Interstellar Travel and the Mission for Outer Space: A Human Rights Perspective

Roy Balleste
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Roy Balleste, J.S.D.*

“Do not go gentle into that good night;
Old age should burn and rave at close of day.
Rage, rage against the dying of the light.”
—Dylan Thomas

I. INTO THE UNKNOWN

Imagine the long night of outer space. It is a total mystery. We really do not know enough about our universe. We know that this limitless expanse is more than an empty vacuum. Cosmology notes that outer space contains an undetectable all-encompassing array, known as dark matter, which binds it together. This dark matter may prompt the gravitational effects that we detect from observable matter, such as stars and galaxies. For this reason, commonly known planetary bodies represent only a small percentage of the entire Universe. Some believe that outer space houses a great deal of dark matter. While the cosmos may be known as a void, this seemingly empty environment contains gas and dust, along with more recognizable bodies; such as planets, moons, and asteroid belts. The delimitation of outer space begins

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3. See Roy Balleste, The Internet Governance Forum & Technology: A Matter of Human Development, 7 LOY. LAW & TECH. ANN. 37, 40 (2007); see also ARCHIVES OF THE UNIVERSE: A TREASURY OF ASTRONOMY’S HISTORIC WORKS OF DISCOVERY 559–67 (Marcia Bartusiak ed., 2004) (“[B]y the 1970s substantial evidence was accumulating that the stars and galaxies constituted just a tiny fraction—merely the luminous component—of a more extensive and hidden ocean of matter distributed throughout the universe.”).
5. Id.
about 100 kilometers (60 miles) above the planet.” This vast expanse came into existence in “a gigantic explosion 13.7 billion years ago” known as the “big bang.”

Within the visible space that we can detect, we can roughly estimate the existence of one trillion galaxies. Imagine how much more exists beyond our view. Our technology is good, but limited when attempting to survey vast distances that may take us to neighboring galaxies. Just one galaxy, our own Milky Way, contains one trillion stars. The vastness of the cosmos is “beyond ordinary understanding.” The cosmos reminds us of our insignificance as living species, while simultaneously reminding us of our greatness. The key to that greatness is recognizing “that understanding is a joy, that knowledge is prerequisite to survival.” Indeed, the key to our civilization relies on having the access to knowledge. We may one day be required to explore our sister galaxy, Andromeda, and its gargantuan black hole, residing at Andromeda’s center. How will information help us achieve success for that type of mission? Is there an example to be followed that can serve as the guiding light for such endeavors? What discoveries will we make?

We will definitely wonder about the mystery, the danger, and the excitement. But above all, that great motivator to go in search of the unknown will drive us. Related mysteries, even close to home, deserve our attention. One of the mysteries of space created appreciation for life, a desire to explore the stars, and enhance satellite communications. Over one hundred years ago, on June 30, 1908, an unidentified object from outer space caused one of the largest waves of destruction of Earth’s recorded history. Witnesses described the Tunguska event as an extremely bright, bluish light moving across the sky during the early morning hours. Although we may never be certain about the object’s identity, experts speculate that the object might

7. Id.
9. Id. at 18.
10. Id. at 19.
12. Id.
13. Id.
14. See Thorne, supra note 8, at 19.
have been an asteroid or a comet. On the other hand, we are certain that the object caused mass devastation in the Russian area of the Tunguska River. The object exploded in mid-air, producing effects similar to those seen during nuclear explosions. The event was so powerful that it was detected as far away as Great Britain.

While some events in history cannot be explained, others will be explained once information becomes available. There is a policy concern regarding the threat created by obstacles to the free and open access of information. In general, information creates knowledge, which in turn becomes power. Frank La Rue, the United Nations' Special Rapporteur on the Promotion and Protection of the Right to Freedom of Opinion and Expression, noted that some governments have restricted content under the guise of national security. These practices have created a "chilling effect" on the right to freedom of both opinion and expression. These rights are the guiding principles that transform simple governance into a legitimate social contract. The social contract is grounded on the natural law precept of a worthy government. A worthy government embraces and protects the social contract. At the center of the social contract is the notion that citizens give up some freedoms, and in return, elected officials represent and fight for the common rights and interests of citizens.


19. Id.

20. Although, humanity would not discover nuclear power until decades later.

21. VERMA, supra note 15, at 1, 4.

22. Id. at 5.


25. Id.


27. See id.

The public, whose support is needed to continue exploring outer space, will support outer space exploration when the social contract can demonstrably coexist with a process that increases the potential for a dignified life.\(^{29}\) Preferably, the development of space exploration starts with such a balance. Societies that deny the free flow of ideas will experience the opposite result.\(^{30}\) Over-restrictive policies, for example, illustrate how outer space exploration may interfere with reaching the resources found in that great expanse. Indeed, society's assessment of the Internet's development may predict society's assessment of outer space exploration. This article will address similarities and the need for appropriate management.

Governments and the private sector are at the center of this future management. Generally speaking, by acting in a managerial capacity, they both have the power to either propel humanity into space with expansionist policies or maroon our global society with repressive policies. But, neither are solely responsible because the future of space exploration rests with all humanity. Shared responsibility is central to the concept of a multi-stakeholder process.\(^{31}\)

This article also acknowledges the importance of space exploration and provides a view into the achievements of humanity. But, above all, this article explores the ideas and ideals of those engineers, astrophysicists, astronauts, radar technicians, and satellite technologists that have prepared humanity for future exploration and commercialization of this new frontier.

II. THE NEW FRONTIER

The second race for outer space is about to begin. In 2001, under the direction of the Russian Space Agency, Dennis Tito became the first paying tourist in space.\(^{32}\) For a total price of twenty million dollars for eight days—including his stay at the International Space Station—Tito's experience opened the door to new possibilities.\(^{33}\) At the time, the possibility of space tourism by public and private investors was considered to be a matter of consent...\(^{29}\) Rousseau posits that a good government can justify its need for individual compromises, rewarding its citizens with 'civil liberty and the proprietorship of all he possesses.'\(^{31}\) See also Max Planck, Good Governance, in Encyclopedia of Public International Law (Brown Weiss, Ahila Sornarajah, eds., June 2013).

