

# TO HUMBLY GO: GUARDING AGAINST PERPETUATING MODELS OF COLONIZATION IN THE 100-YEAR STARSHIP STUDY

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Past patterns of exploration, colonization and exploitation on Earth continue to provide the predominant paradigms that guide many space programs. Any project of crewed space exploration, especially of the magnitude envisioned by the 100-Year Starship Study, must guard against the hubris that may emerge among planners, crew, and others associated with the project, including those industries and bureaucracies that will emerge from the effort. Maintaining a non-exploitative approach may be difficult in consideration of the century of preparatory research and development and the likely multigenerational nature of the voyage itself. Starting now with mission dreamers and planners, the purpose of the voyage must be cast as one of respectful learning and humble discovery, not of conquest (either actual or metaphorical) or other inappropriate models, including military. At a minimum, the Study must actively build non-violence into the voyaging culture it is beginning to create today in 2011. References to exploitive colonization, conquest, destiny and other terms from especially American frontier mythology, while tempting in their propagandizing power, should be avoided as they limit creative thinking about alternative possible futures. Future voyagers must strive to adapt to new environments wherever possible and be assimilated by new worlds both biologically and behaviorally rather than to rely on attempts to recreate the Earth they have left. Adaptation should be strongly considered over terraforming. This paper provides an overview of previous work linking the language of colonization to space programs and challenges the extension of the myth of the American frontier to the Starship Study. It argues that such metaphors would be counter-productive at best and have the potential to doom long-term success and survival by planting seeds of social decay and self-destruction. Cautions and recommendations are suggested.

**Keywords:** 100 Year Starship, Mythology, Frontier, Outer space, Colonialism, Extraterrestrial, Alternative futures

## 1. INTRODUCTION

Technological advances in space travel have enabled human access to extraterrestrial bodies for the first time in our history. Many spaceflight advocates maintain it has become a “durable American cultural narrative – a national mythology of frontier pioneering, continual progress, manifest destiny, free enterprise, rugged individualism, and a right to life without limits” [1]. NASA and others have worked to maintain that image [2-4]. However, relying on the lexicon of settler colonialism and referencing largely American frontier analogies not only color the exploration of celestial bodies, their landscapes and resources, but affect our possible relationships with any extraterrestrial life we may encounter [5-6]. Where metaphors of the frontier are employed, the status of extraterrestrial places, their physical features and their possible life are diminished, abetting their being viewed as inferior and falsely justifying, in part, their domination through colonialism. Once assigned a subservient status, we may be more prone to perceive an obligation to dominate them. This facilitates careless and short-sighted exploitation. They are relegated to the status of the excluded Other, as targets, both figuratively and possibly literally, existing solely for the benefit of the human explorer (Here the term “Other” identifies the excluded, as posed by Hegel, Foucault, Said and others. To gain or maintain social and political power, the Other is the entity described in negative

terms then employed as a societal or political foil or outsider) “Wild” extraterrestrial landscapes must be “tamed.” Once that condescending and negative view is established, opportunities for cultural and philosophical advancement presented by those extraterrestrial venues are diminished [7].

The 100-Year Starship Study must guard against the temptation to perpetuate the use of exploitive colonization and frontier mythologies, language, analogies and metaphors. To do otherwise would jeopardize the nobler purpose of the Study by stifling creativity in design and blocking implementation of novel, perhaps even utopian, experiments.

## 2. THE FRONTIER MYTHOLOGY APPLIED TO SPACE

We create a shared reality through culture and sustain it by communicating a common mythology constructed of symbols, images, histories, and visions [8]. In the creation and maintenance of national, cultural, or even corporate identity these are frequently essential. They require a shared sense of purpose (e.g., destiny, divine plan or direction, long-term goals, nationalistic right, or the expression of governmental or social ideals) and a degree of commonly-perceived inevitability. In the United States, outer space is frequently described as our new frontier, the modern free range once represented by the American West [9]. Space presents us with an unknown place and geography inaccessible to but a few and, in keeping with Earthly frontiers, an area void of the familiar. It represents a

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realm where the “laws of civilization” and custom do not apply and, therefore, all that is civilized must be reinvented. Frontiers allow the pioneers who first venture there an opportunity to redefine who they are.

As reported in a review of Brendon Larson’s recent *Metaphors for Environmental Sustainability*, “Language matters...for anyone engaged in understanding and interpreting the world. Language influences how scientists relay their findings and how they conceive scientific phenomena and frame research questions” [10]. Regarding words employed in metaphors, the review continues, “Such multiple, context-dependent meanings (polysemy) ensure that, even if defined narrowly, a metaphor retains its lay interpretation. The technical cannot be kept distinct from the ordinary; science and society mix.”

