The Final Frontier:
Evolution of Space Law in a Global Society
By: Garett Faulkender and Stephan Schneider

Introduction

“Space: the final frontier!” These are the famous introductory words spoken by William Shatner on every episode of Star Trek. This science-fiction TV show has gained a cult-following with its premise as a futuristic Space odyssey. Originally released in 1966, many saw the portrayed future filled with Space-travel, inter-planetary commerce and politics, and futuristic technology as merely a dream. However, today we are starting to explore this frontier.

“We are entering an exciting era in [S]pace where we expect more advances in the next few decades than throughout human history.”¹ Bank of America/Merrill Lynch has predicted that the Space industry will grow to over $2.7 trillion over the next three decades. Its report said, “a new raft of drivers is pushing the ‘Space Age 2.0’”.² Indeed, this market has seen start-up investments in the range of $16 billion,³ helping fund impressive new companies like Virgin Galactic and SpaceX. There is certainly a market as Virgin Galactic says more than 600 customers have registered for a $250,000 suborbital trip, including Leonardo DiCaprio, Katy Perry, Ashton Kutcher, and physicist Stephen Hawking.⁴

Although Space-tourism is the exciting face of a future in Space, the Space industry has far more to offer. According to the Satellite Industries

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² Id.
³ Id.
Association, small satellites used for observing conditions on the Earth are the fastest growing segment of the $260.5 billion global satellite industry.\textsuperscript{5} Its report states that satellites generated an 11 percent jump in annual revenue for Earth imagery in 2016 and a rapidly increasing volume of the 1,459-operating Spacecraft that circled the planet at the end of that year. These satellites are essential to society contributing to GPS, telecommunications, and Earth imagery.

Thanks to decreased costs, increased capabilities, and new innovations, we are seeing what some call the “democratization of space.”\textsuperscript{6} Improvements in various fields that include satellites and launch systems are essential to this growth. With the advent of artificial intelligence and machine learning, we will see exponential development in technologies that will lead to further investment in Space industries. M. François Lombard, head of the Intelligence Business Cluster, Airbus Defense and Space, \textsuperscript{7} said, concerning the ongoing revolution, “A recurrent theme is that the barriers to access are being reduced and that this is at the core of this revolution.”\textsuperscript{8}

In order to understand this revolution in context, one should look at Thomas Friedman’s theory of globalization as presented in his best-selling book, The World is Flat. In it, he alludes to the fact that countries, companies, and individuals must remain competitive in a global market where historical and geographic divisions are becoming increasingly irrelevant.\textsuperscript{9} His theory designates three stages of globalization, or the interconnection of the world:

\textsuperscript{7} Id.
\textsuperscript{8} Id.
interaction between governments; (2) interaction between businesses; and (3) interaction between individuals.\textsuperscript{10} With the era of government monopoly in Space coming to an end, we are now entering the second stage, where multinational companies drive global integration.

On July 21, 2011, the \textit{Atlantis} Space shuttle landed at \textit{Kennedy Space Center}, thus marking the end of NASA’s 30-year Space shuttle program\textsuperscript{11} and the symbolic shift to Globalization 2.0. NASA administrator, Charles Boden said after the landing, “This final shuttle flight marks the end of an era, but today, we recommit ourselves to continuing human spaceflight and taking the necessary — and difficult — steps to ensure America’s leadership in human spaceflight for years to come.”\textsuperscript{12} Indeed, the private industry has taken the initiative.

For one, Elon Musk has very ambitious plans for \textit{SpaceX}. At the 67th Annual International Astronautical Congress in Guadalajara, Mexico, he announced that he wanted to set up a civilization on Mars.\textsuperscript{13} Using the \textit{SpaceX Interplanetary Transport System}, he estimates that a person will soon be able to travel to Mars for around $200,000.\textsuperscript{14} With 17 successful liftoffs, 14 successful landings, and 4 successful flights of a reusable rocket in 2017, \textit{SpaceX} is a testament to the promise of the private Space industry. This past year, \textit{SpaceX} was contracted by the US government to operate several covert missions for the \textit{Air Force} and the \textit{National Reconnaissance Office}. However, it was on February 6, 2018 that \textit{SpaceX} made history. With the whole world

\begin{itemize}
\item \textsuperscript{\textbullet} Id.
\item \textsuperscript{\textbullet} Id.
\end{itemize}
watching, the company successfully launched the *Falcon Heavy* rocket, establishing itself as the most powerful rocket ever built.\(^{15}\) The rocket placed Elon Musk’s personal Tesla (with a Spaceman sitting in the driver’s seat listening to David Bowie’s ‘Life on Mars?’ and accompanied by references to *The Hitchhiker’s Guide to the Galaxy*) in a heliocentric orbit.\(^ {16}\) The impact of this launch is considerable as the launch showcased an incredibly powerful, yet inexpensive rocket. All things considered, while the entrepreneurial spirit of industry leaders is admirable, they must rely on the government to create the optimal conditions for investment and growth.

Since taking office, U.S. President Donald Trump has identified Space as a matter of importance; he sees it as a source of patriotic unity and as a national security priority.\(^ {17}\) Holding its first meeting on October 5\(^ {th}\), 2017,\(^ {18}\) President Trump’s newly resurrected *National Space Council* has chosen the Moon as its first priority. “We will return American astronauts to the moon, not only to leave behind footprints and flags, but to build the foundation we need to send Americans to Mars and beyond,” said U.S. Vice-President Pence.\(^ {19}\)

In order to accomplish this, the Trump administration will adopt its central theme of business deregulation.\(^ {20}\) Dr. Scott Pace, the executive secretary of

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\(^{16}\) Id.


the *National Space Council*, echoed this in a speech to a Space law group in Washington, D.C.: “The United States should strive to be the most attractive jurisdiction in the world for private sector investment and innovation in outer Space. This requires a transparent, efficient, and minimally burdensome domestic regulatory mechanism for companies conducting Space activities.”

Dr. Pace and the administration believe that a stable, peaceful environment must be fostered for both government and commercial activities. He further states that the private sector “must have confidence that it will be able to profit from capital investments.”

The Space industry will welcome this environment. *SpaceX* President, Gwynne Shotwell told the *National Space Council* that “if we want to achieve rapid progress in [S]pace, the US government must remove bureaucratic practices that run counter to innovation and speed.”

While deregulation will help spur growth and investment, it is still important for jurisprudence to be firmly established. Like all growing industries, the law must be promptly and preemptively crafted to guide those who participate, otherwise, lawless chaos is inevitable.

“Law, if viewed realistically, is not a static body of rules.” Law is fluid, in the sense that this assemblage of rules is always changing due to the constant influx of new discoveries and social behaviors around the world. Just as weeds eventually break through thick concrete sidewalks, even the firmest legal prescriptions, *written in stone*, must give way to modern configurations of social behavior if new facts and opinions so demand it. This analogy has

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22 Id.


25 Id.
once again revealed itself in today’s Space community. Earth’s Cold War-era Space laws are in need of a modern appraisal. Terrestrial laws may serve as an exemplar of how to fashion those laws which extend into the boundless darkness, or perhaps a new form of policy is necessary.

This article is divided into four sections. *Section One* will provide an overview of the industry with a focus on the actors involved, the conflicts they must deal with, and the promise of technological advancement. *Section Two* will detail the jurisprudence of the system. After discussing the system’s role in international law, the authors will provide a case study on American and Luxembourg law. In *Section Three*, we will examine past conflicts between nations to determine how the world can move forward in the future. Finally, in *Section Four*, we address the current system’s flaws while offering our solution in the form of a new system based on both Realist and Liberal ideologies.

### Conflict in the Face of Technological Advancement

*Expanding Man’s Reach Into The Universe Through Technology*

Private and commercial Space travel is no longer light-years away. Modern technology has rapidly outpaced our forefathers’ imaginations. Advances in computing make the capabilities of two decades ago feel more like two centuries ago. Today, a “smartphone is millions of times more powerful than all of NASA’s combined computing in 1969.” Decades of advancements in computer designs, assembly processes, and 3-D printing have made manufacturing drastically less expensive. One company, in particular, *Deep Space Industries* (“DSI”), has created an array of cost-effective products suitable for Asteroid-Mining operations. *DSI* offers customers small Spacecraft technology, such as: (1) an electro-thermal thruster that uses water as a propellant; (2) a two-camera optical navigation system for close-proximity Asteroid-Mining operations; and (3) radiation-tolerant electronic

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equipment built for Spaceflight.  

