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### The Colonization of Mars: Law, Politics and Ethics

An individual's curiosity and will to question a societal norm can lead to expansive discovery and enhanced knowledge. In 2013, a small private Dutch company conceptualized a project to initiate steps working towards colonizing the planet Mars. While space exploration and scientific advancements are accurate reasons to endorse a project such as the Mars One Mission and one can consider the ways this could enhance or benefit human life on Earth, it is not imperative nor feasible. Through extensive research and investigation, I will explore the concepts of space law and international law as they relate to the colonization of Mars. Additionally, I will utilize political and ethical theories to evaluate what this mission would entail and the impact it would have on humanity.

It is important to realize that while scientific advancements and space exploration do not drive the existence of the human race on Earth, both play a large part in the progression and development of humanity as we know it. In this paper I will argue that while space exploration and expansion can further advance scientific discovery, this is not what drives the existence of the human race on Earth. Taking into consideration the legal, political, and ethical aspects of the Mars One Mission expose the lack of technology and funding required for success.

## What Is the Mars One Mission?

The first step to addressing this argument is understanding what the Mars One Mission is and exploring its purpose. The main stated goal of the project is to establish a human settlement on Mars, which would be a giant leap for humankind. According to the Mars One Mission's main website, "Human settlement on Mars will aid our understanding of the origins of the solar system, the origins of life and our place in the universe. As with the Apollo Moon landings, a human mission to Mars will inspire generations to believe that all things are possible, anything can be achieved" ("Current Status"). This mission statement makes the assertion that exploring space and colonizing another planet are beneficial to mankind. It is interesting to read such discoveries will clarify our place in this universe.

Mars is currently the only planet with prospects of supporting human life. Successful completion of this mission would allow the human race to become a multiplanetary species. The driving force behind this mission consists of two entities: "the Dutch not-for-profit Stitching Mars One (Mars One Foundation) and Swiss publicly trading Mars One Ventures AG [FRA: KCC], ISIN: CH0132106482 (Mars One Ventures). The Mars One Foundation implements and manages the mission and owns the mission hardware" ("Current Status"). This foundation is responsible for selecting and training the crew members who would embark on this journey, as well as building a group of experts who can contribute to the progress and success of the mission. Mars One Ventures holds the exclusive monetization rights around the mission, from merchandise, ads on video content, broadcasting rights, Intellectual Property, and many more. While different components of this mission are falling into place, a big obstacle which stands in

the way is funding. Obtaining enough money to successfully complete this project proves to be the ultimate challenge.

The astronauts who would be going to Mars and never returning to Earth are a vital component of this project. It is wild to consider leaving Earth and never returning, however there are hundreds of people signed up for an astronaut position in this mission. These individuals are in a position to conceptualize a completely new existence on Mars which would be exclusive from everything and everyone they know in this world. Although people may register to participate, they are not guaranteed to travel to the red planet. Five main characteristics Mars One is looking for in their astronauts include: resiliency, adaptability, curiosity, ability to trust, and creativity/resourcefulness. There is also a minimum age requirement of 18 years or older.

There are specific standards, extensive qualifications and trainings which must be met and completed. A discussion of qualifications would include:

The astronauts must be intelligent, creative, psychologically stable and physically healthy. In spaceflight missions, the primary personal attributes of a successful astronaut are emotional and psychological stability, supported by personal drive and motivation. This is the foundation upon a mission must be built, where human lives are at risk with each flight. Once on Mars, there are no means to return to Earth. Mars is home. A grounded, deep sense of purpose will help each astronaut maintain his or her psychological stability and focus as they work together toward a shared and better future. Mars One cannot stress enough the importance of an applicant's capacity for

self-reflection. Without this essential foundation, the five key characteristics listed below cannot be utilized to the fullest potential. (“Astronaut Requirements”)

While reviewing this entry, it is intriguing to read one of the qualifications is “a grounded, deep sense of purpose,” which leads to the questioning of set purpose. For people to take on such a role, they must believe that their purpose in life is to travel to Mars for exploration and potential colonization. This involves leaving behind family, friends, and everything that is familiar in order to start a new life on a new planet. Developing a new life and existence on Mars may in fact be the source of meaning in these people’s lives, but survival is not guaranteed. In fact, the chances of survival are low.