Regarding the application of the largely American metaphor of the frontier to explorations in space, if we are metaphorically “conquering” the unknown, the stage is being set for an adversarial encounter. Other words supportive of the frontier myth may be just as powerful: unknown, vast, lonely, godless, godforsaken, virgin, barren, unbroken, untamed, heathen, wild, desolate, savage, unforgiving, cold, hostile, foreboding, limitless, dangerous, uncivilized and even angry. These, then, contribute to the suite of terms that describe aspects of pioneers’ relationship to that frontier, such as fear, battle, challenge, assault, conquering, conquest, subduing, civilizing, and taming. This same lexicon is found especially in fiction about outer space but also appears in contemporary non-fiction works directly related to the American space industry, space politics and policy and elsewhere when extraterrestrial issues are discussed.

In the 1950s the US space program was easily assimilated into this foundational pioneering mythology of growth and destiny, and the words that describe it were accepted with little challenge. Although public support for the Apollo Program during the period from 1965-1975 was far from robust (20 percent of Americans surveyed favored continuation of government spending on space launches while those opposed to launches rose from 30 percent to 50 percent during the period), whether supported or not, Americans in space was, and remains, an integral part of the Nation’s widely-shared vision among our possible futures [11]. In their 1990 report to President George H.W Bush, the National Space Council declared that the US space program’s objective was to “open the space frontier. America’s space program is what civilization needs...Our success will be guaranteed by the American spirit – that same spirit that tamed the North American continent and built enduring democracy” [12]. In an issue of the *Journal of Cosmology* devoted to Mars, astronaut Edgar Mitchell wrote, “Throughout our history, we have never been able to predict the perils nor the benefits of exploration, but *in every case humanity has always prevailed* over all obstacles and the rewards it has reaped have *always* far exceeded our expectations” (emphases added) [13]. Such statements make sense only from the biased perspective of the colonizer but not likely to those who were the victims of colonization. The Mau Mau in British East Africa, the peoples of the Congo under Leopold, the Sioux or hundreds of other subjugated indigenous peoples would likely not agree that they needed taming by Europeans or that “humanity” has always prevailed [14-16] (Mitchell, the author of that statement, was an American astronaut and the sixth man to walk on the Moon. He threw a make-shift javelin there, becoming the first individual to symbolically launch a weapon on an extraterrestrial body; a truly symbolic gesture.

NASA’s report on the 40 Years of Human Spaceflight Symposium cites President Jefferson’s letters to the early 19<sup>th</sup> Century explorer Meriwether Lewis as applicable to the space program: “He (President Jefferson) writes of something more – of the intrinsic nature of the quest itself and of the obligations to the frontier borne by societies that encounter it. And while there was much to say then and much criticism was given by contemporaries like Adams and others, there is still much to say now about the ethics of such an encounter. The arguments, the promises, and the vision that animated that journey (the Lewis and Clark Expedition) are familiar because they are the substance of the vision that has animated much of NASA’s efforts” [17]. President Reagan, in speaking of the space shuttle Columbia, continued that theme in stating, “The quest of new frontiers for the betterment of our homes and families is a crucial part of our national character” [9].

In addition to the words associated with the myth, present day space exploration embodies many of the attributes of myth. First, as with American westward expansion and its links to destiny, space affords milestones documenting progress. These are easily measured in space venturing by increments of improved engineering, architecture of space vehicles and the required hardware and software to launch them; catalogs of new technologies; employment and the economics of the space industry itself; and the most easily measured forms of progress: tons lifted, linear distances travelled and duration of travel. NASA maintains a website that lists planets, asteroids, comets, and moons that have been orbited, photographed, or landed on and a catalog of spinoff technologies, patents, and similar documentation of accomplishments (NASA maintains a “spinoff” homepage and website). All provide measures of progress that can be plotted and, more importantly, extrapolated into the years ahead, a critical tool for controlling a vision of a specific future and maintaining a sense of direction. Extrapolation of documented milestones provides support for a call to destiny.

Second, like European exploitation of the Americas, there are potentials for extraordinary economic gains from the effort in the forms of mining, transportation, tourism, communications and other sectors in addition to more political and military benefits [18].

