**2011-2012 Varsity Packet**

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| **•Mars Colonization Aff**  **•Mars Colonization Neg**  **•SETI Aff**  **•SETI Neg**  **•Asteroids Aff**  **•Asteroids Neg**  **•Constellation Aff**  **•Constellation Neg** | **•NASA Tradeoff DA**  **•NASA Tradeoff DA Aff**  **•Privatization DA**  **•Privatization DA Aff**  **•Space Weaponization DA**  **•Space Weaponization DA Aff**  **•Privatization CP**  **•Privatization CP Aff**  **•Frontier Critique**  **•Frontier Critique Aff**  **•Topicality File** |

**Resolved: The United States federal government should substantially increase its exploration and/or development of space beyond the Earth’s mesosphere.**

**Mars Colonization Affirmative**

# Mars Colonization Affirmative

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# Explanation

Humans have long been fascinated with the other planets in the Solar System. Hundreds of years ago, we believed that the Earth was the center of the universe. Now we know that all of the planets in our solar system orbit around the sun, not the Earth. Despite the immense amount that we have learned since this time through science, there remains the same interest and fascination with outer space.

This case argues that the United States should attempt to establish a permanent human presence on Mars, like a colony. The case believes that this is a good idea because of the many problems that plague people on Earth. There are nuclear weapons, deadly diseases, and a growing population, all of which have the potential to cause great harm to humans. Following the logic that you shouldn’t put all of your eggs in one basket, the case argues that if we had people on a different planet that we would have an insurance policy in case a disaster happened on Earth.

Finally, this case argues that the technology to reach and set up a place to live on Mars is possible with our current technology. Mars is a very attractive option to attempt to colonize because it is a similar size and has a comparable climate to Earth.

# Glossary

**Key Words**:

**Colonize** – sending settlers to a new area with the aim of gaining control of it.

**Status quo** – The world as it is presently

**De-orbited**- taken out of orbit, allowing an object to crash into Earth

**Wane** – When something, like interest in a subject, decreases

**Frontier** – the outer limit of territory that humanity has colonized. Antarctica is a frontier because no humans live there. So is the moon.

**Extinction** – When no more of a species remain. For example, dinosaurs are extinct

**Epidemics** – a widespread and deadly disease. AIDS is an epidemic.

**confined** – restricted or cramped

regions

**self-sustaining** – something that can function on its own.

**Catastrophe** – an event causing great damage and suffering

**Demise** – Something’s demise is its death.

**Species** – a class of living thing. Humans are a species, just like ants or oak trees

**Extinct** – when a species no longer exists

**Implement** – to put into action

**Intriguing** – interesting

**Reserves** – Something stored for later, perhaps in the event of a tragedy

**Inhabitants** – the organisms that live in a certain area

**Vulnerable** – something that is easily open to harm is vulnerable

**springboard** – a point to begin from, like a launch pad.

**Asteroid** – a rocky body, smaller than a planet, that is flying through space with the potential to hit other planets

Key Phrases:

**Axial tilt –** the amount that a planet “wobbles” back and forth along the imaginary line that it spins around. You may have learned that on the Earth are caused by its axial tilt.

**Inelegant Jargon** – Jargon is special words used by people in a specific area (like debaters and “disad” or “1AC”) that are hard for people to understand. Inelegant jargon are phrases that don’t flow easily.

**Diminishing returns –** The idea that it in any area, it is easier to get the basics down than to master everything. For example, the first time you read a book you will learn a lot because you have never read it before. However, the second time you read it you will learn fewer new things because there is less left that you didn’t already know and only the tricky details remain

**Survival prospects** – the likelihood that humans would survive

**Formulate a strategy** – to come up with a plan of action

**Habitable location for homo sapiens** – a place that humans could live in

**Ecological collapse –** when an environment becomes unlivable for many of its inhabitants. For example, if a fresh water lake became contaminated with salt water, many of the plants and animals would not be able to survive, and the lake would suffer an ecological collapse

**Microbial life** – Bacteria, germs, and other organisms that only can be seen through microscopes

**Scientific facility** – a place where scientific experiments are conducted. Think of a lab.

**Political and social implications –** the effects that something would have on the way people work in government and how they interact with each other in society more generally

**El Dorado** – A mythical city of gold that colonizers of the Americas sought. When El Dorado is used today, it refers to an ideal place with great riches that either does not exist or would be very difficult to attain.

**Acronyms**:

**ISS** - International Space Station

**NASA** – National Aeronautics and Space Administration

# 1AC [1/6]

**Contention 1: Inherency**

**The end of the space shuttle program is a symbol of the end of American interest in space exploration. There are currently no plans to colonize Mars, or any other planet.**

**The Economist, 6/30/2011, “The End of the Space Age,” http://www.economist.com/node/18897425**

The reason for that second objective is also the reason for thinking 2011 might, in the history books of the future, be seen as the year when the space cadets’ dream finally died. It marks the end of America’s space-shuttle programme, whose last mission is planned to launch on July 8th (see [article](http://www.economist.com/node/18895018), [article](http://www.economist.com/node/18895010)). The shuttle was supposed to be a reusable truck that would make the business of putting people into orbit quotidian. Instead, it has been nothing but trouble. Twice, it has killed its crew. If it had been seen as the experimental vehicle it actually is, that would not have been a particular cause for concern; test pilots are killed all the time. But the pretence was maintained that the shuttle was a workaday craft. The technical term used by NASA, “Space Transportation System”, says it all. But the shuttle is now over. The ISS is due to be de-orbited, in the inelegant jargon of the field, in 2020. Once that happens, the game will be up. There is no appetite to return to the moon, let alone push on to Mars, the El Dorado of space exploration. The technology could be there, but the passion has gone—at least in the traditional spacefaring powers, America and Russia.

The space cadets’ other hope, China, might pick up the baton. Certainly it claims it wishes, like President John Kennedy 50 years ago, to send people to the surface of the moon and return them safely to Earth. But the date for doing so seems elastic. There is none of Kennedy’s “by the end of the decade” bravura about the announcements from Beijing. Moreover, even if China succeeds in matching America’s distant triumph, it still faces the question, “what next?” The chances are that the Chinese government, like Richard Nixon’s in 1972, will say “job done” and pull the plug on the whole shebang. With luck, robotic exploration of the solar system will continue. But even there, the risk is of diminishing returns. Every planet has now been visited, and every planet with a solid surface bar Mercury has been landed on. Asteroids, moons and comets have all been added to the stamp album. Unless life turns up on Mars, or somewhere even more unexpected, public interest in the whole thing is likely to wane. And it is the public that pays for it all. The future, then, looks bounded by that new outer limit of planet Earth, the geostationary orbit. Within it, the buzz of activity will continue to grow and fill the vacuum. This part of space will be tamed by humanity, as the species has tamed so many wildernesses in the past. Outside it, though, the vacuum will remain empty. There may be occasional forays, just as men sometimes leave their huddled research bases in Antarctica to scuttle briefly across the ice cap before returning, for warmth, food and company, to base. But humanity’s dreams of a future beyond that final frontier have, largely, faded.

# 1AC [2/6]

**Contention 2: Harms.**

Humans have a limited amount of time left on Earth. Global warming, deadly diseases, and nuclear weapons are just a few of many catastrophes that will eventually endanger all life on Earth.

