Heavy, it was paid with internal funds,' then they could do it, too.”¹⁷

But at the same time that one cannot help but watch the launch and think that it’s something that had never been done before, the viewer is also confronted with the egregious display of wealth accompanied by the launch of an unaffordable vehicle into heliocentric orbit just for the thrill of it — a reality which calls into question the natural evolution of this market and brings us back to MacDonald’s central argument that space is and has always been a venue for signaling possession of power and wealth. This idea is underscored by the fact Musk is not the only extremely wealthy new entrant into the space industry; he’s joined by other individuals like Jeff Bezos and Richard Branson, operating alongside a surge in start-up commercial space companies backed by large amounts of venture capital. Considering the types of innovations these companies are able to bring to the world — for instance, Planet Lab’s launch of nearly a hundred small satellites, called doves, around the globe to take and deliver images of the Earth in mere hours — the considerable degree of funding coming from individuals is easy to forget,

¹⁷ Mosher, Dave. "Elon Musk: 'We Want a New Space Race — Space Races Are Exciting'." Business Insider, February 7, 2018. Accessed April 22, 2018. <http://www.businessinsider.com/falcon-heavy-space-race-elon-musk-spacex-blue-origin-2018-2>.

especially when there's an entirely new term, NewSpace to feed into the idea that the current wave of space activity is in fact a new era.

The perceived novelty of the era is even more believable with simultaneous emergence of the term OldSpace to directly contrast with NewSpace. The first instance of the use of the term OldSpace is difficult to chart, but a Washington Post article from 2013 provides a clue into it's meaning and use throughout the industry:

“Old Space (and this is still the dreamers talking) is slow, bureaucratic, government-directed, completely top-down. Old Space is NASA, cautious and halting, supervising every project down to the last thousand-dollar widget. Old Space is Boeing, Lockheed, Northrop Grumman. Old Space coasts on the glory of the Apollo era and isn't entirely sure what to do next.

New Space is the opposite of all that. It's wild. It's commercial, bootstrapping, imaginative, right up to the point of being (and this is no longer the dreamers talking) delusional [...]If there's one thing that New Space has going for it, it's that Old Space is in trouble. Old Space and New Space turn out to be symbiotic. New Space companies need NASA contracts, and NASA needs New Space companies to pick up the agency's slack.”¹⁸

Thus, NewSpace and OldSpace have come to emerge as industry-recognized — if not terms — ideas that paint a picture of a slow and bureaucratic NASA riding the coattails of its Apollo era accomplishments and lacking the ability to move forward. Whereas, NewSpace, seen

¹⁸ Achenbach, Joel. "Which Way to Space?" The Washington Post, November 23, 2013. Accessed April 22, 2018. http://www.washingtonpost.com/sf/national/2013/11/23/which-way-to-space/?utm_term=.e152649c5f9b.

as a new wave of entrepreneurs and start-ups of bright young professionals, is the key to moving the industry forward and finally making space happen.

1.3: An investigation of the rhetorical origins of NewSpace demonstrates the need to be skeptical of its meaning and usage

But as MacDonald shows in *The Long Space Age*, entrepreneurship and individual investment in the space age is part of a long history of space — a reality that led this thesis researcher to become skeptical of the newness of this so-called NewSpace age, especially since most other industries do not lend themselves to being called a new-industry when disruptors or new entrants emerge. For instance, the Internet is a perfect analogue to the commercial space sector. Like the modern day space program, the Internet was born out of military government necessity and began as a U.S. Department of Defense project in the 1960s. But, it was ultimately turned over to the National Science Foundation, which “managed an Internet that lacked market-oriented focusing devices and economic inducement mechanisms.”¹⁹ Just like in the space industry, before the government made serious moves to open the sector up to more commercial stakeholders, Internet services took place through “contracts for carrier services between government buyers and commercial suppliers,” but there wasn’t much of a mechanism for growing the market. But then after the NSF removed restrictions over the Internet for commercial purposes in the mid 90s, there was “rapid entry of tens of thousands of firms into commercial ventures using technologies which employ the suite of TCP/IP standards.”²⁰

As Shane Greenstein writes, the Internet successfully opened to commercialization because firms focused on three factors: lots of small companies rapidly entering the marketplace

¹⁹ Greenstein, Shane. "Commercialization of the Internet: The Interaction of Public Policy and Private Choices or Why Introducing the Market Worked So Well." In *NBER Book Series Innovation Policy and the Economy*, edited by Adam B. Jaffe, Josh Lerner, and Scott Stern, 151-86. Vol. 1. Cambridge, MA: MIT Press, 2001.

²⁰ *Ibid.*

to create competition, multiple companies tailoring to specific geographic needs, and unwillingness of firms to settle on selling only a few products — which sounds very similar to the modern day understanding of the so-called NewSpace industry:

“The Internet access market did suffer from some technical challenges, but not enough to prevent rapid diffusion. Commercialization induced considerable technical innovation in complementary inventive activities. Much of this innovative activity became associated with developing new applications for existing users and new users.”²¹

Just like in the space industry where entrepreneurs sought new technologies for access to space, innovations in the way data could be transmitted over networks opened up new commercial opportunities for companies around how the Internet could be delivered to consumers. There were so many entrants, massive amounts of venture capital funding and startups in the Internet service industry that the well-known dot-com bubble emerged as the technology sector grew. And finally, the bubble burst as investors pulled out of many companies, fearing there wouldn't be a return. But unlike the current era of space development, this age was not called the “new Internet” or the “new Internet” companies, with DARPA and AT&T serving as the old data regime. Of course, barriers to entry in providing Internet services is much lower than that of the space sector, but the transition of the Internet during that time period is much similar to how NewSpacers claim the industry is transforming now — that is moving from the purview of huge governmental regimes and toward the hands of innovative, fast-paced companies that can deliver new types of products and develop a market. In fact, researcher Kim Moon speculates the space sector, with so much venture capital funding dominating its

²¹ Ibid.

trajectory, is potentially forming another bubble, as wealthy investors put their money in and will perhaps decide — particularly in the risk heavy industry — that it would be better to depart from the investment.²² This type of economic fluctuation is a transition that happens in a lot of formerly government-dominated fields just naturally, but space has seemed to take on terms that set apart the days of old from the present.

The question then becomes: How is NewSpace different from OldSpace? An investigation of the origins of the term NewSpace reveals that the skepticism is warranted. Historian Roger Launius writes that one of the more popular conceptions about NASA is that the agency lacked the funding to be remarkably more successful, but that the public wasn't as interested in providing those funds — with polls conducted during the Apollo 11 showing the public believing the government had spent too much money on space.²³ However overall, Americans maintained faith in NASA's goals, with Launius showing in his study of public opinion polls from 1978 to 1979 that Americans generally give NASA as an organization a good rating even though it doesn't necessarily want to fund human spaceflight. Even further, surveys between 1988 and 1999 show that on average over sixty percent of the nation rated NASA's work as being "excellent" or "good."²⁴ But counter to its generally positive ratings from the public, NASA was seen as an unsuccessful organization fairly early on, particularly from other members of the space community. McCurdy, who tracked the public's relationship between culture and views on spaceflight wrote in a 1991 article that by around 1989, "NASA was no

²² Kim, Moon J. "The Potential Speculative Bubble in the U.S. Commercial Space Launch Industry and the Implications to the United States." *New Space*, July 24, 2017. Accessed April 22, 2018. doi:10.1089/space.2017.0029.

²³ Launius, Roger D. "Public Opinion Polls and Perceptions of US Human Spaceflight." *Space Policy* 19, no. 3 (2003): 163-75. Accessed April 22, 2018. doi:10.1016/s0265-9646(03)00039-0.

²⁴ Ibid.

longer perceived as a top-performing organization.”²⁵ Using data on NASA’s budget, workforce statistics and 800 NASA employee surveys in 1988, McCurdy showed that by that time younger scientists and engineers were not as eager to the agency, citing a generally declining budget and the agency’s perception of being burdened by bureaucratic procedure. For example, he found that 84 percent of responding employees agreed NASA placed “a great deal of emphasis on paperwork and procedures,” with another 77% responding dully that they spend most of their work time at a desk in an office instead of “working in a laboratory, test facility, or control or tracking center.” In fact, half of the employees even said they weren’t sure “people within NASA welcome change.”²⁶

Based off the data, it’s clear why Greg Klerkx in his 2004 book *Lost in Space* writes many started to believe “idea of space as a an individual frontier” didn’t align with the agency’s “way of doing business,” and that employees who tried step outside of the box were “tolerated as long as they [didn’t] push the envelope too hard.”²⁷ McCurdy’s survey analysis fits within this context; although the public may have supported the agency as being “relatively unfamiliar with the majority of its activities and objectives,”²⁸ it’s clear that around that time employees and space travel advocates felt like the organization was prohibiting creative thinking due to its bureaucratic and top-down nature. Klerkx writes for instance that NASA was aware it was giving off this impression, when in 1975 it launched National Space Institute to promote its desire to invest in more ambitious plans for spaceflight and at the same time, the National Commission on Space led by NASA administrator Thomas Paine goals like the establishment of an outpost on

²⁵ McCurdy, Howard E. "Organizational Decline: NASA and the Life Cycle of Bureaus." *Public Administration Review* 51, no. 4 (July/August 1991): 308-16. Accessed April 22, 2018. doi:10.2307/976746.

²⁶ Ibid.

²⁷ Klerkx, Greg. *Lost in Space: The Fall of NASA and the Dream of a New Space Age*. New York: Vintage Books, 2004., 75.

²⁸ McCurdy, *Public Administration Review*, 310-313.

the moon by 2006.²⁹ But, it soon became clear that the shuttle program wasn't going to be able to achieve such lofty ambitions.

Amidst this skepticism of NASA, the views of Gerard O'Neill, a major pro-space advocate, began becoming much more popular within the space community. He wasn't sure NASA could truly provide the type of vision he and other pro-spacers wanted. In the introduction to the 2000 version of space colonization advocate Gerard O'Neill's *High Frontier*, physicist Freeman Dyson wrote that soon after Apollo an idea of "real" and "paper" NASA started to form:

"There is the real NASA, that builds and operates the Shuttle and the Space Stations, and there is the paper NASA, that studies advanced concepts and long range ventures. The real NASA is intensely conservative, dedicated to preserving existing programs, and especially dedicated to preserving the Shuttle and the Space Station. The paper NASA is adventurous on paper but lacks the resources to be adventurous in reality. The paper NASA supports advanced concepts as long as they're in the future, but cannot develop alternative infrastructures that might compete seriously with the Shuttle."³⁰

Dyson, however, with a tone of utmost skepticism and even betrayal writes that believers ought to be warned, because "O'Neill's reliance on NASA to bring his dream to reality was a grand illusion." But for the skeptics, he says, "the O'Neill dream can still make sense as a realistic future," as long as the dream has the power to "move us into a new world long after the dreamer has died."³¹ And he was right, because under this framework now major NewSpace

²⁹ Klerkx, *Lost in Space: The Fall of NASA and the Dream of a New Space Age*, 70-80.

³⁰ Dyson, Freeman. "Introduction." Introduction to *The High Frontier: Human Colonies in Space*, by Gerard K. O'Neill, 5-7. Burlington (Ontario): Apogee, 2000. Accessed April 22, 2018. Google Books.

³¹ Ibid.

advocate Rick Tumlinson emerged and formed around 1988 the Space Frontier Foundation (SFF) with other space dreamers. In her book *Making Space Happen*, Paula Berinstein writes that Tumlinson found himself extremely frustrated with NASA for “stonewalling humans-to-space projects and monopolizing space vehicle development.”³² Consequently, he began promoting the idea that private enterprise ought to start taking over the more grandiose and economic space objectives to open up the frontier, as NASA has shown it cannot achieve this goal.³³ The SFF advocated that the government ought to become an investor in private sector development by creating incentives and opportunities that private space companies could bootstrap. Tumlinson’s interview with Berinstein occurred at a time at which views on NASA in the space community began to truly diverge into pro-government or pro-private sector camps. He said to Berinstein:

“The reason I had to come up with this division [Near vs. Far Frontier] was so that I could sleep at night...It seemed that all of space belonged to the government. Belonged to NASA. I love NASA like everybody else, and I want to see them do great things in space...[but] NASA is addicted to the control and power they get from ruling space. Now this didn’t come about because they did it to themselves, but as a result of a lack of visionary leadership at the top of our government...NASA is a bureaucracy...”³⁴

Here Tumlinson provides evidence of the true rhetorical origins of the alternative space vision, showing that it was born from commercial space advocacy groups deciding to create a movement against government-led space. Once this idea became the “new” regime, the term NewSpace emerged as not only an option, but truly to represent the new age of space innovation.

³² Berinstein, Paula. "Rick Tumlinson and James George: Advocating Space." In *Making Space Happen: Private Space Ventures and the Visionaries behind Them*, 331-41. Medford, NJ: Plexus Publishing, 2002.

³³ Ibid.

³⁴ Ibid., 336.

According to the history as shown the Space Frontier Foundation website around the mid 2000s, the founders of the organization had a series of phone calls that were centered on branding a type of movement. They ultimately agreed on a term they thought “embodied the Foundation’s commitment to remain in the vanguard of the non-traditional space movement,” particularly when it comes to commercial space — and this was “NewSpace.”³⁵ This re-branding and development of an official title for the modern space movement made it clear Space Frontier Foundation supporters wanted to turn NewSpace into a movement that would represent free enterprise as the best vehicle for entering final chapter of spaced development. At the same time this type of rhetoric emerged, so did the notion of NASA and its aerospace partners being understood as “old.” In video interview with the MoonandbackGuy on Youtube, Bob Werb, one of the SFF’s founders lays out the development of NewSpace pretty comically:

“The three of us made up the word NewSpace only about five years ago. People were calling it alt.space. And, we hated it. We despised the name alt.space. And the three of us started talking to each other — myself, Chaz Miller, and Bill Boland. And, we just kept kicking around various different things to call it. And, a lot of people had referred to it as “new space,” you know small letters, two words. But we thought, we really kicked it around, we thought there’s a phrase we could brand. Boland said, ‘Let’s just cram it together into one word, capitalize both of them, and let’s see if we can get everybody to start using the word NewSpace to describe this thing.’”³⁶

³⁵ "History of NewSpace." Space Frontier Foundation. 2018. Accessed April 23, 2018. <https://spacefrontier.org/history-of-newspace/>.

³⁶ Bob Werb, Part 1 — The NewSpace Conference.wmv. Produced by Moonandbackguy. Performed by Bob Werb. Moonandback.com, 2012. Accessed April 22, 2018. https://www.youtube.com/watch?v=mme_aafo1dI&t=128s.

1.4: NewSpace is not a new era of development, and we should be wary of calling it so

In investigating the rhetorical origins of the term, “NewSpace,” this thesis arrives at a similar conjecture that MacDonald demonstrated when he looked into the economic history of investment in astronomical observatories by wealthy individuals. This research adds upon MacDonald’s argument by further positing not only that the current wave of space activity is not a new trend, but also that the notion of NewSpace is a self-identifying label being used by new entrants to brand themselves as being better or deviation from than the efforts of past entrants. Thus, this thesis will seek to prove and describe the implications of this hypothesis:

HYPOTHESIS: The current era is not marked by a revolution in space activities; it’s a movement of activities being handled by a collective to a few wealthy individuals, where NewSpace is being used as a brand to signal change, which distracts from the reality that decision-making power is moving toward these individuals.

It’s important to acknowledge that NASA has embraced the emergence of so-called NewSpace activities. As John Logsdon of the George Washington University Space Policy Institute wrote on the new U.S. approach to spaceflight, the US government has continuously cited the importance of a public-private space partnership. For example when President Obama canceled the Bush-era Constellation program, the move signaled an administrative shift toward relying more heavily on commercial companies to get astronauts to the International Space

Youtube description reads: "The Project, through the interview process, takes a look at the people of NewSpace and the governmental personnel who are facilitating private sector involvement. NewSpace is the term commonly used to describe commercial space as opposed to governmental space."

Station.³⁷ NASA hasn't merely ignored the sentiments of people like Tumlinson and other private space advocates, for about a decade; in fact, a look at the history of space development shows the government has always funneled money into entrepreneurial space. Achenbach, for instance, writes that in 2013 the agency had already directed more than \$1.8 billion dollars toward companies developing private spacecraft and other hardware and maintained a strong business relationship with companies like SpaceX. An *Ars Technica* article from 2016 even claimed that NASA contracts with SpaceX help keep the company afloat, while Musk's development of reusable rocket technology and the Dragon capsule provides a more economically friendly option for NASA to launch its own spacecraft.³⁸ Additionally, the U.S. government appears to be in favor of commercial space development, with Musk being recently appointed to President Trump's technology advisory council.

However, this thesis posits that language of space development is still very much so divided along the visions of "Old" and "New," in a way that merits a skeptical eye toward the activities of new entrants in the sector, as well as how those entrants are painting a picture of government-led space. NewSpacers still tend to view NASA as a bloated, bureaucratic, and inefficient operation, while OldSpacers see entrepreneurial visions of space as showing promise, but lacking restriction or focus. The goal of this thesis is not to assess how NewSpace functions, but rather show that the way NewSpace brands itself distracts from historical reality and is used to show change that hides a significant reality — which is that true change in the sector is born from a movement of decision making in the industry toward a wealthy few. This thesis seeks to prove this hypothesis and draw out the implications, if any, of this trend. One such implication

³⁷ Achenbach, "Which Way to Space?"

³⁸ Berger, Eric. "Without NASA There Would Be No SpaceX and Its Brilliant Boat Landing." *Ars Technica*, November 4, 2016. Accessed April 22, 2018. <https://arstechnica.com/science/2016/04/without-nasa-there-would-be-no-spacex-and-its-brilliant-boat-landing/>.

this research will posit is a signaling to society that the development of space should perhaps move toward the decisions of these wealthy entrepreneurs rather than residing in the hands of a government agency dedicated to the greater good. Take for instance, Elon Musk's speech at the 2016 International Astronautical Conference in Guadalajara, Mexico, where he exhibited unprecedentedly an entire engineering model for sending humanity to Mars. He demonstrates this plan in a rather cinematic simulation. In addressing the audience, he says that SpaceX is not just geared toward developing advanced space technology, it's truly presenting a new option, or product, for humanity — and the public must buy into it, without caring to mention the fact that human spaceflight and the potential of living on Mars is extremely dangerous and risky.

“I think there are really two fundamental paths. History is going to bifurcate along two directions. One path is we stay on Earth forever and then there will be some eventual extinction event [...] The alternative is to become a space-faring civilization and a multi-planet species, which I hope you would agree that is the right way to go.”³⁹

This thesis will attempt to prove the presented hypothesis via the use of the methodology as presented in Chapter 2 of exploratory historical case studies around the effective differences of NewSpace and OldSpace ambitions. Within the case studies, this research includes discourse analysis of artifacts including archived NASA press releases and government documents from the DOD and Air Force, archived media documents and interviews, and public campaign documents from NewSpace companies to reveal the trend around how OldSpace and NewSpace are being discussed. Chapter 3 will go through each of these three cases, with Chapter 4 offering results and analysis, and finally Chapter 5 drawing out the conclusions from this investigation,

³⁹ Elon Musk Reveals His Plan for Colonizing Mars. Performed by Elon Musk. Guadalajara, Mexico: SpaceX, 2016. Accessed April 22, 2018. https://www.youtube.com/watch?v=H7Uyfqi_TE8&t=712s.

offering that the current age of space development operating under the umbrella term of NewSpace has implications that society and members of the space industry ought to start considering.