While generations of dreamers have had the ambition, modern technology and cultural interests are finally making the Space Industry a reality. “Space development enriches human life on the Earth.” With the support of various enthusiastic investors, Space pioneers are testing revolutionary Spacecraft technologies and anticipate launching Asteroid-Mining operations by the mid-2020s. Investors’ ambitions are not exclusively focused on Asteroid-Mining, they have other prospects in mind as well. Space tourism and eventually inhabitance on other planets are among the many visions of investors. For instance, in 2014, NASA, Boeing, and SpaceX announced their plans to create a local taxi service to Space.

Machine Learning/Artificial Intelligence

Operating in Space is intricately nuanced. Calculations must be made for every possible scenario. The film, Hidden Figures, documents how

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28 Id.
33 Id.
mathematician Katherine Johnson helped NASA calculate flight trajectories. As the film explained, these calculations are crucial as any slight error could spell disaster for the Space capsule and its passengers. Later in the film, NASA begins to utilize the state-of-the-art IBM 7090 which was capable of making multiple calculations faster than the team of mathematicians.

Computing technology has improved considerably since the 1960s. Today, programmers are developing systems that utilize machine learning. “Machine Learning at its most basic is the practice of using algorithms to parse data, learn from it, and then make a determination or prediction about something in the world.”\(^3\)\(^5\) This may sound familiar; at this point, you may be thinking that it sounds a lot like what Apple’s “Siri” or Amazon’s “Alexa” does. Yes, colloquially, we refer to machine learning as artificial intelligence (“AI”).

Anyone who has seen Stanley Kubrick and Arthur C. Clarke’s *2001: A Space Odyssey* would tremor at the possibility of re-creating HAL 9000. However, Space travel has not become any less complicated with the passing of time. There are still numerous calculations that must be run at every stage of a mission. Furthermore, astronauts need software to help them respond to unexpected events ranging from equipment failure to medical emergencies.\(^3\)\(^6\) Simply put, there is no better tool than AI for operating in Space. Indeed, *IBM’s Watson* supercomputer is a sign of things to come with the software capable of reading one-million medical textbooks in three seconds.\(^3\)\(^7\) As Terry Fong, *NASA Ames Research Center’s* senior scientist for autonomous systems and director of the *Intelligent Robotics Group* explains, AI will allow systems

to be more self-reliant.\textsuperscript{38}

This is crucial for any mission to Mars. Well-crafted artificial intelligence planning software will make distant missions more practical. Daily planning time and costs for missions will be reduced.\textsuperscript{39} Alonso Vera, who leads a group developing artificial intelligence software at NASA Ames Research Center explains:

\begin{quote}
“The human and the computer are equal partners in a dialog that happens around the generation of a plan. Each brings different skills to the table. The human can focus on what humans are good at (high-level decisions, for example), while the computer can focus on what computers are good at -- making thousands of smaller decisions -- or automatically enforcing rules and constraints.”
\end{quote}

Technological barriers for operating in Space will exponentially decrease as AI improves. With \textit{Deep Learning} capabilities being expanded, we will eventually be able to effortlessly run large data sets through “neural networks” until the system can recognize patterns.\textsuperscript{41} IBM recently announced that its software improved “scaling efficiency” to 95%, and did the run in just under 50 minutes, compared with an hour for Facebook.\textsuperscript{42}

If \textit{Moore’s Law}\textsuperscript{43} is any indication, we can certainly anticipate exciting

\textsuperscript{39} Id.
\textsuperscript{40} Id.
\textsuperscript{42} Id.
breakthroughs in the near future. Just over 50 years ago, Gordon Moore, one of the co-founders of Intel, predicted that every two years we’d double the number of transistors that could fit on a single chip of silicon, so you’d get twice as much computing power for only slightly more money. “Moore’s Law” has essentially held up ever since and is an example of sustained exponential growth of a technology. However, at the same time, we must take heed of the legal issues that arise from using this technology.

**Property Rights Conflict**

Current international law is seen as an economic stumbling block for the development of the Space industry. In sum, the *Outer Space Treaty of 1967* (the “Space Treaty”), which is at the base of all laws in Space, forbids any country from laying sovereign claim to any celestial body. However, the *Outer Space Treaty* and subsequent international laws have failed to address whether any country can own any natural resources on celestial bodies.

In 2015, in an effort to elude this ban, the United States enacted its own law, the *United States Commercial Space Launch Competitiveness Act* (the “U.S. Space Act”), which effectively gave United States companies the right to lay claim to Space resources. Nevertheless, some experts still deem this step as a possible violation of the Space Treaty. The problem, however, is in the minerals still unmined. The *U.S. Space Act* only gives ownership of resources already mined. In the law’s current status, Space-miners may be subjected to the invasion of adverse claimants who attempt to mine the same resources they are in the process of mining.

**Flags Of Convenience In Outer Space**

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45 Id.  
46 Id.  
47 Id.  
48 Id.
A danger posed by non-state actors operating without clarified Space regulation is the likely possibility of flags of convenience. Like any industrial arena, there will be companies who want to trim their budgets, even when it creates risk for disasters. Flags of convenience are used to reduce operating costs in business.\footnote{What is a Flag of Convenience? HG.Org Legal Resources, https://www.hg.org/article.asp?id=31395, (last visited Mar. 13, 2017).}

Unregulated Environment: Space-Debris

The low-earth orbit is the area immediately surrounding our globe, and it is crowded with litter. As a result of countless attempts to launch into the deep black beyond, our society has littered it with Space junk. An estimated 600,000 miscellaneous objects larger than a centimeter loop our planet. These objects include old satellite fragments, spent rocket stages, flecks of paint, nuts and bolts, as well as discarded astronaut gloves, spatulas, cameras, and crystals of urine.

Why should Space-pioneers be concerned about a few yellow popsicles? Because this garbage can hurtle through Space with speeds “as much as 17,500 miles per hour.” The Space-debris can damage expensive equipment, and also presents a deadly risk to astronauts. This spectacle is depicted in the 2013 movie, Gravity, wherein two astronauts stranded in Space are repeatedly forced to take shelter to avoid incoming debris. Near-Earth-Object tracking systems, like Sentry or Scout (both of which were created by NASA), may help to alleviate some of the risk of larger Space-debris colliding

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56 Id.
60 Id.
with Spacecraft and/or entering and exiting Earth’s atmosphere. However, the further from Earth a craft travels, the less evasiveness is possible.

The current laws of Space do not adequately address several issues regarding the accumulation of Space-debris.\textsuperscript{62} The \textit{Space Treaty} and other legislation fail to clearly delegate liability for damage caused by this flying garbage.\textsuperscript{63} Under the \textit{1972 Liability Convention}, countries are liable for damage caused to other Spacecraft only if they act negligently.\textsuperscript{64} Despite this effort to assign liability, there is no international policy which defines a standard for operation of a Spacecraft that prevents or reduces creating Space-debris.\textsuperscript{65} This lack of clarity in the law makes it quite a difficult challenge to actually assign liability for negligence.\textsuperscript{66} Furthermore, in Space, it can be nearly impossible to identify where most Space-debris originates.\textsuperscript{67}

In our oceans, there is the \textit{law of salvage} under Maritime law, which essentially rewards a person who recovers another’s ship or cargo after it is lost at sea.\textsuperscript{68} In Space there is no such law, which essentially means that it’s

\textsuperscript{63} Id.
\textsuperscript{66} Id.
\textsuperscript{67} Id.
illegal for one party to remove another’s Space-debris without consent.\textsuperscript{69} Considering the multitude of parties involved, the Asteroid-Mining industry and other Space endeavors will unquestionably bring more Space flight traffic, which will inevitably result in more Space-debris.\textsuperscript{70} This imminent surge in Space activity caused by expeditions makes it abundantly clear that international Space law must be reevaluated. Experts agree this debris could not only pose risks to future Space-travel, but it could provoke armed conflict among nations on Earth.\textsuperscript{71}

**Conflicting Claims**

**Invested Governments**

In the introduction, we alluded to President Trump’s interest in Outer Space. In addition to covert military and Space-travel initiatives, NASA announced its plan to launch the Asteroid Redirect Mission; its first robotic mission to collect samples from Near-Earth Asteroids.\textsuperscript{72} The mission is scheduled for 2023, and the targeted asteroid is named Psyche; one of the largest objects in the asteroid belt, which may be the exposed metal core of an early planet.\textsuperscript{73} Both President Trump and the United States Congress have reaffirmed a commitment to a United States presence in Space. In March of 2017, President Trump signed the 2017 NASA Authorization Act, which is the first
complete authorization of the agency since 2010 while also providing a proposed budget of $19.5 billion for the 2018 fiscal year. Among other provisions, it calls on NASA to reexamine the feasibility of using the Orion spacecraft to transport crews to and from the International Space Station.