29. See Rousseau, supra note 28.
31. See infra Part III.
33. Id.
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agendas and profit creation within the commercial market. Now, a mere fourteen years later, space tourism is more of a reality and promises to be operational in the next few years. The most noticeable example is within Virgin Galactic's efforts toward a futuristic spaceline.

Technological developments also promise to make the journey to space more affordable. These developments also run parallel to the general public's reawakened interest in space travel. The reusable launch vehicle is a notable technological development, as it "could reduce space launch costs from $10,000 per pound to $1,000 per pound." Furthermore, the development of ion propulsion engines could help space travelers reach vast areas of outer space. However, at a price of "$200,000 per passenger," a ride with Virgin Galactic is not feasible for most individuals. A commercial market will not become established unless such travel becomes more affordable to the average person.

Before this new frontier is explored, any proposal for its commercialization must consider the social values that promote human relations that encourage community participation in governance. Expanding upon a basic principle of land and sea, whomever controls outer space also controls the flow of its resources. Theoretically, the one who manages commercialization could give preferential status to resource claims that have the potential to benefit the entire world. However, space travel will lead us to so many re-

34. Id. at 366.
35. Id. at 351.
36. See Our Vision of the Future: Tomorrow Will Be Better than Today, VIRGIN GALACTIC, http://www.virgingalactic.com/our-vision-of-the-future (last visited Jan. 14, 2016) ("As the world's first spaceline, we are by our very nature futuristic.").
38. See Yuna, supra note 37, at 960 (explaining that "market research has clearly demonstrated that many people have strong interest in space travel if it were more affordable").
39. Id. at 960–61.
40. See generally NASA – Ion Propulsion, GLENN RESEARCH CENTER, NASA (May 21, 2008), http://www.nasa.gov/centers/glenn/about/fs21grc.html (providing technical information about the ion propulsion system and its progression).
41. See Chow, supra note 37.
42. See id.
sources that we could accommodate those beneficial claims while avoiding excessive property conflicts.44

Outer space and its resources belong to a well-known group of protected environments called the *global commons*.45 These protected regions of valuable resources, such as Antarctica, the high seas, the atmosphere, and outer space, exist for the enjoyment of all members of the human race.46 These global commons are designated regions that belong to no one.47 Through the concept of the commons, we may find the blueprint for a mission into the stars.48 Humanity should not accept the apportionment of outer space as the ultimate goal and, instead, should focus on improving all human lives. Certainly, there is nothing wrong with simultaneously moving commerce forward—for example, the Internet’s growth was likely aided by the fact that commerce was allowed to flourish freely.49

Any policy designed to explore future possibilities in outer space should avoid the plundering of resources through excessive claims of property rights, which causes *scarcity* and all its failings.50 If the focus of space exploration is on resource acquisition, i.e., property rights, then resource management will become as important as the exploration itself. The scarcity of resources is also known as the “tragedy of the commons.”

Garret Hardin first introduced the concept of the tragedy of the commons to tell the simple story of a field for pasture.52 In Hardin’s story, cattle ranchers freely bring their cows into the field and quickly discover the field’s benefits.53 Eventually, the ranchers destroy the area they held in common by sending in more cows than the field can sustain.54 The moral of the tragedy: the commons fall prey to separate self-interests because they are open to all.55 The tragedy of the commons may be reflected in activities aimed at increasing economic, militaristic, or territorial advantage over everything

45. Id. at 1–2.
46. Id. at 6.
48. See Buck, supra note 44.
49. See infra note 222 and accompanying text.
52. Id.
53. Id.
54. Id.
55. Id.
else.\footnote{See id.} For the most part, nations presently do not regulate space activities implemented by their citizens or activities that originate from within their borders.\footnote{RAM S. JAKHU & YAW OUT M. NYAMPONG, International Regulation of Emerging Modes of Space Transportation, in SPACE SAFETY REGULATIONS AND STANDARDS 216 (Joseph N. Pelton & Ram S. Jakhu, eds., 2014).} However, there are guidelines in international law, which will be addressed later in this article. But, before addressing these guidelines, another reason for international law’s relevance and necessity must be addressed.

Hardin’s observations can be extrapolated to the realities of outer space because, theoretically, the desire to expand could create an inescapable snowball effect leading to tragedy in outer space. This potential effect demands an update of the process that is followed by those seeking to commercialize this global commons. Is “overgrazing” possible in outer space? Hardin’s story discusses a “finite” resource, but outer space is limitless.\footnote{See Hardin, supra note 51, at 1243–48.} Recently, Frank Rose, U.S. Assistant Secretary of State for arms control, considered the benefits of outer space, not only for the U.S. and China, but for humanity.\footnote{Frank A. Rose, Commentary/Strategic Stability in U.S.–China Relations, SPACENEWS (Jan. 29, 2015), http://spacenews.com/commentary-strategic-stability-in-u-s-china-relations (“Frank A. Rose serves as U.S. assistant secretary of state for arms control, verification and compliance, and formerly was duty assistant secretary of state for space and defense policy.”).} Whether intentional or unintentional, Rose’s correctly evaluated outer space by incorporating the concept of the global commons. Outer space is a member of the protected category of realms that benefit humanity.\footnote{BUCK, supra note 44.} In particular, Rose noted the global benefits of information gathered from space-based systems:

- “[w]arning of natural disasters,
- “[f]acilitating navigation and transportation globally,
- “[e]xpanding our scientific frontiers,
- “[m]onitoring strategic and military developments,
- “supporting treaty monitoring and arms control verification, and
- “[p]roviding global access to financial operations”\footnote{Rose, supra note 59.}