Third, space allows for exploration, adventuring, and the call for the “rugged individualism” that perpetuates a national self-image of pioneering at the edge of a vast frontier. It offers the opportunity for the expression of the “right stuff” referenced in Tom Wolfe’s 1979 book of that title, Zubrin’s “How to Live on Mars” (2008), and countless other books and films, both fiction and non [19-20]. As a result, we have a space program that reflects the perceived national character of an optimistic and adventurous people facing a promising unknown in keeping with the Nation’s mythology. And as with the American frontier of past centuries and its David Crocketts and Daniel Boones, national space programs create namable heroes: Yuri Gagarin in the Soviet Union; in the US, Alan Shepard, John Glenn, Sally Ride, Neil Armstrong and many others. In describing the Project Mercury astronauts, McCurdy states, “They touched emotions deeply seated in the American experience... Facing personal danger, they fit the myth of frontier law enforcers, whose grit had filled the substance of Hollywood matinees and feature films” [21] It has been argued that a flaw in linking the space program with pioneer, frontier, and other histories is that “our perception of the past is distorted by the ethics of our society and the historic, social and entertainment mediums

by which the picture of the past is presented” [22]. True; there are certainly disparities separating historical fact and historical myth. But whether accurate or not, the myth of the frontier is what is referenced as a motivating and guiding narrative, not the historical).

But the myth of the frontier breaks down under closer scrutiny – it isn’t really applicable at all. Rather, it leads to counterproductive behaviors that could doom a project such as the Starship Study.

While few could disparage the above-listed space personalities’ courage, ingenuity, self-assuredness and other admirable traits, all were entirely subsidized and salaried in their achievements; frontier American pioneers were not. Early-on explorers had access to the land itself – free land “for the taking” (with the operant word being “taking”) – but that could hardly be considered a subsidy. They were largely unencumbered by regulations and similar governing instruments that came later to sustain the commons and enable the agricultural, transportation and industrial growth that followed. “Frontiers have the reputation for generating a ‘Frontier Mentality’. This is generally thought of in terms of the American frontier myths. The sturdy pioneer is seen as independent, self-sufficient, and highly motivated to provide a better life for his family. He is also portrayed as having little regard for any environmental devastation or for any indigenous society he might encounter” [22]. In “Parables of the Space Age,” Jane Young says of this lineage, “These qualities were embodied in turn by personages such as the woodsman, the pioneer, the cowboy, the oilman, the businessman, and, finally, the spaceman...,” but, she continues, “...all characterized as much by their exploitation of the natural environment as by their drive towards exploration. ... as various areas of the Earth have been labeled nostalgically as the ‘last frontier,’ the need for adventure and for new sources of energy has given rise to the concept of outer space as the ‘new frontier’” [23]. The woodsman in the National forests; the cowboy herding on government range; the oilman drilling on public lands; and finally, the spaceman, the most subsidized of all. While early American pioneers adventurous enough to suffer the hardships and uncertainties of that life were provided access to land, taxes didn’t buy their moccasins or Conastogas. They were not subsidized through the education, training, equipping, staff support, medical monitoring and treatment, insurance, retirement plan and financial payoff provided to those in space. This is a part of the comparison of the American image of the pioneer in buckskin with the one in a space suit that is frequently omitted from our mythology, yet the language of the pioneer and the frontier remains in support of space programs. Rather than compare space programs with pioneers and the opportunities of a wild frontier, it would seem more appropriate to compare our space programs to the military, to automobile or aircraft manufacturers or other modern industrial models.

Second, drawing on past mythologies to explain and justify future actions can be counterproductive. Robert Zubrin, founder and president of The Mars Society, stated in support of a more aggressive space program, “Every feature of Frontier American life that acted to create a practical can-do culture of innovating people will apply to Mars a hundred-fold; ... it is our destiny to do so” [24]. This application of the frontier mythos coupled with the concept of destiny is clearly misleading and inappropriate. No, “every aspect of Frontier American life” will not apply to Zubrin’s or anyone’s Mars or anywhere else. The frontier American life he and many others reference is a narrow

and largely fictional one written *by* the colonizers and those with a financial, political or social stake in their success; it both contributes to and draws from an inaccurate vision of noble settlers, unbroken and unoccupied forests and virgin prairies where challenges required only ingenuity and perseverance to overcome. It entirely discounts, however, the considerable realities that four centuries or more of frontier American life perpetrated on those who were the victims of that colonization and the landscapes colonized, and these are no minor trivialities. It ignores the Indian wars, slavery, introduction of diseases, indenture, institutionalized racism, union-busting, exploitation of immigrant labor and other strong negatives that have been stricken from the myth. Again, the American frontier provides a poor analogy to guide our behavior in space.