It is also important to consider the physical toll this will have on a person. While they prepare for what it will be like traveling to Mars for six months and participate in simulations of what it will be like once they are on the planet, things will of course be different when they are actually happening.

The current six-month rotation on-board the International Space Station was partly designed so that it reflects the time taken to get to Mars, resulting in greater knowledge on what state an individual would arrive at Mars in. Physiological effects aboard the ISS range from muscle atrophy to osteoporosis and negative effects on the balance and cardiovascular system. With these mitigated for to some extent, such signs of the body adjusting to daily life without gravity are in synchrony with those likely to be experienced on a journey to Mars. (“How Will Living On Mars Affect Our Human Body?”)

The concept of gravity plays an important part in this. Mars only has 38% of the gravity Earth does. While this will make landing a bit easier, over time the body may suffer because of the drastic difference. It is stated that “Adjusting to this lower level of gravitational pull on Mars may cause a physiological change in the astronauts’ bone density, muscle strength, and circulation making it impossible to survive under Earth conditions if they were to ever return” (“How Will Living On Mars Affect Our Human Body”).

### **Air Law and International Law**

One important concept to consider is who would have control of Mars and how that would be determined. The question could be raised if another planet acts as another territory or if it would be separate from the legal system of international law put in place on Earth. Exploring the key principles of air law unveil clarity and possible propositions for incorporating Mars into the international system. The common law precedent pertaining to private property rights was established by Lord Coke in the case *Bury v. Pope*, stating that “private property rights attached to real estate extend also into the air above, since ... “the earth hath in law a ayre and all other things, even up to heaven, for *cujus est solum ejus est usque ad coelum*” which has been translated to “he who owns the land owns up into the sky” (Schick, 681). While this is a more classical idea and does not pertain to modern law there is still appreciation for this doctrine. According to practices of Roman Law, there are limitations to certain rights in the air above both public and private property, but it is clearly understood these rights don’t extend “up into heaven” rather are used for “protecting the legitimate use of the land against unauthorized interference from the air” (Schick, 681).

Incorporating interpretation of the Roman precedent and the private law practice, in both common law and civil law countries, “it is not difficult to see why the claims of States to exclusive jurisdiction over their national air space have been justified in modern times with reference to well-established custom, and particularly to the *cujus est solum* doctrine” (Schick, 682). It is established that jurisdiction in air space of both public and private property was to “reach “into the sky” –*ad coelum*—only as far as was necessary to protect such ... lands from unauthorized interference from above” (683). This is supported by Paul’s famous rule amongst other passages of famous jurists such as Marcian, Celsus, and Ulpian, who expanded on the concept of air and sea being common to mankind and beyond the exclusive State authority (683).

While the origins of space law according to varying legal systems comprise the idea of having control of land and air, this altered throughout history with advancements in international law concepts for the protection of states. Different legal documents and treaties present altering stances on this issue. For example, Article 1 of the Chicago convention states, ““every State has complete and exclusive jurisdiction over the airspace above its territory.” As in the Paris convention of 1919, the term “airspace” is not defined ... subsequent technical additions to the convention, such as annexes 6,7, and 8 retain the description of aircraft given at Paris as “any machine which can derive support in the atmosphere from reactions of the air” (Schick, 686). Even though international law regarding jurisdictional rights of a State over territorial air space could be seen as only applying to propeller-driven vehicles which get atmospheric support from air reactions, this definition of aircraft was never supported by the

American government (686). This is clarified in the Air Commerce Act of 1926, the Civil Aeronautics Act of 1938 and the Federal Aviation Act of 1958.