The tragedy could be identified in practices designed to gain a tyrannical advantage.\footnote{E.g., a tyrannical advantage would be if some portion of society could prevent outside the box solutions to the problem of space exploration. Don Pettit, The Tyranny of the Rocket Equation, NASA.GOV (May 1, 2012), http://www.nasa.gov/mission_pages/station/expeditions/expedition30/tryanny.html.}
How will we explore space? Will we begin mining operations in our moon? It is a known fact that there is an abundance of helium 3 in the moon. Helium 3 has the necessary properties to fuel fusion reactors that could propel ships into deep space. Perhaps we will move to Mars and then beyond. The tragedy can be tied to a rejection of the enjoyment of rights delineated in the United Nations’ Universal Declaration of Human Rights: “all human beings are born free and equal in dignity and rights.” Additionally, the United Nations’ International Covenant on Civil and Political Rights (ICCPR) proclaims, in Article 2, that governments will respect and protect human rights for all individuals within their territory. Indeed, the movement of weapons into space creates an imbalance, which directly violates “the most basic principles in the Outer Space Treaty: that outer space is the province of all mankind.” The imbalance, unfortunately, is reflected in the potential distrust and suspicion among nations, but this day and age requires, above all, peace and cooperation. National treaties over outer space should not be changed simply because governments increase their influence over a particular territory. The same could also be said of the private sector.

There is no need to contemplate tragedy when considering the vastness of outer space. Instead, we should think about the future of a new frontier. There was a time when humanity had big dreams. It was the age of the first race to outer space: the age of pioneers traveling into the unknown. The awe-inspiring vistas of the unending horizon made any danger of exploration small in comparison. The desire to understand the unknown drove human nature. In just one hundred years, humanity moved in technological leaps.


64. *Id.;* Deep space is the space outside of our Solar System.


68. *Id.*

The twentieth century witnessed humanity's travels into the stars.\(^{70}\) The twenty-first century continued with long-range probes that pushed for dynamic development of discovery, understanding, and invention.\(^{71}\)

The quest into a new frontier brought great successes and inaudible sacrifices. On paper, this quest was about the mathematics of design, gravity, and propulsion. But, ultimately, the quest was about the human being. In fact, the story of space exploration is filled with great accomplishments. When Neil Armstrong stepped onto the moon during the Apollo 11 mission, he rightly called it "one small step for a man, one giant leap for mankind."\(^{72}\) The Apollo 12 and Apollo 17 missions also evidence acclaimed success.\(^{73}\) After these quests, however, the space program gradually fell from public notice, perhaps because NASA did not consider the opinions of taxpayers as it moved forward.\(^{74}\) To avoid another lapse in public interest, sharing information with the general public is key. An informed society avoids the mistakes of the past and faces the future ready to contribute to new projects. Thus, humanity will have a stake in new missions and realize that the future belongs to all.

When the final Apollo mission was announced in 1972, interest in outer space returned, at least for a moment.\(^{75}\) In 2015, we face an additional challenge primarily because of images from the Kepler Space Observatory.\(^{76}\) These images allow us to catch a glimpse at new worlds that may sustain life.\(^{77}\)

Great sacrifices, unfortunately, accompany the great accomplishments in space travel. On January 27, 1967, the United States lost its first three astronauts.\(^{78}\) The scheduled Apollo 1 mission (AS-204) was the first manned


\(^{71}\) See *id.*

\(^{72}\) See, e.g., Andrew Chaikin & Victoria Kohl, *Mission Control, This is Apollo: The Story of the First Voyages to the Moon* 46 (2009).

\(^{73}\) See generally *id.* at 49–54, 93–101 (providing background information on both missions).


\(^{75}\) *Id.*

\(^{76}\) Mike Wall, *1,000 Alien Planets! NASA's Kepler Space Telescope Hits Big Milestone*, SPACE.com (Jan. 6, 2015, 2:00 PM), http://www.space.com/28105-nasa-kepler-spacecraft-1000-exoplanets.html.

\(^{77}\) *Id.*

\(^{78}\) Apollo 1, NASA (June 14, 2012), http://www.nasa.gov/mission_pages/apollomissions/apollo1.html.
enterprise of the U.S. Apollo lunar program.\footnote{Apollo 1 (AS-204), SMITHSONIAN NAT’L AIR & SPACE MUSEUM, http://airandspace.si.edu/explore-and-learn/topics/apollo/apollo-program/orbital-missions/apollol.cfm (last visited Jan. 15, 2016).}

An accidental fire prevented the mission from taking place and killed the astronauts.\footnote{Id.}

Concurrently, the Soviet Union also experienced fatalities during two of its own missions. On April 24, 1967, the Soyuz 1 mission ended in disaster when the craft’s parachute failed to open properly upon atmospheric reentry.\footnote{Soyuz 1, SPACE SAFETY MAG., http://www.spacesafetymagazine.com/space-disasters/soyuz-1 (last visited Jan. 15, 2016).} As the capsule hit the ground at high speed, its sole cosmonaut was killed.\footnote{Id.}

The losses sadly continued. On June 30, 1971, the three-man crew of Soyuz 11 asphyxiated during the module’s separation from the Salyut 1 space station.\footnote{Ben Evans, The Crew That Never Came Home: The Misfortunes of Soyuz 11 (Part 2), AMERICASPACE (Apr. 28, 2013), http://www.americaspace.com/?p=34951.}

An air vent opened prematurely, exposing the crew to the vacuum of space for at least eleven minutes.\footnote{Id.; see also Nola Taylor Redd, Salyut 1: The First Space Station/The Greatest Moments in Flight, SPACE.COM (July 26, 2012, 1:37 PM), http://www.space.com/16773-first-space-station-salyut-1.html (providing further background on the Soyuz 11 mission).}


