

Technology Name: Space Exploration for Human Habitation

Category: Exploration, Space

Keywords: Space, International Space Station, NASA, and Satellites

Technology Background: The ability to send objects into space was long and coming, it started with Hermann Oberth. He is dubbed the father of space travel. In the spirit human exploration he is quoted saying his life goal was "To make available for life every place where life is possible. To make inhabitable all worlds as yet uninhabitable, and all life purposeful (Man Into Space 1957)." However he had proved the use technical merit of rockets previously to that and it was Sputnik on October 4, 1957 that ignited the space race. American politicians as well as the general public were petrified of nuclear threats, even before Sputnik. General Henry H. Arnold expresses concern in this 1945 quote, "The next war will not start with a naval action nor...by aircraft flown by human beings. It might very well start with missiles being dropped on the capital of a country, say Washington..." Sputnik realized this fear. Less than a year later NASA was formed on October 1, 1958 in order to spearhead the US effort in space exploration.

Technology Description: In 2001 the global canvas of space exploration has evolved radically. The International Space Station is too costly and complex a project for any one single nation to engage in. In this era with funding for space and exploration decreasing globally, in order to be effective at a larger scale it has been necessary for nations to cooperate. The motivation of adventure and exploration is a strong portion of the driving force behind the space station. However, bureaucrats and the general public have become much more scrutinous of how much public money is used on space exploration. NASA states that the following types of research are planned to take place on the ISS; biomedical, fundamental biology, biotechnology, fluid physics, advanced human support, materials science, combustion science, fundamental physics, earth science and space science (International Space Station Fact Book, NASA, October 2000).

Source: <http://spaceflight.nasa.gov/station/>

#### 1. Social Impact

- a. Who are the stakeholders? The stakeholders are; national and international space exploration organizations, potentially all of human kind, politicians & policy makers, other individuals who may benefit from the use of space exploration funds.
- b. Who will benefit? Depending on the technologies refined or invented the potential positive impact is huge. However, it also must be acknowledged that cutting edge technology can seldom be utilized by developing nations until it is manufacturable at low cost. Although, even this does not guarantee that life improving technologies will ever be affordable.
- c. How are the poor affected? The poor are only affected to the extent that money spent on the ISS and other programs could be redirected to care for and improve the quality of life of the poor. This is contingent on funds being spent on the poor. It is possible that if technologies that lower the cost of living and improve it simultaneously that the poor may

benefit, an example of this may be low cost insulation that works very well. This technology may lower climatization costs.

d. Does it bring society together? Yes, in some ways space exploration does bring society together. Space exploration gets a lot of people excited especially those whom are aware of the involvement of their own nation and other nations who are working together. Because not all nations are involved it may not bring people together who do not live in nations that are not involved in exploration or not aware that their nations is involved in space exploration.

e. What effects will it have on employment? In the high technology and space systems sector, space exploration has a positive impact on employment.

## 2. Ethical Questions

a. Does it violate rights? Space exploration does not violate rights directly. However, the technology may be used to violate privacy rights in different ways. Monitoring communications routed through satellites as well as using satellites to take detailed photographs from space could violate individual privacy.

b. Is it fair? Space exploration is fair to the extent that funds could potentially be used to improve the quality of life of poorer individuals.

c. Does it produce the maximum good? I believe that space exploration produces the maximum good in that the potential benefits are great. However, there are parallels to this scenario in other areas of research as well. Lyme disease gets a large amount of funding relative to Malaria. However, Malaria affects many times more people. The issue lies in the fact that Lyme disease is often contracted from ticks while hunting. This is a sport of wealthy North Americans. However, Malaria affects much poorer populations and thus has not received nearly as much research funding.

d. Does it promote the common good? No, especially if you consider that the money spent on space exploration could be used in other areas of society, such as education or poorer populations.

e. Should we pursue this? Yes, although there are costs associated with

## 3. Legal Implications

a. Is it legal? Space exploration technology is legal.

b. Does it promote Law (or assist law breaking)? Certain kinds of space exploration technology could promote law if used correctly. An example is long-range imaging satellite technology. Criminals and law enforcement officers can use this type of technology.

c. Does it assist (or hinder) law keeping? In the same way law keeping can be assisted by use of satellite imaging technology.

## 4. Economics

a. Is it desirable for the country, region, company, people? Yes, it is desirable, at least at the local and national level. Space systems and technology are a considerable source of revenue in the United States and comprise a very strong export segment of the United States economy.

b. Is it globally desirable? Yes, if it developing nations can find a way to profit socially and economically from space exploration. Some developing nations argue that geosynchronous orbits that are directly above should belong to them. In other words nations should be able to collect rent for the area of space in geosynchronous orbit above their nation. While this idea seems extreme, perhaps it would help bring necessary funds to developing nations. The ideal situation would be to use this funding for national infrastructure and development.

c. What is the impact on economic stability? Economic stability is increased due to increased industry.

d. Is it economically feasible? Yes, exploration inspires us to continue to innovate. The intangible benefits of exploration from knowledge and

experiences gained outweigh costs. It can be argued that the money could be used for something with a higher immediate return on investment. However, the possibilities of unknown discoveries make it very difficult to not pursue any research in space exploration.

5. Environmental Issues

a. How does it affect our environment (short term and long term)? Space debris has and continues to be a problem. Aside from space debris which pose as a threat to future space exploration there is waste generated in manufacture and disposal of space systems.

6. Unanticipated Consequences

a. How might it be used? Other uses of space exploration technology could be; war, invasion of privacy, information censoring, crime control, weather prediction, interplanetary travel and we may encounter another life form.

b. What alternate paths might it take? Other uses of this technology are dumping waste, storing sensitive data, faster travel globally and the possibility of finding life on another planet.

c. Are there any historical examples of developments analogous to this one that might serve as a guide to ways in which this technology might evolve? The Space Race era is the historical predecessor to the current era of 'cooperation.' I believe that if

7. Specific Technology questions?

a. Is the cost of space exploration worth the return of knowledge? The cost of space exploration is definitely worth the return of knowledge. It is a fundamental portion the human experience to explore. Perhaps a balanced approach is the best to take. Continuing to explore space is not only needed to gain knowledge it is the pinnacle of scientific research of our society.