Chapter 2: Case Study Methodology and Rhetorical Analysis

Having charted out the origins of the term NewSpace, we can begin to analyze the practices of the industry and the players operating under this umbrella more critically. The central theme of this thesis explores a notion that's well-known throughout society — the common trope that “actions speak louder than words.” But, in reviewing the moves of groups and individuals in the so-called NewSpace industry, can researchers reasonably argue these entities are truly speaking much louder with their actions? In order to flesh this out, this thesis assesses how NewSpace companies differentiate themselves by drawing upon a literature review of different understandings of the terminology, and exploring these factors through case studies with an inclusion of discourse analysis around these terms. This research seeks to answer core questions like: How did different groups within each camp communicate their endeavors to the public?; Is NewSpace is merely a matter of language manipulation, rather than effective change? Here, the thesis proposes a methodology to answer these questions.

2.1: Research design

This thesis is qualitative in nature, as the topic is requires an interdisciplinary analysis of space history and communication. In discerning the differences between NewSpace and OldSpace activities, as well as the narratives behind those actions, there are no quantitative variables to be gathered. Rather, the evidence is entirely observational, where historical realities are compared to contemporary phenomenon and the language surrounding these events will be

analyzed. A literature review of qualitative research scholarship will show that core questions like the one proposed in this thesis — specifically, “How is NewSpace different from OldSpace and what does this mean?” — merits a broader, more exploratory research design. And despite the lack of quantitative analysis, well chosen qualitative approaches can still serve as technically sound approaches of answering questions, and shed light on social relationships and the nuances of real-world scenarios in ways statistics, numerical surveys or data generally cannot demonstrate.

Sociology expert Pertti Alasuutari looked at the history of different types of research practices and writes that the growth of qualitative methods has been seen as a “hindrance to research that is scientifically sound” to some. However, qualitative approaches have continued to gain ground, having emerged around the 60s, because it’s evident the use of quantitative analysis alone can have its own inherent flaws, where it can make “us easily miss the bigger picture,” especially in the social sciences.⁴⁰ Despite the surge in statistical evidence-based methods throughout the 90s and 2000s, qualitative approaches continued to grow because of “disappointment and discontent” with “the results and promise of survey methods” where nuances in social reality ended up being “reduced to causal chain.” Qualitative research is looked upon more favorably as providing value of a scientific nature because it can be grounded in inductive processes, “leading from data collection to coding, concept creation, category formation, and eventually to the formation of a theory.”⁴¹ As a result, qualitative research practices have only become more popular, and increasingly work-shopped to become reasonable and evidence-based methods, which can practically and verifiably demonstrate important social or relational ideas.

⁴⁰ Alasuutari, Pertti. "The Rise and Relevance of Qualitative Research." *International Journal of Social Research Methodology* 13, no. 2 (June 2009): 139-55. Accessed April 22, 2018. doi:10.1080/13645570902966056.

⁴¹ *Ibid.*,141-45.

2.2: Instrumentation – Exploratory historical case studies and discourse analysis

In performing qualitative research, this thesis adopts a historical exploratory case study approach based off of an analysis of research methods by Dr. Robert K. Yin, who has written extensively about qualitative methodological approaches. Yin writes that certain kinds of “what” questions are just exploratory in nature, in which case any kind of research approach can be used with a justifiable rationale. But in many cases, “what” questions are more likely to favor “survey or archival strategies than others,” particularly when the researcher is trying to show the “prevalence of a phenomenon.” Whereas, “how” and “why” inquiries are mostly exploratory and deal with “operational links needing to be traced over time,” meriting the use of “case studies, histories, and experiments.”⁴² In this case, the study is looking into both contemporary and past events, but there is no control over the behavioral events. And, the question proposes a “how” and “why” format.

Exploratory historical case studies: In answering the question of “How is NewSpace different from OldSpace and what are the implications?” this thesis will first observe how NewSpace is discussed and then the effective actionable differences between these two camps. Using three case studies based off a literature review of what NewSpace means and entails in terms of an economic goal, a business approach and a long-term ambition, the thesis will observe whether the actions promoted by NewSpace groups are truly different from steps taken by OldSpace players in the past, as well as why the rhetoric shaping that plays a significant role in how the public views those differences.

⁴² Ibid.

Yin writes that the ultimate purpose of the case study, as a qualitative endeavor rather than quantitative, is in investigating the “characteristics of real-life events” — which perhaps cannot necessarily be understood through numerical or statistical data — including examples like “individual life cycles, organizational and managerial processes, neighborhood change.” He provides an assessment of different research approaches and cases in which those may be acceptable, noting that “each strategy has its own advantages and disadvantages” and we have wrongly been taught a hierarchical approach to research where “experiments were the only way of doing explanatory or causal inquiries.”⁴³

Discourse analysis: The purpose of the thesis is to explore not only whether the actions of NewSpace players are truly different from those made in the past by those qualifying as OldSpacers, but also to see why NewSpace proponents have been able to sell — in the case where these actions perhaps aren’t different — their visions as being new. This exploration is a matter of understanding language and communication tactics, which requires a linguistic methodological approach within the empirical case study design. By studying discourse made in the context of the case studies in both NewSpace and OldSpace camps, this thesis seeks to explore how the language is being used and to extrapolate for what purpose. The questions guiding this rhetorical exploration include: What type of rhetoric is most commonly surrounding the initiatives of stakeholders in either group?; What connotation surrounds the language adopted by these respective camps?; And, how are they making persuasive cases for their innovation?

To effectively perform discourse analysis, then, the interpreter observes three levels, perhaps all occurring at the same time or separately: textual, contextual and interpretive. Textual analysis allows the researcher to focus specifically on the language itself and how it is crafted,

⁴³ Ibid.

while contextual observation looks at setting in which the language was crafted and acquired meaning, and interpretation provides an explanation as to how this language on the sociological level is “information, ideology or a social product.”⁴⁴ Specifically, the thesis focuses in on situational discourse analysis at this level, a study which regards the discourse as having been produced intentionally and for a pragmatic purpose, where the researcher must “inquire as to why the discourse has been produced and for what aim.”⁴⁵ But this can be difficult to do if there is not sufficient background information to realistically categorize those factors, which is why the thesis also explored in the introduction socio-cultural backdrop of the case studies.

2.3: Data collection

To limit the broadness of discourse analysis and to make sure that what’s being analyzed is systematically chosen, the thesis will focus on texts involved in “communication campaigns.” Solomon and Cardillo explain this type of discourse fall into three types of camps, those being political, marketing or advertising, and public communications campaigns, where there are “pre-planned set(s) of communication activities designed by change agents to achieve certain changes in receiver behavior in a specified time period.”⁴⁶ The nature of communication campaigns is that they typically exist to encourage the audience into buying a product or achieving some sort of social change; subsequently, they can be thought of as being “designed” proactively rather than reactively. In using the methodology formed above, it’s easier to determine the objective of the campaign; but of course, there must be some additional analysis on the audiences and their “pre-

⁴⁴ Ibid.

⁴⁵ Ruiz, Jorge Ruiz. "Sociological Discourse Analysis: Methods and Logic." *Discourse and Knowledge* 10, no. 2 (May 2009): 77-90. Accessed April 22, 2018. doi:10.5949/liverpool/9780853238058.003.0006.

⁴⁶ Solomon, Douglas, and Barbara Cardillo. "The Elements and Process of Communication Campaigns." In *Discourse and Communication: New Approaches to the Analysis of Mass Media Discourse and Communication*, edited by Teun A. Van. Dijk, 60-69. Vol. 10. Berlin: Walter De Gruyter, 1985.

existing levels of knowledge, attitudes, motivation to change, and behavior relevant to the problem” — understanding that can come from the case studies.

Therefore, in limiting data collection for rhetorical evaluation the thesis will only look at forms of discourse that were developed with a specific goal, as defined above, within the context of the case studies. These can include press releases, speeches made with the intent of selling a product, public appearances to promote an objective — all specifically made within the time parameters of each case study, so there is a more systemized manner of analyzing discourse. Case studies will draw upon historical facts, literature reviews from former space historians in the field, as well as relevant archival documents from the Library of Congress and NASA headquarters in Washington, D.C. for the purpose of specifically highlighting the differences and similarities between actions in OldSpace and NewSpace.

2.4: Limitations

Obvious limitations to qualitative research, as a form of interpretation broadly, have already been discussed above. In trying to perform more exploratory studies, research is always open to the potential for bias, or perhaps missing documents that could have been an important aspect of the analysis. This thesis acknowledges that without the use of quantitative data, there is an element of the scientific method that is potentially lacking, but stands behind qualitative research as being able to draw upon scientific reasoning in order to produce valuable and logical insight into the social complexities of real-world events. The thesis takes a systematic approach to data collection, only choosing discourse falling into the field of communication campaign and within the time constraints of the case study events, utilizing primarily objective techniques first to then inductively reason through the meaning of NewSpace and OldSpace language.

2.5: Determining the case studies

Before diving a bit deeper into how NewSpace is actually different from OldSpace, we will have to find a decent definition of the former term first. There's confusion surrounding NewSpace activities from a communications standpoint, and that's purely because there are numerous definitions of the industry and what exactly it's intended to do. Because of this reality, looking toward a standard online article for guidance may not be enough. For instance, Robert Jacobson, an expert on entrepreneurial space who has spoken at numerous industry conferences, but defines NewSpace rather broadly in a 2017 article for The Observer:

“NewSpace generally refers to lesser known names with nimbler approaches to space related services and products. Besides rocket launch companies, the sector also includes new satellite companies, technology focused finance groups, business accelerators and space habitats.”⁴⁷

Such an explanation produces more questions than answers. What does it mean to have a nimbler approach to space, for one? For another, the space industry does in fact have numerous companies, but many would argue that those working toward goals of building products like “space habitats” are more theoretical in nature, than actually viable commercial industry stakeholders. An excerpt from Space India 2.0: Commerce, Policy, Security and Governance Perspectives from Observer Research Foundation looking into the differences between new and old space ideas in India, also acknowledges that the term in question is pretty vague, but revolves around a particular ethos now guiding space industry developments:

⁴⁷ Jacobson, Robert. "Startup Culture Has Officially Found Its Ground—In Outer Space." The Observer, December 4, 2017. Accessed April 22, 2018. <http://observer.com/2017/04/startups-investment-opportunities-newspace-sector/>.

“While there is no internationally accepted technical definition of ‘NewSpace’, principally, the ethos of the movement has been to challenge the traditional ways of space exploration that are widely considered as too expensive, time-consuming, and lacking in room for inventive risk-taking.”⁴⁸

The ORF lays out some distinctive characteristics for understanding NewSpace activities, though when Hay et. al of The Tauri Group attempt to determine who NewSpacers are through such attributes, they find they actually aren’t all that unique. In their paper, they claim the term NewSpace has actually been used in the industry since the 80s, when “Orbital and SpaceHab were considered examples of the concept.”⁴⁹ But with the arrival of industry entrepreneurs like Elon Musk and Richard Branson that wanted to open up the market to compete with large aerospace companies, the exact understanding of what NewSpace companies actually are is less clear now. Moreover, the ways in which these entities differentiate themselves is not evident either.⁵⁰ Still, they acknowledge the term is a guiding force in the industry, and thus requires sufficient understanding. Lack of clarity is an issue because the term itself “form[s] a lens through which industry events are interpreted and analyzed,” as well as important policy and business investments.

Entrepreneurs in the sector are quick to adopt the term as an overarching vision, because the reality is that “conceptual differences between new and traditional space companies,” inform where investors are going to put their money. Hay et. al already did this work, having studied about 40 major companies considering themselves in the new space camp — types ranging from

⁴⁸ Rajagopalan, Rajeswari, and Narayan Prasad. *Space India 2.0: Commerce, Policy, Security and Governance Perspectives*. New Delhi: Observer Research Foundation, 2017. Accessed April 22, 2018. Google Books., 14.

⁴⁹ Hay, Jason, Paul Guthrie, Carie Mullins, Elaine Gresham, and Carissa Christensen. "Global Space Industry: Refining the Definition of "New Space"." *AIAA SPACE 2009 Conference & Exposition*, September 14, 2009, 1-7. Accessed April 22, 2018. doi:10.2514/6.2009-6400.

⁵⁰ Ibid.

satellite manufacturing companies to commercial space launchers — in order to find the common thread among them. These researchers developed a list of 50 attributes initially observed to define NewSpace company goals, and after going through the list and cross-checking them with individual analyses of the companies being studied, interestingly they found that already 31 out of the 50 attributes were shared between new and traditional space companies; these included factors like high barriers to entry and the capacity to be publicly traded. Finally, they came up with a list of “key” attributes, depicted below. Though of course they note, “the space industry is constantly refining and redefining new space.”⁵¹ The discernable attributes of NewSpace companies, they write, are that these companies are flatter and more flexible in power structure with entirely consumer focused goals and a willingness to take risks — in other words, a start-up commercial culture. On the other hand, old space is more hierarchical in power structure and focusing on existing lines of business particularly with the government, and focused on “high value,” and “low growth.”⁵²

This analysis provides at least superficially some insight into the types of companies that could qualify as NewSpacers, but realistically, even the Tauri Group researchers write that, “not every new space company displayed each of these attributes,” and really the most fully developed point of consistency among them was the focus on efficient “technology development.” And at the same time, they write that some of the OldSpace attributes were applicable to companies in the NewSpace. So, singularly observing the characteristics of companies that call themselves commercial NewSpace entities might not be enough to really understand what this new age of space development actually entails. Observing a definition of the sector that encompasses its goals and ambitions, rather than just attributes, may shed some

⁵¹ Ibid.

⁵² Ibid.

more light on how exactly NewSpacers are differentiating themselves the past. For this we can look again toward the Space Frontier Foundation, which hosts the annual NewSpace conference. But while the organization's definition comes from the roots of the modern day commercial space movement, it's still pretty ambiguous. On the website, they define NewSpace as:

“People, businesses and organizations working to open the space frontier to human settlement through economic development.”⁵³

Based off this understanding, pretty much any space company, entity or organization should apply. NASA's origins, as McCurdy has shown, are linked with imagination and ambitions of moving humanity into the cosmos. At the very least, NASA's original visionary, Wernher von Braun was an idealist, who in addition to spearheading the nation's rocket program, wrote several books and papers on the engineering possibilities of traveling to Mars. And NASA as an organization has consistently supported economic development of the private sector. In fact in 1984, Congress amended the National Aeronautics and Space Administration Act of 1958 to include a declaration that “the general welfare of the United States requires that the NASA Administration ... seek and encourage to the maximum extent possible the fullest commercial use of space activities.”⁵⁴ So the vagueness of even the Space Frontier Foundation's definition of NewSpace does little to truly illuminate any modern day uniqueness of the movement.

But, using the statement as a guiding principal, we can begin to search for more specific factors to term, and that requires focusing in specifically on answering how NewSpacers are trying to “open the space frontier” through unique forms of “economic development.” NASA itself pulls from Wikipedia an understanding of NewSpace for its 2014 technical report,

⁵³ "What Is NewSpace?" Space Frontier Foundation. 2018. Accessed April 22, 2018. <https://spacefrontier.org/what-is-newspace/>.

⁵⁴ Richardson, James, comp. The International Space Station Commercialization Study. Report no. 97-1. Arlington: Potomac Institute for Policy Studies, 1997. Accessed April 22, 2018. <http://www.panix.com/~kingdon/space/potomac97.pdf>, 6.

“NewSpace: The ‘Emerging’ Commercial Space Industry” to determine that the main economic mechanism is the development of low-cost capabilities:

“NewSpace, alt.space, and entrepreneurial space are umbrella terms for a movement and philosophy often affiliated with, but not synonymous with, an emergent private spaceflight industry. Specifically, the terms are used to refer to a community of relatively new aerospace companies working to develop low-cost access to space or spaceflight technologies and advocates of low-cost spaceflight technology and policy.”⁵⁵

In determining the real rhetorical and effective difference between these two groups, it’s important then to look at the tactics companies are using to actually achieve an overarching goal of opening up the industry to more efficient, easier to access forms of space development. Using the analysis above, we can determine there are three key areas in which NewSpace as a defining identity is used to differentiate stakeholders. To understand whether this is truly different from OldSpace, we must assess these areas via historical case studies, along with analysis around the discourse surrounding those ambitions. In cases where NewSpace and OldSpace converge, how is the former marketing itself to be different?

There are three main areas in which NewSpace aims differentiate from OldSpace.

- Economic goal: The development of new, low-cost access to space technologies like reusable launch vehicles
- Business approach: Building a business model around start-up culture
- Long-term ambition: Opening the frontier to long-term human spaceflight

⁵⁵ Martin, Gary L. NewSpace: The Emerging Commercial Space Industry. PPT. Moffett Field, CA: NASA Ames Research Center, June 30, 2014.

The presentation consists of 38 Powerpoint slides and describes the emerging commercial space sector, key players and capabilities. Available in the online NASA archives. <https://ntrs.nasa.gov/search.jsp?R=20140011156>.

Chapter 3: Case Studies in NewSpace and OldSpace Rhetoric and History

The purpose of this research is to explore fundamentally: *How is NewSpace different from Oldspace?* As this introduction demonstrates, the terms themselves are nebulous and ill-defined. Even stakeholders within the industry will admit that the usage of such language does little to actually distinguish stakeholders on either side. This thesis uses exploratory case studies around the main ambitions of NewSpacers and compares those historically to OldSpace efforts to assess the nuances of these ideas from an actionable and rhetorical perspective. The goal of this study is to demonstrate the power of branding, as well as shine a more critical light on the trajectory of the space industry. Building upon an extensive literature review of the historical public impressions of NASA and the traditional aerospace industry, this research will show how NewSpacers are perhaps tapping into marketing and business techniques that are allowing them to control the messaging around space — which could potentially lead to moral implications on how space is used as a frontier. Ultimately, by discerning the characteristics of these two camps and placing them side by side, this research hopes to add to the literature surrounding how modern day space industry has emerged, allowing for more interpretation around the grandiose ambitions of companies like SpaceX may pan out in the future — particularly for other space enthusiasts that are trying to enter the field. In providing this analysis, the thesis should hopefully through narratives and examples from the past, provide a tool for researchers that are trying to understand the current state of the commercial space sector.

3.1: Case study 1 on economic goal: Lowering the cost of access to space (CATS); reusable launch vehicles

When it comes to the NewSpace era, one of the key aspects of this period is the emphasis on lowering the cost of access to space via technologies like reusable launch vehicles. Every

leader operating under this umbrella term is quick to claim not only that his vision of technology is going to work, but also that it's going to revolutionize space travel. This case study, however, will demonstrate that these so-called pioneers tend to skirt around history in discussing this economic goal. Despite the way these new entrants tend to discuss reusability, it has actually been a core tenant of NASA's and the private sector's ambitions from the onset of the space age; however, funding around the technology has prevented development of an infrastructure around an economically efficient reusable launch vehicle or program. Moreover, in terms of key technology and research necessary for the evolution of space development, it's evident that NewSpace efforts have been born from the work of past governmental, private and even start-up commercial endeavors.

The identity brand of NewSpace and the rhetoric surrounding what this term means couches the true nuance between how current companies and older players approached this economic goal — presenting it in a way that makes it seem like low-cost access to space technology via RLVs has only successfully been accomplished and professed as a business model by incredibly wealthy entrepreneurs and that the government continuously wasted government dollars. In observing the rhetoric NewSpacers employ, it's evident that in discussing this economic goal they are signaling that focusing on making access to space cheaper is novel and one that they have thought up. However, the historical analysis will demonstrate that this economic goal is not unique to the notion of NewSpace, and the only reason why certain entities within this movement have seen success is because of the massive amounts of capital they've personally been able to invest into it. This case study will show not only that reusability is being used as a signal of individuals' importance and wealth, but also as a way to propose that actions of the past were ineffective and not as worthwhile.