Lastly, the beliefs in Western exceptionalism and destiny that are so closely allied with the frontier mythology both nurture and are nurtured by a subtext of conquest often accompanied by violence [14, 15, 25, 26]. Conquest is a charged term, one of the more blatant employed to describe our motivations and actions in space, and its use has become routine to the point where its meaning has been largely forgotten. In 1960, the U.S. Space Policy on Outer Space promised, “Manned space flight and exploration will represent the true conquest of space. No unmanned experiment can substitute for manned exploration in its psychological effect on the peoples of the world” [27]. Both “conquer” and “conquering” have been used as positive terms regarding our relationship with Mars [28].

Over the past half-century, patterns of ecological violence spread through colonialism have become more widely recognized, and the inter-relatedness of colonized landscapes, ecosystems, and the cultures of both indigenous peoples and colonizers is profound [29]. These relationships become so interwoven that they cannot easily be teased apart; what affects the landscape affects ecosystems, including humans, and the reverse. To use the metaphor of conquest in reference to space exploration one must ask “who or what is being conquered?” A familiar poetic response in the context of space is that we are conquering the “unknown.” But why employ the verb conquer? “Understand” would be far more accurate. A possible answer to why conquest remains in the lexicon of space is because it grows from and supports Western expansionism and, importantly, American exceptionalism. Michael Griffin, Director of NASA in 2005, remarked to a meeting of Women in Aerospace: “When human civilization reaches the point where more people are living off Earth than on it, we want their culture to be Western.” He continued that Western civilization is “the best we’ve seen so far in human history” and that the “values they take with them should be Western values” [1]. Such statements make it clear that exceptionalism is a concept at home in the American space program.

But, perhaps, more at the root of the use of the word “conquer” in this context is that it expresses the coupling of fear with feelings of superiority and hubris. This fosters a belligerent attitude toward the unknown, toward what Hegel, Said, Foucault and others might have termed the “Other” [30]. In the original sociological context, the term is an epithet applied to a person or group who are different, neither “us” nor of us. The Other’s culture, history, and ways of thinking cannot be understood and are, therefore, unpredictable, thus dangerous. In frontier North America, indigenous peoples encountered by Europeans were characterized as “savage” and thus cast as Others for non-consideration. The tension produced was expressed through metaphors of conquest and the belligerence

of colonialism, a battle pitting “civilized” man against the native peoples and their environment. As applied to space, fear of the dangers of space travel or of the unknown it poses may conjure the Other in the form of landscape, something required to be dominated because of its mystery and difference. In this extraterrestrial context, defining planets, etc. as Other ensures that the distinction of the alien “them” or “it” from “us” remains clear. We remain apart from it, making assimilation difficult. Thus, we have heard reference to outer space as threatening, hostile, foreboding, bleak, inhospitable, extreme, barren, harsh, menacing, and cruel. An MSNBC article entitled “Assault on Mars Nears Its Climax” described the planet as a “dusty, frigid world, shrouded by an atmosphere too thin to breathe, bombarded with radiation and largely dry beyond the ice that caps its poles. It seemed altogether hostile to life as we know it” [31]. Hostile infers ill intent, giving Mars, for example, a malevolent personality that justifies whatever we may do to it or take from it. These bolster the justification of conquest and decrease the need for consideration of its environment.

Might “explore” be a more appropriate term than conquest? Certainly, it is far less belligerent, even passive in that it does not infer any impact on any other entity – human, other living organism or landscape. Its impact may be little more than leaving a footprint. But it represents a form of trespass and is a requisite precursor of conquest. European colonization and exploitation of the New World and other continents began with exploration, often seemingly for the most benign purposes, such as the botanical and zoological missions popular in the 18<sup>th</sup> and 19<sup>th</sup> Centuries [4, 32, 33]. Our space program is crowded with the use of the term explore, and while exploration is what we do in space, like conquest it should be used carefully.

When billions or more dollars are invested in exploration, there is an expectation, perhaps even a demand, for exploitation.

It is tempting to dismiss the adverse cultural impacts of colonialism when applied to space. True, although millions of indigenous people died and vast unwritten libraries of knowledge were lost as a direct result of expansion in the Americas, such losses have no predictable extraterrestrial parallel, at least in our solar system. It may be argued that the metaphor of settlement of a frontier through pioneering and colonization merely provides a colorful and poetic vehicle for describing our space ventures and little more. But the European settlement of America and other colonizing efforts also resulted in significant environmental degradation that would be applicable to space exploration. The more forgotten products of settlement are depleted soils and denuded landscapes, dust storms, mine leachates that polluted the environment and the squandering of resources later learned to be invaluable [26, 29, 34, 35]. American settlers could not imagine that the forests could be depleted by the ax, aquifers pumped dry or the broken soils washed and blown away in less than a century. Off of Earth, we have no evidence that the situation would be different. What may first appear limitless would prove finite (For example, the space “trash” problem in geosynchronous and lower orbits was likely not imagined prior to the first satellite launches).