The United States is not the only nation looking to the stars above. Luxembourg, with its history in the iron and steel industries and a willingness to reinvent its economy, is now a great competitor in this cosmic gold rush. This tiny country aspires to become “the global center” or Silicon Valley of Asteroid-Mining. The program will utilize a legal and regulatory framework that will guarantee private companies the right to keep any minerals, water or other valuable commodities that they extract in space. Luxembourg passed a law in mid-2017 that sets out the procedures for authorizing and supervising missions to explore, extract, process and utilize Space resources. Luxembourg sent a convincing message when its government publicized its $227 million fund aimed at investing in Asteroid-Mining companies that set

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up operations within the country’s borders. Although countries like the United States, Russia, China, and Luxembourg have expressed their firm desire to conduct activity in Space, the Space Race has evolved into more than just a race between governments.

**Invested Private Parties**

The big players in the transport Space industry are SpaceX, Blue Origin, Virgin Galactic, Lockheed Martin, Boeing, and Airbus. There are also the businesses which utilize satellites including Google Maps, AT&T, Comcast, Garmin, and other telecommunication companies.

Additionally, there are three private companies specifically focused on mining in Space: (1) *Moon Express*, a company planning to mine on the moon, is aiming to launch its maiden voyage in 2018, and could have human colonies there within five years; (2) *Deep Space Industries*, which expects to send an autonomous craft to an asteroid by the end of the decade; and (3) *Planetary Resources*, which expects to begin exploring asteroids starting around the year 2020.

Money is not a dirty word in Space. As Gordon Gekko elucidates in the film,

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Undeniably, money literally has private companies racing to the stars for just that; they seek the promise of abounding profits stemming from their investments. So, if money talks on Earth, money roars in Space. Like all responsible businesses, these Space pioneers seek calculated efficiency. Private companies such as Orbital ATK, SpaceX, and Blue Origin have invested in reusable vehicles, more efficient workflows, and streamlined manufacturing processes. Every detail must be accounted for. If successful, all these advancements will result in significantly lower costing Space launches, thus making Space travel more affordable.

Google recently entered the picture hoping to speed up these advancements. The 30-million-dollar Google Lunar XPRIZE was promised to be the first private firm to land on the Moon, travel at least 500 meters, and transmit high-definition images back from the surface by March 2018. This contest aimed to promote development of low-cost methods of robotic Space exploration.

Five companies raced against the clock in this race to the Moon in hopes of financing their future Space endeavors – SpaceIL (Israel), Moon Express (US), Synergy Moon (International), TeamIndus (India), and HAKUTO (Japan).

According to SpaceNews.com, Israeli team SpaceIL said in a November 29th statement that “it needed to raise $20 million by the end of the year, from both the public as well as the Israeli government, or else it would be forced to

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84 Id.
86 Id.
87 Id.
cancel the entire mission.” 88 Unfortunately, none of the teams were able to reach their goal. On January 23, 2018, Google announced that the prize would expire in March without a winner. 89 Even with several granted extensions in the past, Google stated that no team would be able to launch a mission before the deadline. 90 Despite the disappointment, many of these competitors have indicated that they plan to continue their initiatives independently. 91

Environmental Opposition

These government agencies and private companies are all operating under the premise that it is okay to act first and ask questions later. Yet, like all great endeavors, there are parties who oppose this gold-rush mentality. Environmentalists and other common interest advocates want to leave our solar system pristine and prohibit exploiting its resources. At first, environmentalism in Space might seem unusual. After all, environmentalism typically involves preservation of living organisms. 92 But since we have not yet discovered life in Space, what do we have to protect? 93

As established earlier, Earth’s orbit is crowded with tiny pieces of junk traveling at dangerous velocities; reaching “17,500 miles per hour.” 94 Environmentalists analogize Space-debris as “a classic example of Tragedy of

90 Id.
91 Id.
93 Id.
This economic term references when individuals share a common good, but through the selfish overuse of many individuals acting in their own interests, this good is eventually destroyed. Since we have already affected our own planet, it wouldn’t be difficult to visualize a similar pattern repeating itself on other celestial bodies. For example, irresponsible mining on other bodies in Space could cultivate mass amounts of Space-debris.

This environmental concern is highlighted by a recent experimental effort to clean up Space-junk by the Japan Aerospace Exploration Agency (“JAXA”). The plan was to use a 700-meter (2,296-foot) metal tether attached to a Spacecraft that was designed to slow down Space-junk and bring it back to Earth. The craft launched last December, but unfortunately, its mission was a failure. As the Space Industry continues to grow, environmentalists will inevitably point out threats to the environment and demand balancing regulations to prevent risk and damage.

II. Past Trends in Decisions and Conditioning Factors
International Laws

There are two ways in which a State becomes bound to international law —

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96 Id.
97 Id.
100 Id.
either by signing a treaty or by customary international law.\textsuperscript{102} A treaty is an agreement entered into by countries under international law.\textsuperscript{103} There is more than one path for a country to take when seeking to be a party to a treaty. A country has the option to sign a treaty when it is open for signature and then ratify the treaty, or a country may also become a party by acceding to or by accepting the treaty.\textsuperscript{104} If a country becomes a signatory to a treaty, it is declaring an intention to make the terms of the treaty legally binding on itself.\textsuperscript{105} However, the terms of a treaty are not actually legally binding until a country ratifies the treaty and once the treaty’s requirements for entry into force are met.\textsuperscript{106}

Customary international law, on the other hand, does not require the formality of a signed agreement between nations. The International Court of Justice (the “ICJ”) is considered a global authority in determining customary international law. Through the authority of the United Nations, the ICJ gives advisory opinions on legal questions and settles legal disputes between States in accordance with international law.\textsuperscript{107} In the North Sea Continental Shelf cases,\textsuperscript{108} the ICJ held that for a customary rule to emerge that it needed: (1) the

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\textsuperscript{103} Black’s Law Dictionary, 10\textsuperscript{th} Edition officially defines a treaty as, an agreement formally signed, ratified, or adhered to between two countries or sovereigns; an international agreement concluded between two or more states in written form and governed by international law.
\textsuperscript{104} Clarify the differences between being a party to a convention/treaty and being a signatory and what are the legal implications, Socioeconomic Data and Applications Center (SEDAC), The Trustees of Columbia University in the City of New York, https://sedac.uservoice.com/knowledgebase/articles/41617-clarify-the-differences-between-being-a-party-to-a, (last visited Mar. 14, 2018).
\textsuperscript{105} Id.
\textsuperscript{106} Id.
\end{flushright}
objective element of a widespread State practice; and (2) the subjective element of a virtually uniform practice undertaken in a manner that demonstrates a general recognition of the rule of law or legal obligation.\(^\text{109}\) The passage of time was unnecessary (i.e. duration) to form a customary law.\(^\text{110}\) States that persistently object to an emerging customary law may successfully avoid being bound by it, even after the law matures.\(^\text{111}\)

In Space, customary law would require two key components: (1) a general state practice accepted as law; and (2) the major Space capable nations to be amongst these practicing states. Today, the major Space capable nations are the United States of America, China, the Russian Federation, Japan, the United Kingdom, India, Canada, Germany, France, and Luxembourg.\(^\text{112}\) Fortunately, there are existing laws which govern the great beyond, mostly due to the satellite industry. Currently, there are 1,071 operational satellites in orbit around the Earth, half of which were launched by the United States.\(^\text{113}\) In what is called the geosynchronous equatorial orbit (“GEO”), there are approximately 402 satellites in assigned “orbital slots” which follow the direction of the Earth’s rotation.\(^\text{114}\) Satellites must remain in a very confined area and not drift too far from their assigned orbital slot above Earth;