Michael Huang, writer for The Space Review, 4/11/2005, **“The top three reasons for humans in space,”** [**http://www.thespacereview.com/article/352/1**](http://www.thespacereview.com/article/352/1)

Humankind made it through the 20th century relatively well, but there were close calls: the Cuban Missile Crisis almost began a total war between nuclear-armed superpowers. The 21st century has presented its own distinct challenges. Nuclear and biological weapon technologies are spreading to many nations and groups. Progress in science and technology, while advancing humankind, will also lead to the development of more destructive weapons and possibly other unintended consequences. In addition to these manmade threats, natural threats such as epidemics and impacts from space will continue to be with us. The most valuable part of the universe is life: not only because life is important, but because life appears to be extremely rare. The old saying, “Don’t put all your eggs in one basket”, advises that valuable things should be kept in separate places, in case something bad happens at one of the places. This advice is more familiar to investors in the guise of “diversify your portfolio” and “spread your risk”: one should invest in many different areas in case one area declines disastrously. The same principle applies to the big picture. The most valuable part of the universe is life: not only because life is important, but because life appears to be extremely rare. Life and humankind are presently confined to the Earth (although we have built habitats in Earth orbit and ventured as far as the moon). If we were throughout the solar system, at multiple locations, a disaster at one location would not end everything. If we had the technologies to live in the extreme environments beyond Earth, we would be able to live through the extreme environments of disaster areas and other regions of hardship.

# 1AC [3/6]

**In fact, the likelihood of human extinction due to one of many disasters is likely at least 10% over the next several centuries.**

**Bruce E. Tonn, Department of Political Science, U. Of Tennessee, 09/2009, Department of Political Science, U of Tennessee, “Obligations to Future Generations and Acceptable Risks of Human Extinction,” Futures, 41:7, p. 427-435**

[**http://www.sciencedirect.com/science/article/pii/S0016328709000020**](http://www.sciencedirect.com/science/article/pii/S0016328709000020)

The litany of catastrophe-scale problems facing humanity is long and well known [1]. The set of catastrophic-scale events includes nuclear war, global climate change, massive volcanic eruptions, and collisions with near-earth objects [2]. Humanity is also plagued by myriad lesser risks that, when chained together, could equal or possibly even surpass risks posed by catastrophic events. Imagine the consequences of chaining to together the worst outcomes of terrorism, energy shortages, flu pandemics, HIV/AIDS, air and water pollution, water shortages, soil erosion, species extinction, and forest fire. Indeed, history has witnessed the collapse of many civilizations due to chains of less than catastrophic events, usually anchored by the overutilization of natural resources [3]. Last but not least is the set of potential exotic catastrophic events, which includes out-of-control (grey goo) nanotechnologies [4], the emergence of threatening super computer intelligences [5], bombardment by gamma rays emanating from explosions of super novae [6] and [7] and the creation of earth-destroying tears in the fabric of space–time within new high-energy physics devices [8,9]. Because of the perceived weight of these threats, many knowledgeable people believe that the situation facing humanity is extremely dire [10], so dire that human extinction not only seems quite possible but also very probable. For example, Rees [8] puts the chances of human civilization surviving another 100 years to be just 50–50. Bostrom [9] argues that the imminent chances of human extinction cannot be less than 25%. Leslie [11] estimates a 30% probability of human extinction during next five centuries. The Stern Review conducted for the United Kingdom Treasury assumes probability of human extinction during next century is 10% [[12]](http://www.sciencedirect.com/science/article/pii/S0016328709000020" \l "bbib12)

Plan: The United States federal government should direct the National Aeronautics and Space Administration to develop and implement a strategy to send humans to Mars, in order to establish a permanent human presence in space.

# 1AC [4/6]

**Contention 3: Solvency.**

**Colonizing another planet, specifically Mars, will provide a “life insurance policy” against these disasters on Earth, ensuring that human kind will survive even after one of these catastrophic events.**

**J. Richard Gott, Professor of Astrophysics at Princeton University, 6/17/2009, “A Goal For The Human Spaceflight Program,” http://www.nasa.gov/pdf/368985main\_GottSpaceflightGoal.pdf**

The goal of the human spaceflight program should be to increase the survival prospects of the human race by colonizing space. Self-sustaining colonies in space, which could later plant still other colonies, would provide us with a life insurance policy against any catastrophes which might occur on Earth.

Fossils of extinct species offer ample testimony that such catastrophes do occur. Our species is 200,000 years old; the Neanderthals went extinct after 300,000 years. Of our genus (Homo) and the entire Hominidae family, we are the only species left. Most species leave no descendant species. Improving our survival prospects is something we should be willing to spend large sums of money on— governments make large expenditures on defense for the survival of their citizens.

The Greeks put all their books in the great Alexandrian library. I’m sure they guarded it very well. But eventually it burnt down taking all the books with it. It’s fortunate that some copies of Sophocles’ plays were stored elsewhere, for these are the only ones that we have now (7 out of 120 plays). We should be planting colonies off the Earth now as a life insurance policy against whatever unexpected catastrophes may await us on the Earth. Of course, we should still be doing everything possible to protect our environment and safeguard our prospects on the Earth. But chaos theory tells us that we may well be unable to predict the specific cause of our demise as a species. By definition, whatever causes us to go extinct will be something the likes of which we have not experienced so far. We simply may not be smart enough to know how best to spend our money on Earth to insure the greatest chance of survival here. Spending money planting colonies in space simply gives us more chances--like storing some of Sophocles’ plays away from the Alexandrian library.

If we made colonization our goal, we might formulate a strategy designed to increase the likelihood of achieving it. Having such a goal makes us ask the right questions. Where is the easiest place in space to plant a colony—the place to start? Overall, Mars offers the most habitable location for Homo sapiens in the solar system outside of Earth, as Bruce Murray has noted. Mars has water, reasonable gravity (1/3rd that of the Earth), an atmosphere, and all the chemicals necessary for life. Living underground (like some of our cave dwelling ancestors) would lower radiation risks to acceptable levels. The Moon has no atmosphere, less protection against solar flares and galactic cosmic rays, harsher temperature ranges, lower gravity (1/6th that of the Earth), and no appreciable water. Asteroids are similar. The icy moons of Jupiter and Saturn offer water but are much colder and more distant. Mercury and Venus are too hot, and Jupiter, Saturn, Uranus, and Neptune are inhospitable gas giants. Free floating colonies in space, as proposed by Gerard O’Neill, would need material brought up from planetary or asteroid surfaces. If we want to plant a first permanent colony in space, Mars would seem the logical place to start.

# 1AC [5/6]

**Colonizing Mars is possible – the planet has many characteristics similar to Earth.**

**Fraser Cain, Publisher for Universe Today, 6/8/2008, “Mars Colonizing”,** [**http://www.universetoday.com/14883/mars-colonizing/**](http://www.universetoday.com/14883/mars-colonizing/)

Mars makes an intriguing target for human colonizing. Let’s see what some of the Mars colonizing advantages are: It has a very similar length of day. A Martian day is 24 hours and 39 minutes, so plants and animals might find that familiar. It has an axial tilt very similar to Earth. This gives it familiar seasons to our home planet. It has vast reserves of water in the form of ice. This water would be essential for human travelers to Mars, and could also be used to make rocket fuel and hydrogen for fuel. Robert Zubrin, in his book, “The Case for Mars”, explains how future human colonists might be able to live off the land when traveling to Mars, and eventually colonizing it. Instead of bringing all their supplies from Earth – like the inhabitants of the International Space Station – future colonists would be able to make their own air by splitting water on Mars into oxygen and hydrogen. This Martian water would also be used for drinking, and even rocket fuel. Preliminary experiments have shown that Mars soil could be baked into bricks to create protective structures. Earth plants could even be grown in Martian soil, assuming they get enough sunlight and carbon dioxide. Over time, there may be many mineral deposits that could be discovered on Mars and sent back to Earth for sale. In the far future, there might be a viable economy between Martian colonists and the home planet. Launching precious metals, like platinum, off the surface of Mars would be relatively inexpensive thanks to its lower gravity. And in the far future, Mars colonizing might include terraforming Mars, raising the temperature of the planet to the point that its water melts and vast reserves of gas escape and thicken the atmosphere. One day, there could be real Martians, and they would be us. Here’s a great article written by Nancy Atkinson about the possibility of a one-way, one-person trip to Mars. What about using microbes to help colonize mars. The Mars Society is working to try and colonize Mars. And Red Colony is a great resource of articles about colonizing Mars. Finally, if you’d like to learn more about Mars in general, we have done several podcast episodes about the Red Planet at Astronomy Cast. Episode 52: Mars, and Episode 91: The Search for Water on Mars.