While unlikely that we will encounter sapient aliens in our solar system, life of other sorts might be discovered if we cast our exploratory net far enough and are open to detecting what may be very novel forms. But even if that life is microbial in size, what might be its concerns? How might its interests be considered within the framework of an ethic patterned after an American pioneering and frontier paradigm that discounted

the concerns of other humans only a few generations before? Identifying the concerns of all life and providing them ethical consideration is not a new concept, and it has been extended to include landscapes [36-38]. However, Robert Zubrin, a vocal and well-published proponent for the application of the frontier metaphor to space, maintains that the welfare of extraterrestrial microbes would be inconsequential if one were to terraform Mars into an Earth-like planet. Not only did he find terraforming to be ethical even if detrimental to indigenous life, he determined it unethical to *not* terraform [39] (“What if you could take a world like Mars, a desert world that may have a few microorganisms in its groundwater, and transform it into a fully living magnificent planet like the Earth with forests and meadows and coral reefs and cities and universities and used bookstores? In doing this, you would have performed the greatest positive act of environmental change anyone has ever proposed” (Robert Zubrin as quoted in Lamb [39]) – all this before even knowing what those Martian microbes might offer, what they might be able to teach us, and prior to any consideration of the complexity of their ecosystems or their roles in maintaining it. Such an attitude mirrors aspects of the frontier spirit that are likely best left to history. Regarding the forward contamination of Mars with Earth bacteria, a NASA astrobiologist wrote in the journal *Science* that such contamination is inevitable and not worth the added expense of sterilizing spacecraft we send there. He argued that such contamination should not cause undue concern because we can clean it up later, at relatively low expense and only moderate effort [40]. This attitude is reminiscent of 19<sup>th</sup> Century Europeans who likely did not believe their introduction of an assortment of plant and animal pest species to North America, Australia, the Hawaiian Islands and many other places would cause the collapse of ecosystems and the extinction of scores of species [29, 41-43].

### 3. VISUALIZING ALTERNATIVE FUTURES IN SPACE

Since the late 1940s few national initiatives have been as “futures” oriented as the United States’ space program in linking projected technology with future patterns of society and culture. To many, the program encompasses the best shared vision of possible national and global futures, and it is most often portrayed in a very positive light as Gallop Polls’ tracking of American opinion of NASA has reported [44, 45]. More importantly, the program has been nurtured and managed over the past half century as one of the best examples of what is “good” about America.

However, alternative visions of possible futures in space are suppressed by the concept of “destiny,” an almost supernatural predetermination of how a singular future or narrow range of possible futures must unfold. For example, while many argue for an immediate and aggressive space program, it can be difficult for them to describe why it should be awarded priority over pressing issues here on Earth, such as mitigating global climate change, improving public health, universal education, or decreasing the potential for food chain collapse. Many will invoke destiny. It stops discussions about priorities; space exploration *is* our destiny, universal education is not.

Similarly, reference to some innate human drive to venture into the unknown is employed as part of the pioneering mythology to justify space ventures. It has been portrayed as an instinct that is part of our DNA and, as such, remains unchallengeable as a drive over which we have little control [46]. Following the

Soviet Union's successful launch of Sputnik in 1957, President Eisenhower charged his Science Advisory Committee to prepare an "Introduction to Outer Space" as a way to communicate the US's founding rationale for space activities to both the US and, assuredly, the rest of the world. The Committee's first-listed reason for a national interest in space was a "compelling urge of man to explore and to discover, the thrust of curiosity that leads men to try to go where no one has gone" [47]. President Bill Clinton said exploration was "in our genes," and President George W. Bush stated in his 2003 speech on the Vision of Space Exploration, "This cause of exploration and discovery is not an option we choose; it is a desire written in the human heart" [48]. This drive we can't control is cast as integral to American manifest destiny. Yet to act solely because of innate behavior can be irresponsible and without defense. The unethical results of following instincts without more rational justification have been demonstrated many times in our histories [49]. In addition, the premise that our genetic coding impels us to explore doesn't withstand anthropological scrutiny. Many human societies and cultures have no history of such a will nor do they experience an overwhelming psychological urge to venture beyond their traditional geographic ranges. Innate wanderlust appears an invention that supports the myth, perhaps even attempting to justify conquest.