The Space Shuttle Challenger (mission STS-51-L) broke apart seventy-three seconds into its flight and killed all seven crew members.\footnote{Howell, Challenger: Shuttle Disaster That Changed NASA, supra note 85.} On February 1, 2003, another tragedy occurred when the Space Shuttle Columbia (mission STS-107) disintegrated over Texas and Louisiana upon reentering the atmosphere, killing all seven crew members.\footnote{See Elizabeth Howell, Columbia Disaster: What Happened, What NASA Learned, SPACE.COM (Feb. 1, 2013, 10:00 AM), http://www.space.com/19436-columbia-disaster.html; Kennedy Space Center, Space Shuttle Overview: Columbia (OV-102), NASA.gov (Jan. 31, 2005), http://www.nasa.gov/centers/kennedy/shuttleoperations/orbiters/columbia_info.html.} It is a testament to humanity that the space program endures despite these terrible losses. Humanity also endures, and the memory of these great, heroic explorers continues to serve the mission of conquering the final frontier.
Time is a critical element in both developing new endeavors and planning for technological advancements. The most recent example is “NASA’s New Horizons probe.”88 This marvel of engineering traveled for “more than nine years and 5 billion kilometers” to explore the distant world of Pluto.89 Senate Bill 1297 further reflects the continued interest of the United States in space exploration, which the Senate unanimously passed on August 4, 2015.90 This bill extends the law of commercial launches and operations to the International Space Station beyond 2020.91 There is no doubt, we will return to outer space. Thus, the future is full of possibilities.

Both the protection and communication of information are equally important for the betterment of humanity. As we continue to use our assets in space, satellites and probes are at the forefront of gathering and delivering information.92 These state-of-the-art vehicles of human ingenuity now operate in a silent progression of development.93 Efforts infused with cooperation mark the zenith of perfection.

Today the satellite industry remains strong.94 “As of 2013, the global satellite industry [...] was] a 189.5—billion (US)—dollar business, comprising 62% of the overall space industry sector.”95 While Apollo 17 was the last manned mission beyond the bounds of Earth’s orbit,96 our unmanned probes have moved across the solar system like sentinels in search of the unknown.97

89. Id.
90. U.S. Commercial Space Launch Competitiveness Act, S. 1297, 114th Cong. (as passed by Senate, Aug. 4, 2015); see also Jeff Foust, Senate Passes Commercial Space Bill, SPACENEWS (Aug. 5, 2015), http://spacenews.com/senate-passes-commercial-space-bill/ (explaining the significance of the bill and how it was passed).
91. Foust, supra note 90.
92. See C. Robert Welty, Satellite Basics for Everyone, at ix (2012) (“With satellites we observe the universe and the earth, perform reconnaissance and navigation, make scientific measurements, and perform global communications.”).
93. See id. at ix–x.
95. Id.
96. Chaikin & Kohl, supra note 72, at 93 (noting that “Apollo’s final moonwalk was under way”).
97. See Elizabeth Landau, supra note 70.
In 2012, the Voyager 1 probe became humanity’s first interstellar traveler.\textsuperscript{98} Despite a more basic design than its modern successors, Voyager 1 travels onward, to transmit valuable data back to Earth.\textsuperscript{99} Excitement and fascination are inevitable as we contemplate the cosmos and gaze at the unending darkness of the unknown. However, our artificial instruments, i.e., satellites and probes, help us to fill some of the void. These instruments have two main components: “a mission payload and a support platform or bus.”\textsuperscript{100} The functions of a mission payload include:

- “making measurements,”
- “providing communications,”
- “providing navigation, and
- “special military operations.”\textsuperscript{101}

In addition to transporting the mission payload, the functions of the support platform include:

- “electrical power,”
- “attitude control,”
- “payload pointing,”
- “temperature control,”
- “orbital position control, and
- “orbital changes.”\textsuperscript{102}

The satellite market has shifted from governmental control to a more commercial arena.\textsuperscript{103} Similarly, the market for space tourism is commercial in nature.\textsuperscript{104} Thus, a satellite’s “launching state” may not be the same as its “state of registry.”\textsuperscript{105} Now, more than one entity may now share the responsi-

\textsuperscript{98} Mike Wall, It’s Official! Voyager 1 Spacecraft Has Left Solar System, SPACE.com (Sept. 12, 2013, 2:01 PM), http://www.space.com/22729-voyager-1-spacecraft-interstellar-space.html.


\textsuperscript{100} Welti, supra note 92, at 1.

\textsuperscript{101} Id.

\textsuperscript{102} Id.


\textsuperscript{104} See Yuna, supra note 37, at 961 (recognizing the argument “that the existing international space treaties are inadequate for space commercialization”).

\textsuperscript{105} See id. (discussing the logistical considerations for assigning and determining liability).
bility for a launch into space. To step into the great abyss of outer space is to accept that humanity still has an abundant lack of knowledge. Satellites, already part of our lives, facilitate a global process of communication in which governance plays a key role by defining whose decisions are authoritative. A true governance process must facilitate a flow of information that societies should protect. In particular, geostationary communication satellites are central to our most basic and necessary daily services. These satellites “provide[] global television, radio, business, Internet, and telephone services,” and “are critical for national security.” For these reasons, our lives appear as a science-fiction story, one we may forget is real. While the precepts of international law born from Westphalia may be the point of departure, I believe that they may not be the destination.

III. PRECEPTS OF INTERNATIONAL LAW

History shows human relations, successes, and achievements can change our lives. As early as 1899, scholars recognized that international law may conflict with the interests of nations. International laws originated from “rules of conduct observed by [nations] in their dealings with each

106. *Id.* at 969, 975 (arguing that “space objects should be considered an extension of the jurisdiction of the launching state” and requiring registration would be “reasonable for . . . determining liability”).