# 1AC [6/6]

**Finally, colonizing mars provides a stepping-stone for looking for life on other planets and for colonizing deeper into the Solar System.**

Drik Schulze-Makuch, Professor at the **School of Earth and Environmental Sciences, Washington State University** and Paul Davies, **Co-Director of the Cosmology Initiative, Arizona State University, October 2010,** “**To Boldly Go: A One-Way Human Mission to Mars**”[**http://journalofcosmology.com/Mars108.html**](http://journalofcosmology.com/Mars108.html)

There are several reasons that motivate the establishment of a permanent Mars colony. We are a vulnerable species living in a part of the galaxy where cosmic events such as major asteroid and comet impacts and supernova explosions pose a significant threat to life on Earth, especially to human life. There are also more immediate threats to our culture, if not our survival as a species. These include global pandemics, nuclear or biological warfare, runaway global warming, sudden ecological collapse and supervolcanoes (Rees 2004). Thus, the colonization of other worlds is a must if the human species is to survive for the long term. The first potential colonization targets would be asteroids, the Moon and Mars. The Moon is the closest object and does provide some shelter (e.g., lava tube caves), but in all other respects falls short compared to the variety of resources available on Mars. The latter is true for asteroids as well. Mars is by far the most promising for sustained colonization and development, because it is similar in many respects to Earth and, crucially, possesses a moderate surface gravity, an atmosphere, abundant water and carbon dioxide, together with a range of essential minerals. Mars is our second closest planetary neighbor (after Venus) and a trip to Mars at the most favorable launch option takes about six months with current chemical rocket technology. In addition to offering humanity a "lifeboat" in the event of a mega-catastrophe, a Mars colony is attractive for other reasons. Astrobiologists agree that there is a fair probability that Mars hosts, or once hosted, microbial life, perhaps deep beneath the surface (Lederberg and Sagan 1962; Levin 2010; Levin and Straat 1977, 1981; McKay and Stoker 1989; McKay et al. 1996; Baker et al. 2005; Schulze-Makuch et al. 2005, 2008, Darling and Schulze-Makuch 2010; Wierzchos et al. 2010; Mahaney and Dohm 2010). A scientific facility on Mars might therefore be a unique opportunity to study an alien life form and a second evolutionary record, and to develop novel biotechnology there from. At the very least, an intensive study of ancient and modern Mars will cast important light on the origin of life on Earth. Mars also conceals a wealth of geological and astronomical data that is almost impossible to access from Earth using robotic probes. A permanent human presence on Mars would open the way to comparative planetology on a scale unimagined by any former generation. In the fullness of time, a Mars base would offer a springboard for human/robotic exploration of the outer solar system and the asteroid belt. Finally, establishing a permanent multicultural and multinational human presence on another world would have major beneficial political and social implications for Earth, and serve as a strong unifying and uplifting theme for all humanity.

# Overview Effect Advantage

**Committing to space colonization enacts an overview effect, inaugurating the spirit of human wholeness and connectedness—this solves for human fragmentation and violent divisiveness.**

**Isaac Asimov, President of the American Humanist Association, Biochemist, and famous author, 2003 “Our Future in the Cosmos – Space,” http://www.wronkiewicz.net/asimov.html**

I have a feeling that if we really expanded into space with all our might and made it a global project, this would be the equivalent of the winning of the West. It’s not just a matter of idealism or preaching brotherhood. If we can build power stations in space that will supply all the energy the world needs, then the rest of the world will want that energy too. The only way that each country will be able to get that energy will be to make sure these stations are maintained. It won’t be easy to build and maintain them; it will be quite expensive and time-consuming. But if the whole world wants energy and if the price is world cooperation, then I think people are going to do it. We already cooperate on things that the whole world needs. International organizations monitor the world’s weather and pollution and deal with things like the oceans and with Antarctica. Perhaps if we see that it is to our advantage to cooperate, then only the real maniacs will avoid cooperating and they will be left out in the cold when the undoubted benefits come in. I think that, although we as nations will retain our suspicions and mutual hatreds, we will find it to our advantage to cooperate in developing space. In doing so, we will be able to adopt a globalist view of our situation. The internal strife between Earthlings, the little quarrels over this or that patch of the Earth, and the magnified memories of past injustices will diminish before the much greater task of developing a new, much larger world**.** I think that the development of space is the great positive project that will force cooperation, a new outlook that may bring peace to the Earth**,** and a kind of federalized world government. In such a government, each region will be concerned with those matters that concern itself alone, but the entire world would act as a unit on matters that affect the entire world. Only in such a way will we be able to survive and to avoid the kind of wars that will either gradually destroy our civilization or develop into a war that will suddenly destroy it. There are so many benefits to be derived from space exploration and exploitation; why not take what seems to me the only chance of escaping what is otherwise the sure destruction of all that humanity has struggled to achieve for 50,000 years? That is one of the reasons, by the way, that I have come from New York to Hampton despite the fact that I have a hatred of traveling and I faced 8 hours on the train with a great deal of fear and trembling. It was not only The College of William and Mary that invited me, but NASA as well, and it is difficult for me to resist NASA, knowing full well that it symbolizes what I believe in too.

# Inherency Extensions

**[\_\_\_\_]**

**[\_\_\_\_]Without a commitment to colonization, human spaceflight will end.**

**Jeff** **Foust,** **editor and publisher for the Space Review, 6/6/2011**, <http://www.thespacereview.com/article/1860/1>

Jeff Greason [president of XCOR Aerospace and a member of 2009’s Augustine Committee], though, is more pessimistic about the future of at least NASA’s human spaceflight program without a firm strategy in place for space settlement. Without that strategy, he said, “we’re going to build a big rocket, and then we’re going to hope a space program shows up to fly it. Any in my opinion, that strategy—the strategy of default—is going to result in the end of the NASA human spaceflight program” when members of Congress question the wisdom of spending several billion dollars a year on that effort and its lack of progress in an era of constricting budgets. “If we haven’t done better in the next ten years than we have in the last ten years, we’re going to lose that fight, and NASA’s human spaceflight activity will end.”

**[\_\_\_\_]**

**[\_\_\_\_] Governments are not investing in human colonization in the status quo.**

**Joe Falconer, Australian editor of TheNextWeb news service, 6/26/2011, “What Would Colonization of the Final Frontier Look Like?”** [**http://thenextweb.com/industry/2011/06/26/what-would-colonization-of-the-final-frontier-look-like/**](http://thenextweb.com/industry/2011/06/26/what-would-colonization-of-the-final-frontier-look-like/)

Space colonization is something that people have dreamed about since the moon landing, and is in fact considered a priority for the future of mankind by leading scientists. Unfortunately, we’ve all but ignored space colonization and the development of its technologies in recent decades, though there have been a myriad of developments that weren’t intended to advance the cause that will do just that. Aerospace advances, submarines that humans can survive in for months at a time autonomously and experiments like the Biodome have all led to uncovering pieces of the puzzle. It’s not a huge surprise that governments and corporations aren’t investing heavily in space colonization itself. We still need to make many, many more of these ancillary but important advances before we’d make any significant progress in the area. And there’s that other issue – that governments and corporations don’t see a need to ramp up the timeline on this. But Stephen Hawking, one of the few physicists whose name regular people actually know, thinks differently. He’s worried that until we disperse, we’re in imminent danger of a catastrophic event destroying human civilization – heck, human life – for good. “One we spread out into space and establish colonies, our future should be safe,” Hawking [once said](http://news.bbc.co.uk/2/hi/uk_news/6158855.stm) to a BBC reporter. There’s much to consider, and the question of where we should colonize isn’t even chief among them yet. Let’s skip the boring stuff for the moment, though, and start there. Where would we colonize?