We may appreciate colonization's flaws in a historical context and continue to witness their impact in the present day throughout much of the world, yet many in the US and elsewhere in the West find it extremely difficult to visualize futures in space exploration that are *not* also based on the premise of colonization and the model it provides. The image has been effectively sold for decades. But to continue the "Westward Ho" paradigm and to perpetuate the support of its mythology does the space program a disservice. It is indicative of a purposeful colonizing and exploitative motive that links a rallying cry from a checkered past to a singular vision of a future in space. Perhaps those who find the metaphor so powerful may not be able to fully justify or articulated that vision on its own merit. Myth serves that purpose. Quoting Mody Boatright, folklorist and past Professor of English at the University of Texas, "The more these values (the space program) are threatened, the more vigorously will the myth (here, the pioneer and frontier in American history) be defended" [50].

#### 4. 100 YEAR STARSHIP STUDY

Using mythology that describes space as a new frontier to be conquered requires some careful rethinking. At a minimum, we should recognize and acknowledge the past damages done in the name of pioneering a frontier. That may cause the myth to lose some of its luster as a guiding model for our preferred futures in outer space. The 100 Year Starship Study provides an opportunity for such reassessment.

The following are offered for consideration:

1. Language matters. Consciously abandon the language of conquest, dominance, patriarchy and violence in discussions of space travel and policy. Recast adversarial approaches such as "taming hostile environments" to more neutral descriptions that don't confront the unknown as an adversary. "Learning through encounters with the diversity of our universe" is just as powerful a description of purpose as "conquering the unknown" and is, in many ways, a more accurate accounting of our purpose.
2. Describe the 100-Year Starship's purpose as a voyage, not a mission.
2. Ensure that the 100 Year Starship Study is a global human effort by facilitating the participation of all cultures who wish to participate. The United States and the Soviet Union were the only spacefaring nations for the first few decades, but now many European countries, China, India, Japan, and others have joined the effort. The International Space Station provides billets to a much broader demographic. However, while this trend certainly helps in diversifying gender, race, and culture among participants, there is little evidence demonstrating it has led to significant changes in our visions of space voyaging. Rather, the existing Western model of humans relationship with the cosmos is being taught to the non-Westerner with very little of the reverse.  
The 100YSS should consider instituting a program whereby spacefaring nations enable the participation of non-spacefaring countries in a far more comprehensive and meaningful way. Sponsor the participation of non-industrialized, non-Western indigenous groups in a broad spectrum of Starship program development and implementation, including mission creation and visioning. For example, Jane Young suggests, "Because Native Americans have a different perspective of the world, they can offer us alternative ways of seeing ourselves in relationship to the natural world and help us answer the question of what constitutes appropriate behavior – in outer space, as well as on Earth" [51]. If a motive of the 100YSS is to perpetuate ("sell") a Western, capitalist, colonizing model, it would likely be best to not invite indigenous groups' participation. If, however, the Study is seeking new approaches to designing space-faring civilizations (hopefully what is most likely sought), then inviting them is essential.
3. Our various histories of human expansion and colonialism are rarely complimentary of our species' regard for bioethical justice. NASA has made the search for life within and outside our solar system a priority, yet there is little in the way of policy guiding the ethical ramifications of first encounters unless our immediate assessment of that alien life is that it is clearly sentient. The Study must challenge our common definitions of life, ecosystems and landscapes and strive to explore with an abundant regard for the potential life that may be harmed, regardless of size or seeming complexity.
4. Starting early in the project, undertake actions to instill and institutionalize a culture of non-violence. While there may be a need for internal, intra-crew policing on the voyage itself, there is no need for any militaristic force or defense capability.
5. Terraforming (strictly defined as a re-creation of Earth's environment on an extraterrestrial body) should not be a prime or singular objective. Rather, humans' potential to adapt to new worlds through artificial speciation, biotechnical augmentation and incorporation of artifact and robotic capabilities may be far preferable. Assimilate with natural environments; adapt. The purpose of the Starship's voyaging should not be to create new, identical, Earths; that was the approach of the colonizers who attempted to build a New England or a New Amsterdam in a New World. They failed to recognize that the destination of a voyager, as opposed to that of

a colonizer, frequently changes the individual and his society into something unintended but often improved, and that is where the power of voyaging lies (This is one of the significant themes of Kim Stanley Robinson's Red Mars, Green Mars, Blue Mars trilogy). We must remember that there are reasons why some will choose to leave this planet. We are, in many ways, escaping a world that we have, both by ignorance and by choice, mismanaged to the point of near self destruction. We must guard against packing our shortcomings along with other baggage; let's not take those very factors we are hoping to escape with us. Adapting to a refreshingly novel universe, not recreating a sentimental past, must be a guiding principle.