### **International Aviation and Outer Space Law**

Having a concrete understanding of air law is imperative to investigating the relation and distinction to the legal doctrines pertaining to outer space. First, it is important to acknowledge the existence of these two separate legal systems: international air transit law and the international legal regime for outer space (Bilder, 577). It is evident that international aviation law includes treaties which encompass the required legal structure for air travel and traffic. "Detailed rules have been developed by the International Civil Aviation Organization (ICAO), a "worldwide airspace management system" which operates through regulation, deregulation, bilateralism, and regionalization" (577).

The international legal regime for outer space, which includes the moon and other celestial bodies, focus on planetary life as a whole. "Scientific and technical innovations have been made by advanced states but demands for the use of space are universal. Bhatt invokes such thinkers as Albert Einstein, Vaclav Havel ... in calling for international space law "to be seen with reference to the frame of the universe and the cosmic order in general."" (Bilder, 578). The advancement of scientists looking to explore outer space and push for projects that defy what is humanly possible calls for the policies and regulations found in outer space law.

Differentiating between air and space law shows how the two require special consideration and are in fact distinct areas of law, but they also share similar characteristics and problems. Both planes and spacecrafts can be publicly or privately owned, both are subject to

international governmental processes, and both are able to serve legal and scientific requirements of the international community (Bilder, 578). This could lead one to speculate whether having one entity or governmental body to regulate all air and space use. Bhatt favors:

the development of private space law designed to ensure liability protection for travelers ... he examines space law in the 1990s and discusses India's policy, which is to exploit space technology for peaceful purposes and to advance national reconstruction ... he considers that space exploration will be a unifying influence as humankind enjoy the benefits produced through the application of science and technology to space resources (578).

This theory which is examined takes into consideration the requirements of space exploration through a legal lens and how it can be regulated to benefit the human race.

Viewing space exploration from an international scope may lead to an investigation of different treaties and conventions put in place by the United Nations. Article 7 of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 1967, states that "States launching objects into space are "internationally liable" for any damage caused" ("Outer Space", 576). This concept was later expanded in the Convention on International Liability for Damage Caused by Space Objects, which was created by the Committee on the Peaceful Uses of Outer Space. This convention was commended by the United Nations General Assembly on November 29, 1971 in Resolution 2777 (XXVI) (adopted 93-0-4) and opened for signature in London, Moscow and Washington on March 29, 1972 (576). The foundation of this Convention is to create a system

making liability either absolute or one of fault where it is unlimited, making a resitutio in integrum required (576). This Convention applies to damage in four different scenarios:

Where damage is caused by the launching State's space object on the surface of the earth or to an aircraft in flight; where damage is caused by the launching State's space object to the space object of another launching State elsewhere than on the surface of the earth; where damage is caused by one launching State's space object elsewhere than on the surface of the earth and as a result, damage is caused to a third State on the surface of the earth or to an aircraft in flight; or to a third State's space object elsewhere than on the surface of the earth. (576)

Such provisions should be greatly considered when it comes to different state and non-state actors conducting space exploration projects. This is directly applicable to the Mars One Mission as well as space exploration as a whole.

Studying and understanding the various treaties and policies in place is important to exploring the idea of space law. The most important treaty in place is the Outer Space Treaty of 1967. The provisions which are covered under this treaty include: 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 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; States shall be liable for damage caused by their space objects; and States shall avoid harmful contamination of space and celestial bodies (“United Nations Office for Outer Space Affairs”).

The last treaty that was put in place was the Moon Agreement in 1979, which reaffirms and elaborates many of the same policies stated in the Outer Space Treaty but also adds further context to space exploration provisions. The agreement “provides that the Moon and its natural resources are the common heritage of mankind and that an international regime should be established to govern the exploitation of such resources when such exploitation is about to become feasible” (“Agreement Governing the Activities of States on the Moon and Other Celestial Bodies”). It is interesting to note that a few decades have passed since any new treaties or provisions have been put into place. This is mainly because States are reluctant to work on new policies to put into place or even draft new treaties. With vast advancements being made in space and aviation technology and capabilities, it is a bit alarming that the laws in place would not be progressing as well.

