Discovery and Triumph: Promoting Space Exploration by Appealing to Values

An STS Research Paper
presented to the faculty of the
School of Engineering and Applied Science
University of Virginia

by

Sami Khatouri

May 7, 2020

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Signed: _____

Approved: _____ Date _____
Peter Norton, Department of Engineering and Society

Most public and private space organizations rely on public approval to advance their agendas. Funding for public agencies, such as NASA, depends on public opinion (Steinberg, 2011). NASA's public relations budget for fiscal year 2018 was $54.9 million (NASA, 2019). Private companies now compete in space exploration endeavors (Yuhas, 2018), and public approval of a company attracts talent and prestige. These groups engage in public relations campaigns to promote their space ventures, combining different approaches to garner public support. They invoke values to promote spaceflight, appealing to purported imperatives and ideals.

Space organizations, nonprofits, and contractors cooperate to advocate spaceflight in general and compete to promote their own ventures. Public space agencies aim to advance the aerospace capabilities and prestige of their respective countries, though they also claim to seek scientific discovery. NASA's stated vision is "to discover and expand knowledge for the benefit of humanity" (Loff, 2015). Private for-profit space companies often invoke objectives nobler than profit. SpaceX claims its "ultimate goal" is "enabling people to live on other planets" (SpaceX, 2012). Aerospace contractors depend on public agencies such as NASA. Jacobs Engineering Group states that they "share the commitment to advocate NASA's deep space exploration program and endorse its vision to pursue the benefits returned to our country from long-term national investment in space exploration and scientific discovery" (Business Wire, 2018). The Planetary Society is the largest of many nonprofits that promote space exploration, engaging in political advocacy, public outreach, and research. Planetary Society CEO Bill Nye claims its goal is to "advance space science and exploration for the betterment of humankind" (Planetary Society, 2014).

The general public is divided on government spending on space exploration. Critics of space expenditures contend it diverts funds from more important needs. Professor Amitai Etzioni writes: "What is needed are major technological breakthroughs that will allow for protecting earth while

sustaining a healthy level of economic activity, … Hence, any serious Mars endeavor will inevitably cut into the drive to save Mother Earth" (Etzioni, 2018). Proponents of space exploration allege numerous social benefits, often invoking value-laden rhetoric similar to that of organized advocates. James Orsulak, on his blog, writes: "Space exploration is one of the most important endeavors our civilization will undertake. … This is one movement that cannot end. It is the only way to ensure the continuation of our species" (Orsulak, 2014).

Space groups promote space exploration by appealing to a wide range of values, especially the imperative to explore, the alleged interplanetary destiny of humanity, an innate human curiosity, national exceptionalism, global unity, and capitalist values.

Literature Review

Research on rhetoric in spaceflight advocacy is chiefly limited in scope to specific organizations or eras. Billings (2007), in her examination of the history of American spaceflight advocacy, writes that its rhetoric "has sustained an ideology of American exceptionalism and reinforced long-standing beliefs in progress, growth, and capitalist democracy" and "has tended to rest on the assumption that the values of 'believers' are (or should be) shared by others as well." Slobodian (2015) examines narratives of Mars colonization, finding promoters invoke "biological drives, species survival, inclusiveness and utopian ideals."

Bain et al. (2006) find that values attributed to human nature are viewed as more important, and that "human nature beliefs" predict reactions to "value-laden rhetorical statements." Some values invoked to promote spaceflight implicate human nature, and these findings suggest this technique would be effective.

Exploration and the Frontier

Space exploration advocates commonly invoke the value that humans have an inborn desire for exploration and frontier expansion. Their advocacy campaigns claim that spaceflight satiates the innate imperative to explore the unknown. NASA explains one of its reasons for space exploration by stating: “Humans are driven to explore the unknown, discover new worlds, push the boundaries of our scientific and technical limits, and then push further. The intangible desire to explore and challenge the boundaries of what we know and where we have been has provided benefits to our society for centuries. … Curiosity and exploration are vital to the human spirit” (Wiles, 2013). NASA reported in its study on the Space Exploration Initiative, a long-term space public policy initiative of the George H. W. Bush administration, that, “The imperative to explore is embedded in our history…traditions, and national character,” describing space as “the frontier” to be explored (National Space Council, 1990). Apollo 8 astronaut Frank Borman, speaking to Congress, said “Exploration is really the essence of the human spirit and I hope we never forget that” (Borman, 1969).