107. See infra notes 123–29 and accompanying text.

108. See Yuna, *supra* note 37, at 969 (noting that “space objects should be considered an extension of the jurisdiction of the launching state, whose law prevails”); see also Pamela L. Meredith & Franceska O. Schroeder, *Privately-Owned Commercial Telecommunications Satellites: Licensing and Regulation by the Federal Communications Commission*, 27 CAL. W. L. REV. 107, 108 (1991) (“The United States private telecommunications satellite industry is unique in the world. The political and institutional frameworks in this country have allowed for, and even encouraged, the development of private industry to provide telecommunications services and to engage in space operations. In most countries, these activities are government monopolies.”).

109. See WELTLI, *supra* note 92, at 4, 15, Fig. 1.4 (2012).

110. *Id.*

111. *Id.* at 4.

112. See 1 Thomas Alfred Walker, A HISTORY OF THE LAW OF NATIONS: THE SCIENCE OF INTERNATIONAL LAW § 82 148 (1899) (“Such a settlement as that of the Peace of Westphalia would have been impossible had it not been preceded by a great change in general political thought.”).

113. See generally *Id.* at 1 (“The term [International Law] is by its employers used to denominate certain rules which are asserted to be observed between states. Its propriety is questioned commonly upon the ground that, states being independent, a rule which is observed between states is, in so far as it is interna-
other." At this point in history, it may seem hypocritical and irresponsible to question the existence, benefits, and legitimacy of international laws. However, we currently know that governments may interfere with the protections afforded by international laws, as shown by a failure to protect human rights around the world.

The relationship between international law, outer space, communications, and private actors must be defined. At the heart of this challenge lies a new opportunity. History reflects how agreements forge success and may provide guidance for the future of space exploration. Humanity's predisposition for good is reflected throughout history, including the first moon landing in 1969. Additionally, the splitting of the atom, the invention of the Internet, and the construction of the Large Hadron Collider also present clear examples of human imagination and creativity.

The next step is to create a process to manage outer space activities, which may be illustrated by the Chicago Convention. This process requires an examination of the entire decisional process to uncover the challenge of outer space management. In other words, all participants of the governance

114. Id. at 20.
115. See id. at 20–29 (providing historical “evidence” regarding whether international “rules have been in fact observed”).
118. See Reynolds, supra note 74, at Ch. 2.
120. See Balleste, Internet Governance, supra note 23, at 1 (discussing the invention of the Internet).
121. See generally The Large Hadron Collider, CERN, http://home.web.cern.ch/topics/large-hadron-collider (last visited Nov. 6, 2015) (detailing the construction of the Large Hadron Collider).
122. See infra notes 128–29 and accompanying text.
process must cooperate to reach an effective alternative\textsuperscript{124} and implement a better mechanism.\textsuperscript{125}

A point of departure is the International Civil Aviation Organization (ICAO).\textsuperscript{126} The ICAO "is a UN specialized agency, established by [Nation] States in 1944 to manage the administration and governance of the Convention on International Civil Aviation (Chicago Convention)."\textsuperscript{127} For instance, the Preamble states that "the future development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the world, yet its abuse can become a threat to the general security."\textsuperscript{128} More specifically, four articles in the Chicago Convention provide particularly relevant points:

Article (3): [E]very State must refrain from resorting to the use of weapons against civil aircraft in flight;
Article (5): The aircraft of states, other than scheduled international air services have the right to make flights across state’s territories and to make stops without obtaining prior permission. However, the state may require the aircraft to make a landing;
Article (24): Aircraft flying to, from or across, the territory of a state shall be admitted temporarily free of duty. Fuel, Oil, spare parts, regular equipment and aircraft stores retained on board are also exempt custom duty, inspection fees or similar charges; and
Article (29): Before an international flight, the pilot in command must ensure that the aircraft is airworthy, duly registered and that the relevant certificates are on board the aircraft.\textsuperscript{129}

Similarly, the legitimacy of space exploration is reaffirmed by each participant’s involvement in the process. Requiring participants to have a special "stake" would achieve successful results by ensuring that participants are qualified to share in the exploration and commercialization of outer space.

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, or "Outer Space Treaty," went into effect

"[d]ivides, be they geographical, political, religious, or intellectual, are challenges" and "[t]he first step in overcoming these obstacles, as any other social problem, is to analyze them properly.").

124. See infra note 130, 136.
125. Id.
127. Id.
129. See id. at 3, 4, 11, 13–14.
in October of 1967.\textsuperscript{130} The U.N. Office for Outer Space Affairs explains: The Outer Space Treaty provides the basic framework on international space law, including the following principles:

- the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind;
- outer space shall be free for exploration and use by all States;
- outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means;
- States shall not place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space in any other manner;
- the Moon and other celestial bodies shall be used exclusively for peaceful purposes;
- astronauts shall be regarded as the envoys of mankind;
- States shall be responsible for national space activities whether carried out by governmental or non-governmental entities.\textsuperscript{131}

The Outer Space Treaty not only serves as a legal guideline, it can also serve as a philosophy for future human exploration.\textsuperscript{132} Article I emphasizes the goals of the entire agreement by stating that:

> the exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind . . . [and] there shall be freedom of scientific investigation in outer space . . . and States shall facilitate and encourage international co-operation in such investigation.\textsuperscript{133}

Also notable is Article 5: “States Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the

\begin{thebibliography}{9}
\bibitem{132} See id.
\bibitem{133} Outer Space Treaty, \textit{supra} note 130, 18 U.S.T. at 2412, 610 U.N.T.S. at 207–08.
\end{thebibliography}
territory of another State Party or on the high seas." 134 “When astronauts make such a landing, they shall be safely and promptly returned to the State of registry of their space vehicle.” 135

Another progressive document offering guidance for the second space race is the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, which “[e]ntered into force October 10, 1963.” 136 This agreement’s most important goal to limit military activities in space, which is reflected by the prohibition and prevention of nuclear weapons testing in Article I (1):

(a) in the atmosphere; beyond its limits, including outer space; or under water, including territorial waters or high seas; or
(b) in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the State under whose jurisdiction or control such explosion is conducted. 137

Increased participation of stakeholders who are able to make claims in their own names may benefit the future space program. 138 Therefore, a decision-making process with flexible governance requires a respect for claims of increased participation.