3.1.1: NewSpace rhetoric signals new entrants as more effectively focusing on this economic goal in an unprecedented way

NewSpace advocacy groups like the Space Frontier Foundation profess the economic goal of reusability and cheap access to space in an effort to signal the beginning of a new era of space development before the turn of the century. For example, an October press release from 2000 on the SFF's website even claims that it coined the phrase "Cheap Access to Space."⁵⁶ The title of the press release in itself, "Space Frontier Foundation Ridicules NASA For Praising and Perpetuating Expensive Socialist Spaceflight Monopoly," shows that the NewSpace movement is intended to signal a movement toward a better philosophy around space development that wouldn't — in a sense — allow NASA to "perpetuate" an inequitable system; the title alone highlights the agency as being restrictive and backward, and NewSpacers as being able to point out the ridiculousness of its approach toward the space economy. The document positions NewSpace groups as having the ideas and means necessary to change what it promotes as the existence of a currently unproductive and unequal system, specially through the agency's space shuttle program, writing:

"The Space Frontier Foundation ridiculed NASA celebrations of the 100th launch of the 1970's vintage Space Shuttle as a celebration of failure, by pointing out that some 40 years after the dawn of the space age it still takes tens of thousands of government employees and almost 1 billion taxpayer dollars to fly a handful of government astronauts into space for a week.

⁵⁶ The Space Frontier Foundation. "Space Frontier Foundation Ridicules NASA For Praising and Perpetuating Expensive Spaceflight Monopoly." News release, October 5, 2000. Space Frontier Foundation. Accessed April 22, 2018. <https://spacefrontier.org/2000/10/space-frontier-foundation-ridicules-nasa-for-praising-and-perpetuating-expensive-socialist-spaceflight-monopoly/>.

‘Only NASA would think that’s a cause for celebration,’ stated Foundation President Rick Tumlinson. ‘Instead of privatizing the Shuttle years ago, or supporting commercial space transportation, NASA maintains its human spaceflight monopoly. Meanwhile, the formerly socialist Soviet Union is working with private American citizens to carry commercial passengers into space for around \$20 million per ticket. What’s wrong with this picture? [...] The Foundation, which coined the term “Cheap Access to Space,” called for NASA to privatize the Space Shuttle so it can operate less expensively, stop wasting taxpayer funds on failed attempts to replace the Shuttle with ‘government-approved’ vehicles like the X-33 and the proposed \$4.5 billion Space Launch Initiative Program...’⁵⁷

There’s a lot to unpack here in this press release. For one, the SFF positions NASA’s past efforts and shuttle program as being a “celebration of failure,” that cost taxpayers exorbitant amounts of money. The organization even regards work around the shuttle as being more backward than the efforts of “formerly socialist Soviet Union,” which is now able to benefit from the privatization of the space industry. Interestingly, the group even claims that it coined the phrase “cheap access to space,” a statement that sends a signal that NewSpace proponents are taking steps that are actually going to better the space community, unlike the past several decades of government attempts. The press release showcases one example of how the advocacy group worked to promote an idea of a slow, and bureaucratic agency and the need for there to be a change in leadership and decision-makers around the sector. This type of rhetoric around the

⁵⁷ Ibid.

economic goal of cheap access to space has also included specifically discussion around reusability as being the chief mechanism for opening up the frontier — a notion that NewSpace proponents have also used to discredit NASA and the older private sectors’ paradigm of space development.

For example, in a 2004 congressional hearing on the future of human spaceflight, Rick Tumlinson called upon the government to consider the true efficacy of NASA’s research and development around reusable launch vehicles and turn instead toward the private sector’s innovative, cost-cutting, and speedy spirit:

“I can see the SEV becoming the new OSP/X–33/NASP/X–38/etc.—a cash draining, show killing tech project. NO NO NO! if every element in the transportation part of the equation isn’t low cost, robust and re-usable or designed to become so ASAP, then let’s quit now and go home as this project is DOA,” said Tumlinson.⁵⁸

Tumlinson, of course, fails to mention the fact that NASA as a research and development agency had been researching and testing the cost-effectiveness of reusability for decades, not merely for the sake of wasting money, but to actually search for more economically viable alternative to the current approach toward space travel — efforts which ultimately informed NewSpace projects of today. It’s evident that proponents of the NewSpace idea are not only trying to signal that their efforts are part of an entirely new wave of activity around space, but also that the American public should not be putting its trust in OldSpace to make space more affordable, as its a socialist and therefore backward agency. NewSpace companies have fed into this rhetoric, presenting their focus on reusable launch vehicles within the commercial sector in a

⁵⁸ U.S. Congress. Senate. Committee on Commerce, Science, and Transportation. *NASA's Future Space Mission*. 108 Cong., 2d sess. S. Rept. 1006. Washington: U.S. Government Publishing Office, 2004. Accessed April 22, 2018. <https://www.gpo.gov/fdsys/pkg/CHRG-108shrg20706/pdf/CHRG-108shrg20706.pdf>, 64.

way that's not only intended to seem novel, but also serve a higher, moreal purpose that OldSpace wasn't focused on. In a separate 2015 SFF press release, entitled "Space Is Hard — Cheap Access to Space is Our Future: Space Frontier Foundation Applauds Recent SpaceX Reusable Falcon 9 Effort," the organization not only claims that this economic goal is key to the future of space travel, but also make companies like SpaceX appear to be the vehicle that "pioneer"⁵⁹ Lanius had referred to through which this change is going to happen for the first time:

"Without bold entrepreneurial ventures like SpaceX, we wouldn't be pushing the bar forward as we are now," said James Pura, President & Director of the Space Frontier Foundation. "Those of us that believe in an ever-expanding human civilization settling the solar system understand that the first step towards making that future a reality is affordable, routine access to space. We are all so very proud of the SpaceX team and today's first stage landing attempt, and wish them the best of luck in the future as they achieve this goal."⁶⁰

NewSpace companies have fed into this idea that investing in the extremely difficult to establish infrastructure of reusable rocket technology is going to revolutionize space for the greater good. For example, a SpaceX press release, entitled "Reusability: the key to making human life multi-planetary" on the company's efforts professes this idea:

"If one can figure out how to effectively reuse rockets just like airplanes, the cost of access to space will be reduced by as much as a factor of a hundred. A fully reusable vehicle has never been done before. That really is the fundamental

⁵⁹ Lanius, *Space Policy*, 483-500.

⁶⁰ Space Frontier Foundation. "Space Is Hard – Cheap Access To Space Is Our Future." News release, April 10, 2015. Space Frontier Foundation. Accessed April 22, 2018. <https://spacefrontier.org/2015/04/space-is-hard-cheap-access-to-space-is-our-future/>.

breakthrough needed to revolutionize access to space [...] SpaceX believes a fully and rapidly reusable rocket is the pivotal breakthrough needed to substantially reduce the cost of space access.”⁶¹

And, in an interview with CBS News, Jeff Bezos heavily emphasized just as well as Musk the novelty of his fully reusable rocket: “You’ve seen a lot of rockets take off, but you’ve never seen one land. All the rockets we’ve ever flown as a civilization have been expendable. We use them one time and we throw them away. The rocket you’re seeing behind me is completely reusable, that’s a game changer because it changes the cost structure of spaceflight completely,” said Bezos, not mentioning the The New Shepard is actually suborbital and can in its current form only carry a commercial payload for about 3 minutes in microgravity, rather than launch a payload into orbit.⁶²

There are a couple things to consider here. One characteristic that pops out significantly in this statement is the use and promotion of the singular pronoun. If one — in other words, if someone specifically — can figure out how to make a cost-efficient reusable launch vehicle system, then space will be revolutionized, and an individual will have made that happen, as Bezos points out in calling his rocket-shaped vehicle a “game-changer.” The title of the SpaceX press release is also noteworthy, as reusability is associated not with an economic argument, but rather a moral objective: RLVs are key to making sure humanity persists. And so, we must invest in it. NewSpace leaders like Musk are not shy when it comes to proclaiming such ideas, and while it might seem from a public perspective these types of statements certainly add to the

⁶¹ SpaceX. "Reusability: The Key To Making Human Life Multiplanetary." News release, June 10, 2015. SpaceX. Accessed April 22, 2018. <http://www.spacex.com/news/2013/03/31/reusability-key-making-human-life-multi-planetary>.

⁶² Blue Origin. "First Commercial Payloads Onboard New Shepard." News release, December 21, 2017. Blue Origin. Accessed April 22, 2018. <http://ec2-174-129-141-77.compute-1.amazonaws.com/news/news/first-commercial-payloads-onboard-new-shepard>.

intrigue and even “newness” of the technology, a look at the history of space development will show that reusable launch vehicles have been the goal of the space industry from its start, regardless of whether those efforts have succeeded or not. In looking at the way NewSpace advocates characterize and promote this goal, it’s evident that it’s a core part of the movement’s philosophy and that the brand of NewSpace positions NASA as half-heartedly trying to achieve that goal. The rhetoric calls upon the audience to shift their trust toward the new vanguard of truly dedicated space entrepreneurs that claim they will be able to change the equation of low-cost access to space — in a way that also signals, as MacDonald wrote, that these individuals are important and possess both prestige and wealth. A look at the history will demonstrate that NASA, as well as its aerospace partners, have always focus on cheap access to space since the beginning of the space age and the only mechanism that has really changed from the past is the amount of money that individuals are able to pour into the RLV infrastructure.

3.1.2: An examination of OldSpace history verifies focus on low-costs and reusable launch vehicles not new

A basic Google search of articles around rocket reusability will show news coverage around NewSpace activities often fails to mention the fact that NASA, among other OldSpacers, had invested in reusable launch vehicles (RLVs) before. Not just that, these articles and coverage typically don’t mentions that investing in such technologies was not just a one-time ambition for OldSpacers, but empirically a major source of time, research, and investment. In fact, the notion of reusability goes all the way back to the 30s, when German rocket engineer Eugene Sänger wrote “The Technology of Rocket Flight.” These designs informed early discussions around the space shuttle, which “was envisioned as a fully reusable, commercial spaceplane.” What ended up happening with the shuttle, which debuted in 1981, is well known to the public. Though it

was intended to have reduced the cost of launch to orbit from \$10,000 per pound to \$1,000.⁶³ However, due to “considerable obstacles, budgetary shortfalls, some congressional opposition, increasing public apathy, and design difficulties,” the Space Shuttle emerged as a “smaller, semi-reusable vehicle, advertised as an economical and efficient means of space transport,”⁶⁴ with launches totaling around half a billion dollars each flight — a reality that NASA is often criticized for and what NewSpacers typically point to in discussing the need for a commercial space industry.

It’s important to remember, however, that from the onset of the space age, a focus on low-cost as a prerequisite to space development — and even investment into several RLV options — was always a goal of the agency. Moreover, the government wanted to work with the private sector in order to work toward this capability. In terms of actions, NASA as a research and development agency took the necessary steps to facilitate the growth of such technology and emphasize that low-cost capabilities would be necessary for long-term achievement.

Administrators even used the same metaphorical arguments that are often now employed today, with space historian Launius explaining in a chapter on space policy that, “some NASA officials even compared the older method of using ELVs like the Saturn V to operating a railroad and throwing away the locomotive,” every trip.⁶⁵ And, as Mark Bowles writes in his chapter, “Eclipsed by Tragedy,” the 70s were marked by a bold NASA-private partnership ambition to make reusable launch vehicles the instrument “for all future space initiatives,” as it potentially

⁶³ Launius, Roger. "The Space Shuttle and the Costly Nature of Space Access." Roger Launius's Blog (blog), March 6, 2015. Accessed April 22, 2018. <https://launiusr.wordpress.com/2015/03/06/the-space-shuttle-and-the-costly-nature-of-space-access/>.

⁶⁴ "Toward a History of the Space Shuttle." In *Monographs in Aerospace History*, compiled by Roger Launius and Aaron Gillette, 1-74. Washington: NASA Headquarters, 1992. Accessed April 22, 2018. https://history.nasa.gov/708235main_Shuttle_Bibliography_1-ebook.pdf. Annotated Bibliography.

⁶⁵ Launius, Roger D. "Episodes in the Evolution of Launch Vehicle Technology." Introduction to *To Reach the High Frontier: A History of U.S. Launch Vehicles*, by Dennis R. Jenkins, 1-33. Lexington, KY: University Press of Kentucky, 2002. Accessed April 22, 2018. Google Books.

promised a “new home for humans in space, a way to take advantage of other worldly resources, and the ability to extend the knowledge of the universe.”⁶⁶ To continue this focus on RLVS, in 1994 the White House as part of its National Space Transportation Policy developed by the Office of Science and Technology Policy in an effort to work on “technology development and demonstration for next-generation reusable space transportation systems,” simultaneous to the use of the space shuttle, recognizing that the program wasn’t as efficient as it was intended. With this, the agency developed its Reusable Launch Vehicle program, focusing on technologies like “advanced propulsion systems, reusable cryogenic tanks, composite primary structures, advanced thermal protection system, avionics and more-operable systems,” as the National Academies of Sciences, Engineering, and Medicine authors write.⁶⁷

The agency also conducted the Highly Reusable Space Transportation Study⁶⁸ to address the long-term challenge of reducing the costs to space, in an effort to enable a “revolutionary expansion of space activity and enterprise,” and make attempts at reducing the operations costs down to \$200 per payload pound to Low Earth Orbit, as Mankins notes.⁶⁹ He explains that the RLV program that NASA was developing at the time already validated “technology to enable industry to develop all-rocket reusable launch systems,” at costs of around \$1000 - \$2000 per payload pound, which at the time was a reduction in existing launch service pricing by a factor of 5. The proposals for these systems at the time sound similar to SpaceX’s own vertical landing

⁶⁶Bowles, Mark D. "Eclipsed by Tragedy: The Fated Mating of the Shuttle and Centaur." In *The Reach the High Frontier: A History of U.S. Launch Vehicles*, edited by Roger D. Launius and Dennis R. Jenkins, 415-42. Lexington, KY: University Press of Kentucky, 2002. Accessed April 22, 2018. Google Books.

⁶⁷Hartunian, Richard A. "Introduction." *Introduction to Reusable Launch Vehicle: Technology Development and Test Program*, 11-18. Washington, D.C.: National Academy Press, 1995. Accessed April 22, 2018. <https://www.nap.edu/read/5115/chapter/3>.

⁶⁸Haney, J. W. "Highly Reusable Space Transportation System Study." *Space Technology and Applications International Forum (STAIF - 97)* 387, no. 1 (1997). Accessed April 22, 2018. doi:10.1063/1.51914.

⁶⁹Mankins, John C. "Highly Reusable Space Transportation: Advanced Concepts and the Opening of the Space Frontier." *Acta Astronautica* 51, no. 10 (2002): 727-42. Accessed April 22, 2018. doi:10.1016/s0094-5765(02)00020-6.

systems, where Lockheed Martin proposed “a lifting body aeroshell with vertical liftoff and horizontal landing capability,” and McDonnell Douglas and Boeing proposed “a vertical takeoff/vertical lander.”⁷⁰ The effort resulted in numerous experimental planes, with the X-37, developed by Boeing having been flown the most times, and several others being canceled due to budget cuts. The main reason for the cancelation of these programs, their lack of efficacy and the empirical cost difficulties, they write, was due to “the simple economy analysis,” and the reality that “a primary hurdle to economically viable RLV” was the lack of a “high enough launch rate market for the vehicles to service,” as Rasky et. al find.⁷¹ Yet again, the history demonstrates a consistent commitment to the goal of lowering costs of access, from the moment the Apollo missions ended. Constant budgetary cutbacks needed for initial investments are arguably one of the more significant factors behind why the agency and the DOD were not able to fully achieve this goal.

NASA, however, continued to research technologies and incentivize private players to consider business models around them. At the same time NASA was spending billions of dollars on the ultimately costly and inefficient shuttle system, as well as pouring resources into research around reusable technology, commercial players were already stepping and investing in RLVs without a government top-down approach. If the argument to be made at the onset of alt.space motives was to be the novelty of space entrepreneurship, there were already numerous private space entrepreneurs that were trying to finance entirely reusable systems as well. Just as one example, physicist Walter Kistler and aerospace engineer Bob Citron formed a private company called Kistler Aerospace in 1993 with the intention of developing fully reusable launch vehicles.

⁷⁰ Ibid.

⁷¹ Rasky, Daniel, R. Bruce Pittman, and Mark Newfield. "The Reusable Launch Vehicle Challenge." AIAA Space 2006 Conference and Exhibit, September 2006, AIAA 2006-7208. Accessed April 22, 2018. doi:10.2514/6.2006-7208.

Interestingly, leading engineers at Kistler included George Mueller, who was head of NASA during the Apollo program, as well as Randy Brinkley, a former president of Boeing Satellite System. The company was the ultimate example of the NewSpace dream, seeking to develop its K-1 rocket without government funding and entirely through private capital. Eventually it even secured the support of NASA, which made plans to purchase commercial flights to the International Space Station after the shuttle program would be retired. But at the same time Kistler was representative of NewSpace funding around developing low cost access to space technologies, it was also a demonstration of just how difficult it was for a private company receiving venture capital — and even a government agency appealing to the public for tax dollar support — to get over the financial hurdle needed to actually successfully build the expensive reusable infrastructure and make it effective in the long-term. Ultimately, although the company was able to raise \$700 million in capital, it ended up filing for bankruptcy with debts of more than \$600 million by 2003.⁷²

NewSpace leaders like Musk and Bezos are not persuaded by the past failures, and part of that could be that they are spearheading a vision, a commitment to cheap access to space, where reusability and the technologies they are investing in is not only a matter of economics, it's a matter of committing to sending humans into the cosmos — and not just human astronauts, but tourists and explorers. The business case for that didn't work out for people like Walter Kistler (among many others); but as Tumlinson promotes, the RLV infrastructure could work out for a new wave of determined and wealthy entrepreneurs. And undoubtedly, as SpaceX's recent success has shown, it appears to be working. The entrepreneur and other NewSpace contributors are certainly driving down the cost of space launches, but it's still hard to argue that the ambition

⁷² Slotkin, Arthur L. *Doing the Impossible George E. Mueller and the Management of NASA's Human Spaceflight Program*. New York, NY: Springer New York, 2012. Accessed April 22, 2018. Google Books, 262.

— under the rhetorical umbrella of NewSpace — is actually in itself is all that new. History has shown that the ambition has always existed for budget strapped OldSpace visionaries, but now the business approach has simply evolved and tends to work for those with the means to make it happen.

Gary Hudson, the founder of the now-bankrupt Rotary Rocket, which tried to create reusable launch vehicles within the commercial before the start of the NewSpace movement, explained in a 2003 interview that really past efforts have failed as a matter of funding, and now “people of means” might be able to make it happen. In the interview, he notes that at the time there were “several comsat constellation projects in low earth orbit” and that these “promised to provide a solid market for a low cost vehicle that could carry replacement satellites to orbit.” But ultimately, those companies of Iridium and GlobalStar went bankrupt, and investment in Rotary— and notably— “several other startup RLV companies disappeared.”⁷³ Hudson responds to this market reality, saying, “it is really hard to convince anyone a private team with a few percent of the cash and 1/100th the staff can do better, but history is replete with stories of just how to do that.” But before that he explains, “the interest in new projects seems to be increasing, and a heartening sign is that people of means are funding their own projects, such as Elon Musk (SpaceX) and Jeff Bezos (Blue Origin).”⁷⁴

3.2: Case study 2 on the business approach: free enterprise start-up culture

Just as in the other case study, this thesis will not argue that start-up culture in the space industry is bad or will fail. Rather, it posits that this type of approach toward the sector is actionably not all that new. It’s actually another emergence of a past trend that didn’t stick. And

⁷³ Hudson, Gary. Interview by HobbySpace. HobbySpace. June 9, 2009. Accessed April 22, 2018. <https://www.hobbyspace.com/AAdmin/archive/Interviews/Systems/GaryHudson.html>.