Spaceflight advocacy rhetoric often emphasizes that the desire to expand the frontier is inherent to society. Former NASA Administrator Mike Griffin claims: “It is in the nature of humans to find, to define, to explore and to push back the frontier. And in our time, the frontier is space and will be for a very long time. … the nations that are preeminent in their time are those nations that dominate the frontiers of their time” (Griffin, 2006). Rick Tumlinson is the founder and director of the Space Frontier Foundation, a space-advocacy nonprofit. He states that: “The one necessary and sufficient reason we are called to the Space Frontier is buried deep within us. It is a feeling,” a “calling to go, to see, to do, to be ‘there.’ We believe Homo sapiens is a frontier creature. It is what we do, it defines what we are” (Tumlinson). The Mars Society is a space-advocacy nonprofit that promotes human settlement of Mars. Its founder Robert Zubrin says he holds the “belief that the

frontier is a crucial part of the American character," and "would like to see our traditions carried forward" (Leahy, 2006). In President John F. Kennedy's famous speech announcing NASA's goal of landing a human on the Moon, he provides this rationale: "We choose to go to the moon. We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too" (Kennedy, 1962). With this iconic line, Kennedy suggests that accepting challenges solely to expand beyond the frontiers of humanity's capabilities is a fundamental aspect of American culture.

Destiny and Survival

Promoters of space exploration allege that it is the ultimate destiny of humanity to settle the Solar System and become an interplanetary species. Many claim that the species has an inalienable right and responsibility to expand through the cosmos, invoking themes analogous to the manifest destiny of the nineteenth-century United States. In 1957 German rocketeer Krafft Ehricke summarized his philosophy of spaceflight in "three fundamental laws of astronautics." His second law states: "Not only Earth, but the entire Solar System and as much of the Universe as we can reach under the laws of nature, are man's rightful field of activity." According to his third law: "By expanding through the Universe, man fulfills his destiny as an element of life, endowed with the power of reason and the wisdom of the moral law within himself" (Ehricke, 1957). Space advocate Charles Sheldon writes: "Mankind is destined to step beyond his earthly bonds just as his ancestors once crawled out of the seas. Colonizing new worlds …spread[ing] into new places, the race will survive." (Sheldon, 1964). Marshall Savage, writer and founder of the First Millennial Foundation space-colonization advocacy group, asserts that "it is our policy to enliven this sterile universe … if

we … forsake our cosmic destiny, we will commit a crime of unutterable magnitude" (Savage, 1994) Speaking to Congress, former NASA administrator Mike Griffin says: "For me the single overarching goal of human space flight is the human settlement of the solar system, and eventually beyond. I can think of no lesser purpose sufficient to justify the difficulty of the enterprise, and no greater purpose is possible" (The Future of Human Space Flight, 2003). Aboard the interstellar Voyager 1 spacecraft, the Golden Record contains sounds and images intended for any intelligent extraterrestrial life who may find it. As part of its English message, President Jimmy Carter states: "We hope someday, having solved the problems we face, to join a community of galactic civilizations" (Carter, 1977). With this message, Carter implies that humanity's final destiny is to spread its influence beyond the Solar System.

Other spaceflight advocates emphasize that an interplanetary future for humanity is necessary to avoid the otherwise inevitable extinction of the species. English theoretical physicist and cosmologist Stephen Hawking says: "I don't think the human race will survive the next thousand years, unless we spread into space. There are too many accidents that can befall life on a single planet. But I'm an optimist. We will reach out to the stars" (Hawking, 2001). Elon Musk, founder of SpaceX and advocate of Mars colonization, argues: "The future of humanity is fundamentally going to bifurcate along one of two directions: Either we're going to become a multiplanet species and a spacefaring civilization, or we're going be stuck on one planet until some eventual extinction event" (Musk, 2016). He explains: "To our knowledge, life exists on only one planet, Earth. If something bad happens, it's gone. I think we should establish life on another planet — Mars in particular" (Musk, 2007). According to Musk: "The extension of life beyond Earth is the most important thing we can do as a species" (Musk, 2008). Former NASA administrator Michael Griffin claims that "In the long run, a single-planet species will not survive" (Griffin, 2006). American author and journalist

Tom Wolfe wrote: “The purpose of the space program is not to maintain superiority in space but to build a bridge to the stars before the sun dies. … Homo sapiens (rational man) is the only thoughtful creature in the universe, so far as we know. If he doesn't build himself that bridge to escape across, all is lost” (Wolfe, 2009). Apollo 11 astronaut Buzz Aldrin said: “Many say exploration is part of our destiny, but it’s actually our duty to future generations and their quest to ensure the survival of the human species” (Aldrin, 2006).