\(^{110}\) Id.


otherwise, they may interfere with other satellites.\textsuperscript{115} The \textit{International Telecommunication Union} assigns these orbital slots and settles disputes between countries about the slots.\textsuperscript{116}

The \textit{Space Age} and the satellite industry began on October 4, 1957, the year the Soviet Union launched \textit{Sputnik I}, the first satellite to be placed into Earth’s orbit.\textsuperscript{117} Then in 1958, the United States launched its own satellite, \textit{Explorer I}, and created the \textit{National Aeronautics and Space Administration} (“NASA”), a federal agency dedicated to Space exploration.\textsuperscript{118} The notorious 20th-century arms race brought by the Cold War morphed into a Space race. As a result of this dramatic global competition, the \textit{United Nations} formed the Committee on the Peaceful Uses of Outer Space (“COPUOUS”) in 1958.\textsuperscript{119}

\textit{COPUOUS} has 77 members, including the United States (NASA), Russia (Roscosmos), Japan, China, Canada, Brazil, Australia and the member states of the \textit{European Space Agency}.\textsuperscript{120} \textit{COPUOUS} is used for promoting international cooperation and peaceful negotiations in Space by exchanging information of government and nongovernmental activities.\textsuperscript{121} \textit{COPUOUS} has influenced the creation of five principles and five treaties that govern much of Space law today.\textsuperscript{122}

The most important treaty influenced by \textit{COPUOUS} is the \textit{Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies} (the “Space
Treaty”), ratified in 1967.\textsuperscript{123} The Space Treaty satisfies the requirements of customary international law; a general state practice accepted as law, and the major Space capable nations to be amongst these practicing states. Thus, all nations are bound, even those who are not signatories.

When discussing the Space Treaty, one must recognize its place not only in law, but also in the context of international affairs. The international community was starting to embrace the theory of liberalism following two world wars,\textsuperscript{124} essentially caused by geopolitical expansion (i.e.; Germany basically wanted to conquer all of Europe).\textsuperscript{125} The key tenants of liberalism, the rejection of power politics and the focus on the mutual benefits of international cooperation, are easily apparent in the Space Treaty.\textsuperscript{126} The writers of the treaty saw Space as an opportunity to fully embrace the theory and prove that the system was a superior alternative to the realist approach that was well established in the international community.\textsuperscript{127} The Space Treaty set up the framework, which remains in effect today, for managing activities in Space and established national governments as responsible for governing Space.\textsuperscript{128} There are four basic concepts of the Space Treaty: Parties must (1) keep Space open for exploration and use by all states; (2) take responsibility for all activities conducted from within their borders (whether carried out by

governmental or nongovernmental entities); (3) assume liability for damage caused by their Space objects; and (4) cooperate with one another and provide mutual assistance.\textsuperscript{129} The Space Treaty also imposes a benefits clause which imposes that use of Space should be “in the interests of all countries”.\textsuperscript{130} It also further restricts appropriation by barring sovereign claims in Space.\textsuperscript{131}

In support of the Space Treaty and peaceful Space exploration, COPUOUS implemented four more treaties.\textsuperscript{132} The first of these treaties is the 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (the “Rescue Agreement”), formed to give astronauts emergency assistance.\textsuperscript{133} It decreed that States “shall immediately take all possible steps to rescue them and render them all necessary assistance.”\textsuperscript{134} The second treaty is the 1972 Convention on International Liability for Damage Caused by Space Objects (the “Liability Convention”), which addresses concerns if a Space object causes damage or loss to human life.\textsuperscript{135} It stated that “a launching state shall be absolutely liable to pay compensation for damage caused by its [S]pace object on the surface of

\begin{footnotesize}
\begin{enumerate}
\item Id.
\item Id.
\item Id.
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In 1975, the Convention on Registration of Objects Launched into Outer Space (the “Registration Convention”) was enacted to help nations keep track of all objects launched into outer Space. The fourth convention born of the Space Treaty is the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the “Moon Agreement”); it was developed by COPUOUS in 1979. The Moon Agreement is essentially a more detailed and specific extension of the Outer Space Treaty, focused primarily on property rights and usage of the moon and other celestial bodies in the solar system. Presently, the Moon Treaty only has 17 State parties, and 11 signatory states, all of which are minor players in Space exploration. “The United States, the Russian Federation (former Soviet Union), and the People’s Republic of China have neither signed, acceded, nor ratified the Moon Treaty, which has led to the conclusion that it is a failure from the standpoint of international law.” Simply put, the Moon

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Agreement does not qualify as binding customary international law.

The Moon Agreement is disfavored by major Spacefaring nations. Their disfavor is primarily due to one controversial section which deals with natural resources on the Moon.\textsuperscript{142} The term “resources” is not defined, but it is reasonable to presume that it refers to the “mineral deposits including titanium, the substantial water ice discovered at the Moon’s south pole, and the helium-3 within the lunar regolith.”\textsuperscript{143} Through a benefits clause, the Moon Agreement effectively forbids states from conducting commercial mining on planets and asteroids until there is an international regime to approve such exploitation.\textsuperscript{144} For some major governments, the impossibility to make profit outweighs the positive aspects of the agreement.\textsuperscript{145} The Moon Agreement failed to elaborate on the proposed structure of an international regime. However, it would likely develop into an arrangement mirroring that of the international regime hypothesized by Part XI of the United Nations Convention on the Law of the Sea (the “Sea Treaty”), implemented in 1994.\textsuperscript{146}

Part XI of the Sea Treaty sets forth an international organizational structure to regulate the future industry of deep-seabed mining of mineral resources in the world’s oceans, which involves areas beyond national jurisdiction.\textsuperscript{147} Also, the Sea Treaty proposed an International Seabed Authority (“ISA”) to enforce the

\begin{flushleft}
\textsuperscript{142} Id. \\
\textsuperscript{143} Id. \\
\end{flushleft}
regime; composed of all States parties to the Convention.\textsuperscript{148} The \textit{Sea Treaty} recognized an underlying concept present in the \textit{Moon Agreement} called the “common heritage of mankind,” a phrase which refers to the seabed and its resources as vested in mankind as a whole.\textsuperscript{149} Under this concept, claims to sovereign rights over any part of the seabed or its resources are forbidden.\textsuperscript{150} In an effort to manage developed nations involvement, the \textit{ISA} would require a portion of the mineral wealth mined from the ocean floor to be taxed from the developed nations for redistribution among the undeveloped countries.\textsuperscript{151} Additionally, the \textit{ISA} would enforce a mandatory transfer of technology so that undeveloped countries could participate in the extraction of resources from the seabed.\textsuperscript{152} If the international regime proposed by the \textit{Moon Agreement} were to take a form akin to that of the \textit{Sea Treaty}, it would require nations to relinquish not only a portion of their resources extracted from celestial bodies, but they would also be required to surrender technology developed by private industries under their jurisdiction.\textsuperscript{153} Basically, “the \textit{Moon Treaty’s} common heritage view applies not only to extraterrestrial real property and resources but to intellectual property rights as well.”\textsuperscript{154}

Although most scholars have concluded that exploitation of Space resources (i.e. mining of celestial objects) is permissible, there is still no customary norm of international law in existence.\textsuperscript{155} This deficiency in international law is partially due to an absence of consistent state practice.\textsuperscript{156} Both the United States and Russia have occasionally transported moon rocks and other materials back to Earth for scientific research, without protest from other

\textsuperscript{148} Id.
\textsuperscript{149} Id.
\textsuperscript{150} Id.
\textsuperscript{152} Id.
\textsuperscript{153} Id.
\textsuperscript{154} Id.
\textsuperscript{156} Id. at 185.
States. “Yet the quantities were quite small, the occasions were infrequent, and only two states were involved. It cannot be seriously argued that such limited activities have matured into a customary norm that would permit large-scale exploitation.”

**American Law**

In September of 2014, a bill presented to Congress called the *American Space Technology for Exploring Resource Opportunities in Deep Space Act* (the “Asteroids Act”) failed to get off the ground. The bill failed to address basic issues, such as who would license and regulate Asteroid-Mining operations, as well as larger issues, such as the legality of mining operations under international law.