⁷⁴ Ibid.

it also appears that history repeating in another way, as the sector sees these very start-ups toward building partnerships with the primary customer, being NASA, and being highly dependent upon government contracts just like past aerospace companies. Still these companies identifying as NewSpace are able to differentiate themselves. And, when observing the nuances between these types of businesses from the past and their current counterparts, this study will also show that the primary difference is the concentration of wealth — a reality that also harkens back to MacDonald’s argument that certain activities in the space sector are intended to demonstrate prestige. In fact, the industry has seen an upswing in the numbers of businesses that are highly tied to an unprecedentedly high amount of rich venture capitalist sources that are able to pour more money than ever into the types of companies they so choose. What this logic shows is that start-up culture within the industry is in fact not actionably new, even for the big aerospace companies that are termed as being old. Further, the study demonstrates that commercial space start-ups continued to arrive, in particular as the government tried to support their emergence, but many began to fail due to an unsustainable market. This reveals that the current era is not marked by a new type of culture or business approach to how space ought to be done, but rather really driven by economic wealth transitions that have allowed for more entrants to remain afloat — though with many of them going toward similar public-private partnerships that have always defined the industry.

3.2.1: NewSpace rhetoric paints a picture of a stifling government influence over economic activity, and free enterprise start-ups as opening the frontier

Rick Tumlinson’s 2003 testimony to congress lays out in very blunt terms the role of NASA in the future of space development, arguing the Silicon Valley leaders that have become interested in space should be left to their own devices for the advancement of spaceflight

programs. They are a new breed of innovators that develop technology through competition and incentives like the Peter Diamandis' Ansari X-Prize⁷⁵, managing to do what NASA has tried to do more effectively and more cost-effectively. So how does NASA fit into this trend? In his testimony, Tumlinson lays it out pretty bleakly:

“Let’s be frank. NASA as currently constituted cannot do the things I have outlined. It is bloated, self preservation oriented, and is spending its time wasting billions of our tax dollars re-inventing the wheel...Some call for the agency to be shut down, and I admit there are times I feel the same way. The private sector is already beginning its own space program, and the agency, especially its human space flight component, may soon be redundant...the contrast between the Alt. Space firms’ approach to space and NASA’s reveals a true split in the genetic line of the evolution of human space flight. Those who lead our nation can ignore this reality, try to stomp it to death, or embrace it, nurture it and leverage off of it for the greater good and glory of all Americans.”⁷⁶

NewSpace advocates for the “free enterprise” approach to space rooted in the Silicon Valley type of start-up culture as a means to truly revolutionize the space industry. In the testimony above, it’s evident that the NewSpace movement situates NASA as being a stifling government agency that needs to step aside for the sake of a new era of development. In his testimony, Tumlinson makes it clear that there is a “split” between contemporary space activities and what NASA did in the past, even calling it’s a divide in the “genetic line of the evolution of

⁷⁵ This competition last awarded company Scaled Composites, and was formed in the 90s after entrepreneur and space enthusiast Peter Diamandis developed the X-Prize to offer \$10 million to a winning start-up that could make a reusable spacecraft; it’s often credited as the start of commercial space. Information on this can be gleaned from Klerkx, *Lost in Space*.

⁷⁶ U.S. Congress. Senate. Committee on Commerce, Science and Transportation. Testimony of Rick Tumlinson Founder, Space Frontier Foundation. By Rick Tumlinson. 108 Cong. S. Doc. Accessed April 23, 2018. https://history.nasa.gov/columbia/Troxell/Columbia%20Web%20Site/Documents/Congress/Senate/OCTOBE~1/Tumlinson_test.htm.

human space flight,” a message that really this endeavor should be taken up by NewSpace actors that can really make change, unlike those who “lead our nation.” The language of his testimony demonstrates how NewSpace groups have tried to forge the idea of there being a divide within the space industry, as well as how they’ve managed to advertise that NewSpace entrepreneurs should be calling the shots around major ambitions like human spaceflight. The testimony certainly makes activities in the emergent private sector seem new, with their alternative way of doing space becoming the saving grace for the industry. Another 1997 press release, entitled “Foundation Calls NASA Commercialization a ‘Costly Joke,’” from the Space Frontier Foundation professes this sentiment even more boldly, claiming that the government has done nothing but prevent the development of a space economy overall. The title of the release even demonstrates how the NewSpace movement diminishes the agency’s efforts at trying to promote commercial activity:

“Many NASA managers see the private sector as a threat, not a potential partner.

What’s worse is that our allegedly free enterprise oriented Congress let’s the agency get away with this. It’s as if the mystique of space has them all hypnotized,” he said. “There’s a reason there is no economic boom in space. NASA’s bureaucracy has killed it. To the right staffers at the agency, space is theirs. Period. They do not want the great unwashed to play in their sandbox, and they don’t give a damn what it costs in today’s tax dollars or tomorrow’s lost opportunities for the American people.”⁷⁷

With language like this, NewSpace advocacy groups present the mechanism of funding as a moral necessity in space, arguing that NASA has failed the American people by wasting

⁷⁷ Space Frontier Foundation. "Foundation Calls NASA Commercialization Effort "A Costly Joke"." News release, February 2, 1997. Space Frontier Foundation. Accessed April 22, 2018.

their dollars and not funneling them into the more ethically responsible venue of free enterprise and decentralization. Though NASA was born as a socialist agency, where decisions and advances are the result of public influences, NewSpace argues that this perception is actually a lie and that bureaucracy has made space “theirs.” Subsequently, this camp believes the decision-making of space should be turned over to the new group of liberated start-ups, working outside the stalling influence of government and promoting a free-market economy that will finally make the frontier open to true advancement. One such NewSpace contender, Thomas Markusic — founder of Firefly Space System, Inc. and also a former SpaceX engineer — is a firm believer in this mission and mantra of the new space age. Like many of his counterparts, the current era of space development means taking on a Silicon Valley like approach, as well as decentralizing not only the realm of outer space, but also the business model of the industry so that “people truly feel that they are part of one organization with a singular mission for success.” In a 2016 interview with Ansys, Markusic lays this argument out clearly:

The "old space" paradigm was based on government control of space access, a culture characterized by bureaucracy and rules, and relatively slow, methodological progress. By contrast, "new space" is about picking up where the pioneers of the 1950s and the 1960s left off. It's about having a bold vision of providing high-speed space transport for civilians, creating re-usable vehicles that can orbit the Earth, and eventually colonizing other planets [...] By privatizing the space industry, we want to subvert the dominant big aerospace paradigm of slow progress and high costs. As a new space company, we are shifting to mass

production methods, rapid application of real-world lessons, and ubiquitous use of advanced design tools, such as simulation, that can help us move quickly.⁷⁸

This is the type of framework that Markusic and fellow NewSpacers are promoting present a value for fast innovation and creative ideas coming to the table; it's an age where picking up on the ideas of visionary pioneers of government-development enterprise now falls in the hands of those that can embrace failing often, and quickly, to reiterate, perfect and move forward — So what if a rocket blows up a few times? We'll fix it and move on until we get it right. These individuals argue that this type of approach is the only way to move the sector beyond its current standstill in momentum. Markusic, for example, uses the language of “big aerospace” companies and also associates them with being slow to innovate, which means there needs to be an emergence of new commercial players that can pick up “where the pioneers of the 1950s and the 1960s left off.” Significantly, NewSpace presents the start-up culture as being a new approach to how space ought to happen, one that new entrants in the sector are pioneering, much like NASA's early visionaries — people like Wernher Von Braun. Industry analysis group NewSpace Global's website sums up this culture in a description of what this new wave of companies represents and why the start-up culture has the power to signal not only a new era of space development, but also a better, more open approach to the industry where everyone can participate:

“Today, the “great innovation economy” of NewSpace is composed of nearly 1,000 companies worldwide. What was once dominated by few players is today an incredibly diverse ecosystem in terms of company sizes, business models and geographic locations. As with any great innovation economy — e.g. aviation,

⁷⁸ Markusic, Thomas. "The New Space Race." Interview. Ansys. 2016. Accessed April 23, 2018. <https://www.ansys.com/about-ansys/dimensions-magazine/volume-i-issue-1-2016/the-new-space-race>.

automotive, the PC, biotech, the Internet, and social networking -- humble beginnings often lead to integration with nearly every aspect of contemporary society. From garage and university-born startups to Global 1000s, the number of companies targeting growth around the commercialization of space increases almost daily. Today, the smart decision makers — including seasoned executives, university officials, heads of state, market analysts and finance professionals — understand the commercialization of space is not just "the future," it is happening now. They also know they must be informed to capitalize on the growing number of opportunities. As recent history shows us, to study a great innovation economy like the NewSpace industry even in its nascency is an investment worth making.”⁷⁹

Again, the language here is very similar to that of the Space Frontier Foundation, as well as Markusic, where NewSpace companies in their business approach are seen as providing a “great innovation economy.” These businesses are associated with the American dream idea of starting from “humble beginnings,” in the “garage and university-born startups,” toward “smart decision makers” making “the future” happen. In this way, these companies are positioned as being the more ethical approach to progressing the industry forward, where space is no longer limited to being “dominated by a few players,” and can finally become a “diverse ecosystem.” NewSpace is associated with this type of business approach not only because it’s the best mechanism for making actionable change in the industry, proponents say, but also because it’s being free enterprise is what is absolutely right. And, a look at how the media has perceived such language points to a trend of the public really buying into the argument that new commercial

⁷⁹ NewSpace Global." NewSpace Global. 2018. Accessed April 22, 2018. <https://newspaceglobal.com/home>.

entitites are changing the landscape and that the government had prevented these advances from happening in the past. For example, a 2017 article from The Conversation claims:

“The space environment is no longer the sole preserve of government agencies. Private companies have entered the exploration domain and are propelling the sector forward more vigorously and swiftly than would be the case if left to governments alone.”⁸⁰

It’s evident that NewSpace companies and their advocates are sending a message to those outside and within the industry that supporting a free market approach is key to decentralization of the space sector, and this move must happen because it’s ethically necessary. But, the language certainly skirts around the past efforts of the government in promoting opportunities for commercial companies to enter the industry, and only really positions the government as stifling of private sector efforts. The following section will show, however, that neither start-up culture is new, and that public-private partnerships, as well as government promotion of new entrants into the industry, has always happened.

3.2.2: Oldspace is rooted in start-up culture and actively promotes it

Thrills and perks of start-ups typically tend to take a backseat to actual financial health and sustainability once a business is able to move from working in the negative to finding a marketable product and scaling it to make a profit. This is one of the most fundamental criticisms of entrepreneurs so eagerly using the language of a start-up mentality. Any individual with venture capital can start a company intended to “shake up” the industry, but that start-up typically can only leave a mark once it starts to take on the very same business hierarchical

⁸⁰ Grady, Monica. "Private Companies Are Launching a New Space Race – Here’s What to Expect." The Conversation, October 3, 2017. Accessed April 23, 2018. <https://theconversation.com/private-companies-are-launching-a-new-space-race-heres-what-to-expect-80697>.

model that it once worked against; inevitably, the uncertainty has to be replaced with certainty, and bets on majorly ambitious projects are going to be considered more thoughtfully. This reality has demonstrated itself throughout the history of aerospace. In fact, OldSpace is rooted in start-up culture, and it has even supported this culture through incentives for decades, which allowed for many space ventures to emerge as early as the 80s. While many new entrants in the NewSpace arena argue that the emergent wave of space excitement is part of a new era, it really continues from a historical trend, where OldSpace stakeholders actively supported the emergence of new commercial players.

At the start of their space careers, people like Musk, Bezos and Branson, among the veracious other entrepreneurs dominating the field, had a lot in common with William Boeing, who possessed a great deal of capital and decided to start a company based on his personal fascination toward human flight. And just like his NewSpace contemporaries, Boeing was a risk taker. He left Yale University in 1903 to get into the uncertain timber industry, eventually managing to start the Greenwood Timber Company, and used those profits — as well as personal inherited wealth — to finance his own personal interest in aviation. Becoming interested in how to make a better airplane design, Boeing decided to build a company around his own ambition to construct the perfect airliner and used his own money to get the business going. Importantly, at the time there wasn't much of a market for commercial aviation operations, as “the early aircraft market was primarily one of wealthy sportsmen and adventurers attracted to the excitement and novelty of flight,” which is fairly similar to the modern-day commercial space industry:

“The tiny company conducted research, sought patents, built an unusually training plane, taught flying, and had an especially intense, yet utterly fruitless, fling with

pontoons. These stages constitute Boeing's start-up era, the company's forgotten early years before it assumed its modern form as a manufacturer."⁸¹

Boeing was a shrewd businessman. He formed relationships with potential competitors, namely the Martin Company, studied their flaws, and secretly developed the technology he thought would change the marketplace. Spitzer writes that in the beginning the company's assets, "would not allow it to be a production company, but were sufficient for it to be a high-tech venture," until finally, in December 1917, the company received an order for 50 of its unique Model C aircraft, with a \$600,000 contract. Subsequently, Boeing could no longer treat the company like a hobby or a small personal business project; the order for multiple aircraft, "ended a forgotten era of experimentation," and began operating as a "for-profit business."⁸² Similarly, Raytheon, which is currently one of the nation's leading defense and industrial corporations, now developing electronics and defense system units, including satellite components and systems, among other products for government and commercial customers, began as a small company that raised venture capital. It got its start based on the vision and determination of three friends and science advocates. The three friends managed to raise \$50,000 in venture capital, and after unsuccessfully spending part of it to make a fancy refrigerator, bet it on their original S tube innovation — which ended up transforming the radio industry, eliminating the former cumbersome design of the radio equipment by getting rid of large batteries. And by 1925, the company was making a profit, taking on that year the name Raytheon Manufacturing Company. And after surfacing from the difficulties of economic depression, Raytheon and its founders stayed strong and became a prime developer during the Second World War, after which it emerged as a "vastly larger company than it had been just a few years earlier." As its production

⁸¹ Spitzer, Paul. "Boeing as a Start-Up Company, 1915-1917." *The Pacific Northwest Quarterly* 95, no. 3 (Summer 2004): 140-48. Accessed April 22, 2018. <http://www.jstor.org/stable/40491760>.

⁸² *Ibid.*

increased by a factor of forty and employment skyrocketed to nearly 16,000, “the company would never be the same.”⁸³

Of course today, the latest iteration of Boeing and Raytheon gets jumbled into the OldSpace terminology, where OldSpace still refers to having the characteristic of being slow to innovate. Boeing, as one of the prime contractors for NASA and the DOD, is often perceived as being one of those monolithic corporations where free creativity is challenged. But, Boeing has also existed for over a century, and NewSpace advocates citing the glamor of start-up culture and its ability to shake up the industry typically forget that even this big firm got its start taking exactly the same approach. Raytheon too was born out of individual efforts and venture capital funding. Just like any start-up that becomes much bigger, processes around employee management must emerge and it typically gets called bureaucratic. But for its time, Raytheon only got into the industry and stayed in it because it was developing something valuable and new — a reality that helps the typical start-up move to a full-fledged company, and unfortunately lose all the perks it once had. This is an important factor to consider, because the rhetoric surrounding OldSpace tends to argue that businesses like Boeing have always been dominated by government influence — and while that may be true throughout its lengthy history — the move away from the risk-heavy approach is a reality that often takes over businesses when they move from being entrepreneurial to actually successful players in a competitive marketplace, with responsibilities to customers and employees.

The history clearly shows that the NewSpace identity of existing around a start-up framework is actually not very new to the industry at all. In terms actions taken, OldSpace counterparts also began as start-ups but took on the normal transition of becoming a for-profit,

⁸³ Earls, Alan R., and Robert E. Edwards. *Raytheon Company: The First Sixty Years*. Charleston, SC: Arcadia Publishing, 2005. Accessed April 22, 2018. Google Books., 9-22.

full-fledged business. As a qualifier for older companies in this sector, this terminology clearly is more of a brand or marketing technique to help set new entrants apart than actually being grounded in historical reality. However, if an argument is to be made that NewSpace really only regards commercial companies, rather than private ones, the history will still show that commercial start-ups emerged as early as the 80s and were highly supported, even encouraged and incentivized by the government. NewSpace era advocates will typically argue that these aerospace companies tended to dominate the industry via public-private partnerships that eventually resulted in the dominance of a few major market holders, where commercial start-ups weren't able to compete. This section, however, will demonstrate the government has been taking the steps necessary to open up the commercial space industry, with many start-ups emerging but failing to build sustainable business models without significant public support. This study will build upon that argument, showing that so-called NewSpacers are following this same historical trajectory, but their emergence and ability to stick in the marketplace is highly tied to the amount of venture capital they are able to glean.

Documents from as early as the 70s shows NASA's supportive attitude toward both public and private access to technical achievements from the agency, as well as the mutual advancement these sectors ought to be working toward. For instance, an April 1970 report entitled, "Economic Impact of Stimulated Technological activity," written for agency's headquarters demonstrates this imperative, with report authors writing that there's a need to confront risks and take bold moves in the sector, just as NewSpacers proclaim today. Furthermore, Reagan throughout the 80s stayed committed to fostering private company growth, with the passage of the Commercial Space Launch Act to open up a market for American companies to develop launch services. And following this, Clinton also issued his first national

space policy proposal to strengthen the private sector further through the NSDD 94, “Commercialization of Expendable Launch Vehicles,” which stated verbatim:

“U.S. Government fully endorses and will facilitate the commercialization of U.S. Expendable Launch Vehicles. The U.S. Government will license, supervise, and/or regulate U.S. commercial ELV operations only to the extent required to meet its national and international obligations and to ensure public safety.”⁸⁴

The reality, however, was that U.S. launch firms “remained largely uninterested in offering commercial launch services, finding it difficult to compete” with the shuttle. Even so, Reagan took more concrete steps to open up the commercial launch market when he declared the shuttle — following the Challenger disaster — wouldn’t be carrying commercial payloads. As the Niskanen Center writes, his declaration explicitly asked for the government to “purchase commercial capabilities, avoid crowding out private investment where possible, and take as light an approach to commercial space regulation as possible.”⁸⁵ The Bush administration followed up on this rhetoric, incorporating commercial launch capabilities into the nation’s overall space transportation strategy; the Clinton administration as well emphasized the importance of “free and fair trade” in the American commercial space sector.⁸⁶ And to put actions to lip service, in 1994 the Air Force actually began the EELV, or evolved expendable launch vehicle program. The U.S. government foresaw ahead of the formal adoption of the term NewSpace the necessity of developing of a “robust commercial launch market that would provide sufficient rate and throughput necessary to provide low cost and reliable launch systems across a broad industrial

⁸⁴ Federal Aviation Administration. "Origins of the Commercial Space Industry." FAA Milestones and Events. 2017. Accessed April 22, 2018. https://www.faa.gov/about/history/milestones/media/Commercial_Space_Industry.pdf.

⁸⁵ Hampson, Joshua. The Future of Space Commercialization. Research Paper. Niskanen Center, 2017. Accessed April 22, 2018.

<https://science.house.gov/sites/republicans.science.house.gov/files/documents/TheFutureofSpaceCommercializationFinal.pdf>.

⁸⁶ Ibid.

base,” as noted by the Air Force Space Command.⁸⁷ The intention of the program was to provide critical space support while “fostering interagency and commercial cooperation.”