The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement), adopted by the General Assembly in 1979, is another source to consider in the new phase of space exploration. 139 The agreement, effective July 1984, brings considerations of

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134. Id. at 2413 (or 610 U.N.T.S. at 208–09).

135. Id.


137. Id. at 1314 (or 480 U.N.T.S. at 45).

138. Michael W. Reisman, Development and Nation-Building: A Framework for Policy-Oriented Inquiry, 60 Me. L. Rev. 309, 313 (2008) (“[A] respect development occurs when group members perceive themselves increasingly as full participants able to make claims in their own names.”).

international human rights law to the forefront. While the “agreement reaf-

firms and elaborates on many of the provisions of the Outer Space Treaty as

applied to the Moon and other celestial bodies,” it also delves into the con-

cept of the “common heritage of mankind.”

The “common heritage of mankind” may further strengthen the future of

space exploration while considering ownership claims over resources. In

1967, Ambassador Arvid Pardo of Malta considered this concept in connec-

tion with the deep seabed and ocean floor. The concept has five main

purposes:

- no ownership;
- internationalized management;
- peaceful purposes;
- preservation for future generations; and
- sharing of resources.

A sui generis approach is required to manage outer space. Under the
correct approach, governance will promote greater opportunities for human-

ity and establish a social contract on behalf of the global community. The

first four articles of the Moon Agreement reflect this concept and are worthy

of notice. Article 1(1) reminds us that the treaty applies to the moon and

other celestial bodies within the solar system, not just Earth. Article 1(2)

expands its application to include orbits or other trajectories around the

moon. Article 2 sets forth an aim of space exploration: “all activities on the

moon, including its exploration and use, shall be carried out in accordance

with international law, in particular the Charter of the United Nations . . . in

the interests of maintaining international peace and security.”


141. Moon Agreement, supra note 139, art. 11.

142. See id.

143. Id.


145. See generally Balleste, Internet Governance, supra note 23, at 151 (discussing the requirement that governance decisions be “made by and for the world community.”).

146. See Moon Agreement, supra note 139, art. 1–4.

147. Id. art. 1.

148. Id.

149. Id. art. 2.
Article 3 defines pitfalls in the quest for new frontiers in space. Article 3(1) states that the moon shall be used exclusively for peaceful purposes. Article 3(2) proclaims that any threat, use of force, or any other hostile act “in relation to the earth, the moon, spacecraft, the personnel of spacecraft or man-made space objects” is prohibited. Article 3(3) notes that the moon should not be used to store weapons of mass destruction, or serve as a launching base for such weapons. Additionally, Article 3(4) prohibits the “establishment of military bases, the testing of any type of weapons and the conduct of military maneuvers on the moon.” Finally, Article 4(1), (2) highlights other aspirations of the agreement:

The exploration and use of the moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries . . . Due regard shall be paid to the interests of present and future generations as well as to the need to promote higher standards of living . . . in accordance with the Charter of the United Nations.

While the international community may lack an all-encompassing international strategy for outer space activities, guide posts still exist and illuminate the proper response in certain situations. Yet, the future of space exploration will need international peace and security. The guidance provided in Chapter VII of the United Nations Charter deserves due care, particularly Article 51, if acts of aggression begin. A stealthy aggressor could become difficult to identify. Before even considering the use of force, Article 51 states:

Nothing in the present Charter shall impair the inherent right of individual or collective self-defense if an armed attack occurs against a Member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security. Measures taken by Members in the exercise of this right of self-defense shall be immediately reported to the Security

150. See id. art. 4.
151. Id.
152. Moon Agreement, supra note 139, art. 3.
153. Id.
154. Id.
155. Id.
156. See, e.g., id.
158. PAUL ROSENZWEIG, CYBER WARFARE: HOW CONFLICTS IN CYBERSPACE ARE CHALLENGING AMERICA AND CHANGING THE WORLD 51 (2013).
159. See id. at 49–51.
Council and shall not in any way affect the authority and responsibility of the Security Council under the present Charter to take at any time such action as it deems necessary in order to maintain or restore international peace and security.160

Unsurprisingly, these activities would be infused with human dignity and surrounded by laws formulated in accordance with the benefits owed to humanity.161 Unfortunately, a global constitutive process aimed purely at control may, in general, diminish the goals of any effort to explore space.

Additionally, regional agreements help us ponder further about the future. For example, the American Declaration of the Rights and Duties of Man notices that every person has the right to freedom of investigation, opinion, expression, and dissemination of ideas, in any medium.162 Further, the American Convention on Human Rights recognizes the rights of freedom to seek, receive, and impart information and ideas, of all kinds, regardless of frontiers.163 Further, the American Convention on Human Rights states that indirect methods may not restrict the right of expression.164 Such indirect methods include the abuse of control from either government or private individuals, or by any other means tending to impede the communication and circulation of ideas.165 Other, similar documents that apply equally around the world do exist.

On January 29, 2015, Assistant Secretary Frank Rose noted the need to maintain a “sustained dialogue [to] improve our understanding of China’s strategic perspective and enhance China’s understanding of U.S. policy and strategy.”166 Rose suggested outer space is a “domain that we should explore in the U.S.-China strategic relationship.”167 The United States recognizes that China, by joining the space race, gained the capacity for orbital, military operations.168 Rose commented on a long term process to “strengthen strategic stability” and enhance “mutual trust and risk reduction” as a necessary

164. Id.
165. Id.
166. Rose, supra note 59.
167. Id.
and strategic approach by the U.S.\textsuperscript{169} The U.S.'s strategy could create a potential partnership with another nation that strengthens the bonds of trust, while exchanging information and enhancing cooperation.\textsuperscript{170} Unfortunately, Rose observed, China has proven to be more of an adversary in outer space.\textsuperscript{171} Nonetheless, we cannot forget our humanity and morals during any future space exploration.