Discovery and Understanding

Spaceflight advocates emphasize the value that furthering scientific knowledge benefits humankind and satisfies a curiosity innate in humans, implying that humans naturally yearn for discovery and understanding. NASA argues that: “Every day, space exploration missions fulfill people's curiosity, producing fresh data about the solar system that brings us closer to answering profound questions that have been asked for millennia: What is the nature of the Universe? Is the destiny of humankind bound to Earth? Are we and our planet unique? Is there life elsewhere in the Universe?” (ISECG, 2013). NASA says that its exploration missions “increase our ability to observe, adapt, and uncover new knowledge” (Wiles, 2013). Spaceflight company Virgin Galactic claims: “Sending people to space has not only expanded our understanding of science, but taught us amazing things about human ingenuity, physiology and psychology” (Virgin Galactic). Aerospace and defense contractor Northrop Grumman says that the NASA programs it supports “are helping to … answer compelling questions about the origins of our universe and our place in it” (Northrop Grumman). According to Planetary Society CEO Bill Nye: “We want everyone everywhere to understand our cosmos and, importantly, our place within it” (Planetary Society, 2014).

Patriotism and Prestige

Public space agencies emphasize values of patriotism and national exceptionalism, asserting that successful space exploration demonstrates a nation's prestige. According to former NASA Administrator Michael Griffin, NASA wants "to be the world's preeminent space-faring nation for all future time, second to none" (Linda, 2007). When announcing NASA's plan to go to the Moon, President John F. Kennedy said: "Within these last 19 months, at least 45 satellites have circled the earth. Some 40 of them were 'made in the United States of America' and they were far more sophisticated and supplied far more knowledge to the people of the world than those of the Soviet Union" (Kennedy, 1962). The National Space Council reported to President George H. W. Bush that: "America's space program is what civilization needs … America, with its tremendous resources, is uniquely qualified for leadership in space … Our success will be guaranteed by the American spirit – that same spirit that tamed the North American continent and built enduring democracy" (National Space Council, 1990). On the thirtieth anniversary of the Apollo mission to the moon, President Bill Clinton stated: "Space exploration has become an integral part of our national character, capturing the spirit of optimism and adventure that has defined this country from its beginnings … Its lineage is part of an ancient heritage of the human race … deep in the human psyche and perhaps in our genes" (Clinton, 1994).

Unity and Peace

Space exploration advocates appeal to the value of global unity and the welfare of humanity as a species, rather than as divided nations. Virgin Galactic explains that: "From space, the borders that are fought over on Earth are arbitrary lines. From space it is clear that there is much more that unites than divides us" (Virgin Galactic). In explaining the benefits of space exploration, NASA states that it is "an inherently worldwide endeavor that attracts broad international interest and affects people all across the globe by producing knowledge, capabilities, and relationships that help

society deal with some of the most pressing long-term global challenges," describing it as "a catalyst for nations to build mutual understanding and trust, and international partnerships that advance common exploration goals help to align interests among nations and promote diplomacy" (ISECG, 2013). NASA points to the International Space Station as evidence that "opportunities for collaboration will highlight our common interests and provide a global sense of community" (Wiles, 2013). The European Space Agency claims: "International cooperation is a key pillar of ESA's exploration efforts – it realizes the benefits and opens new perspectives for future challenges. A global space exploration endeavor creates new opportunities for addressing humanity's global challenges" (ESA). China National Space Administration says that one of its purposes is "to utilize outer space for peaceful purposes, promote human civilization and social progress, and to benefit the whole of mankind" (CNSA). The Planetary Society argues: "As we become absorbed and mired in short-term issues and challenges here on Earth, seeing our differences more than our similarities, our individual weaknesses more than our combined strengths – we need that singular event that can pull us all up and out of the quagmire and lift our spirits to the stars" (Young, 2019).

Capitalism and Resources

Advocates of spaceflight appeal to capitalist values. These groups invoke the idea of free enterprise, claiming that it can be furthered with space exploration. The Space Frontier Foundation claims their purpose "is to unleash the power of free enterprise and lead a united humanity permanently into the Solar System" (Space Frontier Foundation). The National Commission on Space, appointed by President Ronald Reagan to develop long-term civilian space exploration goals, states that its purpose is to establish "free societies on new worlds," for which, "we must stimulate individual initiative and free enterprise in space" (National Commission on Space, 1986).