A year later, Congress passed the *U.S. Space Act*. This 2015 law was designed to foster growth in the emerging commercial Space industry, specifically in areas such as mining and tourism. Advocates believe the *U.S. Space Act* to be a step forward, but there is much criticism surrounding this law. In a nutshell, the *U.S. Space Act* makes it legal for United States...
citizens to “possess, own, transport, use, and sell” an asteroid resource once they obtain it. On the other hand, Article One of the Outer Space Treaty, to which the United States is a signatory, says that Space exploration and use thereof shall be carried out for the benefit and in the interests of all countries. Essentially, the Outer Space Treaty prevents the sale of Space-based resources for profit, which is exactly what the U.S. Space Act permits. The U.S. Space Act also has a paragraph stating that these claims are not declarations of sovereignty. However, there is concern that not every country is going to see things the same way. Indeed, the law is spurring contentious international debate.

In Spring of 2017, the United States Congress passed the National Aeronautics and Space Administration Transition Authorization Act of 2017 (the 2017 NASA Authorization Act). The law authorizes $19.5 billion in spending for NASA in fiscal year 2017 and includes a number of policy provisions directing NASA’s activities; these include the development of a detailed plan for NASA’s human exploration programs (such as sending humans to Mars) and NASA

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166 Id.


168 Id.

169 Id.

establishing long-term medical monitoring of former astronauts.\(^{171}\) It is, however, an iterated commitment to commercial space-operations that stands out in this law.\(^{172}\)

The law creates an indemnity clause that shifts the power from Congress to the Executive Branch (the NASA administrator); this will help the parties involved efficiently handle a catastrophic event.\(^{173}\) Furthermore, private companies are mandated to purchase insurance coverage of $500 million for any launch or reentry mission. More importantly, the new law effectively bans the use of foreign human space flight transportation services from a foreign entity unless: (1) no United States Government-operated human space flight capability is available; (2) no United States commercial provider is available; and (3) it is a qualified foreign entity.\(^{174}\)

This shows a commitment to home-grown commercial enterprises such as SpaceX and Boeing. With the Office of Space Commerce being established in 2015 within the Department of Commerce,\(^{175}\) the 2017 NASA Authorization Act reinforces the commitment to commercial Space enterprise in that it “calls on NASA to facilitate the ‘commercialization and economic development’ of low-earth orbit activities, such as lowering the costs of commercial satellite operations and exploring the possibility of transferring the International Space


\(^{172}\) Id.


Station into the private sector.” In 2015, Congress extended NASA’s operations of the International Space Station through 2024. The 2017 NASA Authorization Act reemphasizes a commitment to the 2024 date and notes that “once developed and certified to meet the Administration’s safety and reliability requirements, United States commercially provided crew transportation systems can serve as the primary means of transporting United States government astronauts and international partner astronauts to and from the ISS.”

After 2024, the White House plans to have NASA shift its attention from the ISS. As of January 26, 2018, it is reported that the Trump administration is preparing to end NASA support of the International Space Station program by 2025. Although the program is useful in conducting scientific research, it costs NASA “between $3 to $4 billion each year, and represents a more than $87 billion investment from the US government.” US leaders are confident that this money would be best utilized to help “fund the development of vehicles needed to explore deep space.”

There are those that oppose this plan. Some fear that “canceling the ISS too

180 Id.
181 Id.
early without a viable replacement could lead to a gap of human activities in lower Earth orbit.”  

“A similar scenario played out in 2011, when the Space Shuttle program ended. The Obama administration had canceled NASA’s initiative to return to the Moon, known as the Constellation program, leaving the space agency without a way to get its astronauts into space.”  

In addition, many commercial space companies rely on the ISS to test their technologies. Voicing opposition, Senator Bill Nelson (D-FL) recently said, “If the administration plans to abruptly pull us out of the International Space Station in 2025, they’re going to have a fight on their hands” as the move would decimate Florida’s blossoming commercial space industry.

Private Space companies are eager to learn what the future holds in store for them. “Several companies, including Axiom Space, Bigelow Aerospace and NanoRacks have proposed developing commercial stations, in some cases starting with commercial modules on the ISS.” Although US Space law is in the process of being rewritten, it remains clear that the United States sees commercial enterprise as the future.

Luxembourg Law

Roughly the size of Rhode Island, Luxembourg has no Space agency, no launch sites, and minimal research capabilities. This begs the question of why this tiny country has an interest in Space. Atossa Araxia Abrahamian, a writer for The Guardian, opines that “Luxembourg’s very essence – as a speck in the heart of Europe – allows, even requires, it to partake in such ambitious

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182 Id.
183 Id.
184 Id.
186 Id.
ventures.” A quick glance at this country’s economic history certainly shows that it has devoted “itself to anticipating and accommodating the needs of global capital.” Prior to becoming a financial powerhouse (a tax haven), this tiny country’s main industry was steel mining. When the satellite communications industry was just emerging in the 1980s (also coinciding with the demise of its steel industry), Luxembourg provided financial support and created a business-friendly environment (through tax breaks) that allowed it to become host to the world’s second-largest commercial satellite operator. Thirty years later, Luxembourg aims to become the nucleus of the Asteroid-Mining industry. Indeed, Luxembourg Deputy Prime Minister, Etienne Schneider, believes that the Space industry’s GDP growth in the country could reach 5% within 10 or 15 years.

Luxembourg is now the first European country to join the United States in adopting rules dictating ownership rights over Space resources. Its parliament passed a law in 2017 giving companies the rights to Space resources they extract from asteroids or other celestial bodies while setting up a system for the government to authorize and supervise resource extraction.

and other Space activities. Article One provides that Space resources are capable of being appropriated in accordance with international law. This legislation will ensure that private mining operators, based out of Luxembourg, can claim rights to the resources they extract from celestial objects.

Appraisal of the Future
Conflict Between Nations

Claimed ownership of the Geosynchronous orbit has been a point of contention since the Space Treaty. The orbit is extremely desirable due to its location around the Earth’s equator, as it is the ideal location for telecommunications satellites to maintain a constant link with their contact point on Earth. As an essential component of intelligence-gathering, communications, entertainment, and enterprise, a spot on this orbit is in high demand. Recognizing its importance, some nations have fought for the territorial claim over the geosynchronous orbit by classifying it as airspace.

Most notable is the Bogotá 8. Created and led by Colombia in 1976, eight equatorial countries sought to secure the rights to the geostationary orbits directly above their territories. They argued that they could do this by extending their sovereignty to Outer Space. These nations attempted to do this with the 1976 Bogotá Declaration. With this declaration, the Bogotá 8 argued that the GSO arises directly from the Earth’s gravity, thus implying that everything that lies in Earth’s gravitational field is airspace. This would

196 Id.
197 Id.
200 Id.
201 Id.
202 Id.
allow the GSO to fall under air law instead of space law. They requested a special exemption for the GSO so that they could claim sovereignty without conflicting with the *Outer Space Treaty* and breaking international law under the established legal regime. They further claimed that the current system and solutions used and created by the *International Telecommunications Union* was “at present impracticable and unfair and would considerably increase the exploitation costs of this resource especially for developing countries that do not have equal technological and financial resources as compared to industrialized countries, who enjoy an apparent monopoly in the exploitation and use of its geostationary synchronous orbit.” In the end, the representative of the Soviet Union overwhelmingly rebutted the Bogotá 8’s argument. The subcommittee agreed that claims of sovereignty over the GSO or any other part of outer space are incompatible with the spirit of the *Outer Space Treaty* and should be dismissed. On top of this, none of the Bogotá 8 were space-capable. This is significant because their actions could have potentially led to another space-capable nation to do the same and claim the GSO over their territory.

Even though the Bogotá 8 was defeated, the battle over the GSO still continued. Colombia, who signed the *Outer Space Treaty* but did not ratify it, went so far as to claim sovereignty over the GSO directly over their land in the 1991 Colombian Constitution. Article 101, Paragraph 4 states:

> Also part of Colombia is the subsoil, the territorial sea, the contiguous

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207 Id.
208 Id.
209 Id.
zone, the continental shelf, the exclusive economic zone, the airspace, the segment of the geostationary orbit, the electromagnetic spectrum and the space in which it operates, in accordance with international law or the laws of Colombia in the absence of international regulations.  