IV. INTERLUDES OF INTERSTELLAR TRAVEL

"The nations that had instituted spaceflight had done so largely for nationalistic reasons; it was a small irony that almost everyone who entered space received a startling glimpse of a transnational perspective, of the Earth as one world."

— Carl Sagan\textsuperscript{172}

Many experts have recently started to grapple with the future commercialization of space.\textsuperscript{173} The future offers an opportunity to consider the governance of outer space from the perspective of the global commons, individual nations, the private sector, and the rest of humanity.\textsuperscript{174} The future of outer space exploration will be better served by those that support a \textit{sui generis} process guided by specific characteristics.\textsuperscript{175} There are approaches that should be avoided, however, particularly those that show apprehensiveness towards activities outside of governmental influence. The exploration of outer space should be studied beyond the prism of the global commons. This vast commercial environment is much more complex, and requires additional considerations.

The Roman classifications of property may provide guidance in the management of outer space. Roman mythology assigned the Roman name Jove to Jupiter.\textsuperscript{176} The term Jovian derives from this mythology, and ultimately became a term to describe the outer planets of our solar system.\textsuperscript{177} The Roman world also evidences the concept of property and its relationship

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\textsuperscript{169} Rose, \textit{supra} note 59.

\textsuperscript{170} \textit{Id.}

\textsuperscript{171} \textit{Id.}

\textsuperscript{172} \textsc{Carl Sagan}, \textit{Contact} 279 (1997).

\textsuperscript{173} \textit{See supra} notes 32–39 and accompanying text.

\textsuperscript{174} \textit{See supra} notes 44–57 and accompanying text.

\textsuperscript{175} \textit{See, e.g.,} Balleste, \textit{Internet Governance}, \textit{supra} note 23, at 155.

\textsuperscript{176} \textsc{Mike Dixon-Kennedy}, \textit{Encyclopedia of Greco-Roman Mythology} 181 (1998).

\textsuperscript{177} \textsc{Danny R. Faulkner}, \textit{New Astronomy Book} 28 (2014).
to the apportionment of resources by human beings.\textsuperscript{178} Seeking guidance from the Romans for activities related to the geostationary orbits in space, Professor Siegfried Wiessner first looked beyond traditional notions of modern international law.\textsuperscript{179} This article goes beyond Wiessner’s analysis by expanding the concept to all of outer space’s resources.\textsuperscript{180} This paper also arrives at a different conclusion, guided by the research in the area of Internet law and the existence of new technology.\textsuperscript{181}

The Romans’ list of property classifications could provide guidance in the management of outer space. The Romans would have defined outer space as a \textit{res}, or something of monetary value.\textsuperscript{182} While difficult to monetize all of outer space, future commercialization of outer space will ultimately create some form of price tag.\textsuperscript{183} We must decide what a “price tag” means for the future and what “monetary value” means for humanity.\textsuperscript{184} Roman law would more specifically classify outer space as either \textit{res in patrimonio} or \textit{res extra patrimonium}.\textsuperscript{185} The former relates to the ownership and enjoyment of certain property by individuals, while the latter relates to areas enjoyed by the community.\textsuperscript{186}

Broadening participation in the development of future projects will, obviously, require partners and investors from different groups of individuals.\textsuperscript{187} Because outer space comingles with technology, analyzing the management of cyberspace will respond better to a classification for rapidly changing developments.\textsuperscript{188} Like cyberspace, \textit{res extra patrimonium} classifies


\textsuperscript{180} See Blueprints for the Future, supra note 179, at 244–46.

\textsuperscript{181} See, e.g., \textit{Balleste, Internet Governance}, supra note 23, at 151–73.

\textsuperscript{182} J.A.C. Thomas, \textit{Textbook of Roman Law} 125 (1976) (defining \textit{res} as “the law related to things”).

\textsuperscript{183} See Chow, supra note 41.

\textsuperscript{184} See supra notes 55–57, 109–11 and accompanying text.

\textsuperscript{185} See Thomas, supra note 182, at 184.

\textsuperscript{186} Id.; 2 Patrick Mac Chomaich De Colquhoun, \textit{A Summary of the Roman Civil Law} 1–2 (1988).

\textsuperscript{187} See supra notes 43–47 and accompanying text.

\textsuperscript{188} See supra notes 35–41 and accompanying text.
outer space best because it includes the subcategories res nullius, res communis, res publica, res universitatis and res divini juris.189 Within res extra partimonium and its five sub-categories the answer is found:

- res nullius: not applicable to outer space;
- res divini juris: not applicable to outer space;
- res communis: applicable, but insufficient;
- res publica: applicable, but insufficient; and
- res universitatis: applicable to outer space: goes beyond the res communis and res publica concepts.190

The res nullius category wrongly classifies outer space because it includes resources outside of the scope of any type of ownership, for example, a new rising island in the ocean.191 Similarly, res divini juris wrongly classifies outer space because this category includes religious sites.192 The res communis category correctly, but insufficiently classifies outer space by opening the use and enjoyment of resources, like the sea and air, to everyone.193 To achieve proper classification, however, outer space’s activities will require management to avoid a potential tragedy of resources.194

Cyberspace and outer space’s similarly include an area that is “intended for public use” and for the public’s benefit.195 Res publica potentially classifies outer space correctly by accounting for public things that belong to the populous, or all citizens.196 Thus, in line with the principles of the Outer Space Treaty, one could argue that common areas, such as outer space, belong to all of humanity.197 Space exploration will become a multi-stakeholder endeavor because advancements are being initiated by the private sector.198 Much like the res communis subcategory, if we want to follow res publica to its ultimate definition then we have to accept sole control of the nation state.199 Even though outer space could be designated a res publica, making it accessible to the whole world, such a designation likely requires a governance approach that would not be practical without ignoring all other stake-

190. See Thomas, supra note 182, at 184–85.
191. Id.
192. Id. at 5.
194. See supra notes 35–41 and accompanying text.
195. Thomas, supra note 182, at 129.
196. Id.
197. See G.A. Res. 34/68, supra note 139, at 78.
199. Thomas, supra note 182, at 129.
holders. An answer may lie in its own characteristics. Both cyberspace and outer space have a particular trait in common: an area “intended for public use” and for their benefit.200

The heart of the last category, res universitatis designates certain property for public use.201 An area designated for public use is described as an area inherently managed with some degree of control “by corporate public bodies such as municipalities” which includes “theatres, parks, racecourses and stadia,” for example.”202 The word universitatis draws its significance from the word universitas, or universe, denoting a degree of governmental control.203 The word universe, then, refers to a collective, or a community.204 The multi-stakeholder model arguably refers to such a community.