### **Space Law and Mars One**

Just like with any project or action, great legal consideration had to be taken to ensure that Mars One was in compliance with any treaty or policy put in place. One of the concepts which applies to this mission is appropriation. In this context, appropriation refers to the inability of any company or state to go into space and claim a planet or other celestial body as their own. For example, the Dutch company in charge of Mars One can not go into space, land on Mars and claim territory of the planet. Furthermore, any company or state can not put any

restrictions on others entering or exploring the planet. It is made evident that the purpose of the Mars One Mission is not one of claiming territory, rather one of breaking boundaries and expanding on human norms. An example of this is when America had a man land on the moon and plant the nation's flag there. It was not to claim the land and restrict others from coming, rather to express pride in the accomplishment. The same would apply to Mars in relation to this project.

Another aspect of space law which greatly applies to this project is liability. Having a basic understanding of the laws and policies put in place regarding liability and accountability is imperative when constructing such a project. The law explains how a party is to be held liable for any damage done to any person or thing. This applies to members of that company or state as well as other states. Since space differs from aviation laws in that there are no restrictions to where someone can fly (being that no one owns any part of space) people need to be held accountable for any damage they cause. This idea is put in place to hold parties liable since there is no sovereignty or limitations in outer space. In reference to Mars One, a challenge arose in regard to which State would take responsibility for the people involved in the mission if something were to happen. In other words, who would be liable in the event of any damage.

In order to ensure the parameters of the Mars One Mission are compliant with the legal provisions in place, there are State entities who are responsible for reviewing the plans and actions of this project and ensuring they are in compliance with the law. Some of the factors which are considered for review include any potential harm to the environment as well as potential harm to any other entity. Additionally, close attention is paid on what materials and resources are brought back to Earth, if any. As outlined in various treaties and provisions, it is

against the law to bring potentially harmful materials or resources to the planet Earth. Overall, special precautions have to be taken when approaching space travel to ensure safe practices which will allow for future generations to continue such exploration and discovery.

### **Politics of Mars Exploration**

Conducting any space mission requires advanced technology and engineering. When it comes to exploring Mars, there are many issues faced by organizations such as NASA, including political concerns and road blocks. One of the potential benefits, however, would be a spark of interest in the younger generation to be involved in space and other scientific fields. Viewing this from a political lens would lead one to come to the conclusion that such interest would boost the economy, which could be reason enough for individuals in the legal field to provide support for various projects related to space exploration. While Mars One's main focus is colonization, it is important to evaluate the challenges NASA has faced regarding human exploration of Mars and how this has been addressed in terms of political influences.

One of the biggest challenges in achieving human exploration of Mars stems from varying governmental policies throughout different presidents who take office. In order for such a concept to have a chance at success, NASA "needs to show Congress and the current administration "consistency and constancy of purpose" for the project ... "Sustainability for a Mars exploration effort ... requires a considerable degree of consensus" ... "For a government-funded and -managed exploration program, probably the most important element is policy continuity" (O'Neill). The main idea of this passage is to acknowledge the need for governmental backing and support in space projects such as Mars One.

Another major aspect of exploring Mars which can be politically questioned is the motivation for wanting to explore the planet. The best answer to this would most likely be for pure scientific discovery. A comparison can be made with the Apollo missions, which were arguably “a Cold War response to a perceived threat, and it served the national interest to go to the moon at the time ... But once you’re committed to go to the moon, what are you going to do? ... You’re going to collect rocks. You’re going to do science. Science is what is going to dominate your activity, but it’s not the lawmakers’ motivation for going” (O’Neill). This idea expands upon the concept of striving for discovery through place exploration rather than just trying to fulfill a political agenda.