Article 102, Paragraph 1 then follows up by saying, “The territory with the public resources that are part of it, belong to the nation.” Colombia’s actions, even though it can be argued that they are in direct violation of international law, shows that it still believes it can lay claim over the GSO directly above it and that it believes that the current legal regime is unfair to developing nations. Colombia is not alone in this conflict. China has also played around with the idea of claiming sovereignty in outer space. They are doing this by exploring the differences between res nullius, (areas which may be appropriated as national territory), and res extra commercium (areas which may not be appropriated as national territory). As the common heritage and global commons adds another dimension to these legal principles, countries like China are realizing that the status-quo has been altered in a way that could lead to a change in the international legal structure in regard to space.

The enactment of domestic Space law (e.g.; the U.S. Space Act) combined with the emergence of non-state Spacefaring actors will likely create Westphalian boundary disputes and property right conflicts with nations whose laws clash. Affording United States citizens with the right to claim Space resources will be seen as a direct blow to customary international law making. This has already encouraged Luxembourg to enact its own domestic Space law and is likely to influence other Spacefaring nations to create similar

211 Id.
213 Id.
214 Id.
legislation that benefits their own citizens. It is expected that not all nations would have the same values and beliefs. Without international discussion, this inevitable free-for-all of domestic law making will most likely produce laws that oppose each other. If this domino effect creates opposing laws then there will be conflict in Space, which consequently creates conflict on Earth. China and Russia will likely be the next candidates to implement conflict on Earth. China and Russia will likely be the next candidates to implement domestic policy for Space, which could lead to major legal and political issues.  

IV. Recommendations

There is a deficiency in Space jurisprudence; the legal system pales in comparison to the exponential growth of the Space industry. While there are several treaties signed by many nations, depending on interpretation, private entities may not be covered under existing treaties. Also, the priorities which drove the creation of some of these treaties has changed now that many years have passed. This, coupled with the rise of non-state actor involvement in Outer Space ventures means that policy needs to be updated to reflect our present realities.

Correcting the Flaws in Recent Laws

The matter of Asteroid-Mining illustrates the conflict in the jurisprudence of Space. The U.S. Space Act says a United States citizens’ claim of ownership

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217 Id.
218 Id.
begins as soon as the existence of metals on an asteroid are detected.\textsuperscript{219} But what if other Spacefaring nations decide to have laws for their citizens which are contrary to the standard proscribed by \textit{U.S. Space Act}?\textsuperscript{220} Hypothetically, if the Chinese follow suit and formulate their own domestic Asteroid-Mining laws, which happen to conflict with American law, who’s laws will govern when they both decide to mine the same asteroid?

The \textit{U.S. Space Act} has made private investors ecstatic at their newly attained freedom, but one predicament everyone seems to be missing is that this law is insufficient to ensure a loosely regulated industry.\textsuperscript{221} For instance, the \textit{U.S. Space Act} only gives ownership of resources already mined.\textsuperscript{222} However, there is no legal claim of right given for the unmined resources. Picture a United States based private company discovering valuable metals on a particular asteroid, then imagine the next day another company arrives and begins to mine the same ground at the same time.\textsuperscript{223} For this reason, there has to be international regulation to ensure that only the party that made the initial discovery can own the mining rights to that particular asteroid, even if this ownership is temporary.\textsuperscript{224} Furthermore, the \textit{U.S. Space Act} fails to establish an agency or process for issuing Asteroid-Mining licenses.\textsuperscript{225}

\textit{The Federal Aviation Administration} issues launch licenses and re-entry licenses, but there

\begin{footnotes}
\item[220] Id.
\item[221] Id.
\item[222] Id.
\item[223] Id.
\item[224] Id.
\end{footnotes}
is no agency responsible for anything that happens in orbit or beyond.” Asteroid-Mining should be internationally regulated to some degree. Where there is no order, chaos is inevitable.

The United States and Luxembourg have set dangerous precedent by enacting their own laws determining property rights in Space. Nations cannot be permitted to independently decide when and how its citizens obtain rights over Space resources, particularly when existing customary international law conflicts (i.e.; the Space Treaty). Laws in Space directly or indirectly affect all nations on Earth, thus Space law should be a topic determined through global discussion. “What concerns all must be decided upon by all.” The Roman Empire truly had it right when they made this statement their legal maxim.

**Alternative Parallel Development Schemes**

**The Moon Agreement and the Sea Treaty**

Principles from existing terrestrial law and Space agreements may be utilized and serve as an exemplar for the future of the Space industry. The world’s nations could look to the Moon Agreement and the Sea Treaty as parallel development schemes for the creation of laws governing Space.

The Moon Agreement’s failed effort to create a universal authority in Space could be the best place to start for new laws regarding Outer Space. Although the United States is not a signatory to this treaty due to disagreement with certain provisions, most of the principles proposed may be favorable to all.

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228 Id.
nations if properly restructured. For instance, the following provisions imposed by the *Moon Agreement* could be agreeable incentives: (1) peaceful exploration and use of celestial bodies; (2) prevention of contamination of celestial bodies; (3) equal access to celestial bodies for all states; (3) the *United Nations* must be informed of any activities on celestial bodies; and (4) the creation of an international regime.

The biggest issue major Spacefaring nations have with both the *Space Treaty* and the *Moon Agreement* is the imposed benefits clauses. Because they are based off of the international relations theory of Liberalism, these benefits clauses emphasize the sharing of Space resources and intellectual property (i.e.; Space technology) with the global community. Consider for a moment, policy-oriented jurisprudence; the approach *Toward a World Public Order of Human Dignity.* Through policy-oriented jurisprudence, “law” is the process by which members of a public community seek to illuminate and secure their common interests. This approach demands satisfaction of eight values which all humans desire: (1) respect; (2) power; (3) enlightenment; (4) well-being; (5) wealth; (6) skill; (7) affection; and (8) rectitude. It can be interpreted that “sharing” among the public is an inherent element. The goal of this approach is to maximize access to all eight values by expanding beyond just attaining the greatest happiness for the greatest number of people, which may leave some minorities out in the cold.

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230 Id.


232 Id. at 319.


shouldn’t everyone have an equitable shot at it?  

Unfortunately, no. Let’s face it, people don’t like to share. If this “sharing” requirement is included in any future Space agreements, it is not likely to be signed by nations that value the international relations theory of realism, which advocates for actions that promote a state’s own interests for self-preservation. Proof of this realist perspective is demonstrated by the United States’ enactment of the U.S. Space Act and Luxembourg’s recently adopted Space law.

Liberals believe that international institutions are key to shaping policy choices and encouraging cooperation between states. The international community or United Nations could create a regime that mirrors the legal structure established by the Moon Agreement, except for the portions requiring redistribution of resources and sharing of intellectual property. Once an international regime is formed which consists of all Spacefaring nations, this administration could develop individual Space authorities, such as an International Asteroid-Mining Authority (“IAMA”) to oversee safe and orderly development of the Asteroid-Mining industry. Also, IAMA could provide day-to-day management of the parties participating in resource extraction from celestial bodies. IAMA would be comparable to the International Seabed Authority suggested by the Sea Treaty.

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237 Id. (explaining the application of liberal international relations theory to law); see also Eric B. Shiraev & Vladislav M. Zubok, International Relations, Note 128, New York: Oxford University Press, 78-87 (2d ed. 2014), (last visited March 15, 2018), (explaining the approach of liberalism).

Orbital Slots Model

The world could look to other functioning systems in Space for structural guidance. For instance, the system that allocates orbital slots for satellites.\textsuperscript{239} But even orbit slots are dispersed by a first come, first serve basis.\textsuperscript{240} Additionally, due to solar heating, asteroids orbit in an individual and unpredictable manner, which would make determining any territorial limits on a specific set of asteroids quite difficult.\textsuperscript{241}

Recommendation

Free Market Approach

In light of the *Space Treaty*, there is a notion that claims to sovereignty have no place in Space. On the contrary, claims to sovereignty in Space may be in the best interest of the world community, given the tendency to neglect shared resources on Earth.\textsuperscript{242} Common resources are easy to disregard when they seem abundant.\textsuperscript{243} For example, it doesn’t seem wrong to pollute the air or water if, technically, no one owns these resources and the individual damage isn’t exceedingly noticeable.\textsuperscript{244} Space-debris is evidence that this same view exists in the mind of a Space pioneer. Sovereignty would help preserve the


\textsuperscript{242} Garrett Hardin, *The Tragedy of the Commons*, 162 Science 1243 (1968).