# Extinction Inevitable – Human Weapons

**[\_\_\_\_]**

**[\_\_\_\_] Nuclear war is inevitable as resources run out.**

**Andrew R. Jones, Assistant Professor of Sociology at California State University, Fresno, 2009, “The Next Mass Extinction: Human Evolution or Human Eradication”, Journal of Cosmology, 2009, Vol 2, pages 316-333.** [**http://journalofcosmology.com/Extinction108.html**](http://journalofcosmology.com/Extinction108.html)

An additional threat manifests in the form of global warfare. As resources become increasingly scarce, and human populations attempt to migrate away from areas desertified or inundated due to climate change, the use of military force to secure liveable space will come into play (Klare, 2001; McKee, 2009). The likelihood of this scenario is predicated on whether international efforts at cooperation in addressing our collective situation succeed or fail (Klare, 2009; Levy & Sidel, 2009). Failure could result in the probable use of nuclear weapons, and chemical and biological agents to eliminate “problem” populations (Homer-Dixon, 2001). Be it the Khmer rouge of Cambodia, Hitler and the Nazis, the Armenian genocide, the purposeful eradication of the "Native Americans" and so on, history is replete with stark evidence of humanity's willingness to exterminate their fellow humans. With nuclear proliferation and the increasing risk that "rogue states" or international terrorists will acquire and unleash weapons of mass destruction, it would be naive to believe that humans will not attempt to exterminate millions of their fellow humans again in the future. Dwindling resources, competition for clean water, gas, oil, and other commodities, may guarantee it.

**[\_\_\_\_] If nature’s threats don’t end life first, human behavior will lead to their own extinction.**

**Anders Sandberg, Jason Matheny, and Milan Cirkovic, James Martin Research Fellow, Future of Humanity Institute, Oxford University; Special Consultant, Center for Biosecurity, U of Pittsburgh Medical Center;, Senior Research Associate, Astronomical Observatory, Belgrade and Asst. Prof of Physics, 9/9/2008, Bulletin of the Atomic Scientists Online**

The risks from anthropogenic hazards appear at present larger than those from natural ones. Although great progress has been made in reducing the number of nuclear weapons in the world, humanity is still threatened by the possibility of a global thermonuclear war and a resulting nuclear winter. We may face even greater risks from emerging technologies. Advances in synthetic biology might make it possible to engineer pathogens capable of extinction-level pandemics. The knowledge, equipment, and materials needed to engineer pathogens are more accessible than those needed to build nuclear weapons. And unlike other weapons, pathogens are self-replicating, allowing a small arsenal to become exponentially destructive. Pathogens have been implicated in the extinctions of many wild species. Although most pandemics "fade out" by reducing the density of susceptible populations, pathogens with wide host ranges in multiple species can reach even isolated individuals. The intentional or unintentional release of engineered pathogens with high transmissibility, latency, and lethality might be capable of causing human extinction. While such an event seems unlikely today, the likelihood may increase as biotechnologies continue to improve at a rate rivaling Moore's Law.

# Extinction Inevitable – Asteroids

**[\_\_\_\_]**

[\_\_\_\_] In fact, the planet is overdue for a major impact.

A. Ghayur , Lecturer at the University Institute of Information Technology, Pakistan, 2007, “Developing a Three Period Strategy to Face a Global Threat: A Preliminary Analysis”<http://www.aero.org/conferences/planetarydefense/2007papers/P5-1--Ghayur--Paper.pdf>

1694 was the year when a man envisioned a bone chilling scenario after witnessing a Near Earth Object (NEO); “What if it would return and hit the Earth?” The man is now a world renowned scientist, Dr. Edmond Halley, and the object now one of the most famous comets, the Halley’s Comet has returned numerous times without any incident. Human civilization has come a long way since the Dark Ages of mid twentieth century, however, it is only now that the mankind is realizing the veracity of the apocalyptic scenario – a heavenly body colliding with earth – the Hellish nightmare which troubled Dr. Halley. Although the chances of Halley’s Comet plummeting into earth are nearly nonexistent, the chances nevertheless of another NEO colliding head on with earth are very much there. The battle-scared face of moon and the numerous impact craters on earth are a living testament to it. But all this evidence proved insufficient to turn any heads until 1994 when Shoemaker-Levy Nine crashed into Jupiter. The earth-sized storms created on Jupiter surface sent alarms through the echelons of bureaucracy and politics and suddenly a nonexistent apocalyptic nightmare had become a very much possible scenario. 1 Today, we are sitting in the midst of ever increasing human population on this planet Earth, which in turn is sitting amidst ever increasing number of identified NEOs. We are already overdue for our next big hit*; last one occurring 65 million years ago at Chixilub.* Any impact of that scale would result in deaths and displacement of billions, if not more. Do we have a global network and an institution to respond timely and effectively?

## [\_\_\_\_] Extinction from asteroids is inevitable without space colonization.

James Oberg**, Space Writer and former Space Flight Engineer. 1999, “Space Power Theory”**

We have the great gift of yet another period when our nation is not threatened; and our world is free from opposing coalitions with great global capabilities. We can use this period to take our nation and our fellow men into the greatest adventure that our species has ever embarked upon. The United States can lead, protect, and help the rest of mankind to move into space. It is particularly fitting that a country comprised of people from all over the globe assumes that role. This is a manifest destiny worthy of dreamers and poets, warriors and conquerors. In his last book, Pale Blue Dot, Carl Sagan presents an emotional argument that our species must venture into the vast realm of space to establish a spacefaring civilization. While acknowledging the very high costs that are involved in manned spaceflight, Sagan states that our very survival as a species depends on colonizing outer space. Astronomers have already identified dozens of asteroids that might someday smash into Earth. Undoubtedly, many more remain undetected. In Sagan’s opinion, the only way to avert inevitable catastrophe is for mankind to establish a permanent human presence in space. He compares humans to the planets that roam the night sky, as he says that humans will too wander through space. We will wander space because we possess a compulsion to explore, and space provides a truly infinite prospect of new directions to explore. Sagan’s vision is part science and part emotion. He hoped that the exploration of space would unify humankind. We propose that mankind follow the United States and our allies into this new sea, set with jeweled stars. If we lead, we can be both strong and caring. If we step back, it may be to the detriment of more than our country.

# Extinction Inevitable – Overpopulation

**[\_\_\_\_]**

**[\_\_\_\_] Overpopulation will eventually render Earth inhabitable.**

**Nawal Mahmood, writer for the tech journal, 6/28/2010,** [**http://thetechjournal.com/science/eminent-scientist-claims-humans-will-be-extinct-in-100-years.xhtml#ixzz1Qt1nhm6n**](http://thetechjournal.com/science/eminent-scientist-claims-humans-will-be-extinct-in-100-years.xhtml#ixzz1Qt1nhm6n)

Eminent biologist Professor Frank Fenner, who helped to eradicate smallpox, recently made the dire prediction that humans will probably be extinct within the next 100 years due to overpopulation, environmental destruction and climate change. Fenner, who is emeritus professor of microbiology at the Australian National University (ANU) in Canberra, said homo sapiens will not be able to survive the population explosion and “unbridled consumption,” and will become extinct, perhaps within a century, along with many other species. United Nations official figures from last year estimate the human population is 6.8 billion, and is predicted to pass seven billion next year. Fenner told *The Australian* he tries not to express his pessimism because people are trying to do something, but keep putting it off. He said he believes the situation is irreversible, and it is too late because the effects we have had on Earth since industrialization (a period now known to scientists unofficially as the Anthropocene) rivals any effects of ice ages or comet impacts.