Even though scientific discovery is the driving force behind more space missions, it can be argued that a more concrete purpose should be established. “If scientists and advocates can’t convey a clear purpose for the exploration of Mars, public opinion will waver and Congress will be less inclined to support NASA funding for the project. At worst, space programs begin under one presidential administration, only for the next administration to strip funding” (O’Neill). An example of this includes the Obama administration cancelling the Constellation program due to a committee finding it to be unsustainable with the budget NASA had. Another example includes the Trump administration cancelling the Asteroid Redirect Mission (ARM) in the 2018 NASA budget (O’Neill). While some projects have lost their funding from president to president, the budget is mostly flat and does not face much change from year to year. This makes it possible for some long-term projects and missions to stay alive and continue to progress. For example, with the assistance of Russia and other international partners, the

International Space Station (ISS) was able to be constructed and is still has a crew even though the shuttle fleet was retired (O'Neill).

Funding has proven to be a major setback in any space mission. While NASA operates mostly on a flat budget, it is questionable whether a mission to Mars could be supported by this. An interesting comparison can be made to the "Antarctica Model" in which science is not the driving force behind the mission. It was observed that "We spend about \$2 billion a year to maintain a presence in Antarctica. The justification for that, on the surface, is that [the U.S. is] doing fantastic science in a very collaborative environment (O'Neill). An idea that can be drawn from this is that alternate funding may be provided from tax dollars if a compelling reason to explore Mars could be promoted.

### **Politics of Mars Colonization**

Colonizing another planet may seem far-fetched, but it is worth considering how introducing human life options on another planet would look and how that would affect life on Earth. After reviewing the extensive provisions provided by space law, the question of government may arise in the context of a new planet. Since no single state can claim sovereignty over Mars, it would be interesting to consider how a functional society would be created on that planet. Who would be in charge of governmental operations? What legal system would they have? Would Mars be an addition to the United Nations and interact with other countries on Earth? How would humans be able to claim any part of Mars, especially if there were to hypothetically be other life forms already inhabiting the planet? It is important to consider how human life would be fostered on another planet and how this would fit into

humanity on Earth. The question of including Mars into the international legal system seems to be an imperative one, being that another planet would potentially be included as a place of human habitation. However, feasibility needs to be greatly questioned in how this would even be possible.

Each of these questions is important to consider. While the purpose of the Mars One Mission is to colonize Mars, there are many factors which work against this from happening. A large issue the project encountered was related to finances and not having the adequate resources to support such a mission. Since a private company conceptualized this project, receiving additional funding proved to be a challenge. Additionally, it was apparent that significant planning for colonizing the Red Planet and fostering human life there was not done to a satisfactory level. This ties into the risks humans face just being on Mars and how such a project would affect them physically, mentally, and emotionally. Such a concept is addressed through an evaluation of the ethical aspects of Mars One.

### **Ethics and Utility**

While it is important to consider the impact this mission will have on those directly involved in it, it is also necessary to explore the implications such a project will have on the rest of humanity. One of the main details necessary for colonizing Mars would be resources that are not yet there. Various resources would have to come from Earth, which may have negative short term consequences, but having less people on Earth will reduce pollution and have a positive impact on the environment (Robinson). This would be beneficial and have a positive impact on the people living on Earth. By connecting this to a search for meaning, any

improvement to the living conditions of the planet we currently inhabit would be beneficial. An issue regarding the approach of helping improve the climate would stem from a lack of communication or connection between Mars scientists and Earth climate scientists (Robinson). With an issue such as global warming or climate change, the future of the planet Earth is in a limbo; we are slowly destroying this planet, which could be a reason to explore options on another planet. While this idea would not allow for all of humanity to relocate to the red planet, it would still provide an outlet to continue the existence of the human race. In the long run this could even provide an opportunity to improve the conditions on Earth.

Another aspect of this mission which must be evaluated is the economic toll it will pay, but how this could be a great investment in the long run. In the interest of utility, making an investment which would benefit humanity would be a wise decision, but in this case it may not be something that is successful and most likely won't have an impact on all people. One economic opportunity which would arise would be a need for more engineers to craft and operate ships bringing good to and from Mars which could be beneficial. However, this would not have to be the only method of obtaining resources on Mars.