\textsuperscript{244} Id.
Space environment and prevent accumulating Space-debris. Generally, people are more inclined to respect something owned to avoid conflict with the owner who is likely to defend his ownership.

Some argue that without the ability to own property in space, firms will not invest and develop Space business. On top of that, the treaties which are the framework of international space law contain language and definitions of key words that are inconsistent either among the five treaties or in the translations in the official languages of the United Nations. To add to this, the enforcement of the provisions of these treaties is extremely weak as documented by Colombia’s constitution and China’s 2007 anti-missile tests. It is left to the negotiations between aggrieved parties and the guidance of a UN Commission to make recommendations to the affected nations. Dr. Henry Hertzfeld, a leading expert on Space law, remains optimistic that commercial enterprise in Space has a future but cautions that change must be made to provide incentive to private businesses.

Free market systems encourage protection of the environment because the resources are privately owned and privately managed. Nevertheless, the government may step in and establish some regulation to prevent misuse. In a radical free market system, the environment and its resources are only subject to minimal public requirements and governmental regulation. While remaining within the limits of sensible and balanced regulation, Space pioneers should be afforded the right to partake in almost any activity they

246 Id.
247 Id.
248 Id.
249 Id.
251 Id.
252 Id.
desire with their own property.

One possible form of regulated ownership could come in the form of temporary leaseholds over portions of celestial bodies. These leaseholds would expire after a reasonable time period that affords Space companies to procure enough resources to make their mission worthwhile. After the expiration of a leasehold, another company may claim this same leasehold. The private owner is less inclined to cause damage because it would be depleting the company’s ownership value, and the surrounding owners who are affected are likely to sue. Meanwhile, the government intervention contributes its broader assessment of the universal impact. Both forces balance each other out. The institutional structure for this government intervention could be provided by a novel, specialized body, an International Outer Space Agency.\(^{253}\)

Considering the substantial cost and tremendously technical undertaking associated with reaching the Moon and other celestial bodies, it seems apparent that sovereign claim to local resources is an essential element influencing growth in any Space industry. The economic freedom of a free market system will more than likely encourage the continued advancement of the Space endeavors. Investors need assurance that their investment will return profit.

**Liability**

The world is not what it once was. The world has evolved, and with it, law must adapt to these changes. The *Space Treaty* was created during a time when there was a fear plaguing the world that nations would simply take land by force from other countries – like Germany did during World War II.\(^{254}\) The *Space Treaty* was formed to combat this fear and foster cooperation between nations, by implementing a general rule that Outer Space was for the public per the dictum of *res communis*, and no one could lay claim to anything in


it. Since then, the *United Nations* has helped to subside this fear.\(^{256}\)

The future of Space law is tied with Thomas Friedman’s theory of Globalization.\(^{257}\) When the foundation of Space law was written, the world was in the first stage – interactions between states.\(^{258}\) Now, we are moving towards the second stage, interactions between businesses.\(^{259}\) With this in mind, we must adapt from traditional international law and gravitate towards a more business and contract-oriented law. Under the *Space Treaty*, “States shall be responsible for their national activities” in Space, “whether carried on by governmental or non-governmental entities.”\(^{260}\)

Simply put, a country is liable for any Spacecraft that operate under their roof. This may have been adequate law during the Cold War era when private party involvement in Outer Space operations was inconceivable, but now that there is major private actor involvement, policy must mold to shifting tides. Private actors must be held accountable for their decisions via an appropriate legal mechanism. If a nation and a private company decide to operate together, then they will both be held jointly and severally liable for their operational errors. But nations cannot afford to allow private entities to operate under the impression that their country will always fix their individual mistakes. As a system, by moving from a macro to a micro scale, the Space community will be able to better innovate, allow those involved to protect their trade secrets, and promote the industry as a whole all while ensuring that they are held


\(^{258}\) Id.

\(^{259}\) Id.

directly accountable for any impropriety or errors.

**International Outer Space Agency**

A multilateral *International Outer Space Agency* ("IOSA") has yet to be established. As foreshadowed in the *Moon Agreement*, such a decision-making body should already be in place. The 1998 *ISS Agreement* (which established the International Space Station) shows that such multilateral cooperation is possible. This agreement is important in that it was done without the *United Nations* and allows individual countries to maintain its own jurisdiction over certain modules as well as provide protection for intellectual property and procedures for criminal prosecution.

The IOSA could serve as a one-stop-shop for all problems in Outer Space by collecting all available information and supplying guidance on Space science and technology. It would also serve as a framework for building specific industries such as Asteroid-Mining and Space tourism. Although faced with the problem of individual sovereignty and multilateral unity, a global authority is needed to forego the dilemmas established in this article before the fast-approaching Space industry forces nations to create their own domestic laws, like the United States and Luxembourg have already done with their domestic Space laws.

This global authority can be formed through international agreement by a

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265 Id.
congregation of the major Space-capable nations. While staying within some bounds of the *Space Treaty*, this congregation should form updated international agreements that address the concerns of nations and non-state actors.\(^{266}\) Even though it is important to allow the free market to set its direction, balanced government intervention is necessary to create a uniform and systemized set of laws. Following a free market approach, the international agreements should be sensible but not so overly restrictive that industrial growth is hindered. The agreements could establish the following:

a) An impartial global authority governing all issues in Outer Space.

b) The specific threshold required to be a “Major Spacefaring” member with veto power. Technological and financial qualifications will be considered.

c) Reasonable and uniform protection standards on how resources are to be cultivated and activities to be conducted in order to avoid dangerous practices that may threaten the industry and environment.

d) Process for issuing Space activity-licenses.

e) Options for lease holder rights to particular celestial bodies, to avoid conflicting claims of rights.

f) Consequences to ensure that Space industries and polices are not abused. This includes civil and criminal penalties, and the system of enforcement.

**Framework for International Cooperation**

Our proposed system would operate as such at the domestic level – private Spacefaring companies will congregate together within their own country. Each private company will cooperate with the others to determine their own propositions for rules and discuss mutual aspirations. Within this cartel-like

structure, a “Panel” will be formed consisting of three elected ambassadors. One ambassador will be appointed by the coalition of private companies while the nation’s government will appoint the other two ambassadors (with one possibly from the Office of Space Commerce).

This Panel will represent both private and national interests at the IOSA. In preparation for the IOSA, this Panel will congregate independently to determine their cumulative interests. In case of disagreement between a private and a national party within a country, a tie vote can be broken by the second government ambassador. Theoretically, the safeguard of a two-thirds majority representation in each country ensures that private companies will be less likely to corrupt the system and society is represented as a whole. That said, the government must take measures to ensure that their ambassadors are not institutionally corrupted by industry interest groups in some form of “regulatory capture.”

All ambassadors from each Spacefaring nation would congregate at the IOSA headquarters to discuss policy, industry, and all other issues related to Outer Space. All Panels would have the ability to bring proposals for policy change to the IOSA, and each Panel will have voting privileges. An elected IOSA council would operate the congregations and establish rulings based on the votes of all Panels. Panels from major Spacefaring nations would have veto power to resolve conflict and abolish outlandish proposals brought before the IOSA by other Panels. Such a system will ensure that policy decisions are based on consensus as the self-regulatory nature will cause the involved actors to efficiently work together for the benefit of the Space community.

Once Space industries expand, the ultimate goal will be to gravitate towards a

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system like FIFA (minus the rampant corruption). Under a system like FIFA, continental regions, consisting of multiple Spacefaring nations, would operate independently but always in accordance with the rules of the global authority—ISOA. Each region would have standing committee members that attend the global congress to advise and assist the ISOA, while also representing the majority interests of their region by voting; this promotes more uniformity and alleviates congestion at the global conference. In a system like FIFA there would be fewer ambassadors at the global congress, yet all nations’ interests would be represented because their voices can still be heard at the regional level.

A Realist Approach – Diverging Ideologies

In the sphere of international relations, the debate is divisive between supporters of liberalism and realism. While liberalism emphasizes cooperation between nations, realism “is a view of international politics that stresses its competitive and conflictual side… Realists consider the principal actors in the international arena to be states, which are concerned with their own security, act in pursuit of their own national interests, and struggle for power.” The theory has been promulgated by philosophers including Thucydides, Machiavelli, Hobbes, and Kenneth Waltz.