Just one of many companies that emerged from the opening in the commercial sector was Space Services Inc. Its founder, David Hannah, was a determined entrepreneur who assembled a team to start building a rocket. With just some support from NASA, which eventually agreed to provide the company with a Minuteman booster for \$340,000, Space Services Inc. launched the Conestoga I, which on September 8, 1982 became the first privately funded rocket to reach space. Despite the hype, the economic reality was simply that the space market was not amenable to a commercial industry. The company launched another rocket in 1989, but was eventually purchased by EER Systems, which also got out of the rocket business shortly after. The early history of Space Services Inc. is an analogue to the efforts of commercial NewSpace start-ups, and certainly a story of firsts for commercial space — most notably the first time NASA had agreed to purchase commercial launch services from a private company. Though the company endured a short-lived romance with the launch market, it was evident that long before events like the Ansari X-Prize that entrepreneurs in the sector were already emerging and had been for quite some time. But, as a 1990s New York Times article characterizes it, the search for a space market outside NASA was just too difficult of a task, particularly for those with limited capital. On the fate of Space Services Inc. the article notes:

“But after spending 10 years and some \$19 million seeking a profitable niche launching small satellites high into space for government and commercial customers, Space Services does seem to be swooping very low, or, indeed, about to

⁸⁷ "Evolved Expendable Launch Vehicle." Air Force Space Command. March 22, 2017. Accessed April 22, 2018. <http://www.afspc.af.mil/About-Us/Fact-Sheets/Article/249026/evolved-expendable-launch-vehicle/>.

crash. The story of the company's dramatic attempts to survive contain a number of important lessons for commercializing and exploring space in the decades to come.”⁸⁸

The article still issues a word of hope. It seems that even in the early 90s, the commercial sector was already developing — slowly but surely — as NASA was taking steps to open up the market. In fact the same New York Times piece explains that already “electronics companies,” were finding “that more and more power can be put into small 1,000-pound satellites,” and “as a result, 36 corporations, universities and other organizations are now working on small-satellite projects.”⁸⁹ It’s clear NASA early on was ready to give companies like Space Services Inc. a launch contract, but the company bellied up once its main venture capital investor decided to pull out. This is a key point, because while NewSpacers often point to the government as stifling innovation and the commercial sector, it actually tried to build it up — but venture capitalists ultimately made the decision on whether to keep many of these companies around. This same dynamic persists today, with more money circulating around just a few venture capital space investment firms. This analysis is shown in the article, as the author writes at the time NASA and DOD were under way to purchase commercial launching services for niche smaller satellites. However, the article citing space analyst David Wicks makes a point that “unfortunately, there is a saying in the venture-capital industry that pioneers end up with arrows in their backs.”⁹⁰ The article notes:

“A Commerce Department study of five other companies seeking to become established in commercial space ventures found that all have faced the same

⁸⁸ Cushman, John H. "Earthly Risks of Business in Space." New York Times, 1990. Accessed April 23, 2018. <https://www.nytimes.com/1990/08/26/business/earthly-risks-of-business-in-space.html>.

⁸⁹ Ibid.

⁹⁰ Ibid.

financial obstacle - finding a strategic investor with enough money and patience - with varying degrees of success. [...] The investment limits of venture capitalists are usually modest compared with the immense capital needs that typify the aerospace industry, the study found. They "like to see the opportunity in a business plan to make five times their investment in three to five years," the study concluded. "These are severe challenges for space-related projects."⁹¹

Thus, what this section demonstrates is that as a business approach, the start-up mentality has always been a part of the OldSpace culture, even though it gets branded as being primarily slow and stifled by government whims. In actuality, start-up culture has always existed in the industry and governments have welcomed the opportunity to work with them, but many of these businesses failed. The relative success of the emergent commercial sector contributes to the novelty of the current era, but as the history shows, this activity is pretty standard, but now there is more wealth to ensure more of these ventures are successful. Significantly, a great deal of the financing is still in the hands of the few venture capitalists sponsoring the firms — which also showcases MacDonald's signaling argument once again, where the use of NewSpace is a brand of differentiation rather than truly a new era.

3.3: Case study 3 on the long-term ambition: Opening the space frontier to human settlement and economic activity

This final case study explores the long-term ambition of opening the space frontier to human settlement and activity. When it comes to the NewSpace movement, it's evident that the main proponents of this idea exist under the umbrella of a more futurist O'Neillian concept of how space should happen. An examination of the rhetoric shows that contemporary space

⁹¹ Ibid.

industry folks will often times position NASA as being backward and incapable of providing the type of future they want; however, a look at the history of space development will show that NASA has always been at the forefront of the long-term ambition of opening the frontier. However, the reality of funding and needing to meet the demands of the public has made it difficult for the agency to be able to singularly focus on human spaceflight — a luxury that is afforded to wealthy private sector individuals that can determine their business models for themselves. This case study will demonstrate the ambition is not a uniquely NewSpace goal and that the true difference exists in, yet again, the mechanism of funding.

3.3.1: NewSpace positions government as not being able to send humanity to cosmos

Following the excitement of the Apollo era, critics of NASA began to observe that the agency didn't seem like it was going to complete another major human spaceflight mission. Soon the agency began to take on the identity of being OldSpace with an acronym meaning for some to be “Not About Space Anymore.” In *Lost in Space*, Greg Klerkx writes that the reality is that “NASA is both more and less than the sum of its parts, of where there are many and of which few are in agreement about anything at any given time,” meaning that perceived restrictions on innovation were due to the nature of bureaucracy. He adds there were “never-ending turf wars for internal and external funding, political control and public-affection that shape up like existential title fights,” making it difficult for certain projects to make it through.⁹²

“What NASA insiders have known for years...is that there is no ‘NASA’; or rather, there are multiple ‘NASA’s. Which one you deal with largely determines whether you feel ‘NASA’ is a beleaguered repository of genius fighting to carry

⁹² Klerkx, Greg. *Lost in Space: The Fall of NASA and the Dream of a New Space Age*. New York: Vintage Books, 2005., 148.

humanity into the final frontier, or a lumbering dinosaur that has by virtue of its size and reputation managed to outlive its evolutionary window.”⁹³

Robert Zubrin, founder of the Mars Society as well as a leading figure of the NewSpace movement, does a better job of a little less brutally explaining NASA’s perceived inability to push humanity into the next frontier — a step that NewSpacers truly believe in and liken to Frederick Jackson Turner’s frontier thesis, where going out in search of new terrains is intrinsic to the American democratic characteristic of not being chained down or pushed around by some hierarchical order. At the 2017 Mars Society convention, Zubrin, in conversation with Carol Stoker of NASA Ames Research Center, explains that NASA has done exceptional things in its past, but that doesn’t necessarily have the same passion about manned missions as it once did, particularly following the Challenger disaster in 1996.

“Why have the space astronomy and robotic exploration programs been so productive, whereas the manned space program, with the exception of Apollo and the Hubble Space Telescope has been unproductive, scandalously so?” posited Zubrin at the panel. “It’s because the astronomy program and the robotic exploration program are mission driven. They are spending money to do great things; they are not doing things in order to spend a great deal of money. This is the key distinction...if they were to say our objective is to establish humans on the moon and mars and what’s the most efficient way to do that then they could become equally productive as these other programs...”⁹⁴

⁹³ Ibid., 150.

⁹⁴ Panel: What Should Be the Way Ahead for NASA? - 20th Annual International Mars Society Convention. Performed by Robert Zubrin, Carol Stoker, Craig Davidson and Rick Tumlinson. Irvine, CA: The Mars Society, 2017. Accessed April 22, 2018. <https://www.youtube.com/watch?v=EK8Zhgy5qXQ>.

Here, Zubrin is spinning a common NewSpace argument in a way that seems a bit more objective in reasoning. He explains that NASA hasn't actually been a failure of an agency; it's completed a number of scientific missions that are truly profound and exceptional. But ultimately, he arrives at the same conclusion that NewSpacers have — which is that NASA isn't focused on human spaceflight and that this mission should perhaps move toward private sector groups that are truly dedicated to it. Thus, the idea of focusing on long-term human spaceflight and “opening the frontier” to human settlement and economic development is one of the defining characteristics of the terminology and the movement. In an article by Eric Berger, Tumlinson explains that he remembers how NASA used to be a sort of magical entity to him, delivering on his wildest imaginations of deepest corners of the galaxies. “It was the Wizard of Oz,” said Tumlinson to Berger. “There was nobody behind the curtain. But now it's moved outside the government. And frankly, it kind of saddens me, because no one is betting on the government to deliver the future any more.” In an attached video, Tumlinson expounds upon this — elaborating that now NewSpace as an idea has become a belief system that provides a renewed faith toward the possibilities of human extension into the cosmos, which OldSpace has failed to keep alive. “This really is a faith, there is a faith to this a belief in something we cannot exactly prove, but that somehow if we open the frontier, civilization will be improved. If we open the frontier that will be sort of a manifestation of why we are here, and that's where these guys are coming from [people like Musk and Bezos]. Again, if I had said this to you 15 years ago, I would have sounded crazy...but now we've got these guys showing up...” explained Tumlinson, who adds that what NewSpace has to offer is no longer just the familiar lip service of OldSpace goals, but the actual business models and economic rationale to back up the ultimate goal of long-term human settlement within the next obvious frontier.

“Elon Musk, by himself, based on the economics of what he’s doing with SpaceX, maybe combined with a Branson or Bezos could go to Mars, by himself! SO here we are having this big wrangling typical discussion that we always have in the Washington beltway world about the cost and how many billions and trillions it’s going to cost to do these things over the next 20 years, and here’s some guys who can do it on their own in the next 15... Elon says he’s going to Mars in the year 2026, and in another place, another age, another time — that would be laughable. When a guy like that now and here says that it’s very very serious.”

And genuinely, for the most part, the types of NewSpace activities that are often most at the forefront of the industry are the ones that are intended to make humans the main focus. People like Bezos, who are developing economic models around the space industry, are certainly tapping into a publicly popular argument that expanding humanity into other parts of the solar system is absolutely necessary. For them, the science doesn’t matter; it’s about the technologies and the capabilities to finally get where humans need to be going in order to exist indefinitely. It’s also about taking the risks and spending the enormous amounts of capital that would be necessary to visit and potentially colonize another planet — or broadly, open up the frontier to human settlement. Even in trying to present itself as being dedicated toward the goal of human spaceflight, NASA offers more of a vague promise than anything else. When directly comparing this statement of intent against those of Blue Origin and SpaceX, for example, it’s becomes more difficult to dispute that NewSpace companies are perhaps more aligned with the ambition of opening up the frontier to human settlement than OldSpacers. Or at least, it seems from an there’s a passing off of the torch from NASA, during its days of Apollo-type missions, to

NewSpacer’s heavy lift rocket launches positioned on the pathway to the Moon, Mars and beyond — and not just for exploration, but the future of human life. Consider the mission statements of SpaceX and Blue Origin:

“SpaceX designs, manufactures and launches advanced rockets and spacecraft. The company was founded in 2002 to revolutionize space technology, with the ultimate goal of enabling people to live on other planets.”⁹⁵ — SpaceX website mission statement, 2018

“Earth, in all its beauty, is just our starting place. We are of blue origin, and here is where it begins.”⁹⁶ — Blue Origin website mission statement, 2018.

The inconsistency in NASA, or the OldSpace approach, to human spaceflight, says Tumlinson will not result in any concrete moves into the next frontier. The new age of spaceflight isn’t about just financing the big rockets and laying out the mission plans, it’s now about actually “getting there,” as Zubrin noted at the Mars Society conference. The difference between NewSpace and NASA now is the emphasis on the concrete engineering action — like the Von Braunians of OldSpace had initially wanted. The objective of focusing on the science and the question of how humans can survive in space is one many NewSpacers, like Zubrin, now think that NASA is exclusively and only going to be able to focus on into the near future. This is apparent in the language of NewSpace leaders, with Musk arguing that we must colonize Mars to save the human race from the impending doom of ecological devastation or certain extinction on

⁹⁵ "SpaceX." SpaceX. November 28, 2012. Accessed April 23, 2018. <http://www.spacex.com/about>.

⁹⁶ "Blue Origin." Blue Origin. 2018. Accessed April 23, 2018. <https://www.blueorigin.com/>.

Earth. And, there's Bezos, who said at a coding conference that he didn't want a 'Plan B' for Earth⁹⁷; instead, he wanted to use space to save Earth by turning the extraterrestrial realm into an industrial center. The ideas professed both on the company websites, as well as in the press releases appears to be percolating throughout the industry, even to the point where NASA advocates like Carol Stoker of NASA Ames Research Center even explained at the 2017 Mars Society convention that NASA is perhaps not as committed to opening the frontier as it was before, particularly after the Challenger disaster:

“In 1981, we were not that far from Apollo that we actually had a lot of both the can-do spirit and the capability, you know, the hardware, to have gone you know probably by the mid-1970s easily to a lunar base and a permanent presence. The Wernher von Braun plan that put in front of then Vice President Spiro Agnew was actually to land humans on Mars in 1984, and had we gone ahead with what we were doing at the time of Apollo we would have easily made that milestone,” she said.⁹⁸

The idea that NewSpacers now deserve public faith in being able to open up the space frontier to human settlement is clearly spreading throughout the space industry and even the media. However, the question of whether OldSpace groups like NASA and its so-called big aerospace partners have tried to do the same is a bit of a no-brainer. The following section shows that this long-term ambition of opening up the frontier to humanity — especially since NASA and its government counterparts, are the only groups that have been able to sustain humans actually living and working in space such as through the International Space Station — shows that this idea is more a matter of rhetoric and than actual reality.

⁹⁷ Grush, Loren. "Jeff Bezos: 'I Don't Want a Plan B for Earth'." *The Verge*, June 1, 2016. Accessed April 23, 2018. <https://www.theverge.com/2016/6/1/11830206/jeff-bezos-blue-origin-save-earth-code-conference-interview>.

⁹⁸ *The Mars Society* 2017.

3.3.2: OldSpace has always worked toward opening the frontier, and still is — but is subject to the public and funding

“For the past half century the intriguing possibility of traveling to Mars in a spaceship has challenged the imagination of many men...” So opens a scene from episode “Mars and Beyond,” of the 1950s Disneyland television series on space, featuring the well known German rocket engineer and pioneer of the American space program, Wernher Von Braun, pointing toward a model of a circular, rotating spacecraft, accurately designed to carry men on a year and a half long mission to The Red Planet. The “science-factual” tale — as Disney called it — centered on considering the future and invited the viewer to tap into her broadest sense of imagination:

“When Earth's man finally walks upon the sands of Mars, what will confront him in this mysterious new world? Will any of his conceptions of strange and exotic Martian life prove to be true? Will he find the remains of a long-dead civilization or will the more conservative opinions of present-day science be borne out with the discovery of a cold and barren planet where only a low form of vegetable life struggles to survive? These questions will be answered by our space pioneers of the future. In solving the enigma of the Red Planet Mars, man may find a key that opens the first small door to the universe, carried forward on the wings of modern science. Man, in the years that follow, may discover the miracle of life as it exists in all its countless forms throughout an infinite creation.”⁹⁹

The series was made with the intention of getting the American public excited about the prospect of going to the Moon, and potentially beyond into the solar system, at a time when

⁹⁹ Disney's 1957 Mars & Beyond 6 of 6: Travel to Mars. Produced by Walt Disney. Performed by Wernher Von Braun. Disney Studios, 1957. Accessed April 23, 2018. <https://www.youtube.com/watch?v=esYyOnz76NU&t=70s>.

space travel was considered to be merely the stuff of science fiction. Produced with the help of Von Braun, a master of science publicity, the episodes were not only scientifically accurate, but also entertaining, magical and designed to convince swaths of the population about the limitless possibilities of a rocket, which “if backed by an organized and well-supported space program, ‘could be built and tested within ten years.’”¹⁰⁰ Unfortunately, the needs of the military did not align with the more exploratory and expensive ambitions of NASA, and for the most part they still haven’t. In looking at the history of NASA it’s evident that the agency is more focused on scientific missions and research development; and in terms of human spaceflight, the agency gets particularly looked upon with a critical eye, because taxpayers saw Apollo as being incredibly expensive, as well as the shuttle program. But truly, right after the Apollo mission, people like Von Braun all through the agency were staunch supporters of modern day efforts like SpaceX and its daring CEO Elon Musk for the ultimate goal of turning humans into an interplanetary species.

While the days of the shuttle were truly meant to offer that new era of space visionaries were seeking, the reality is simply that the government agency couldn’t and still can’t really act on those dreams without the necessary funding. Howard E. McCurdy, in his book *Space and the American Imagination* charts over the development of the space age the American government’s decision-making around planetary exploration. Underneath a photo of the 1997 Pathfinder mission to Mars, he writes that the notion of how difficult human spaceflight would only occur to agency much later. But at the same time, the agency continued make promises to the American public about what it could do as a space-faring organization, with public facing disappointments along the way. From its inception, NASA has made it clear that human

¹⁰⁰ Scott, David, and Richard Jurek. *Marketing the Moon: The Selling of the Apollo Lunar Program*. Cambridge, MA: MIT Press, 2014.

spaceflight is both risky and extremely expensive, and has consistently argued that for these reasons government and big aerospace companies should be overseeing it.¹⁰¹ Solomon writes that undoubtedly, the Apollo program was the “crowning glory” of NASA, but unfortunately the agency “had nowhere to go but down after the successful mission.”¹⁰² But still in 1972, NASA forged ahead — at least from a scientific perspective. The agency in the post-Apollo era proceeded to launch the Skylab, which became the site of almost 300 scientific experiments, until it fell out of orbit in 1979. This was followed by a number of other successful ventures, such as Viking I, which orbited Mars, and Project Voyager, which sent a fly by spacecraft to record data from Jupiter, Saturn, Uranus, and Neptune. The agency also launched a number of important satellites, such as Landsat and the Lunar Prospector and Clementine missions to look for water on the Moon. Such missions occurred during the 80s and into the 90s, the same time period that other people in the space community saw NASA as being stagnant.¹⁰³

Moreover, NASA also worked hard, regardless of the budgetary constraints, to develop its human spaceflight program. As the previous case studies show, officials sought to create a reusable spacecraft that would make human space travel more cost-effective. However, since the agency wasn’t able to acquire the amount of funding it needed to actually develop the technology, it had to cut costs and change the design. In its ultimate form, the Space Shuttle was designed to carry scientific and other types of important military satellite into orbit, as well as accommodate a flight crew of around ten people — which wasn’t what NASA officials initially intended. Then the Challenger shuttle disaster in 1986 signaled a complete turning point in NASA’s human spaceflight program. Solomon writes that the aftermath of the event made it

¹⁰¹ Solomon, Lewis D. *The Privatization of Space Exploration: Business, Technology, Law and Policy*. New Jersey: New Brunswick, 2008.

¹⁰² *Ibid.*, 19.

¹⁰³ *Ibid.*

seem as though Americans had completely lost faith in NASA, which caused the agency to become more cautious and introspective, constantly assessing the safety and reliability of its shuttle technology — a reality that has contributed to the agency’s slow pace toward a human spaceflight mission.

NASA continues to do amazing scientific work; for instance, it landed the Mars pathfinder on the surface of Mars, an incredible engineering feat. And now, the Cassini spacecraft is delivering back to Earth incredible photos of the void between Saturn and its rings. But due to its rocky history with human spaceflight, NASA, even with its outstanding scientific technology, is now understood as being “Old,” outdated, and inefficient. In 1992, then NASA administrator Dan Goldin even launched a program called the Faster, Better, Cheaper initiative for planetary science, which was an attempt to change the agency’s reputation and propel it toward human spaceflight mission. Wohlforth and Hendrix write their book *Beyond Earth* that the organization was really trying to learn from earlier failures, focusing on strengths, and empowering individual teams, in an attempt to copy Silicon Valley type of focus on taking risks and reiterating quickly.¹⁰⁴ With this competition, a NASA team was able to create the Near Earth Asteroid Rendezvous mission, which only took twenty-seven months and cost \$234 million. The mission studied the surface of the asteroid Eros and even landed on it. Given a decent track-record of discovery, it’s difficult to understand how NASA has had so much difficulty selling itself as the agency that’s ‘making space happen.’ The reality was simply that while the spaceflight program stalled, “planetary science grew and thrived,” and NewSpacers tend to focus on the former, while NASA doesn’t get much credit for the scientific focus.¹⁰⁵

¹⁰⁴ Wohlforth, Charles P., and Amanda R. Hendrix. *Beyond Earth: Our Path to a New Home in the Planets*. New York: Vintage Books, a Division of Penguin Random House LLC, 2017.