**[\_\_\_\_] Overpopulation will cause extinction. The population has tripled in the last century.**

**Melinda Ham, Writer for the Sydney Morning Herald, 3/21/2011, “The world keeps on churning; overpopulation – our changing environment Part I”**

Mankind is losing the numbers game, writes Melinda Ham. The population of the world's low-income or developing countries is growing at a faster rate than in the higher-income or "developed" countries. In many cases worldwide, this growth is unsustainable, causing overpopulation and putting immense pressure on economic resources and essential services, resulting in poverty and environmental problems. WHY SO MANY PEOPLE ON THE PLANET? During the 19th and early 20th centuries, the development of modern medicine and the control of infectious diseases decreased death rates around the developed world. After the Second World War, this population growth spread to the developing world, resulting in a global population explosion and urban expansion. The number of people on the planet has tripled in only a century, according to the World Bank report Beyond Economic Growth, published in 2004. This has caused "overpopulation", especially in developing countries, where insufficient economic resources means clean water, food, hospitals, schools and jobs can be scarce. This also causes increased pollution and deforestation. HOW BIG WILL THE POPULATION GET? Many push-and-pull factors affect how much world population will increase. By early next year, the United Nations' Population Fund (UNFPA) estimates the world will have reached 7 billion people and go beyond 9 billion by 2050. Most of this growth will still be in the 49 least-developed countries, even though the number of babies women are having is decreasing markedly. Simultaneously, the population growth also depends on the impact of the HIV/AIDS epidemic. If, for some reason, women in less-developed countries stop using contraception, the world population would increase by nearly twice as much as projected, the World Bank says.

# Answers To: War in Space

**[\_\_\_\_]**

## [\_\_\_\_] Space colonization will eliminate ethnic tensions.

The Columbus Dispatch**, 5/23/**2001

There may come a time when humans will consider space colonization. Initiatives such as the space station and a manned Mars landing could be steppingstones toward pitching a tent on another world. In one unexpected consequence, an international push into space could be the great uniter. The heavens, so immense and enigmatic, could make ethnic and religious groups look beyond their problems with each other. Everyone has a stake in this trip.

**[\_\_\_\_]**

## [\_\_\_\_] Space colonization will end nationalism.

**Frank** White, **space lecturer and writer**, 1990, **The SETI Factor**

Many scholars and scientists see benefits in opening up the “space frontier.” It provides an opportunity to divert nationalistic energies away from war and toward peaceful cooperation ventures; it also offers an expanded range in which to work out new forms of societal and political interaction. In the Overview Effect, I pointed out that space exploration also provides an opportunity for human awareness to evolve and transform itself because it provides us with a new perspective on the earth, the universe, and ourselves. The defining feature of the space development subculture is a refusal to consider the future of humanity as confined to the surface of one planet. While members of the space development community may be concerned about the future of Earth, it is not because they plan to stay here. They see themselves as the leaders in creating a “spacefaring civilization,” and making humanity into a “multi-planet species.”

# Overview Effect Extensions

**[\_\_\_\_]**

**Experiencing the “Overview Effect” solves war as we shift to a more peaceful mindset.**

**Frank White, space writer and lecturer, 1998, “The overview effect: space exploration and human evolution” page 48**

The space frontier has become a symbol of humanity working out its destiny: war or peace, cooperation or competition, love or hate. The Overview Effect says it all: we are one; we are all in this together; war and strife solve nothing.Returning to Earth, the astronaut has many choices regarding transmission of the message, and each per-son uses the experience in terms of his or her own interests and place in society. However, because of the cultural role that they have played, people who have been in space often have creditability un-matched by others**.** Many of our cultures are replete with the stories of angels, messengers, sky-gods who come from above with a better view of what is happening below. Even for those who are not reli-gious, this symbolism of people who go into the regions of God (or the gods) and return must be powerful. And previously pointed out by Loren Acton, the influence of astro-nauts, cosmonauts, and other space travelers back to Earth may be the most important aspect of recent missions. The Space Shuttle Program,regardless of the other benefits it may or may not bring to soci-ety,is consolidating the impact of the effect and the supporting its dissemination to the people on Earth. The ultimate impact could be substantial, Nelson suggested, **if** the superpower leaders would have to ar-range a summit meeting in space in the next century. “It would have a positive effect on their making decisions on war and peace.” Ultimately, the Space Shuttle points to a future when living on the frontier with a new perspective will be normal. As Bonnie Dunbar put it, “With success flights, I have become more at home in Space….. I miss looking down n the Earth and out into the universe.” Her views are echoed by Al Sacco, a recent space flier: “For me, being in orbit was very comforting. In some ways, I was more comfortable in space than on Earth, and I hated to leave that environment.”

# Overview Effect Extensions

**[\_\_\_\_]**

**[\_\_\_\_] Colonizing space will cause the next renaissance and promote universal prosperity and clarity.**

Patrick Collins and Adriano Autino, **Professor of Economics at Azabu University (Japan); President of the Space Renaissance International,** 2008 **“What the Growth of a Space Tourism Industry Could Contribute to Employment, Economic Growth, Environmental Protection, Education, Culture and World Peace”**

Healthy societies can revitalise themselves. An interesting explanation of the potential of space travel and its offshoots to revitalise human civilisation is expressed in the idea that "The Earth is not sick: she's pregnant" [35]. Although this idea may seem strange at first sight, it is a surprisingly useful analogy for understanding humans' current predicament. According to the "Pregnant Earth" analogy, the darkening prospect before humanity is due to humans' terrestrial civilisation being "pregnant"—and indeed dangerously overdue—with an extra-terrestrial offspring. Once humans' space civilisation is safely born, the current stresses on the mother civilisation will be cured, and the new life may eventually even surpass it's parent. This idea not only illuminates many aspects of humans' present problems described above, it also provides detailed directions for how to solve these problems, and explains convincingly how successfully aiding this birth will lead to a far better condition than before the pregnancy. A young couple may be happy in each other's company, but their joy is increased by the birth of children and life with them, from which many new possibilities arise. Likewise, the birth of humans' coming extra-terrestrial civilisation will lead to a wide range of activities outside our planet's precious ecosystem. This evolution will solve not just our material problems, by making the vast resources of near-Earth space accessible, but it will also help to cure the emptiness of so-called "modern" commercial culture -- including the "dumbing down" by monopolistic media, the falling educational standards, passification by television, obesity, ever-growing consumption of alcohol, decline in public morality, pornography, narcotics, falling social capital, rising divorce rates, and youths' lack of challenge and lack of "dreams". It will do this by raising humans' sights to the stars, and showing that the door to them is unlocked, and has been for decades—we have only to make a small effort to push it open forever. In addition, re-opening a true geographical frontier, with all its challenges, will in itself be of inestimable value for the cultural growth of modern civilisation. The widespread sense that we live in a closed world which is getting more and more crowded will be replaced by an open-ended, optimistic vision of an unlimited future. Access to the cornucopia of space resources that await humans' exploitation can clearly make a unique contribution to this. To the extent that leaders of major industries are motivated by ambition in business competition, they will welcome this opportunity to extend their activities to new fields in the far wider arena of space. However, to the extent that they are motivated by the attempt to achieve monopolistic control and profits, they may try to hinder development in space, even at the cost of preventing its wide benefits, since this could be more profitable to them. Implementing the "Pregnant Earth" agenda can prevent this cultural regression and start a true world-wide Renaissance, an unprecedented ﬂowering of civilisation of which human culture has been in need ever since the inspiration of the Italian Renaissance was followed by a decline into progressive materialism and war-mongering [35].