United States Secretary of State Henry Kissinger used the theory to navigate the complexity of international politics and has essentially become a poster-

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269 The Fédération Internationale de Football Association (FIFA) is the governing body of organized soccer around the world. It is comprised of regional confederations made up of member nations. Representatives from each confederation make up the Congress, FIFA’s Supreme governing body.
273 Id.
child for the philosophy. As an article by famed biographer, Walter Isaacson, notes, “he forged a détente with the Soviet Union and an opening to China, then played off both to create a triangular balance of power that preserved the U.S.’s influence after its retreat from Vietnam.” In his 2014 book, World Order, Kissinger maintains that “Westphalian principles are... the sole generally recognized basis of what exists of a world order.”

Kissinger showcases the theory of realism as he describes the context leading to Hitler’s invasion of Czechoslovakia. He writes in A World Restored,

Those ages which in retrospect seem most peaceful were least in search of peace.... Whenever peace -- conceived as the avoidance of war -- has been the primary objective of a power or a group of powers, the international system has been at the mercy of the most ruthless member of the international community.

Kissinger promotes the realist argument when he expounds on British Prime Minister Chamberlain’s mistake. “It is a mistake to assume that diplomacy can always settle international disputes if there is ‘good faith’ and ‘willingness to come to an agreement’.” He follows by professing, “most fundamental problem of politics ... is not the control of wickedness but the limitation of righteousness.”

A Realpolitik Approach in Space

U.S. President Donald Trump has embraced realism with his “America First” doctrine. Speaking at the 12th Eilene M. Galloway Symposium on Critical Issues in Space Law in Washington, D.C., Dr. Scott Pace listed seven “core

275 Id.
277 Id.
278 Id.
elements” of the Trump Administration’s policy approach in Space: 279


2. Strive to be the most attractive jurisdiction in the world for private sector investment and innovation in space with a light touch of regulation.

3. Use legal and diplomatic means to create a stable, peaceful environment for governmental and commercial space activities.

4. Provide confidence to the private sector that it can profit from capital investments made to develop and utilize in-situ resources, commercial infrastructure and facilities in space.

5. Respond to questions about how the United States registers space objects and the responsibilities of space object ownership and operation.

6. Develop non-binding international norms complementary to the existing legal regime through best practices and confidence building measures — but no new treaties or international arms control agreements.

7. Reject the notion that space is a “global commons” or “common heritage of mankind” or “res communis” or a public good.

With these seven principles, the Trump administration fully espouses the basic principles of realism. By promoting “America First,” the administration places emphasis on states as central actors in the international community rather than individuals or organizations. Under the realist theory, opposing jurisdictions are not only possible, but desirable. The competition between states will result in environments that maximize growth in the Space industry. Thus, instead of having a slow-acting supranational governing entity, order will be imposed by the opposing actors. Business will gravitate towards the most inviting environments. As alluded to earlier, the United States and

Luxembourg are priming themselves to take prime position in this race. Finally, because all states desire power to ensure their own self-preservation, the system holds that each state actor will act rationally to maximize their self-interest.

**Addressing the Potential Pitfalls of Liberalism**

While our proposed system borrows heavily from liberalism, it is important to recognize the pitfalls that stem from this approach. After all, “[l]aw is nothing other than a certain ordinance of reason for the common good, promulgated by the person who has the care of the community.”

The issue with law and politics is that we as a society often fail to recognize opposing stances. Polarized sides are quick to dismiss the other’s critiques as blasphemy forgetting that both parties seek what is best for the community – all that differs is their proposed solutions. If we are to accept Friedrich Nietzsche’s declaration that “there are no facts, only interpretations” then we should address the views of divergent philosophies when seeking a solution.

One such issue that arises from a liberal system is that of maintaining pace. Dr. Pace explains that “technology and entrepreneurship threaten to outpace the legal and domestic regulatory mechanisms intended to enable and manage [S]pace activities. When technological generations occur every 18 months or so, it would appear to outside observers that the pace of international [S]pace discussions at the United Nations is, by comparison, glacial.”

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In addition, one must come to terms with the conflicting notions between liberalism and individual sovereignty. It is for that reason that Dr. Pace disagrees with the *Moon Agreement.*

In the same symposium speech mentioned earlier, Dr. Pace took issue with an agreement that was “more restrictive than the laws we have here in the United States” and was “contrary to American interests.” Following the realist ideology, the self-interest of a state actor will cultivate a more viable atmosphere for investment and growth. By trusting in the self-interest of the individual state actors, the Trump administration proposes a system that develops “non-binding international norms that are complementary to the existing legal regime through both ‘bottom-up’ best practices developed cooperatively with other space actors, and ‘top-down’ non-legally binding confidence-building measures.”

We live “[i]n a world in which space capabilities are increasingly global.” Because of this, “no one state will be in a position to impose rules unilaterally for the exploration and development of [S]pace.” Since numerous competing interests deter a functional supranational order, “the task for the United States, if it wishes to influence how [S]pace is developed and utilized, is to create attractive projects and frameworks in which other nations choose to align themselves and their space activities with us, as opposed to others.” By leading the Space race, the United States can ensure that the values of “democracy, liberty, free enterprise, and respect for domestic and international


285 Id.

286 Id.

287 Id.

288 Id.
law in a peaceful international order” are well-represented in Space.  

It is for these reasons that we need a global self-regulating entity like the IOSA where the actors involved will be motivated to think as a collective unit so as to achieve their own self-interests. It will be in everyone’s interest to be efficient and decisive, as the success of the group as a whole will lead to substantial benefits for the individual actors; likewise, dragging their feet will only stifle their investment opportunities when the group leaves them behind. The free market will determine who survives within this structure and the systematized industry will work collectively to further itself. Thus, if the United States and Luxembourg want to be front-runners in Space, they must effectively become global leaders by cultivating a premier investment opportunity for businesses while inspiring others to believe that their success is shared by all.

If we turn to FIFA and organized soccer as an example, we can see how the sport grows as a whole with the collective body’s centralized leadership, but the structure still allows the regional confederations and leagues to make decisions which would allow them to maintain their sovereign authority. This would explain how some regional confederations such as UEFA (Union of European Football Associations) and CONMEBOL (South American Football Confederation) maintain a higher prestige and influence than others. Moving within each confederation, we have policies initiated at the league level that determines how competitive the teams are or what conditions will be established to entice players to join the league and teams. For example, will there be limits on spending or will teams be incentivized to spend big in order to lure star players? Will TV revenues be equally shared or distributed proportionately to ratings? Working in a mutual capacity with the leagues, the teams must sometimes balance their own interests with those of the league as a whole or they will find themselves restrained from the lack of true competition. Indeed, there is a reason that teams like Real Madrid (Spain), Manchester United (England), or Bayern Munich (Germany) are held in higher esteem than teams like LA Galaxy (United States), Guangzhou Evergrande (China), or Celtic F.C. (Scotland) – being the dominant champion.

289 Id.
in a subpar league will still affect your standing when compared to the others. Inversely, since there is no sport without teams, each level of the system must work conjunctively to create an environment that helps the teams thrive. That said, the teams also have to perform on the pitch and function effectively to keep their prime positions.

**Conclusion**

The Space Industry is booming and its growth will only continue to exponentially develop. It is not difficult to imagine the plausible catastrophic consequences of increased Space activity paired with a lack of updated international law. Due to resistance in judicial systems to keep the status-quo, change in the law can be delayed.\(^{290}\) Often, adjustments in the law do not come about without a fight.\(^{291}\) This process may take years to develop, which is more reason to start now, before the Space industry grows to an unmanageable scale.\(^{292}\)

The Space industry can be analogized to the global tech boom at the turn of the century, and the cyber security issues which have ensued as a result of this new era. Law is constantly catching up to privacy issues brought by new technology. We have the chance now to learn from our mistakes and get a leg up on operating efficiently and peacefully in Outer Space. It would be quite incorrect to say that our recommendations are optimistic or easy to implement. Nevertheless, as a planet we need to come together to earnestly negotiate the rules of operating in Outer Space before the day arrives when technology and investment has surpassed our fancies and the new frontier that is Space becomes the new *Wild-Wild West*.


\(^{291}\) Id.
