

Benchmark III

Objective 1

Space and Space Activities

Space grants many advantages and disadvantages to the human race. For example, since the dawn of time humans have had the nature of exploring new places and trying to understand the world around them. When Christopher Columbus discovered the New World in 1492 all of the major European countries wanted a piece of this so-called “New World.” Fertile lands, endless plains, mountains and hills as far as the eye could see, where some of the descriptions Columbus made to the Spanish royal court. Space is not much different, our knowledge is limited, but as time goes on our collective knowledge of space increases. We see it as a place with endless resources a “New World” to conquer and explore, it’s only human nature to want to explore what has not been explored, it’s only human nature to want to understand what it doesn’t already understand. Many times politics, culture, and even economics play a vital role in what can and cannot be done.

For the most part of the 20th century many have pondered the notion of space exploration, many have dreamed of systems to put into space. For example, Walter Hohmann came up with a way to move artificial satellites from one orbit to another, what makes this extraordinary is that he came up with this 32 years before the first artificial satellites was launched: Sputnik I in 1957. Hermann J. Oberth a scientist in Germany came up with a mathematical theory of how to get into space in the year of 1923, his theory spurred the growth of space science in Germany. Wernher von Braun took part in all of this, his genius led to the development of the V-2 and later the Saturn V for the U.S. However, politics played a role that greatly slowed down the effort of space exploration. The Treaty of Versailles hindered the Germans from having any development

flexibility, the reparations the German government had to pay was top priority for them. Their economy was not able to support a space program. Now we are looking at the well-being of the country or spend millions on theories that have not been proven...blasphemy (Aerospace Science).

Many times culture influences what is done in the scientific community, if a new advancement is not socially or culturally accepted then it goes nowhere, no one will be willing to fund any experiments that deal with this new advancement, so it will be discarded and lost to time. Many times space programs have to be accepted by the general public of a nation to be started, if nothing productive is being exploited from the program then it is decommissioned, many times not being able to explain what is being done to the public hurts a space program. If no one understands the benefits that a society will gain from a space program they will fear it and refuse to let it be taken any further. So, having something socially and culturally accepted will bring us closer to fully understanding the cosmos.

All views and opinions expressed within the text represent the opinions of the writer. References have been added to validate any information taken from other sources.

References:

Sellers, Jerry J., et al. Aerospace Science: The Exploration of Space. U.S.A. McGraw-Hill, 2003

The following text summarizes the conflicts in the movie *2001: A Space Odyssey*:

There were several conflicts in the movie 2001: A Space Odyssey. One central conflict was with the HAL (**H**euristically programmed **A**lgorithmic computer) 9000 supercomputer.

HAL is an artificial intelligence, the sentient onboard computer of the spaceship *Discovery*. He was built to assist the crew onboard. After what seemed like an error made by HAL about a fault in the spacecraft, Dave Bowman and Frank Poole (two crewmembers) consider disconnecting HAL's perception circuits. Bowman and Poole think that HAL is unable to hear them, however, they are unaware of HAL's ability to read lips. HAL is caught in between the choices of whether to care for the crew or carry on with his mission. If HAL were to put the crew before the mission, HAL would be unable to carry on with the mission because the crew would disconnect his circuits. HAL decides that the mission is more important and makes sure that the crew is exterminated. HAL kills Poole while he is out repairing the ship and he cuts off the life support for the other crewmembers ending their lives as well. After realizing what has occurred, Bowman proceeds to shut HAL down. After Hal is shut down, a prerecorded message from mission control plays which tells the true intentions of the mission to Jupiter - it was hidden from the crew and was not to be revealed until the spaceship enters Jupiter's orbit.

A solution to HAL's error is to not create a supercomputer with self-awareness.

2100: The Final Contact

In the sequel to 2010: The Year We Make Contact, space has become monopolized by the human race. Inter-planetary travel has become commonplace in the Society of 2100. Space has also come to play an important role in the international economy, and more advanced methods of research have been developed in the study of the environment and the further branches scientific field. Peace has been kept in the 90 years since the first contact with the Europeans, who mysteriously disappeared after the transmission of their first and only message to Earth. However, everything changes when a mysterious, unknown force destroys one satellite of Russia and one satellite of the United States. Both nations suspect the other for the destruction

of their satellite, and tensions as well as hostilities increase between the two nations. Eventually, negotiations fail as the two nations fail to find the true reason for the destruction of the satellites, and a blockade on trading between the two countries is established. Just as things appear to begin spiraling out of control, the U.S.S Discovery re-enters the orbit of the Earth, transmitting one last message from the Europeans:

“Mistrust has become mankind’s greatest flaw. When your satellites were destroyed by our experiment, both nations were quick to blame the other for their troubles, leading to the brink of a war. We leave you now in peace, and ask only for but one thing. Remember to trust each other.”