Mars has resources that can be used for a sustainable settlement. Water is present in the soil and can be made available to the settlement for hygiene, drinking, and farming. It is also the source of oxygen generated through electrolysis. Nitrogen and argon in the Martian atmosphere can be mined to be the inert part of the atmosphere inside the habitat. Martian soil will cover the outpost to block cosmic radiation. Carbon dioxide can be taken from the atmosphere if the plants take in more than the humans expel. The systems to mine water from the soil and to mine nitrogen, argon, and carbon dioxide

from the atmosphere have never been tested in space. Mars is however not space because there is gravity and a thin atmosphere. Additionally, the processes are all more than 100 years old. The water can be collected from the soil by breaking up the soil with a drill and harvesting the resulting debris. (“Mission Feasibility”)

Such processes and discoveries are a main reason why extensive exploration and potential colonization are being considered, because the planet has resources necessary for human life.

Another aspect of Mars One which should receive consideration is the health and well being of the astronauts as well as individuals who would live on the planet. There would need to be a system in place to provide medical attention to people. With noted side effects of being on another planet, there would have to be professionals who are trained and educated on how to handle and address the different harms that happen to the human body. This contributes to the cost of the project and would add to the expenses that are not able to be covered in the first place. In addition to having astronauts, there should be trained medical professionals who are also going into space to care for them. Since this detail was not mentioned on the Mars One website, it is interesting to ponder whether or not such consideration was taken. If not, what does that say about the value of the astronauts’ lives and how does that play a part in the ethical aspect of this project.

### **Mars One Goes Bankrupt**

It is interesting that a focus of this research was how unfeasible Mars One was because the mission faced bankruptcy and is no longer active. The company that was financing the project was liquidated. The original plan was to have people land on Mars in 2023 which would

create opportunity for money to be raised which would keep the mission going. In reality this was not a realistic expectation as the company faced many setbacks and delays which made the expected timeline to be pushed back by about ten years. The company had hundreds of thousands of people apply to be astronauts for this project, and had the list whittled down to about a hundred. It was expected that a select group would be moved to a remote location where they would practice what it would be like living on Mars. Instead of moving forward with this to work towards a 2031 launch date, according to the website, Mars One is “in administration” (Chappell). Mars One has been actively searching for investors and making efforts to rise from bankruptcy, being in over one million euros in debt (which equates to about \$1.1 million).

Although Mars One is facing bankruptcy, its CEO Bas Lansdorp is denying that the mission is over. He stated that, “the Dutch non-profit Mars One Foundation is not affected by the bankruptcy proceedings. But it's unclear what that entity might now be able to accomplish, as it was the Ventures unit that was supposed to produce money to pay for the space mission” (Chappell). While there are many things missing to make this project, there is one thing it does have: willing applicants. One applicant, Heidi Beemer who is a young U.S. Army officer states, “I actually decided and told my parents when I was 8 years old that I was going to be an astronaut and go to Mars. The thought of being afraid or having the fear of the fact that I’m going to die on a different planet doesn’t really bother me because this is something that will help out humanity for years and years to come” (Chappell). She ended up being passed over, but this just proves that people do believe in the possibilities Mars One has and the impact it could have

on humanity. Even without Mars One, inhabiting Mars one day is not something that will not be considered, it just will be done in a different manor and by a different company or organization.

### **NASA and Mars**

NASA has provided claims explaining that inhabiting Mars in the near future is not realistic. It stated, "transforming the inhospitable Martian environment into a place astronauts could explore without life support is not possible without technology well beyond today's capabilities" (Clifford). Professor Jakosky from the University of Colorado is the principal investigator on NASA's mission to study the atmosphere around Mars, the MAVEN (Mars Atmosphere and Volatile Evolution) mission, which was funded by NASA. Through his studies, he supports the statement that unsupported human life on Mars is not possible, at least for now. It was explained that:

The atmosphere surrounding Mars is too thin and the temperature too cold to allow for liquid water. One way to make terraforming Mars possible, some suggest, is by releasing carbon dioxide from the polar ice caps and soil on Mars to create an atmosphere thick enough to warm the planet up and make liquid water possible. "Our results suggest that there is not enough CO<sub>2</sub> remaining on Mars to provide significant greenhouse warming were the gas to be put into the atmosphere; in addition, most of the CO<sub>2</sub> gas is not accessible and could not be readily mobilized. As a result, terraforming Mars is not possible using present-day technology," said Jakosky. (Clifford).