¹⁰⁵ *Ibid.*

For instance, when it came to Mars exploration, Robert Markley in his article, “Red Planet Scientific and Cultural Encounters,” charted NASA and the public’s interest in continuing to research even the possibility of going to the Red Planet. He argued that each renewed endeavor was the product of whether or not the agency was able to find anything that was even remotely indicative of life — something that could affirm whether going there would be of worth to humanity. Whether or not it was too much of an investment depended on level of interest even if it wasn’t a good idea. The Mars Mariner program, he writes, was described as “an ambitious prelude to a heroic but overhyped strategy to colonize Mars before 2020.” There wasn’t enough valuable emphasis on the technological advances or feasibility of the idea. And of course, the U.S. had to scale it back because it was too far of a jump. Unfortunately, McCurdy writes, “the reality of space exploration, during the early years of venture,” was far different from the “romantic vision offered by advocates of cosmic flight.” And this situation meant that the “truth or validity of the vision” was often irrelevant to the feasibility of its undertaking.

Today, this divide between the public, scientists and industry persists in terms of a consensus over the importance of including humans in a future space mission. For instance, the Pew Research Center’s 2014 survey of adults and scientists from the American Association for Advancement of Science found that while 59% of Americans “view that human astronauts are an essential part of future U.S. space exploration,” only 47% of AAAS scientists say they are necessary.¹⁰⁶ Even more reflective of the divide is the language and intent of the original Space Act of 1958, which established NASA and laid out the eight main objectives of the U.S. civilian space program. Within this, the act explicitly says that the main objective of the agency is to work toward activities that accomplish either the “expansion of human knowledge of

¹⁰⁶ Kennedy, Brian. "5 Facts about Americans' Views on Space Exploration." Pew Research Center, July 14, 2015. Accessed April 23, 2018. <http://www.pewresearch.org/fact-tank/2015/07/14/5-facts-about-americans-views-on-space-exploration/>.

phenomena in the atmosphere and space,” the establishment of studies that would use aerospace activities “for peaceful and scientific purposes,” and “the preservation of the role of the United States as a leader in aeronautical and space science and technology,” while making relevant discoveries accessible to the military and national defense, but no explicit mention of human spaceflight.¹⁰⁷ NASA’s sort of lived up to this, evolving into a program centered on science and the possibility of further human flight to the Moon and beyond — but, it has nonetheless always been dedicated to opening up the frontier to human expansion, counter to what NewSpacers promote.

Chapter 4: Results and Analysis — Key Takeaways

When observing the grandeur of events like the launch of Falcon Heavy and a Tesla into orbit, it’s easy for the allure of NewSpace to stand by itself, without the audience member necessarily considering the origins or the utility of such rhetoric. But understanding what NewSpace brings or could bring is important, particularly as wealthy and powerful individuals such as Elon Musk and Jeff Bezos take on the sector, hoping to as they claim, change the trajectory of humanity. If NewSpace is truly a change in the pioneers of the next frontier — from the hands of government to the efforts of a few — what can we be expecting as a society? Is NewSpace really going to usher in a new age of sending humanity into the furthest parts of the cosmos, or just merely the same old economic transition that happens in most other types of industries, or perhaps even continuation of the status quo? The previous case studies have demonstrated that NewSpace is effectively the same as OldSpace and that the terminology serves as a branding mechanism that signals change and positions efforts of past space developers as

¹⁰⁷ U.S. Congress. National Aeronautics and Space Act of 1958, as Amended, and Related Legislation. Cong. Bill. Washington: U.S. G.P.O., 1983.

being old or ineffective. This part of the thesis reviews the results of this study and provides analysis around the nuances of the true differences between NewSpace and OldSpace, while Chapter 5 will draw out the implications of this study.

4.1: Case study 1 takeaway — NewSpace companies’ investment in reusable launch vehicles and focus on cheap access to space not novel, but the amount of wealth is

Any good businessman will take a nod from history. In determining what to put money into, the obvious logic to follow would be to consider economic endeavors of the past, look towards which ones worked and which ones failed. But even though numerous private entrepreneurs failed to see the cost-savings benefits of investing in reusability — either because of the technology itself was too expensive or the market ultimately fell flat — Musk and other NewSpacers today have whole-sale invested in this goal as part of opening of the space frontier. However, the economic argument around reusability is still not anymore clear than it was in the 90s. Companies like SpaceX, Blue Origin, Virgin Galactic, among others, that are betting on RLVs, are simply setting a price, which has certainly lowered costs for customers in the short-term; but, as they confront costs of production with market demand, the long-term impact of their efforts on the cost of accessing space is still largely unclear.

Sterner, Pace and Adkins explain this reality in their book on America’s space future, writing “many have studied the failures of the Shuttle, NASP, and X-33 for lessons to apply in the next attempt to build RLVs and rightly so,” but simply “those who promote a purely laissez-faire approach,” often “ignore the hard empirical data.” They offer a series of companies, including Pacific American, Kistler, Pioneer Rocketplane, Kelly Space & Technology, Rotary Rocket, among others that tried to develop this technology over three decades and turn it into a sustainable business model — “but the size of the investment required to fully develop their

systems has proven beyond their reach.”¹⁰⁸ And, Musk even acknowledged this reality in a 2003 HobbySpace interview, where John Carmack asked him why prior businesses failed. Over email, Musk responded that there were three reasons, including a lack of “critical mass of technical skill, insufficient capital to reach the finish line [and] success was reliant on series of technology breakthroughs that did not happen.” Here MacDonald’s initial argument about signaling comes up, as several companies throughout the 80s and 90s, such as Orbital Sciences, were actually able to lower the cost of access to space by focusing on evolved expendable launch vehicles, rather than reusable launch vehicles. A decision to develop this type of infrastructure certainly comes with an impression that one’s technology is going to be able to subvert a historical trend — where this thesis posits a decision for NewSpace to focus on reusability is in part based on the economic argument but also the prestige that comes with making RLVs actually work.

When looking at the amount NewSpacers working on reusability has spent, it’s clear that the true difference between success and failure has been the amount of money they have — which also harkens back to MacDonald’s argument of “conspicuous consumption,” — where “agents can choose to invest — with time, money, or other resources — in order to differentiate themselves from others.” Significantly, SpaceX, which began with an investment of about \$100 million¹⁰⁹ from Musk’s fortune eventually had to spend around \$1 billion dollars over 15 years to finally successfully achieve reusability, after losing hundreds of millions in profits following launch accidents in the 2015 and receiving more than a billion dollars in help from NASA.¹¹⁰

But what’s most significant is that Musk, who has the capacity to continue investing a fortune in

¹⁰⁸ Sterner, Eric R., Scott Pace, William Adkins, Charles Miller, and James Veda. *America's Space Futures: Defining Goals for Space Exploration*. Cork: BookBaby, 2013. Accessed April 22, 2018. Google Database.

¹⁰⁹ Tuttle, Brad. "Here's How Much It Costs for Elon Musk to Launch a SpaceX Rocket." *CNN Money*, February 6, 2018. Accessed April 22, 2018. <http://time.com/money/5135565/elon-musk-falcon-heavy-rocket-launch-cost/>.

¹¹⁰ Mosher, Dave. "Elon Musk Spent \$1 Billion Developing Reusable Rockets - How Fast Can He Make It Back?" *Science Alert*, June 22, 2017. Accessed April 22, 2018. <https://www.sciencealert.com/elon-musk-spent-1-billion-developing-spacex-s-reusable-rockets-how-fast-can-he-actually-make-it-back?perpetual=yes&limitstart=1>.

this extremely difficult market for the sake of his vision to go to Mars, now reportedly owns 54% of the outstanding stock of SpaceX and has voting control of 78% of the outstanding stock of SpaceX, according to an FCC filing.¹¹¹ This means that when it comes to reusability infrastructure, it is truly Musk's fortune that will lead to its development. Similarly, Jeff Bezos publicly announced he would, "sell about \$1 billion of Amazon stock a year," to finance his ambitions around RLVs — a luxury that has never existed before in the space industry or any entrepreneurs that have tried to enter.¹¹² Rick Tumlinson has even acknowledged that new players in the industry have only been able to stay in the industry because of their fortunes.

"Our old joke is, if you want to make a million in space, start with a billion," he told Quartz in 2016, "We have a few of those people showing up."¹¹³

Thus, the first case study demonstrates that NewSpace and OldSpace are effectively the same when it comes to the types of approaches to low-cost access to space that are being invested in. In fact, the technologies NewSpacers are investing in were born from the work of OldSpace research and development. The fact that rich entrepreneurs of the past tried to create this type of reusable launch vehicle infrastructure, but went bankrupt due to lack of finances, highlights that truly NewSpace entrepreneurs are only able to make a difference because of their wealth. This potentially sends a signal to the public that these entrepreneurs are using their wealth for a type of 'greater good,' of RLV investment. Additionally, their decision to invest in RLVs specifically, due to its expensive and difficult to develop nature, sends a message that these players should be trusted in terms of decision-making around how space should happen

¹¹¹ Lambert, Fred. "Elon Musk's Stake in SpaceX Is Actually worth More than His Tesla Shares." Electrek, November 16, 2016. Accessed April 22, 2018. <https://electrek.co/2016/11/16/elon-musk-stake-spacex-tesla-shares/>.

¹¹² Fernholz, Tim. "If Jeff Bezos Is Spending a Billion a Year on His Space Venture, He Just Started." Quartz, April 12, 2017. Accessed April 22, 2018. <https://qz.com/956607/jeff-bezos-the-worlds-second-wealthiest-human-isnt-spending-billions-on-his-space-venture-blue-origin/>.

¹¹³ Fernholz, Tim. "Jeff Bezos' Space Company Is a Lot like Amazon Was in 1994." Quartz, September 17, 2016. Accessed April 22, 2018. <https://qz.com/783233/jeff-bezos-space-company-is-a-lot-like-amazon-was-in-1994/>.

because they've been able to — at least perceptibly — make it work. In contrast, those in the past perhaps didn't have the resources or connections necessary to develop this *necessary* good, as the NewSpace brands it to be.

4.2: Case study 2 takeaway— New era of commercial activity is not new moment of change, but a transition of wealth in the sector

When it comes to discussing the NewSpace era, historians and journalists often point to the 2004 Ansari X-Prize competition as the moment where commercial space finally got that special push and needed public support to develop not only the type of technology that could get humans on the path back to the Moon and beyond, but a sustainable market around that goal. Just as one example, an article from Popular Science in 2014 begins with, “Ten years ago this week, commercial spaceflight took off when a private spaceflight company won the Ansari X Prize...”¹¹⁴ But while the event was in fact historical, it's not fair to say it was really the moment where commercial space industry truly began. Nonetheless, discussion on the emergence of NewSpace typically revolves around this time period, and subsequently many also see it as the time when commercial activity really began to take off. But in actuality, the second case study shows that the current wave of development is really just a matter of history repeating itself.

Commercial activity is certainly not a NewSpace era characteristic, though NewSpace proponents tend to present it this way by focusing in on the notion of “start-up” culture and entrepreneurial activity. An observance of the so-called OldSpace past demonstrates however that the government and NASA not only actively supported the growth of a commercial sector, the sector's roots are actually embedded in the start-up business approach. Some of the older aerospace companies like Boeing and Raytheon that are often criticized today as being a part of

¹¹⁴ Grush, Loren. "From The Archives: How The \$10 Million Ansari X Prize Was Won." Popular Science, October 3, 2014. Accessed April 23, 2018. <https://www.popsci.com/article/technology/archives-how-10-million-ansari-x-prize-was-won>.

government bureaucracy actually began as start-ups and only became what they are known as today because they transitioned into full-fledged businesses that couldn't afford to be so risk heavy. The NewSpace branding of this type of business approach is just that — a brand, which points away from a reality that the most successful new entrants into the space sector inevitably have to enter the same public-private partnerships that currently drive space development. Furthermore, the second case study demonstrates that start-ups that could be classified as “commercial” rather than “private” also emerged during the 80s with Space Services Inc. But unfortunately, there wasn't a stable enough space market that necessitated multiple entrants development launch vehicle services or niche small satellites.

Again, this case study shows that NewSpace and OldSpace are effectively the same; however, this is simply more funding in the emergent market that allows for greater numbers of start-ups to persist. An article from CNBC for example reports that wealthy private individuals poured around \$3.9 billion dollars into the commercial space industry in 2017, with a record of 120 venture capital firms investing in the sector.¹¹⁵ A graph of investments in the industry shows a stark increase from 2014, which demonstrates that more simply wealthier individuals have seen the industry as a more popular place to put their resources — which is also a demonstration of MacDonald's signaling theory of how people decide to transfer their fortunes. But at the same time, much of this investment has come from hype, which is why some researchers have contended this industry might become the next bubble. For example, in the same article, CEO of space venture firm Space Angels, Chad Anderson is quoted as saying, “in a world where we're inundated with loads of information, knowledge and wisdom comes from knowing what to

¹¹⁵ Sheetz, Michael. "Space Companies Received \$3.9 Billion in Private Investment during 'the Year of Commercial Launch': Report." CNBC, January 18, 2018. Accessed April 23, 2018. <https://www.cnbc.com/2018/01/18/space-companies-got-3-point-9-billion-in-venture-capital-last-year-report.html>.

exclude," Anderson said. "There are people claiming there are 10,000 commercial space companies."¹¹⁶

And despite the influx of venture capital, these companies are getting significant subsidy support from the government — much like the public-private contracting partnerships of the past. For example, the *Los Angeles Times* reported in 2015, “Tesla Motors Inc., SolarCity Corp. and Space Exploration Technologies Corp., known as SpaceX, together have benefited from an estimated \$4.9 billion in government support.”¹¹⁷ And when it comes to Blue Origin, Bezos has reportedly spent upwards of \$2.5 billion on developmental costs, not primarily from investors, but from selling about a billion dollars worth of Amazon stock per year, and will continue to do so until his mission is accomplished.¹¹⁸ And, NASA awarded Blue Origin a \$3.7 million through a 2009 Space Act Agreement, along with OldSpace companies such as Boeing and ULA.¹¹⁹

And a great deal of that investment comes from NASA’s commercial cargo, or Commercial Orbital Transportation Systems (COTS), which began in 2006 to incentivize private sector technology to take cargo to the International Space Station and a commercial crew program for a company to ferry astronauts back and forth between the station and Earth. While SpaceX presents itself as a primarily NewSpace commercial provider, the company is actually one of a few COTS providers for NASA — with the other groups being the so-called OldSpace entity Orbital ATK, United Launch Alliance, and Sierra Nevada Corporation. When it comes to the commercial crew program, in 2014 NASA awarded \$4.2 billion to Boeing and 2.6 billion to

¹¹⁶ Ibid.

¹¹⁷ Hirsch, Jerry. "Elon Musk's Growing Empire Is Fueled by \$4.9 Billion in Government Subsidies." *Los Angeles Times*, May 30, 2015. Accessed April 22, 2018. <http://www.latimes.com/business/la-fi-hy-musk-subsidies-20150531-story.html>.

¹¹⁸ Smith, Rich. "How Amazon CEO Jeff Bezos Is Funding Blue Origin." *The Motley Fool*, April 23, 2017. Accessed April 22, 2018. <https://www.fool.com/investing/2017/04/23/how-amazon-ceo-jeff-bezos-is-funding-blue-origin.aspx>.

¹¹⁹ Vone, Michelle La. "Virgin Galactic, a Brief History." *Space Safety Magazine*, 2014. Accessed April 22, 2018. <http://www.spacesafetymagazine.com/space-disasters/virgin-galactic/virgin-galactic-brief-history/>.

SpaceX for development. So ultimately, both OldSpacers and NewSpacers have received a significant portion of taxpayer dollars. In fact, in a 2012 congressional hearing, NASA's associate Administrator for Human Exploration and Operations Bill Gerstenmaier admitted the government has funded around 80 to 90% of the supposedly commercial crew system development.¹²⁰

All in all, the commercial space market has grown, with the international space economy valuing at over \$320 billion today and 76% of that, or about \$253 billion, coming from the commercial space sector. But NASA and other international government agencies — or government backed companies — still end up composing some of the most significant buyers, with the latest Trump budget proposal for the government to allot \$150 million toward encouraging commercial space development. All this of course begs a couple questions: what is really a NewSpace commercial company as opposed to a private endeavor now?; and, if billionaire entrepreneurs are unable to continue financing their companies, will the sector revert back to — or ostensibly maintain the current paradigm — of private-public arrangements? SpacePolicyOnline explains the definition of commercial typically revolves around “a private sector entity put[ing] its own capital at risk and provides goods or services primarily to other private sector entities or consumers rather than to the government.”¹²¹ This may have been the initial goal of NewSpace visionaries, but Obama's 2010 National Space Policy offers another understanding that perhaps more in line with reality — where reality certainly harkens back to the past:

¹²⁰ "Commercial Space Activities." SpacePolicyOnline. 2017. Accessed April 22, 2018.
<https://spacepolicyonline.com/topics/commercial-space-activities/>.

¹²¹ "Commercial Space Activities." COMMERCIAL SPACE ACTIVITIES. 2017. Accessed April 24, 2018.
<https://spacepolicyonline.com/topics/commercial-space-activities/>.

“The term “commercial,” for the purposes of this policy, refers to space goods, services, or activities provided by private sector enterprises that bear a reasonable portion of the investment risk and responsibility for the activity, operate in accordance with typical market-based incentives for controlling cost and optimizing return on investment, and have the legal capacity to offer these goods or services to existing or potential nongovernmental customers.”¹²²

What this case study demonstrates is that NewSpace commercial activity is no different from the activity of the past and that these companies are receiving more funding than their older counterparts. What’s significant here is that by branding themselves as start-ups and new commercial entrants, these companies are able to signal that they are different while they are still benefitting ultimately from taxpayer dollars. Even while they are selling an idea of moving away from government funding, they are still dependent upon it. This simply means that more public money is moving away from being in the hands of a government agency working off the desires of the public, to individuals with both their own wealth federal wealth but more liberty to make decisions based off their own whims rather than the greater population.

4.3: Case study 3 takeaway — NewSpace marketing of humans in the space frontier makes the ambition seem novel, but they are really selling to a specific customer

Through the development of its highly promoted Space Launch System and astronaut-carrying Orion spacecraft, NASA has tried to show that it’s once again focusing on long-term human spaceflight. The agency’s 2018 strategic plan outlining says that following the cessation of funding for the International Space Station by 2025, it hopes to reorient its human spaceflight program toward “the Moon and cis-lunar region, evaluating new habitat technologies, surface transportation systems, fuel generation, and storage solutions, as well as additional technologies

¹²² Ibid.

that need to be developed prior to traveling to the surface of the Moon and deeper into space.”¹²³

But of course, NASA has said things like this in the past, and its slowness toward these ambitions has evidently stirred a number of restless space advocates to action.