# Solvency Extensions

**[\_\_\_\_]**

**[\_\_\_\_]Space Development requires more funding and new visions.**

**Michael Griffin, Administrator of NASA, seven degrees in the fields of Physics, Electrical Engineering, Aerospace Engineering, 2003: “The Future of Human Space Flight,”** [**http://www.spaceref.com/news/viewsr.html?pid=10683)[KEZIOS**](http://www.spaceref.com/news/viewsr.html?pid=10683)%5bKEZIOS)

The required time to achieve the intermediate milestones is irrevocably tied to funding constraints. If no new funding can be provided, we will spend the next several years - probably a decade - working our way out of the Space Shuttle and International Space Station dilemmas, even proceeding as expeditiously as possible. It will be difficult, likely impossible, to begin development of (for example) heavy lift launch vehicles and space nuclear power systems while restricting NASA to today's budget levels and simultaneously respecting current obligations to ISS. Yet, these technologies and others are crucial to any permanent step beyond LEO. There is a lot of ground to be made up, but with a $5 B annual funding increase for NASA, I believe one could expect to see the first lunar base within a decade. What is needed is a different view of spaceflight in the affairs of men and nations than we have so far seen. Space programs in the United States have so far have been just that - programs. They are justified individually, each on its own merits, and have defined goals, funding, start dates and, it is hoped, completion dates. Space activities so far have been largely episodic, when in fact they need to become, again, a way of life. NASA and the space community generally, whether civil or DoD, receive frequent criticism for the high cost of what we do, the cumbersome pace at which it often seems to proceed, and the not infrequent failures which occur. This may not be entirely unfair; it is my own belief that the nation is entitled to expect a higher standard of performance on space projects than has often been the case in recent years. But we in the space community - the engineers who must execute a multiyear vision one budget year at a time - are, I think, entitled to expect a higher and more consistent standard of commitment by the nation, through its policymakers, to that vision.

[\_\_\_\_] Our only chance of survival is to move into space.

**Niall Firth, writer for The Daily Mail, 8/10/2010, “Human race 'must colonise space or face extinction', warns Stephen Hawking”** [**http://www.dailymail.co.uk/sciencetech/article-1301482/Human-race-colonise-space-face-extinction-warns-Stephen-Hawking.html**](http://www.dailymail.co.uk/sciencetech/article-1301482/Human-race-colonise-space-face-extinction-warns-Stephen-Hawking.html)

‘If we are the only intelligent dead’beings in the galaxy we should make sure we survive and continue.’ But he warned that mankind was entering an increasingly dangerous period. ‘Our population and use of the finite resources of planet Earth are growing exponentially along with our technical ability to change the environment for good and ill,’ said the author of the bestseller, A Brief History of Time. ‘But our genetic code carries selfish and aggressive instincts that were a survival advantage in the past. It will be difficult enough to avoid disaster in the next 100 years let alone the next thousand or a million. 'Our only chance of long-term survival is not to remain on planet Earth but to spread into space. ‘We have made remarkable progress in the last 100 years but if we want to continue beyond the next 100 years our future is in space.’

# Answers To: Can’t Establish a Colony Fast Enough

**[\_\_\_\_]**

**[\_\_\_\_] Space Colonization is possible due to new propulsion technologies.**

**Clara Moskowitz, staff writer for Space.com, 2/1/2010, “NASA’s Far-Out New Plans,” http://www.space.com/7852-nasa-plans.html,**

One of the possible consequences of new commercial space vehicles and new propulsion mechanisms is the chance that human civilians could travel to space in large numbers for the first time. That means that space vacations and moon hotels may not be a mere pipe dream anymore. "I am excited to think that the development of commercial capabilities to send humans into low earth orbit will likely result in so many more earthlings being able to experience the transformative power of spaceflight," Apollo 11 astronaut Buzz Aldrin said in a statement. In his comments, Bolden echoed this sentiment. "Imagine enabling hundreds, even thousands of people to visit or live in low-Earth orbit, while NASA firmly focuses its gaze on the cosmic horizon beyond Earth," he said.

**[\_\_\_\_]**

**[\_\_\_\_] A direct trip to mars would be quick.**

**Robert Zubrin, Aerospace engineer and founder of the Mars Society, 6/24/1996, “The case for Mars,”**

Mars Direct says what it means. The plan discards unnecessary, expensive, and time-consuming detours: no need for assembly of spaceships in low Earth orbit; no need to refuel in space; no need for spaceships hangars at an enlarged Space Station, and no requirement for dawn-out development of lunar bases as a prelude to Mars exploration. Avoiding these detours brings the first landing on Mars perhaps twenty years earlier than would otherwise happen, and avoids the ballooning administrative cost that tend to afflict extended government programs.

# Answer To: Health Risks in Space

**[\_\_\_\_]**

## [\_\_\_\_] Nuclear power creates artificial gravity- avoids adverse effects.

**Space.com, 5/21/2000, http://www.space.com/scienceastronomy/solarsystem/nuclearmars\_000521.html**

One of the great added strengths of the Bimodal Nuclear Thermal Rocket is that it can be used to generate not only thrust, but all the power that a crew needs during interplanetary travel. Once the crew-transfer vehicle escapes from Earth orbit and reaches speed on its trip to Mars, the engines are brought down to an idle. Their heat is routed through a generator to produce power for crew survival, high data-rate communications, and even a refrigerator to keep the liquid hydrogen fuel from boiling off into space. Because liquid hydrogen boils at minus 423 degrees Fahrenheit (minus 217 degrees Celsius), the loss of hydrogen propellant is a serious problem which forces most mission designers to carry a great deal of extra propellant to make up for the loss. With nuclear reactors, though, there is plenty of energy to run a refrigeration system to keep the hydrogen cold. This greatly reduces the total mass of the vehicle. Nuclear reactors even provide enough power to create artificial gravity, a feature that should protect the astronaut crew from the physiological ravages of living in low-gravity conditions for extended periods.

**[\_\_\_\_]**

**[\_\_\_\_[ Radiation doesn’t pose significant risks to Mars cosmonauts, shelter sufficient.**

**Robert Zubrin, Aerospace engineer and founder of the Mars Society, Journal of Cosmology, October-November 2010, Vol 12, 3549-3557. “Human Mars Exploration: The Time Is Now”** [**http://journalofcosmology.com/Mars111.html**](http://journalofcosmology.com/Mars111.html)

It is alleged by some that the radiation doses involved in a Mars mission present insuperable risks, or are not well understood. This is untrue. Solar flare radiation, consisting of protons with energies of about 1 MeV, can be shielded by 12 cm of water or provisions, and there will be enough of such materials on board the ship to build an adequate pantry storm shelter for use in such an event. The residual cosmic ray dose, about 50 Rem for the 2.5 year mission, represents a statistical cancer risk of about 1%, roughly the same as that which would be induced by an average smoking habit over the same period.