At this the blockade is ended, and peace is resumed, the human race begins its first step towards a more trustful society.

The conflict could have been handled much more easily and quickly, if the people of both nations had trusted each other from the beginning. Therefore, it seems that the only way to end war and proliferation is to cast aside our differences and live together in peace. If the nations of the world today could dispose of their weapons of mass destruction without worry today, then the world would become a better and safer place to live, with space open to the use and exploration of all nations.

Objective II

The year is 2047. The cloud of debris orbiting the Earth makes space flight difficult. The lucrative business of space tourism is drawing to a close. Narrow corridors are maintained in the junk field so that spacecraft can exit the atmosphere, but high tolls are charged. Pollution in major cities is a serious problem; even though cars now run on alternative fuels and electricity, the factories that manufacture the products still belch smoke into the atmosphere. Colonization of the moon has begun. The lunar colonies resemble Antarctic expeditions, at the present they are only populated by scientists. The worlds' space programs have become more cooperative, with the United States and Russia taking the lead. China and India are still behind as they cope with the problem of feeding their billions of inhabitants. Even Chinas' annexation of Mongolia has not produced enough usable farmland to sustain their massive population. Demonstrations in the streets against space funding are beginning to take place as citizens starve so satellites can be launched. A large middle class is beginning to take shape in China comprised of workers from the booming space industry. India is going in much the same direction, having resisted cultural change but spurred technological growth. The United States, through a partnership with Russia, controls the majority of space assets and owns the colonies on the moon where the international scientists go to do research. The new generation of 'space babies' has been brought up entirely dependent on cell phones and satellite television. Cell phone companies have consolidated and charge very high rates as a result of this dependency. So far no military actions have been attempted in space, but rogue terrorist cells have started an ant-satellite campaign in an attempt to hurt the US economy. Terrorism is in decline on the global scale, with the disappearance of oil from the planet and the hard-line policies of NATO nations, what remains of the terrorist networks is poorly funded and ruthlessly hunted. Space-based defenses have rendered nuclear

weapons useless, but there are rumors of satellites in existence capable of destroying other defense satellites in order to allow for a nuclear attack.

The effects of space warfare on the nations of the world would be tremendous, in several different ways. The possibility of space warfare would cause dramatic changes in the domains of economic growth, political stability, social stability, accountability, and evolving technologies. Space war is an all but too real possibility, and the event of one is more than likely to occur, should the world's nations fail to settle their differences in a peaceful and civilized manner. If indeed a hostile conflict were to erupt in outer space, the areas of national security, environmental change, economic development, and space exploration would all experience serious consequences. Some of these developments face the serious possibility of leading to even further unforeseen consequences in the future.

From a standpoint of economic growth, the effects of a space conflict on the global market could be both equally beneficial, as well as devastating. Any type of warfare can help a nation's economy by accelerating the output of military weapons and materials, or by boosting the output of certain civilian products. Both of these are what help to create new jobs, and speed up the flow of currency in and out of a given country. However, it should be noted that after a war of any kind that the economy of the nations involved will descend in the same manner that it had previously increased. Ultimately, the government of any nation would fall into a never-ending arms race, leading only to inescapable debt and the eventual fall of the given nation.

A nation that entered a space war would be affected in terms of its political stability as well. If the nations of the world engaged in global space warfare, national security in all countries would be severely disrupted. Trust between the leaders of the involved countries would quickly break down, leading to further hostilities down the road. This process has already been

illustrated in the events of the Cold War from 1946 to 1991 and in particular, the Cuban Missile Crisis in October of 1962.

It is almost certain that the same event would occur in terms of the social stability of the world's nations. Mistrust among the people of nations at war would create hostile relationships with other nations. Eventually, a nation would create so many enemies, that the Earth would spiral down into a never-ending conflict.

Accountability for objects would become a thing of the past. That is, as weapons being deployed across space would become more and more common, it would become almost impossible to keep track of who had launched objects into space, and who's country had destroyed who's country's satellites.

Evolving technologies would cease being used for peaceful purposes, while research and funds would be poured exclusively into military developments. The result would be a halt in environmental and peaceful discoveries, and creations made for the good of mankind would take a backseat to advancements developed exclusively for the battlefield.