However, the third case study around the long-term ambitions of NewSpace and OldSpace again demonstrate that the goal of opening up the space frontier to human settlement and economic activity has intrinsically always been a part of NASA’s central aims. And, it’s evident that the agency is still focusing on the ambition with the development of the SLS and its strategic plan, even if the government may take a more risk-averse approach to it. Significantly as well, the history demonstrates that NASA has chronically been subject to the demands of the public, which has historically never really wanted to finance a long-term human spaceflight mission. And at the same time, while the agency has pivoted toward focusing both on human spaceflight and scientific missions, it’s been difficult for the group to show it has made concrete steps toward the long-term ambition because selling science is empirically difficult. For example in 2012, the president’s then science advisor John Holdren explained that communicating NASA’s scientific goals to the public can be challenging, especially if they are difficult and perhaps not as interesting of a buy as what private sector developers are promoting — such as exciting tourist missions to the Moon, suborbital flights and trips to Mars.¹²⁴ Holdren is quotes as saying the positions demonstrated to him just “how difficult it is to communicate when the messages require a lot of references to analysis and detail,” especially when “counter-messages” on NASA’s reputation are alternatively very easy to understand.¹²⁵

¹²³ United States. National Aeronautics and Space Administration. NASA Strategic Plan 2018. 2018. Accessed April 23, 2018. https://www.nasa.gov/sites/default/files/atoms/files/nasa_2018_strategic_plan.pdf.

¹²⁴ Mervis, Jeffrey. "Space Policy Is a Hard Sell, Says Holdren." *Science Mag*, May 22, 2012. Accessed April 23, 2018. <http://www.sciencemag.org/news/2012/05/space-policy-hard-sell-says-holdren>.

¹²⁵ *Ibid*.

This thesis posits that even in this case study NewSpace and OldSpace are effectively the same but what has changed is actually the customer. NASA's focus on the desires of the public is always front and center, even though it may not be perceived that way. NewSpace commercial entrants are able to set goals like 'going to Mars' as their primary objectives; whereas, NASA must take on a more outlined and well-developed approach to such a loft goal, especially when it is communicated to the public. It's clear that what has changed in the ambition of 'opening up the frontier,' is really that NewSpace opens up the frontier to the few that want to finance human spaceflight. While companies like SpaceX and Virgin Galactic say that their main goal is to lower the cost of access to space so that all people, not just astronauts, are able to know what it feels like to go to space, the reality is that they are *selling* this opportunity rather than truly providing it to the public. For instance, while Virgin Galactic has already sold over 640 seats on its suborbital flights for space enthusiasts, these tickets are still around \$250,000 each.¹²⁶ And, in a press release on its mission to send two tourists to the moon, SpaceX claimed these individuals put in a "significant deposit" for this service.¹²⁷ This means that opening up the frontier from the NewSpace perspective is truly still only possible for the elite.

The terminology of NewSpace, however, in being associated with the ambition of human spaceflight overshadows this reality and positions NASA as seeming like its "losing leadership," has "no vision," and is "giving up proven technologies for unproven ones," as Holdren contends.¹²⁸ Ultimately, he concludes, "in many respects, we haven't won that communications

¹²⁶ Carrington, Daisy. "What Does a \$250,000 Ticket to Space with Virgin Galactic Actually Buy You?" CNN Travel, August 16, 2013. Accessed April 23, 2018. <https://www.cnn.com/travel/article/virgin-galactic-250000-ticket-to-space/index.html>.

¹²⁷ SpaceX. "SpaceX to Send Privately Crewed Dragon Spacecraft beyond the Moon next Year." News release, February 27, 2017. SpaceX. Accessed April 23, 2018. <http://www.spacex.com/news/2017/02/27/spacex-send-privately-crewed-dragon-spacecraft-beyond-moon-next-year>.

¹²⁸ Mervis, *Science Mag*, 2012.

battle about NASA.”¹²⁹ While private space entrepreneurs are working tirelessly to find a home in the planets, NASA is doing the legwork necessary to actually see if a place like Mars is habitable in the first place. In fact, Wohlforth and Hendrix write in *Beyond Earth* that Mars research consumes the largest portion of the agency’s planetary science budget, even though NASA scientists have discovered and publicly explained that Mars would be a difficult place to live and that “there isn’t a compelling reason for human beings” to go there.¹³⁰

To those invested in the NewSpace mentality of fast-paced technology production, such scientific efforts are OldSpace hesitations. And simply, as Holdren points out, the science doesn’t sell. The rhetoric surrounding the importance of human spaceflight both by NewSpace proponents and circulating more often throughout the industry has certainly made some tangential impact on the agency in that now five of NASA’s earth-science missions are on the chopping block, according to Space.com. And overall under the Trump administration, “the budget request gives the space agency’s Earth-science division \$1.75 billion in 2018, compared with \$1.92 billion,” in the year prior.¹³¹ Meanwhile, the human spaceflight budget for the space launch system and planetary science saw a boost¹³² — which doesn’t necessarily signal a negative aspect of the budget, but certainly demonstrates a change in emphasis over what Congress thinks NASA ought to prioritize. Given that NASA has been able to achieve phenomenal goals both inside and outside the realm of human spaceflight and has also determined that a colonization mission to Mars wouldn’t be all that great, how is it that NewSpace continues to market its products so much better? It’s clear that NewSpace branding is

¹²⁹ Ibid.

¹³⁰ Wohlforth and Hendrix, *Beyond Earth*, 47.

¹³¹ "Trump's 2018 Budget Request Axes 5 NASA Earth-Science Missions." Space.com, May 24, 2017. Accessed April 23, 2018. <https://www.space.com/36989-nasa-budget-cancels-five-earth-science-missions.html>.

¹³² Clark, Stephen. "Space Launch System, Planetary Exploration Get Big Boosts in NASA Budget." Spaceflight Now. March 23, 2018. Accessed April 24, 2018. <https://spaceflightnow.com/2018/03/23/space-launch-system-planetary-exploration-get-big-boosts-in-nasa-budget/>.

certainly having an effect on what types of missions are being perceived as important both inside and outside the space community. But significantly, as the case study shows, the people not wanting to finance a human spaceflight mission are still providing funds for those companies that are focusing on things like space tourism and suborbital flights, because NASA is now partnering with them. However, the public is not going to have access to these services, because only the wealthy can afford to purchase them.

Chapter 5: Conclusion — The Implications of NewSpace Branding

*“Entertainment. Actually more edutainment. We’ll teach ‘em stuff. We want to develop a national curriculum for schools that’ll be tied with the various broadcasts so that students can do experiments, mostly aimed prior to sixth grade. Our secret agenda is to give them the space bug before they’re too old, because once they hit puberty they have no interest in space; they’re interested in each other. Every space activist you talk to got the bug before there they hit puberty..Increase the market and the potential and the enthusiasm for man being in space — we can achieve it if we will it. We just aren’t willing it. Twisted, but I think it’s a fairly good assessment. Some people just don’t understand that. They think the benefits of being in space are self-evident. Every rocket company that makes a paper rocket and then wonders why no one wants to do anything with it is assuming that the benefits of their paper rocket are self-evident. You have to explain.”¹³³ — Denise Norris, CEO of Applied Space Resources, interview in *Making Space Happen*, 2002*

¹³³ Berinstein, Paula. "Denise Norris: Marketing Space." In *Making Space Happen: Private Space Ventures and the Visionaries behind Them*, 291-310. Medford, NJ: Plexus Publishing, 2002.

At the time of Paula Berinstein’s interview with space entrepreneur Denise Norris, Applied Space Resources was making plans to land a rover on the moon and bring the dirt back to sell — not a particularly riveting business model, considering a 2018 Google Search of the company brings back very little on Norris or any successful efforts her company has made. But her advice in Berinstein’s 2002 book *Making Space Happen*, which profiles several of the leading NewSpace business leaders at that time, is pretty valuable, because it’s a window into how some of the most outlandish, and even most basic commercial entrants were trying to effectively brand themselves as being new, different and lucrative. As she and her business partner brought to the company a background in both science and communications, they were well prepared to test the market and understand what it would take to stand out, telling Berinstein, “our company is a marketing company, not a rocket company building paper rockets.”¹³⁴ Her ultimate advice on being successful in the commercial space industry is to think big, saying “you’re not just there to take money out of your market. You’re there to nurture your markets and make them think of [your company] as benevolent influence.”¹³⁵ Norris’s advice is a reflection of the types of tactics NewSpace entrants have used to market themselves not only as being different from the idea of OldSpace, but also to make many of their outlandish ideas seem reasonable. This conclusion will conjecture on some of the *possible* implications of what this type of branding may tangentially lead to, particularly when it comes to the hypothesis that decision-making in the space industry is moving toward the wealthier few investing in space for the purpose of signaling their value, rather than making investments for the greater good — as NASA has always done.

¹³⁴ Ibid.

¹³⁵ Ibid.

5.1: Implication A: Shift away from interest in the space frontier for the public toward individuals, where the branding hides that reality

Space has always been a frontier intended for the general public, and NewSpace advocates use this idea to promote their views. The historical case studies demonstrate, however, that really what's happening is a movement away from a group, or an agency, making decisions around how the space frontier is opened toward individuals. The implication of this is that this frontier starts to become less of a venue for humanity, and more of a place for those that can actually afford it — the implication of which is that space is becoming less of a democratized zone for everyone to participate, and truly a restricted zone. This thesis posits that NewSpace branding twists this idea and makes it seem like the activities new entrants are performing are truly intended for the greater good; but, this research calls those activities into question and argues there are ethical implications of this misleading marketing.

In terms of how this marketing is able to distract away from this movement, it's really just a matter of entrepreneurial branding. Erenkol and Oztas explain that entrepreneurial branding, in particular, is a “complex combination of images and experiences in the customers' minds” that's intended to offer a type of promise on a product or enterprise; above all, the brand is intended to create a sense of shared identity with the consumers and the sellers. To really successfully differentiate, the entrepreneur makes a claim that the contribution he or she is making doesn't only exist on the “micro economic level but also at macroeconomic level and contribute in the economy of the country.” Typically, one of the main strategies employed is to “touch the hearts and minds of the customers on the other side. One of the main drivers of the success within entrepreneurial branding techniques is the fact that the business “is not relating

the publicity of the enterprise with the publicity of the product,” so if a “product fails or considered as low quality,” the name of the brand shouldn’t be damaged.¹³⁶

But again, this is typical entrepreneurial marketing; businesses exist to make a profit, and must make a profit to survive — so that will always be a goal, no matter the ultimate agenda. Jeff Bezos and his decision to start Blue Origin is no different in this regard, and neither is colleague Richard Branson, or any of their counterparts. Bezos also brands Blue Origin as being primarily aspirational and helping humanity get to space — but there’s a twist. Blue Origin doesn’t have the same branding as SpaceX to propel humanity to Mars and find a new home. Even though Bezos is developing essentially the same type of technology and for the same proposed purpose — reusable launch vehicles to lower the cost to space — there’s a different marketing message attached to it: We need to go to space to save the Earth. At the 2016 Pathfinder Awards at Seattle's Museum of Flight, Bezos explains the company’s vision:

“We need to go into space if we want to continue our growing civilization [...] we can continue grow or you know we could go another route and continue to face stasis and not continue to grow [...] I don’t think you want to just survive on this planet. I think you want thrive and do amazing things. And to do that we need to go out into the solar system. In the next few hundred years all heavy industry will move off planet. It’ll just be way more convenient to do it in space where you have better access to resources, better access to 24/7 solar power,” he explained. “We want to go to space to save the Earth, I don’t like this plan B idea that we want to go into space so we have a back up planet. [...] Believe me, this is the best planet. There is no

¹³⁶ Erenkol, H. Anıl Değermen, and Y. Burçak Boydak Öztaş. "Entrepreneurial Brand." *Procedia - Social and Behavioral Sciences* 195 (July 2015): 1138-145. Accessed April 24, 2018. doi:10.1016/j.sbspro.2015.06.473.

doubt this is the one that you want to protect. It's the jewel. We evolved here. We're kind of made for this planet [...] and we can use space to protect it."¹³⁷

It's interesting that Bezos takes care to even mention the "Plan B" argument; it's evident that he's trying to undermine that strategy, which seems counter to the ultimate NewSpace goal — any and all efforts to open the space frontier. But, Bezos mentions the Plan B approach because that's the brand of his direct competitor; and while his competitor may be in actuality selling the same type of technology, he's in theory really marketing a vision, or really a promise. And, a promise has no accountability mechanism attached to it, Bezos or Musk can continue to market their vision so long as they continue to maintain a following, while the technology itself can continue to go through its various iterations. Branson, too, is selling just a variation of the same aspiration.

Virgin Galactic's original business model to fly wealth tourists to space was pretty feeble to begin with, having disappeared from the scene for several years. Now after regrouping, the company still wants sell expensive seats to celebrities and millionaires, but also with an added prerogative — one of those aspirational mission statements on how the company aims to help humanity on earth. On the Virgin Galactic website, this reads:

"We are helping to create, for the first time, a basic space access infrastructure that will act as an enabler for scientists and entrepreneurs. It will also provide the catalyst for a new age of space exploration which promises enormous positive potential for life on Earth."¹³⁸

Branson's version of a product is a variation of Bezos's plan of using space to help the Earth, as Branson argues that his suborbital rides will help build science research opportunities

¹³⁷ Jeff Bezos Discusses Space Flight and His Vision for Blue Origin. Performed by Jeff Bezos. Seattle: GeekWire, 2016. Accessed April 24, 2018. <https://www.youtube.com/watch?v=VNwE3sRWxHw>.

¹³⁸ "Vision." Virgin Galactic. Accessed April 24, 2018. <https://www.virgingalactic.com/vision/>.

back home; though, obviously NASA has been dedicated to this goal for a long time. But again, while the technology itself is a suborbital vehicle, the product Branson is selling is an experience, an opportunity to tap into the individual's sense of imagination and a promise that his rides will help humanity somehow become better. The importance of such a brand is the emphasis on the individualistic effort; taking on the NewSpace terminology doesn't just signify that a company is a new entrant, or a start-up, or even that it's revolutionizing OldSpace technology — it's about trying to come up with a business purpose to justify the entrepreneur's fascination with a certain goal.

While this reality is presented by NewSpacers and advocates as “unleash[ing] the power of free enterprise,” it's evident that the movement is really about marketing an expensive and lofty, perhaps not all that critical, ambition, with the hope that there is a reasonable enough business purpose to justify it. Undoubtedly, companies like SpaceX and Blue Origin are opening up the market and reducing the cost of spaceflight, but the business models they present are not all that realistic, as it doesn't exactly follow that expensive rides for tourists to zero gravity, building space hotels, constructing likely inaccessible industrial zones, or flying people on a one way mission to Mars is truly going to save humanity, save the Earth or lead to greater scientific research opportunities. The implication of this is that space as a once open frontier for the greater good now is moving toward becoming a venue for flights of fancy for those who can afford it, which means that space may become the next zone of class division — a reality that has played out in frontiers of the past, as anthropologist David Valentine posits.¹³⁹

¹³⁹ This thesis wasn't intended to draw out these implications, but rather to claim we ought to be considering whether there are moral questions surrounding the space industry. If you are interested in seeing the argument of whether space is becoming another frontier where class divisions occur see Valentine, David. 2012. Exit strategy: Profit, cosmology, and the future of humans in space. *Anthropological Quarterly* 85 (4): 1045-67.

5.2: Implication B: NewSpace branding of start-up culture normalizes risk in business and aspiration

At the International Astronautical Conference in Guadalajara, Musk effortlessly laid out the technical details of his Mars plan in an incredibly convincing manner. So much so, that even if the simulation weren't enticing enough, his elaborate discussion on the mechanics of his reusable rocket system could effectively send any skeptical engineering questions to the back of the head, at least for the laymen in the audience. For over a decade, he has contended that lowering the cost of spaceflight can happen--must happen-- through commercial industry, and that cheaper, more accessible launch will be absolutely necessary to humanity in the future. But while the economics and architecture of his proposal seems fairly clear, what's less obvious is an answer to a more existential question--*Why exactly would we want to do this?*

The reality is that Elon Musk's video debut, along with other marketing in the space industry is highly targeted and merits some pause. The video's advanced rocketry, engineering promise, and hopeful narrative of space colonization is incredibly alluring. But a few moments of consideration dedicated to the notion of living in an environment like Mars ought to make most people wonder how Musk could sell a one-way ticket to the Red Planet at all. Beyond that, the video did little to offer real evidence of how difficult life in space would be. Still, he insisted that the video was not a fantasy. It was real:

“So what you saw there is really quite close to what we will actually build...So this is not an artist's impression. The simulation was actually made from the SpaceX engineering CAD models,” said Musk to the viewers. “Over time there would be many spaceships. You would ultimately have, I think, upwards

of a thousand or more spaceships waiting in orbit. And so, the Mars colonial fleet would depart en masse, kind of like *Battlestar Galactica*.”¹⁴⁰

For one explanation for how this is happening, Slobodian conjectures that the success of selling space colonization can be boiled down to marketing, not just with grand visions of the future, but also with fear — for example, an asteroid hitting the earth — where the risks of such enterprises like going to Mars are played down, so that it all makes sense. Musk’s speech above is not technical at all; rather, it’s an appeal to science fiction fantasy. While he’s done in excellent job of explaining his plans in a way that’s accessible to the public, he also completely washes over how difficult and risky his vision is. Slobodian explains that the way such commercial products are being presented makes it so that consumer now essentially has two options: “a romantic story leading humanity back to the glory days of the old explorers along with a utopian society.” Or the other, “a frightening story that we that we must colonize now or face extinction of the human race.”¹⁴¹ But what’s more alarming is that Musk’s video is being sold as reality. In fact, a huge chunk of NewSpace industry is selling the same type of product. When it comes to how this is working, Slobodian quotes communications researcher Linda Billings, who has studied the rhetoric of space advocacy. She explains that fundamentally the language of “enduring American values of pioneering, progress, [and] enterprise,” serves to advance “the cause of capitalist democracy”; and certainly here, NewSpacers selling such lofty ambitions are tapping into this type of pioneering rhetoric, while diminishing the risks of how difficult going into a frontier actually is.

¹⁴⁰ *Elon Musk Reveals His Plan for Colonizing Mars*, 2018.

¹⁴¹ Slobodian, Rayna Elizabeth. "Selling Space Colonization and Immortality: A Psychosocial, Anthropological Critique of the Rush to Colonize Mars." *Acta Astronautica* 113 (August 2015): 89-104. Accessed April 24, 2018. doi:10.1016/j.actaastro.2015.03.027.

Slobodian dives a bit further into this idea, addressing the marketing ethics of groups in the space community, which she claims have a “do whatever it takes attitude” that overtly disregards the reality of risk. She explains entrepreneurs can avoid discussing the risks because they are strategically making an appeal to biological desires for survival, utopian thinking, immortality and fear, and cognitive distortion. Such tactics twist or manipulate some of the facts, which she claims can have implication in the future. She cites an advertisement on The Inspiration Mars website:

“There are risks associated with the mission, as is true of every space exploration mission. But these are exactly the kinds of risks that America should be willing to take...we believe that risks and challenges we have uncovered are well within the scope of our collective experience and can be overcome to achieve a safe and successful mission...”¹⁴²

This is a clear example of how NewSpace advertisements on goals like going to Mars gloss over the obvious risks like exposure to skin scorching radiation, lack of oxygen, inability to acquire food, possibilities of rocket blowup, etc. Instead, what actually comes through is a hopeful, misleading narrative about how the company will be able to overcome any imaginable difficulties. Ultimately, NewSpace proponents are turning ideas like Mars colonization into an industry good in the same way as other sectors, where advertisements begin to sound a lot like a pharmaceutical company selling a drug on TV and quickly reading through its potential side effects. The payoff is huge, but the ethics are a bit murky. However, NewSpacers will contend that this type of communication goes toward a greater importance of developing the technology to get humans off the Earth, which is absolutely critical for opening the frontier. In order to

¹⁴² Ibid.

develop the infrastructure for a space economy, Schwartz says that there must be “economic reasons for servicing destinations other than LEO.”¹⁴³ And an idea like Mars colonization certainly fits the bill, with Klara Capova arguing that NewSpace is really just an “economically driven” private sector “effort to gain control over space resources “ in the pursuit of business.”¹⁴⁴ And, this reality plays out in the branding, where the communication of risks takes a backseat to the business model.