6. There are no true utopian forms of government on this planet, so attempts to perpetuate any singular form of existing government would be an opportunity lost. Similarly, all existing economic and social systems have their flaws and strengths. Make use of the strengths. Question the use of a capitalist model, both while in transit and after arrival at a destination, and seek alternatives that do not foster development of a society based on a hierarchy of economic classes and similar classifications.
7. The project must represent a global effort, incorporating the best of what all cultures have to offer for realizing utopian ideals. Even if the Starship never sails, lessons learned from the experience of planning such re-creation may prove invaluable in creating a more harmonious and just Earth and in our expansions to planets and other

bodies within our own solar system. In the end, that may be the project's greatest achievement.

## 5. THE OPPORTUNITY OF RE-CREATION

The 100-YSS Study represents a bold experiment in visioning our possible futures in the context of a voyage beyond our own solar system. But in addition to the myriad of prerequisite engineering and architectural challenges of the starship vessel itself, the undertaking not only allows for reconsideration of a range of social and cultural issues, it demands it. As such, it provides a unique opportunity to re-invent humanity based on our highest principles and ideals. It allows for the premeditated creation of new cultures, the design of new governments or perhaps even the decision to forego governments in a traditional sense altogether in favor of some novel form or structure. In short, the Starship allows us to design a utopian society.

Whereas previous attempts at utopian living have been hindered by the reality of sharing a planet dominated by millennia of violently conflicting beliefs, the Starship is not bound by such restrictions unless we fail to purge it of those destructive traditions, unless we fail to understand that we *can* abandon them. This is the key rationale for avoiding the language of frontier colonization, conquest, exploitation, and violence along with their associated social and environmental injustices. To continue to talk in those terms is useful only if one's motives are regressive, are motives to perpetuate a sub-optimum *status quo* by exporting it beyond our solar system. We are better than that. We have an opportunity to leave that behind us. Be bold, but be humble.

## REFERENCES

1. L. Billings, "Overview: Ideology, Advocacy, and Spaceflight – Evolution of a Cultural Narrative", *Societal Impact of Spaceflight*, U.S. Government Printing Office, 2007.
2. L. Billings, "Frontier days in space: are they over?", *Space Policy*, **13**, pp.187-190, 1997.
3. L. Billings, "Aim for exploration, not exploitation," *Space News*, October, p.13, 1996.
4. R. Williamson. "Outer Space as Frontier: Lessons for Today", *Western Folklore*, **46**, pp.255-267, 1987.
5. T. Paine, "Pioneering the Space Frontier: The Report of the National Commission on Space", National Aeronautics and Space Administration, Bantam Books, 1986.
6. R. Beebe, "Opening New Frontiers in Space: Choices for the next New Frontiers Announcement of Opportunity", National Research Council of the National Academies, p.72, 2008.
7. W. Kramer, "Colonizing Mars – An opportunity for reconsidering bioethical standards and obligations to future generations", *Futures*, **43**, pp.545-551, 2011.
8. J. Campbell and B. Moyers, "The Power of Myth", Doubleday, 1988.
9. P. Limerick, "Imagined frontiers: Westward expansion and the future of the space program", *Space Policy Alternatives*, pp.249–262, 1992.
10. N. Golubiewski, "Mind Your Language - Review of Metaphors for Environmental Sustainability (Review of Brendon Larson)", *Science*, **333**, pp.700-701, 2011.
11. H. Krugman, "Public Attitudes Toward the Apollo Space Program, 1965–1975", *Journal of Communication*, **27**, pp.87-93, 1977.
12. National Research Council Space Studies Board, "America's Future in Space - Aligning the civil space program with national needs", National Research Council Washington, D.C., p.90, 2009.
13. E. Mitchell and R. Staretz, "Our Destiny – A Space Faring Civilization", *Journal of Cosmology*, **12**, pp.3500-3505, 2010.
14. C. Elkins, "Imperial Reckoning: The Untold Story of Britain's Gulag in Kenya", Owl Books, 2005.
15. A. Hochschild, "King Leopold's Ghost, A Story of Greed, Terror and Heroism in Colonial Africa", Houghton Mifflin Co., 2008.
16. D. Brown, "Bury My Heart At Wounded Knee - An Indian History of the American West", Henry Holt and Company, 1970.
17. S. Garber, "Looking Backward, Looking Forward", NASA History Series, 2002.
18. K. Ehrlicke, "Extraterrestrial Imperative", *Futures*, **13**, pp.107-114, 1981.
19. R. Zubrin, "How to Live on Mars: A Trusty Guidebook to Surviving and Thriving on the Red Planet", Three Rivers Press, 2008.
20. T. Wolfe, "The Right Stuff", Vintage Books, 2005.
21. H. McCurdy, "Space and the American Imagination", Johns Hopkins University Press, p.100, 2011.
22. D. Gray, "Space as a frontier-the role of human motivation", *Space Policy*, **15**, pp.159-165, 1999.
23. M. Young, "Parables of the Space Age – The Ideological Basis of Space Exploration", *Western Folklore*, **46**, pp.227-233, 1987.
24. R. Zubrin and R. Wagner, "The Case for Mars: The Plan to Settle the Red Planet and Why We Must", Free Press, 1996.
25. A. Bacevich, "American Empire: The Realities and Consequences of US Diplomacy", Harvard University Press, 2002.
26. H. Zinn, "A People's History of the United States", Harper Perennial Modern Classics, 2010.
27. J. Logsdon, D. Day and R. Launius, "Exploring the Unknown: Selected Documents in the History of the U.S. Civilian Space Program – Volume 2", p.363, NASA History Series, 1996.
28. R. Joseph, "Marketing Mars. Financing the Human Mission to Mars and the Colonization of the Red Planet", *Journal of Cosmology*, **12**, pp.4068-4080, 2010.
29. A. Crosby, "Ecological Imperialism - The Biological Expansion of Europe, 900 -1900", Cambridge University Press, 1986.
30. E. Said, "Orientalism: Western Representations of the Orient", Penguin, 1985.
31. A. Bridges, "Assault on Mars Nears Its Climax." MSNBC.Com, <http://msnbc.msn.com/id/3728514/>. (Last Accessed 2 April 2013)
32. D. Lester and M. Robinson, "Visions of exploration", *Space Policy*, **25**, pp.236-243. 2009.
33. L. Brockway, "Science and colonial expansion: the role of the British Royal Botanic Gardens", Academic Press, 1979.
34. J. Diamond, "Collapse: How societies choose to fail or succeed", Penguin Group USA, 2005.
35. C. Mann, "1491", Random House, 2005.