Jakosky further elaborates on the idea that science allows individuals to imagine any type of technology that can be created in the far future but taking feasibility into consideration does

not always make it possible to create. Even though science is constantly advancing, it is not possible to work with technology that does not exist. It is one thing to imagine creating something and it is another to actually have the resources and capacity to do so.

While NASA has identified that having unsupported human life on Mars is not realistic, at least for now, they have been studying the planet for years and have recently made great progress and discoveries through different rovers and space crafts. One of the goals of NASA's Mars Exploration Program includes preparing the planet for human exploration. In order to make this possible, NASA aims to "obtain knowledge of Mars sufficient to design and implement sustained human presence at the Martian Surface with acceptable cost, risk, and performance" (Clifford). NASA's various science teams who focus on the flight missions are responsible for analyzing the measurements and determining which factors and variables are needed for understanding Mars as a planet and how it relates to the solar system as well as other planetary systems (Clifford).

Jakosky has studied and observed different developments of Mars and has focused on what parameters would have to be in place for the planet to support human life. He stated:

Our analysis was part of our ongoing task of trying to understand the volatile inventory of Mars, its history, and the history of the planet's climate. We are focused on, among other things, determining how much CO<sub>2</sub> Mars has had, how much has been lost to space (derived from data from the MAVEN mission), how much has been locked beneath the surface (from the [Mars Reconnaissance Orbiter] mission), and how it can interact or exchange with the atmosphere. (Clifford)

These are observations which have been made based off the data collected through NASA's work. Having an established space entity putting work in to understanding the planet Mars and working to create an environment that could one day be conducive to supporting human life is an example of how such a project should be approached. NASA's work excels due to its validity, caliber of scientists, and accessibility to resources such as funding.

Although there are certain factor limiting the work NASA can do, this has not stopped them from making great scientific discoveries and advancements. According to their website, "Working with U.S. companies and international partners, NASA will push the boundaries of human exploration forward to the Moon and on to Mars. NASA is working to establish a permanent human presence on the Moon within the next decade to uncover new scientific discoveries and lay the foundation for private companies to build a lunar economy" (Dunbar). This article explains how NASA has addressed the challenges of living in space and has worked with different companies to utilize existing resources, create options for disposing of trash, and more.

NASA makes the claim that exploration of the Moon and Mars is intertwines. Their website explains, "The Moon provides an opportunity to test new tools, instruments and equipment that could be used on Mars, including human habitats, life support systems, and technologies and practices that could help us build self-sustaining outposts away from Earth" (Dunbar). It is explained that having people live on the Gateway for months at a time will provide researchers further understanding on how the human body reacts to deep space environment. This is something that would have to be done before grand trips to Mars for exploration can be conducted.

### **Inspiration for This Research: Why Mars One?**

Examining space exploration and studying how law, politics, and ethics play a role in colonizing Mars may seem different as far as a research topic goes, but it is something that needs to be studied. The first time I heard of the Mars One Mission was on the first day of my Global Legal Order class. I remember being intrigued hearing about a company who intended on shipping people off to Mars to start a colony. While the motives of this mission are not necessarily centered around moving people from Earth or having an alternate place to house humanity if anything were to happen to Earth, the concept reminded of the movie *Interstellar*. The premise of the movie is centered around finding a new planet for humans to live because Earth destroyed and could no longer be inhabited by the human race. It was interesting to see that a focus was placed on finding a new planet to live on rather than making efforts to fix Earth. While this movie is a work of science fiction, attention should be placed on the issues and motives expressed in the work and how they relate to Mars One.