Managing outer space will require stakeholders to demonstrate their intent to manage outer space’s resources for the benefit of the world community.205 A governance process infused by the precepts found in res universitatis goes beyond the res communis and res publica categories, much like cyberspace.206 While the res universitatis category considers outer space as a commons, the category requires an established list of members that jointly participate in the management.207 Thus, the res univeritatis category understands traditional claims of ownership as inappropriate for outer space’s expansiveness.208 Res universitatis will require members of the community to invest in the common endeavor of space exploration.209 In the case of outer space, three important characteristic would make res universitatis more viable:

• management would not be the sole province of governments;
• management would be open to a limited group of stakeholders (a community); and

200. THOMAS, supra note 182, at 129.
201. Id.
204. Rose, supra note 203, at 107.
205. See supra notes 50–57 and accompanying text.
206. Rose, supra note 203, at 106.
207. Id. at 106.
208. Id.
209. Id. at 107–08.
V. THE LIGHT OF A DISTANT SUN

Will we achieve interstellar travel? We have already achieved parts of the interstellar travel goal with deep space probes.\textsuperscript{210} Humans may ultimately follow their journey into that unknown. We have to embrace our mortal nature if we are to become better beings in the future. Our planet looks beautiful and impressive when viewed from outer space. While natural Earth formations are visible from orbit, the monuments constructed by humanity are not visible to the unaided eye.\textsuperscript{211} As we move farther away into outer space, we discover a change of perspective: “A celebrated photograph taken in 1990 from the edge of the solar system by the Voyager 1 spacecraft shows how underwhelming Earth looks from deep space: a pale blue dot . . . and that’s generous. Without the help of a picture caption, you might not find it at all.”\textsuperscript{212}

Celebrated astrophysicist Neil deGrasse Tyson echoes similar words from cosmologist Carl Sagan when describing the trait that will get us to the stars: humanity’s willingness to put itself in harm’s way to reach out and touch the next frontier in order to expand the boundaries of our existence in the Universe.\textsuperscript{213} Humanity now faces the challenge of finding the ethical way to improve the future of space law and management.\textsuperscript{214} One solution embraces philosophy and reason by finding a “common ground” that cuts through the differences inherent in humanity.\textsuperscript{215}

Human pollution of water ways, including the deep oceans, and climate change may slowly fade life from Earth.\textsuperscript{216} How do we, as a species, move from our present point? Considering the meaning of life from this perspective, however, takes us beyond this article’s scope. Leo Tolstoy suggests the meaning of life stems from knowing that an undertaken project would make

\begin{itemize}
\item management would be a shared responsibility—restricted to those that share a desire to cooperate for the peaceful benefit of the community.
\end{itemize}


\textsuperscript{211} \textsc{Neil deGrasse Tyson}, \textit{Space Chronicles: Facing the Ultimate Frontier} 27 (Avis Lang ed., 2012).

\textsuperscript{212} \textit{Id.}

\textsuperscript{213} \textit{Id.} at 201.

\textsuperscript{214} Mervyn Frost, Ethics of Commercial Space, in \textit{Commercialisation of Space: Opportunities and Challenges} 184, 185–86 (Bhupendra Jasani & Ram Jakhu eds., 2014).

\textsuperscript{215} \textit{Id.}

a permanent difference to the world. Tolstoy underscores the importance of selflessness to develop a better future in outer space and preserve human morals. Appropriately, the substance of a memorable dialogue between astronauts on the way to Mars, from the movie Red Planet, reflects this idea:

*Chantilas*: [Suppose] we just finished poisoning the earth and everyone was dead in a hundred years. Then what was the point of anything? Art, beauty—all gone—the Greeks, the Constitution, people dying for freedom, ideas. None of it meant anything? What about religion? Do we give up on God too?

*Gallagher*: You didn’t just give up being a scientist one day, did you?

*Chantilas*: I realized science couldn’t answer any of the really interesting questions. So, I turned to philosophy. I’ve been searching for God ever since.

In the end, outer space exploration and its commercial success will first depend on simpler concepts, such as finding common ground amongst stakeholders. A civilization that is preparing to move into outer space should realize that a focus on values in current actions will improve the future of its endeavors. Finally, one should utilize the history of society’s treatment of the Internet because the standards that Dr. Jon Postel envisioned for the Internet would enrich any model of governance for outer space. Postel, one of the fathers of the Internet, noted that governance of Internet activities required implementing a trust for all members of the community. Postel suggested that concerns about ownership were inappropriate and that the focus should be on responsibility and community service. Outer space communications should demand this approach. Standards of human rights provide guidance, by pointing to find in favor of fairness. An improper governance


218. See id.


220. See supra notes 43–47 and accompanying text.

221. See BALLESTE, INTERNET GOVERNANCE, supra notes 23, 145 and accompanying text.


223. Id.

224. Id.

policy focused on national frontiers considers outdated perspectives, focuses too narrowly on the short-term, and fails to accept the greater challenge. Ultimately, tackling the problem of interstellar travel incorporates the boundaries of human knowledge.