# Answers To: Colonization Technologically Impossible

**[\_\_\_\_]**

**[\_\_\_\_] Leading experts in the field conclude that funding a human mission to Mars can establish a human colony using current technology.**

**Jeremy A. Kaplan, Executive Editor of PC Magazine, 12/30/2010 “NASA Scientist Publishes 'Colonizing the Red Planet,' a How-To Guide”, http://www.pcmag.com/author-bio/jeremy-a.-kaplan**

A manned mission to Mars would be the greatest adventure in the history of the human race**.** And one man knows how to make it a reality. In fact, he just wrote the book on it -- literally. Joel Levine, senior research scientist with NASA's Langley Research Center and co-chair of NASA's Human Exploration of Mars Science Analysis Group, just published "The Human Mission to Mars: Colonizing the Red Planet." The book reads like a who's who of Mars mission science, featuring senators, astronauts, astrophysicists, geologists and moreon getting to Mars, studying its atmosphere and climate, the psychological and medical effects on the crew and other details. There's even a section detailing the science of sex on Mars, should NASA attempt to create a permanent colony there. "For the last three years, I've been co-chairing a panel of about 30 U.S. and Canadian scientists, coming up with a blueprint, purely from a scientific perspective, of humanity's role on Mars," Levine told FoxNews.com. He was asked to put together a special edition of the Journal of Cosmology exploring the topic, which was just published as the new book. "The United States of America is the only country that can do this successfully right now," he said. And to remain the technological leader of the world, he argued, we need to do this. And it's quite possible**,** the book notes; after all, a trip to Mars isn't even a lengthy one.

# Answers To: Colonization Technologically Impossible

**[\_\_\_\_]**

**[\_\_\_\_] We can reach mars quickly with current technology.**

**Robert Zubrin, Aerospace engineer and founder of the Mars Society, 5/14/2011, “How We Can Fly to Mars in This Decade—And on the Cheap”, Wall Street Journal**

Nothing in this plan is beyond our current technology, and the costs would not be excessive. Falcon-9 Heavy launches are priced at about $100 million each, and Dragons are cheaper. With this approach, we could send expeditions to Mars at half the cost to launch a Space Shuttle flight. There is no question that this plan involves considerable risk, and a variety of missions, technology developments and testing programs in advance might reduce that risk. But if we try to do even a significant fraction before committing to the mission, we will never get to Mars. Is it responsible to forgo any expenditure that might reduce the risk to the crew? I believe so. The purpose of the space program is to explore space, and its expenditures come at the cost of other national priorities. If we want to reduce risk to human life, there are vastly more effective ways of doing so than by spending $10 billion per year for the next two or three decades on a human spaceflight program mired in low Earth orbit. We could spend the money on childhood vaccinations, fire escape inspections, highway repairs, better body armor for the troops—take your pick. For NASA managers to demand that the mission be delayed for decades while hundreds of billions are spent to marginally reduce the risk to a handful of volunteers, when the same funds spent on other priorities could save the lives of tens of thousands, is narcissistic in the extreme. The Falcon 9 Heavy is scheduled for its first flight in 2013. All of the other hardware elements in this plan could be made ready for flight within the next few years. NASA's astronauts have gone nowhere new since 1972, but these four decades of wasteful stagnation need not continue. If President Obama were to act decisively and embrace this plan, we could have our first team of human explorers on the Red Planet by 2016.

# Answers To: Privatization DA / CP

**[\_\_\_\_]**

**[\_\_\_\_] Governments must pioneer on a mission to mars in order to allow the private sector to follow behind it.**

**Charles Q. Choi, journalist for Astrobiology Magazine, 2/10/2011, “Red Planet for Sale? How Corporate Sponsors Could Send Humans to Mars,” Space.com**

It could be argued that NASA and other government space agencies should spearhead a human mission to Mars instead of corporations because of cost and safety. Astronauts have never set foot on Mars, and like the Apollo missions that sent men to the moon, the mission to Mars would need teams of engineers and other scientists working together over many years, with cost concerns more about staying under a projected budget than earning big profits. Governments also pioneered space travel due to the risky and untested aspects of venturing into such territory. Only after pushing boundaries to make voyages into space safer, more routine and less expensive, could business go where they once feared to tread. "I think it likely most people would find it difficult to conceive there wouldn't be any government involvement in such a mission," said space-law expert Timothy Nelson at New York-based law firm Skadden. "The possession of a rocket alone would probably trip you up on the military regulations that govern the ownership of missile technology in the United States. Not to sound too cynical, but space rockets were built as a byproduct of the arms race." There is no ban on putting ads on the sides of spacecraft or for licensing TV broadcast rights on such missions in the existing law regarding outer space, Nelson added. "The question becomes, economically, whether you can generate enough license fee revenue to pay for what you're trying to do," he said.

# Article: Why Spaceflight Has Ended

**The Economist: *The End of the Space Age: Inner space is useful. Outer space is history*. June 20th, 2011.**

HOW big is the Earth? Any encyclopedia will give you an answer: its equatorial diameter is 12,756km, or, for those who prefer to think that way, 7,926 miles. Ah, but then there is the atmosphere. Should that count? Perhaps the planet’s true diameter is actually nearer 13,000km, including all its air. But even that may no longer be an adequate measure. For the Earth now reaches farther still. The vacuum surrounding it buzzes with artificial satellites, forming a sort of technosphere beyond the atmosphere. Most of these satellites circle only a few hundred kilometres above the planet’s solid surface. Many, though, form a ring like Saturn’s at a distance of 36,000km, the place at which an object takes 24 hours to orbit the Earth and thus hovers continuously over the same point of the planet.

Viewed this way, the Earth is quite a lot larger than the traditional textbook answer. And viewed this way, the Space Age has been a roaring success. Telecommunications, weather forecasting, agriculture, forestry and even the search for minerals have all been revolutionised. So has warfare. No power can any longer mobilise its armed forces in secret. The exact location of every building on the planet can be known. And satellite-based global-positioning systems will guide a smart bomb to that location on demand.

Yet none of this was the Space Age as envisaged by the enthusiastic “space cadets” who got the whole thing going. Though engineers like Wernher von Braun, who built the rockets for both Germany’s second-world-war V2 project and America’s cold-war Apollo project, sold their souls to the military establishment in order to pursue their dreams of space travel by the only means then available, most of them had their eyes on a higher prize. “First Men to a Geostationary Orbit” does not have quite the same ring as “First Men to the Moon”, a book von Braun wrote in 1958. The vision being sold in the 1950s and 1960s, when the early space rockets were flying, was of adventure and exploration. The facts of the American space project and its Soviet counterpart elided seamlessly into the fantasy of “Star Trek” and “2001: A Space Odyssey”. Other planets may or may not have been inhabited by aliens, but they, and even other stars, were there for the taking. That the taking would begin in the lifetimes of people then alive was widely assumed to be true.

No longer. It is quite conceivable that 36,000km will prove the limit of human ambition. It is equally conceivable that the fantasy-made-reality of human space flight will return to fantasy. It is likely that the Space Age is over.

**Bye-bye, sci-fi**

Today’s space cadets will, no doubt, oppose that claim vigorously. They will, in particular, point to the private ventures of people like Elon Musk in America and Sir Richard Branson in Britain, who hope to make human space flight commercially viable. Indeed, the enterprise of such people might do just that. But the market seems small and vulnerable. One part, space tourism, is a luxury service that is, in any case, unlikely to go beyond low-Earth orbit at best (the cost of getting even as far as the moon would reduce the number of potential clients to a handful). The other source of revenue is ferrying astronauts to the benighted International Space Station (ISS), surely the biggest waste of money, at $100 billion and counting, that has ever been built in the name of science.

The reason for that second objective is also the reason for thinking 2011 might, in the history books of t

the future, be seen as the year when the space cadets’ dream finally died. It marks the end of America’s space-shuttle programme, whose last mission is planned to launch on July 8th (see [article](http://www.economist.com/node/18895018), [article](http://www.economist.com/node/18895010)). The shuttle was supposed to be a reusable truck that would make the business of putting people into orbit quotidian. Instead, it has been nothing but trouble. Twice, it has killed its crew. If it had been seen as the experimental vehicle it actually is, that would not have been a particular cause for concern; test pilots are killed all the time. But the pretence was maintained that the shuttle was a workaday craft. The technical term used by NASA, “Space Transportation System”, says it all.