Again consider SpaceX’s entrepreneurial marketing technique, which can be seen as an unflinching commitment to persuading the public that it’s going to be his rocket technology that gets humanity to Mars not matter what it takes. It’s a strong emotional appeal that taps into the imagination and almost vindicates SpaceX’s record of rocket failures. These are necessary, he says, because they are steps toward a goal for the greater good. This certainly isn’t a new tactic. When talking about Tesla, Musk has echoed a similar statement, saying “Why does Tesla exist? Why are we making electric cars? Why does it matter? It’s because it’s very important to accelerate the transition to sustainable transport. This is really important for the future of the world.” Musk is quick to cite the scary statistics to his audience, noting that 53,000 deaths occur annually from toxic emissions, and so of course “it stands to reason that if a vehicle is spewing toxic gas, that is obviously bad for your health.” Musk is a master of marketing to the audience’s emotions and attaching both himself and the brand of his personal company to a necessary business solution — all the risks aside. People appreciate the story of a hard-working individual striving for the good of others, and Musk of course, taps into that narrative as well, even perhaps

¹⁴³ Schwartz, James. "Prioritizing Scientific Exploration: A Comparison of the Ethical Justifications for Space Development and for Space Science." *Space Policy* 30, no. 4 (2014): 202-08. Accessed April 24, 2018. doi:10.1016/j.spacepol.2014.08.010.

¹⁴⁴ Capova, Klara Anna. "The New Space Age in the Making: Emergence of Exo-mining, Exo-burials and Exo-marketing." *International Journal of Astrobiology* 15, no. 04 (2016): 307-10. Accessed April 24, 2018. doi:10.1017/s1473550416000185.

developing his own type of cult following of devout supporters. Certainly, members of the Space Frontier Foundation would fall into this category.

SpaceX in its history of launch failures has taken this approach numerous times, and has for the most part come out of it unscathed. Compared with NASA's response to the Challenger disaster — which truly changed the agency and resulted in a decision to not allow civilians in space for 22 years until 2007 — his response was almost blasé. Much of that had to do with the loss of actual human life; but, as the SpaceX CEO fully plans on moving forward with his Mars ambitions, continuous launch failures making agencies like NASA nervous about placing bets on his technology to be carrying humans. But, for the general public — Musk is still just in the testing phase and he's merely working out the kinks. For an agency like NASA that's committed to the general welfare, such a response would probably ruffle some feathers. For instance, in February 2017, Musk unveiled his plan to fly two tourists to the Moon, after which NASA officials wrote in a statement that SpaceX first and foremost ought to be committed to its contractual obligations and secondly would have to demonstrate the safety of the equipment before any humans would actually be allowed to use the transportation service:

"NASA commends its industry partners for reaching higher," NASA officials wrote in a statement. "We will work closely with SpaceX to ensure it safely meets the contractual obligations to return the launch of astronauts to U.S. soil and continue to successfully deliver supplies to the International Space Station."¹⁴⁵

Even though the agency is handing over much of the technology development to commercial industry — in keeping with a history of private cooperation — the agency still has to serve as a regulatory body, particularly when expensive payloads are involved and especially

¹⁴⁵ National Aeronautics and Space Administration. "NASA Statement About SpaceX Private Moon Venture Announcement." News release, February 27, 2017. NASA. Accessed April 24, 2018. <https://www.nasa.gov/press-release/nasa-statement-about-spacex-private-moon-venture-announcement>.

when humans are involved. Musk has even been bold enough to say, “For the people who go to Mars, it’ll be far more dangerous. It kind of reads like Shackleton’s ad for Antarctic explorers. ‘Difficult, dangerous, good chance you’ll die. Excitement for those who survive.’ That kind of thing,” during the 2018 Q&A at the South by Southwest festival.¹⁴⁶ This type of approach is unacceptable to NASA, which prioritizes above all the safety of humans. Unfortunately, statements like one above do very little for the agency’s brand in comparison to a space entrepreneurial brand of embracing the risks and innovating along the way. On the surface, such statements give off a vibe that NASA doesn’t want to make a moon mission, rather than that the agency would rather return to the moon safely. An Atlantic article following the announcement presents that narrative, with headline reading, “Elon Musk’s Moon Mission Would Vault SpaceX Past NASA.” The article boldly claims that a successful trip would “establish SpaceX as the state of the art in human spaceflight,” while “NASA is still a few years away from testing its Space Launch System, which is supposed to carry astronauts into low-Earth orbit, and even further away from testing the system with humans on board.”¹⁴⁷

Statements like those made in The Atlantic article are reflective of how SpaceX brands itself not as a producer of rockets, but as a company working toward an ultimate vision, no matter the consequences. The power of this specifically entrepreneurial brand has helped the company get away with a lot, while maintaining its place in the space market. Disregarding the fact that NASA essentially prevented the company from going bankrupt after it gave it \$1.6 billion dollars in contracts, the business experienced a number of embarrassing mishaps that

¹⁴⁶ Montag, Ali. "Elon Musk Explains His Motivation to Succeed: "There Need to Be Things That Inspire You" ." CNBC, March 16, 2018. Accessed April 24, 2018. <https://www.cnbc.com/2018/03/16/elon-musk-on-inspiration-and-success.html>.

¹⁴⁷ Koren, Marina. "Elon Musk’s Moon Mission Would Vault SpaceX Past NASA." *The Atlantic*, February 27, 2017. Accessed April 24, 2018. <https://www.theatlantic.com/technology/archive/2017/02/spacex-announcement-moon/518010/>.

pointed toward poor operational standards and fast construction without care — a strategy, at least in NASA’s view, that becomes morally prohibitive as a track record when humans are involved.¹⁴⁸ As an example, in January 2018, SpaceX, after years of operations, was reported to have lost a sensitive military satellite payload; but, Gwynne Shotwell, the president of the company, defended the Falcon 9’s performance, saying “after view of all data to date, Falcon 9 did everything correctly... if we or others find otherwise based on further review, we will report it immediately. Information published that is contrary to this statement is categorically false. Due to the classified nature of the payload, no further comment is possible.” This statement, however, strongly contrasts with that of OldSpace player, Northrop Grumman, which was the contractor for the payload. In a statement, the firm said simply, “this is a classified mission. We cannot comment on classified missions,” according to a 2018 article from the Financial Times.¹⁴⁹ The unaffected attitude of the company regarding risks also came through in Musk’s response to a 2016 failure, where engineers of the Falcon 9 maintained doubts the rocket would survive carrying a heavy 11,000 pound satellite payload to orbit. When it did fail, Musk simply tweeted, “Didn’t expect this one to work (v hot reentry), but next flight has a good chance.”¹⁵⁰

Undoubtedly, Musk’s haphazard business approach is on the government’s radar. At a Senate hearing on National Security Space Launch Programs in 2014, where Musk challenged ULA’s control over contracts with the Air Force, one government representative challenged the SpaceX CEO on the failure of one of his Falcon 9’s to deliver a secondary payload satellite to the right orbit. When asked what the company did about that event, Musk’s response was a bit of a

¹⁴⁸ Berger, “Without NASA There Would Be No SpaceX...” 2016.

¹⁴⁹ Odell, Mark, and David Bond. "SpaceX Defends Rocket after Reports of Launch Failure." *Financial Times*, January 9, 2018. Accessed April 24, 2018. <https://www.ft.com/content/e4f1e474-f54b-11e7-88f7-5465a6ce1a00>.

¹⁵⁰ Yuhas, Alan. "Elon Musk Unfazed by SpaceX's Failed Landing: 'didn't Expect This to Work'." *The Guardian*, March 5, 2016. Accessed April 24, 2018. <https://www.theguardian.com/science/2016/mar/05/elon-musk-spacex-failed-landing>.

non sequitur: “By ULA’s definition of success that was perfect... the primary mission was to deliver the Casio satellite was 100% successful. There was a secondary satellite that was an optional objective that was not part of the primary mission. But if you accept ULA’s definition of success, that mission would be successful.” Meanwhile, former CEO and president of ULA, Michael Gass challenged that type of approach, arguing to the government that the company’s primary objective is to maintain “a laser focus on technical rigor.” Musk’s appeal to hearing was less focused on the logic of mission success, and more on the brand that SpaceX has always offered of providing a type of higher good for the greater economy, as he contends, “As a country, we’ve generally decided competition and the free market is a good thing and monopolies are not good.”¹⁵¹

SpaceX’s history highlights why these types of companies are not public and instead live under the umbrella of being a commercial start-up — decisions are not made based on the input of multiple investors or shareholders; they are entirely based on the whims of the company owner. This idea was reflected in the difference between ULA’s response to the missing government satellite and SpaceX’s response; ULA is committed to the government’s interest to serve the public good, while it’s commercial competitor is dedicated to reaching the goal of its founder — a small nuance, but one that may have important implications down the line. If anything, it’s clear that NewSpace intentionally downplay the scientific language in favor of appealing to the emotional desires of their audience — a reality that explains why the audience may want to buy into NewSpace rhetoric that the individual, rather than international or governmental steady and cautious approach to space, is going to satisfy humanity’s desires to finally go into the next frontier — all risks aside.

¹⁵¹ Carlin, T. J. "Elon Musk to Congress: Here's Why You Should Pick SpaceX." Popular Mechanics, March 7, 2014. Accessed April 24, 2018. <https://www.popularmechanics.com/space/rockets/a10215/elon-musk-to-congress-heres-why-you-should-pick-spacex-16570920/>.

5.3: Implication C: NASA's brand as a socialist organization dedicated to science for the greater good becomes increasingly less remarkable

When it comes to effective marketing, Musk has echoed similar sentiments as those of Norris, explaining that to resonate with the public, one must focus less on the technical, scientific ideas. With respect to how SpaceX has managed to differentiate itself from companies of the past, Musk has said that talking about the hard sciences isn't interesting to the average person — people want to see what makes the company stand out, and that typically comes with what Berinstein calls understanding the “the power of media.” In an interview during the 2017 conference, entitled *The Future The World & Technology*, Musk explained that NASA has done great scientific work, but the public may not always know about it. The reason why, he says, is because people aren't involved — and that's perhaps what sometimes sets it behind. Subsequently, in talking about his company, he says he tries to focus more on the aspect of human involvement, rather than the scientific or technological advances:

“You know, I think NASA does a lot of good things for which it doesn't get enough credit, and that the public, I guess, doesn't know that much about. Most members of the public, they're not really into hard science. It's not the thing they're tuning in for most of the time. I love hard science, but it's not that popular,” said Musk. “But to get the public excited, you've got to get people in the picture. It's just a hundred times different, if there are people in the picture. You know, if there's some criticism of NASA, it's important to remember, people in the picture [...] But if you talk to a scientist about that, they're sort of like, “Well where is the science in that?” Like, you're not getting it. It's like, that's not why people are giving you money [...] So you've got to have something that's going to fire people up, and get them real excited. I think if we had a serious goal

of having a base on the moon, and sending people to Mars, and said, ‘Okay, we’re going to be outcome oriented. How are we going to do this?’¹⁵²

When looking at the commercial space industry, it’s easy to be distracted by companies focusing on those more grandiose products and ambitions, such as SpaceX , Virgin Galactic, Bigelow Aerospace and Blue Origin. At the same time, when the term NewSpace is used, it’s almost always exclusively utilized in a conversation where these companies in particular are being compared to the actions of major OldSpace entities like NASA and its traditional aerospace partners like Boeing and Lockheed Martin. As both Musk and Norris explain, the reality of how the industry has formed means that in order to really stand out within the crowd — where NASA takes up a huge chunk of the sidewalk — focusing on branding is really important. And as Musk explains in that interview, part of standing out means focusing less on the type of hard science rhetoric that NASA is dedicated to and shifting toward a focus on human involvement. After all, it’s not just logos or public appearances, but truly the mission behind the endeavor that helps the company stand out, because as Norris says, “Your market’s going to spend money with someone; it might as well be you.”¹⁵³

And actually, a lot more experts in the industry are starting to point out — similar to how the case studies have demonstrated — that many elements of the NewSpace umbrella are actually quite OldSpace. Linda Billings, a research professor at the George Washington University School of Media and Public Affairs and conducting communications research for NASA, said in a 2012 Q&A with Wired that while what’s happening now in the industry is “certainly different from the past,” there’s also a lot of “rhetoric from the new spaceflight

¹⁵² TSP Staff. "Elon Musk Interview 2017: The Future The World & Technology (Transcript)." The Singju Post, January 12, 2018. Accessed April 23, 2018. <https://singjupost.com/elon-musk-interview-2017-the-future-the-world-technology-transcript/>.

¹⁵³ Berinstein, *Making Space Happen*, 2002.

companies,” that “masks what's going on.” Billings, who has been studying the way that space companies and stakeholders in the industry have been trying to brand themselves, explains that while many NewSpace groups “say this is all that free-spirited, free-market, American-style pioneering the future,” in reality many of them are “not really some huge new never-been-done-before method” and what’s troublesome about the way they present themselves is that in actuality “these private companies trying to launch new things are receiving government subsidies,” just as before.¹⁵⁴ It’s true that many commercial space providers today function the same way as sellers to the government and other big aerospace firms, NewSpacers in theory are selling to a broad array of customers looking toward a catalogue of products from competing companies, with different variations of those products, as well as influences from changes in supply and demand. Thus as businesses trying to survive a competitive marketplace, NewSpace companies actually do marketing. NASA, of course, had to do this in the days of Apollo — but it was marketing to the public for support in the use of taxpayer dollars.

And now, NASA has come to realize that it’s confronting a branding problem. It’s one of the strongest international brands in the world, having been the agency to really dominate for the first time the field of human spaceflight; it’s produced some of the most magical and awe-inspiring missions. But with NewSpace rhetoric to build doubt over NASA’s ability to deliver on long-term ambitions like going to Mars, the agency recognizes it has to work to maintain its hold over the narrative of spaceflight. NASA is fully aware of the necessity and power of branding. In their book *Marketing the Moon*, Richard Jurek and David Scott demonstrate how in the early days of Apollo NASA worked tirelessly to appeal to the public and develop one of the best marketing campaigns in history around the importance of not only getting to the Moon, but

¹⁵⁴ Mann, Adam. "Q&A: Space Policy Analyst on Historic SpaceX Flight." *Wired*, May 3, 2012. Accessed April 24, 2018. <https://www.wired.com/2012/05/spacex-qa-linda-billing/>.

studying and exploring the cosmos. Maintaining this brand has been just as important to the agency's viability, as SpaceX's brand has been critical to its enduring success — taxpayers may not be customers, but as a government agency, NASA certainly has to appeal to them and meet their expectations. A 2004 presentation from the administration from the Center for Cultural Studies & Analysis lays out the agency's current public relations predicament perfectly:

“NASA's success at achieving their goal of successful moon landings has defined not only the current popular vision of space exploration, but NASA's “brand.” Despite setbacks, NASA's “brand” as the premier space exploration program is secure, but it is still integrally bound up with the Apollo program of manned space flight. In the mind of the public, human exploration of space is NASA's brand. The space quest is a human equation, not just a technical mission... Space science is seen as an outcome, not a goal. It's what you do while you are in space, not the sole reason for going. The same applies to the substitution of robots for humans. Without the potential for human follow-up and exploitation, both space science and robotic exploration downshift in public perception from need-to-know to nice-to-know [...] It is important to understand that the public's vision of space exploration has not changed – the ongoing interest in Hubble images of other galaxies and the massive public response to the Mars landings clearly demonstrates that. But NASA's accomplishments since Apollo, however important, fall into the categories of science and technology — categories the public consciously believes are valuable but does not have the expertise to evaluate.”¹⁵⁵

¹⁵⁵ American Perception of Space Exploration. PDF. Washington: The Center for Cultural Studies & Analysis, April 21, 2004.

There's a lot to unpack here, but the researchers do a good job of explaining to NASA officials how maintaining public support is highly dependent upon the taxpayers buying into the agency's mission. Another factor to consider here, is that there is a difference between the agency's general popularity within the American public and its ability to secure funds to actually finance its endeavors. This has been NASA's chronic paradox, as it does a very good job of tapping into public excitement and imagination, but somehow cannot seem to convince its audience that it needs more support to do great work. Entrepreneurs' arguments for lower costs and finding economic benefits in utilizing space are far more appealing. The reasoning may go something like: If someone wants to put up the money to finance a trip to the Moon, that's great; but, we as taxpayers don't think it's worth putting our money into it. NASA as a governmental agency doesn't have the luxury of being able to make the same types of advertisements that NewSpacers are able to take advantage of. And as the researchers note, space science isn't really seen as a long-term outcome; it's more of a goal, but science is really what the agency is focusing on. There's simply a discrepancy between what NASA scientists deem to be important, and what the public evaluates to be important — and, this will always have an impact on the agency's ability to maintain control over the narrative of how spaceflight is happening, particularly now that there are other players in the industry who do not have to stay dedicated to scientific communication.

Roger Launius looked extensively into this idea as he examined public opinion polls on NASA's performance and the agency's funding history. He found that there are primarily five ways of promoting a large-scale spaceflight agenda, with those being: scientific discovery and technological development, national security and military applications, economic

competitiveness and commercial applications, human destiny and survival of the species, and finally national prestige and geopolitics. In assessing the history of how NASA has tended to win funds via these reasons, Launius concludes that mostly the commercial and national security or military rationales really see success in selling themselves — but none of them really necessitate or absolutely marshal support for “ the flight of astronauts beyond the atmosphere.”

The conundrum for the agency from the beginning, Launius says, is answering the question “What are the compelling reasons for the nation to expend large sums of money (bucks), to fly the astronauts (Buck Rogers) to orbit, to the Moon, or perhaps beyond?” The answer to this question has never been apparent, and its for this reason the agency “began to build a public/media affairs/relations arm that could make the case,” but unfortunately as a government agency “federal laws” prohibited the use of advertising and lobbying — activities that private or commercial entities can take advantage of. The old Cold War message of building up astronauts as “heroes” promoting the “triumph of ‘good’ capitalist democracy over ‘evil’ communist totalitarianism,” continues to persist as the overarching message of American exceptionalism as tied to the agency, and it necessitates that NASA take the obvious step of expanding the nation into the cosmos for the sake of prestige. The fact that the agency doesn’t have the funds to do this effectively gets lost, and the stalling ends up getting perceived as failure that cyclically doesn’t justify the taxpayers pouring more money into the agency.¹⁵⁶

The implication of shinier NewSpace branding to overshadow NASA’s brand as dedicated to science for the greater good means that the agency could potentially lose some of its hold over the messaging power of how space should happen. Considering that this thesis demonstrates the true difference between NewSpace and OldSpace is a movement away from a

¹⁵⁶ "Compelling Rationales for Spaceflight History and the Search for Relevance." In *Critical Issues in the History of Spaceflight*, edited by Steven J. Dick, by Roger D. Launius, 37-70. Washington, DC: National Aeronautics and Space Administration, Office of External Relations, History Division, 2006.

socialist framework of everyone being able to participate toward only a few wealthy individuals, the affront to NASA's brand has potential ethical implications on how space gets developed — or around who gets to decide how space gets developed. This research concludes that in finding NewSpace is not much different from OldSpace, new companies and their marketing techniques ought to be looked at with a critical eye, particularly if they position NASA as being incapable or unworthy of leading humanity into the next frontier. At the end of the day, NASA is committed to scientific knowledge and expansion into the cosmos for all of humanity; whereas, NewSpace companies are inevitably dedicated to profit, no matter what their branding power may present — and space historians and scholars have a responsibility to start demonstrating this reality, so that the next frontier is led by a humanitarian nation and not a few rich entrepreneurs.

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