36. C. Stone, "Should trees have standing? - and other essays on law, morals, and the environment", Oceana Publications, 1996.
37. C. Cockell, "The Rights of Microbes", *Interdisciplinary Science Reviews*, **29**, pp.141-150, 2004.
38. C. Cockell, "Planetary protection – A microbial ethics approach", *Space Policy*, **21**, pp.287-292, 2005.
39. R. Lamb, "Terraforming Mars for the Greater Good", <http://blogs.howstuffworks.com/2010/05/03/terraforming-mars/>. (Last Accessed 2 April 2013)
40. C. McKay, "Planetary science: biologically reversible exploration", *Science*, **323**, p.718, 2009.
41. M. Weisler, "Centrality and the collapse of long-distance voyaging in East Polynesia," in "Geochemical Evidence for Long-Distance Exchange", M. Glascock (ed), Greenwood Publishing Group, pp.257-273, 2002.
42. S. Carlquist, "Hawaii: A Natural History", Natural History Press, 1994.
43. W. Kramer, "Keeping Mars Clean", *Science*, **324**, pp.1265-1266, 2009.
44. J. Jones, "Majority of Americans Say Space Program Costs Justified", [www.gallup.com/poll/121736/Majority-Americans-Say-Space-Program-Costs-Justified.aspx](http://www.gallup.com/poll/121736/Majority-Americans-Say-Space-Program-Costs-Justified.aspx). (Last Accessed 2 April 2013)
45. R. Jones, "They came in peace for all mankind: popular culture as a reflection of public attitudes to space", *Space Policy*, **20**, pp.45-48, 2004.
46. J. Anderson, "The Ulysses Factor: The Exploring Instinct in Man", Harcourt Brace Jovanovich, 1970.
47. President's Science Advisory Committee, "Introduction to Outer Space", Executive Office of the President, 1958.
48. G.W. Bush, "Remarks by President George W. Bush at the Memorial Service for the crew of STS-107, Space Shuttle Columbia" Johnson Space Center, TX, 2003.
49. M. Robinson, "The Problem of Human Missions to Mars", *Journal of Cosmology*, **12**, pp.3558-3565, 2010.
50. B. Stoeltje, "Making the Frontier Myth: Folklore Process in a Modern Nation", *Western Folklore*, **46**, pp.235-253, 1987.
51. M. Young, "Pity the Indians of Outer Space: Native American Views of the Space Program", *Western Folklore*, **46**, pp.269-279, 1987.

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