While Mars One had different motivations than those presented in *Interstellar*, there is an interesting scope which the mission can be viewed if it were to relate to the issues and concerns expressed in the movie. One idea I struggle to accept is that time, money, energy, and resources are being investing into shipping the human race off to another planet upon the demise of the planet Earth. It is understandable that efforts need to be put forward to explore space and advance scientifically, but I have to question whether or not funneling millions and even billions of dollars into colonizing Mars is the best use of money. The science fiction film *Interstellar* addressed having a backup plan to colonize another planet upon natural conditions on Earth not being favorable to humanity as a result of environmental damages. Even though

this is a fantastic idea, it is too relatable to modern day concerns to ignore. I can not help but to consider if global warming and climate damage could be the driving force behind Earth not being able to support human life any further. This indeed is only loosely related to Mars One, but it something that should be considered. It would be smarter and more beneficial to invest the time money and energy into improving Earth and fostering human life on this planet rather than investing in a different planet which may not even be able to support human life.

### **Conclusion**

Initiating a project to work towards colonizing another planet takes a grand imagination, the knowledge to conduct such practices, money to put these thoughts into place, and the will to follow through with such a mission. While a major organization such as NASA is in place to conduct projects of space exploration, space law allows for any company whether it is public or private to explore space. Evaluating the various aspects of the Mars One Missions proved to expose different holes and flaws in their plan, which is ultimately what led to the projects demise and bankruptcy. While it is easy to note how fantastic such a mission was and the downfalls it may have faced, it is important to also consider the positive contributions conceptualizing such a project has. It takes a lot for a person or small group of people to come together in an effort to not only reach but colonize another planet. Even though they were not successful, and never even came close to accomplishing their goal, it is still admirable that someone was able to come up with the operation.

An important variant to consider with any space or science related project is how beneficial the outcome will be. Defending the motivation for Mars One is easy through a lens of

pure scientific advancement, but should be evaluated closely in regard to influencing and enhancing human life. Inhabiting another planet would require a sophisticated level of technology and knowledge which is why NASA defends the statement that us as a human race and our position with science is not advanced enough to tackle such an obstacle. With extensive exploring being done on Mars by NASA it is probably that life human life will one day be supported on Mars, just not any time soon. A major reason why an organization such as NASA would find greater success than a smaller private company is because of its accessibility to resources such as money.

A great focus has been placed on money and how it plays a big role in who can explore space. It is interesting to consider that if someone has the resources and technology, they can conduct space missions. While the company behind Mars One had some of the resources required for the project, there are a few important variants that were overlooked. A major aspect of life which requires consideration is food and other resources as well as how they would get to Mars. It is interesting to consider if supplies would have to be constantly sent to Mars or if there would be a different system in place to provide the required necessities for life.

Politics have been the driving force of almost everything in today's world. Having a system of government in place is vital to having a successful state. It is confusing to contemplate how a system of government would be established and who would have control of the planet Mars, especially since appropriation won't allow a single group of country to claim the land as their own. When these laws were created and put into place, the possibility of inhabiting another planet may not have been taken into consideration. Even though the colonization of Mars is in the distant future, or may not even be possible, it is still important to

consider how another planet would fit into the political system currently in place. It would also be important to consider how a system of government would be created and who would be in charge of establishing it. This also plays into a conversation of what constitutes a nation and what qualities a society needs to function. Overall, creating a colony, especially on another planet, requires much more than what is accessible to scientists in present time.

A project such as the Mars One Mission shows a drive and hunger to reach further than what a human hand can grasp and achieve more than any other great mind has. Although there were many things working against the success of Mars One, the idea itself was not necessarily a bad one. The major source of the downfall came from overreaching and working beyond the available means. Anything related to science or mathematics builds off of each other. It is not possible to jump from a basic foundational understanding to a complex one. Although Mars One was lacking as far as technology, money, and resources, another organization will one day have what is required to successfully have human life on Mars. While the Mars One Mission ultimately did prove to be unfeasible, this does not mean that the concept is impossible. It is important to realize that while scientific advancements and space exploration do not drive the existence of the human race on Earth, both play a large part in the progression and development of humanity as we know it.

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