Advocates also emphasize the potential resources to be gained through space exploration, highlighting the economic benefits this can bring to a capitalist society. Spaceflight company Blue Origin "believes that in order to preserve Earth, our home, for our grandchildren's grandchildren, we must go to space to tap its unlimited resources and energy. Like the Industrial Revolution gave way to trade, economic abundance, new communities and high-speed transportation - our road to space opens to the door to the infinite and yet unimaginable future generations might enjoy" (Blue Origin). According to John Marburger, Policy Director of the White House Office of Science and Technology for the George W. Bush administration, the president's space exploration vision was "to begin preparing now for a future in which the material trapped in the Sun's vicinity is available for incorporation into our way of life" (Marburger, 2006). Gerard K. O'Neill, space activist and founder of the Space Studies Institute, stated that the organization's mission is "opening the energy and material resources of space for human benefit … to make possible the productive use of the abundant resources in space" (Space Studies Institute). Robert Zubrin, author and advocate for human exploration of Mars, writes: "Unless people can see broad vistas of unused resources in front of them, the belief in limited resources tends to follow as a matter of course. And if the idea is accepted that the world's resources are fixed, then each person is ultimately the enemy of every other person, and each race or nation is the enemy of every other race or nation. The extreme result is tyranny, war and even genocide. Only in a universe of unlimited resources can all men be brothers" (Zubrin, 1996).

Conclusion

Advocates of space exploration appeal to these values as a cornerstone of their rhetorical strategy. Invoked values commonly hinge on assumptions about a fundamental aspect of human character, such as some ubiquitously innate desire. Using this rhetoric, spaceflight groups imply that

the invoked value is believed by all, or that the value is intrinsically true. Some values used seem to contradict others, sometimes appearing mutually exclusive. The value of nationalist exceptionalism and globalist unity are ideologically opposed, and the imperialistic expansion of territory and resources contrasts with the pursuit of humbling existential knowledge. These values must be invoked independently to appeal to differing demographics. Advocates of various endeavors throughout history have commonly appealed to values analogous to these. The interplanetary destiny of humanity correlates closely to the manifest destiny of the nineteenth-century United States. Advocates of countless national pursuits have appealed to similar nationalistic themes. Promoters of scientific ventures emphasize the pursuit of knowledge. The protection of a free capitalist lifestyle is claimed throughout Cold War-era U.S. government rhetoric. Each value invoked to justify space exploration is present in the rhetoric of many other advocacy campaigns. This ubiquity could indicate that value-laden rhetoric is particularly effective for promoting ideas and efforts. Further research must be done to reveal its degree of effectiveness at persuading targets. Surveys could shed light on the most common values held by the general public, and psychological studies could examine the most effective values for changing targets' mindsets.

References

Aldrin, B. (2006, July). 37th Anniversary of the Apollo 11 Landing.

Bain, P. G., Kashima, Y., & Haslam, N. (2006). Conceptual beliefs about human values and their implications: Human nature beliefs predict value importance, value trade-offs, and responses to value-laden rhetoric. *Journal of Personality and Social Psychology, 91*(2), 351–367. doi: 10.1037/0022-3514.91.2.351

Billings, Linda. 2007. "Overview: Ideology, Advocacy, and Spaceflight—Evolution of a Cultural Narrative." Pp. 483–99 in Steven J. Dick and Roger D. Launius, eds., *The Societal Impact of Spaceflight.* Washington, DC: NASA.

Blue Origin. (n.d.). Our Mission. www.blueorigin.com/our-mission

Borman, F. (1969, Jan.). Washington.

Business Wire. (2018, April 17). Jacobs Joins Coalition for Deep Space Exploration [Press release]. www.businesswire.com/news/home/20160315005644/en/

Carter, J. (1977, July 29). Voyager Spacecraft Statement by the President. www.presidency.ucsb.edu/documents/voyager-spacecraft-statement-the-president

Clinton, W. (1994). National Apollo Anniversary Observance, A Proclamation by the President of the United States of America, July 19, 1994", Washington, DC: Office of the President

CNSA. (n.d.). China's space activities in 2011. www.cnsa.gov.cn/english/n6465645/n6465648/c6480839/content.html

Ehricke, K. A. (1957). The Anthropology of Astronautics. Astronautics, 4. larouchepub.com/eiw/public/2017/eirv44n12-20170324/03-07_4412.pdf

ESA. (n.d.). We explore. youbenefit.spaceflight.esa.int/we-explore/

Etzioni, A., & Etzioni, E. (2018, Aug 25). nationalinterest.org/blog/buzz/humanity-would-be-better-saving-earth-rather-colonizing-mars-29712

Future of Human Space Flight, The: Hearing before the Committee on Science, House of Representatives, 108th Cong. (2003) (Testimony of Michael D. Griffin).