In essence, a space war would throw national security into disarray, destroy the environment, plunge the world's nations into economic ruin, and all but halt outer space exploration. But how can this vicious cycle of violence and disarray be stopped? War has been prevented before. Several treaties have been developed to govern the terms and conditions of the use of outer space. Through upholding the treaties we have now, and creating further treaties to lay down the law of the use and the exploration of space, hostilities can be severely decreased. Also, the establishment of cooperative, joint group projects between the space programs of different countries, an event that is already taking place, will even further help to spread peace

among the world's nations. So is space warfare preventable? If today's world leaders are willing to put out the extra effort, we just might stand a fighting chance.

The following compares and contrasts the Chinese and the European space agencies:

China:

- Man in space on October 15, 2003
 - Sent 3 of their astronauts into space (2003-2005)
 - Future mission with 3 astronauts in 2008
- Plans for continued manned space programs
- Many satellites launched
- Shot down one of their own satellites
- Does not believe in weaponization of space

European Space Agency:

- Peaceful organization
- Many satellites launched
- Working on simulated mission to Mars with Russia
- Aurora satellite system
- Global positioning system
- Against weaponization of space

Commonalities:

- Peaceful intentions
- Many satellites launched
- Against weaponization of space
- Future plans for space exploration

Objective III

Consequences of Space Programs

Throughout the years of numerous space programs, nuclear fission has been used to power satellites throughout their service-life. For example, the United States satellites SNAP 9-A, SNAP-10A, and SNAP 19 (all launched during the 1960s) used nuclear power in one way or another. The former Soviet Union and present day Russia have had many satellites in orbit that

were powered by nuclear fission; one-way power is harnessed from radioactive material. All of the above mentioned satellites and spacecraft have one thing in common other than what powered them, they all reentered the Earth's atmosphere crashing and leaving traces of radioactive material where they crashed. Furthermore, these mentioned satellites were all sent up before any treaty was formally adopted that restricted the use of nuclear power in space.

Having these types of satellites come back to Earth pose serious problems for us here on Earth. One, once these satellites reenter, they leave radioactive debris in the atmosphere, this will soon spread throughout the Earth and there is nothing we can do about it. Second, at times satellites crash in the oceans with the radioactive material they have on board spreading in the surrounding water contaminating not only the water but also the marine life living there. This can cause serious problems to the rest of us if drinking water comes from that area, millions around the world would drink radioactive water - never a healthy thing. Lastly, one of these satellites may crash in a populated area possibly contaminating those that live there and causing nation-wide panic - and maybe military response if the nation's leaders take it as an act of war.

Now with this in mind the following will be a possible scenario for the future of a possible incident regarding a nuclear powered satellite crashing in a heavily populated city in a respected country:

On April 14th of 2017, the country of France launched an interplanetary probe towards the planet Mars in hope to further our understanding of the planet. Unfortunately, technical problems during launch sent the probe and the rocket in a parabolic trajectory heading west towards the east coast of the United States of America. The U.S. anti-ballistic system was activated but failed to destroy the rocket and its payload, thus the rocket exploded about 200 feet

above the city of New York unleashing radioactive plutonium through out the city...affecting thousands.

The French probe used new nuclear power technology that allowed it to function without having to depend on the light of the sun. Many probes and satellites use solar panels as their main source of energy, this causes several burdens on launch - more weight has to be sent up costing more money and hinders the position of a satellite when in space. Using nuclear power reduces weight to an extent, and it allows the satellite to have higher orbits, be farther away from the sun and not affect how the satellites works (NASA Nuclear Systems...). Even with the wonders nuclear power grants us, grave consequences come with this technology.

So, on April 14th (as previously stated) a French probe exploded over New York City around mid-day...thousands have been affected by the radioactive material onboard the spacecraft, many relief agencies have been deployed to help those affected by this tragic event. Representatives from France and the United States have already met and are currently meeting to learn what happened and determine if there was any wrongdoing by the French Space Agency. France has also sent relief teams to help the United States government in their efforts to assist those affected by the radioactive blast. Teams of experts from the United States and member nations of the ESA have been deployed to measure and monitor the amount of radiation released into the atmosphere and the ground below.

Talks between the United States and France have been intense...neither side wanting any tension between them. Many nations have condoned the French Space Agency for sending up a nuclear powered object into space, many call foul and the French Space Agency has formally apologized for the mishap but has no intention of backing down with this newfound technology. With this, new talks have been scheduled by the United Nations to bring about the subject of

space, new treaties are expected to result from these talks but nothing is certain at the time being. Investigations regarding the technical problems that occurred during the launch of this probe have been initiated by the ESA to determine what went wrong and prevent any such event from happening again to any other country.

The above scenario reflects the views and opinions of the writer. References have been used solely to validate any questionable information within the text.

References:

“NASA’s Nuclear Systems Initiative Overview.” 17 May 2007. <http://eos.gsfc.nasa.gov/eos-ll/docs/nuclear_syst_init.pdf>