Griffin, M. (2006, Feb. 23). Personal interview with Rolling Stone Magazine.

Griffin, M. (2006, Aug. 15). Personal interview.

Hawking, S. (2001, Oct. 18). Personal interview with Roger Highfield.

ISECG. (2013). Benefits Stemming from Space Exploration (p. 2). NASA.

Kennedy, J. F. (1962, Sep.). er.jsc.nasa.gov/seh/ricetalk.htm

Leahy, B. (2006, May 18). Save Our Planet: Space Advocates See the Bigger Picture. www.space.com/2415-save-planet-space-advocates-bigger-picture.html

Loff, S. (2015, Jan 28). About NASA. www.nasa.gov/about/index.html

Marburger, J. (2006, March 15). Keynote Address: 44th Robert H. Goddard Memorial Symposium, American Astronautical Society, Greenbelt, MD

Musk, E. (2006). Personal interview with Robin Snelson.

Musk, E. (2007, March 5). Personal interview with Time magazine

Musk, E. (2016, Nov. 14). Personal interview with Ron Howard.

NASA. (2019). FY 2020 Budget Request, FY 2020 Budget RequestSD31 (n.d.). nasa.gov/sites/default/files/atoms/files/fy_2020_congressional_justification.pdf

National Commission on Space. (1986). Pioneering the Space Frontier (pp. 2–3). New York: Bantam Books.

National Space Council. (1990). Report to the President (p. 17). Washington, DC: Office of the President.

Northrop Grumman. (n.d.). Space. www.northropgrumman.com/space/

Orsulak, J. (2014, Nov. 4). The Importance of Space Exploration: Why We Must Press On. www.fuelspace.org/blog/2014/11/4/the-importance-of-human-space-travel.

Planetary Society. (2014, March 17). “The Planetary Society Announces Its Largest Single Donor Gift.” The Planetary Society Blog. www.planetary.org/press-room/releases/2014/largest-single-donor-gift.html.

Savage, M. (1994). The Millennial Project: Colonizing the Galaxy in Eight Easy Steps. Little, Brown and Company.

Sheldon, C. (1964). National Goals in Space (p. 74).

Slobodian, R. E. (2015). Selling space colonization and immortality: A psychosocial, anthropological critique of the rush to colonize Mars. *Acta Astronautica, 113*, 89–104. doi: 10.1016/j.actaastro.2015.03.027

Space Frontier Foundation. (n.d.). About the Space Frontier Foundation: Who We Are. newspace.spacefrontier.org/about/

Space Studies Institute. (n.d.). About SSI. ssi.org/about/

SpaceX. (2012, Nov 28). www.spacex.com/about

Steinberg, Alan. (2011). Space policy responsiveness: The relationship between public opinion and NASA funding. *Space Policy. 27.* 10.1016/j.spacepol.2011.07.003.

Tumlinson, R. (n.d.). About the Space Frontier Foundation - Who We Are. www.space-frontier.org/History/frontierfiles.html

Virgin Galactic. (n.d.). Purpose - Why We Go. www.virgingalactic.com/purpose/

Wiles, J. (Ed.). (2013, Sep. 30). Why We Explore. www.nasa.gov/exploration/whyweexplore/why_we_explore_main.html#.Xn4rw4hKiUl

Wolfe, T. (2009, Oct. 1). Where Will the Next 50 Years in Space Take Us? Expert Opinions. www.popularmechanics.com/space/a5694/4221315/

Young, G. (2019, July 10). The Future of Deep Space Exploration - A Mission to the Stars. www.planetary.org/connect/share-your-story/2019/20190710-young-the-future-of-deep-space-exploration.html

Yuhas, A. (2018, Feb. 9). The new space race: how billionaires launched the next era of exploration. The Guardian. www.theguardian.com/science/2018/feb/09/new-space-race-billionaires-elon-musk-jeff-bezos.

Zubrin, R. (1996). The Case for Mars. Touchstone.