But the shuttle is now over. The ISS is due to be de-orbited, in the inelegant jargon of the field, in 2020. Once that happens, the game will be up. There is no appetite to return to the moon, let alone push on to Mars, El Dorado of space exploration. The technology could be there, but the passion has gone—at least in the traditional spacefaring powers, America and Russia.

The space cadets’ other hope, China, might pick up the baton. Certainly it claims it wishes, like President John Kennedy 50 years ago, to send people to the surface of the moon and return them safely to Earth. But the date for doing so seems elastic. There is none of Kennedy’s “by the end of the decade” bravura about the announcements from Beijing. Moreover, even if China succeeds in matching America’s distant triumph, it still faces the question, “what next?” The chances are that the Chinese government, like Richard Nixon’s in 1972, will say “job done” and pull the plug on the whole shebang.

**No bucks, no Buck Rogers**

With luck, robotic exploration of the solar system will continue. But even there, the risk is of diminishing returns. Every planet has now been visited, and every planet with a solid surface bar Mercury has been landed on. Asteroids, moons and comets have all been added to the stamp album. Unless life turns up on Mars, or somewhere even more unexpected, public interest in the whole thing is likely to wane. And it is the public that pays for it all.

The future, then, looks bounded by that new outer limit of planet Earth, the geostationary orbit. Within it, the buzz of activity will continue to grow and fill the vacuum. This part of space will be tamed by humanity, as the species has tamed so many wildernesses in the past. Outside it, though, the vacuum will remain empty. There may be occasional forays, just as men sometimes leave their huddled research bases in Antarctica to scuttle briefly across the ice cap before returning, for warmth, food and company, to base. But humanity’s dreams of a future beyond that final frontier have, largely, faded.

# Article: Why We Must Return to Space

**J. Richard Gott: *A Goal For the Human Spaceflight Program*. June 17th, 2009.**

The goal of the human spaceflight program should be to increase the survival prospects of the human race by colonizing space. Self-sustaining colonies in space, which could later plant still other colonies, would provide us with a life insurance policy against any catastrophes which might occur on Earth.

Fossils of extinct species offer ample testimony that such catastrophes do occur. Our species is 200,000 years old; the Neanderthals went extinct after 300,000 years. Of our genus (*Homo*) and the entire *Hominidae* family, we are the only species left. Most species leave no descendant species. Improving our survival prospects is something we should be willing to spend large sums of money on - governments make large expenditures on defense for the survival of their citizens.

The Greeks put all their books in the great Alexandrian library. I'm sure they guarded it very well. But eventually it burnt down taking all the books with it. It's fortunate that some copies of Sophocles' plays were stored elsewhere, for these are the only ones that we have now (7 out of 120 plays). We should be planting colonies off the Earth now as a life insurance policy against whatever unexpected catastrophes may await us on the Earth. Of course, we should still be doing everything possible to protect our environment and safeguard our prospects on the Earth. But chaos theory tells us that we may well be unable to predict the specific cause of our demise as a species. By definition, whatever causes us to go extinct will be something the likes of which we have not experienced so far. We simply may not be smart enough to know how best to spend our money on Earth to insure the greatest chance of survival here. Spending money planting colonies in space simply gives us more chances--like storing some of Sophocles' plays away from the Alexandrian library.

If we made colonization our goal, we might formulate a strategy designed to increase the likelihood of achieving it. Having such a goal makes us ask the right questions. Where is the easiest place in space to plant a colony - the place to start? Overall, Mars offers the most habitable location for *Homo sapiens* in the solar system outside of Earth, as Bruce Murray has noted. Mars has water, reasonable gravity (1/3rd that of the Earth), an atmosphere, and all the chemicals necessary for life. Living underground (like some of our cave dwelling ancestors) would lower radiation risks to acceptable levels. The Moon has no atmosphere, less protection against solar flares and galactic cosmic rays, harsher temperature ranges, lower gravity (1/6th that of the Earth), and no appreciable water. Asteroids are similar. The icy moons of Jupiter and Saturn offer water but are much colder and more distant. Mercury and Venus are too hot, and Jupiter, Saturn, Uranus, and Neptune are inhospitable gas giants. Free floating colonies in space, as proposed by Gerard O’Neill, would need material brought up from planetary or asteroid surfaces. If we want to plant a first permanent colony in space, Mars would seem the logical place to start.

If colonization is our goal, rather than bringing astronauts back from Mars, we should leave them there to multiply using indigenous materials. Once we have astronauts safely sitting on the surface of Mars, it makes more sense to send them additional supplies rather than to trade them for an equal number of astronauts sitting on Earth. After all, trips from one planet to another pose an additional risk, and it is on Mars that the astronauts help our survival prospects. We just need a few astronauts who would rather be founders of a Martian civilization than return to ticker tape parades on Earth. We can find such intrepid men and women.

**The real space race is whether we colonize off the planet before the funds for the human**

**spaceflight program end.** Now that the Cold War is over, the driving force that got us to the Moon has ended and the human spaceflight program is in danger of extinction. Expensive technological projects are often abandoned after awhile. The Egyptians built bigger and bigger pyramids for about 50 years and then built smaller and less well made ones before finally quitting entirely. Admiral Cheng Ho sailed a great Chinese fleet all the way to Africa and brought back giraffes to the Chinese court. But then the Chinese government decided to cancel the program. Once lost, opportunities may not come again. The human spaceflight program is only 48 years old. The Copernican Principle tells us that our location is not likely to be special. If our location within the history of human space travel is not special, there is a 50% chance that we are in the last half now and that its future duration is less than 48 years (cf. Gott, 2007). If the human spaceflight program has a much longer future duration than this, then we would be lucky to be living in the first tiny bit of it. Bayesian statistics warn us against accepting hypotheses that imply our observations are lucky. It would be prudent to take the above Copernican estimate seriously since it assumes that we are not particularly lucky or unlucky in our location in time, and a wise policy should aim to protect us even against some bad luck. With such a short past track record of funding, it would be a mistake to count on much longer and better funding in the future. Instead, assuming funding levels in the next 48 years like those we have had in the past 48 years, we should ask ourselves what project we could undertake in the next 48 years that would be of most benefit to our species. Planting a self- supporting colony on Mars would make us a two-planet species. It would change the course of world history. You couldn’t even call it world history any more. It might as much as double our long term survival prospects by giving our species two chances instead of one. Colonies are a great bargain. You just send a few astronauts and they multiply there using indigenous materials. It’s the Martian colonists that would do all the work. They would increase their numbers by having children and grandchildren on Mars while increasing their habitable facilities and biosphere using indigenous materials--with no further help needed from us. If couples had four children, on average, the colony, on its own, might multiply its initial population by a factor of as much as a million in 600 years.

And colonies can plant other colonies. The first words spoken on the Moon were in English, not because England sent astronauts to the Moon but because it planted a colony in North America that did. People on Mars might one day plant colonies elsewhere themselves. If people on Earth were extinguished by some catastrophe, Martian colonists might at some later date send an expedition to repopulate it.

Since the funding window for colonization may be short, we should concentrate on establishing the first self-supporting colony in space as soon as possible. That it be self-supporting is important since this would allow it to continue even if funding for space launches from Earth were discontinued.

If establishing a self-supporting colony is our goal, we could skip going back to the Moon, and concentrate on colonizing Mars. According to calculations by Gerard O’Neill, about 50 tons per person are required for a self-supporting colony in space (including biosphere). One of the three colonization waves that populated North and South America with Native Americans began when perhaps a dozen or so people traveled across a land bridge from Asia about 12,000 years ago. The Aboriginal population of Australia may have started with as few as 30 people who voyaged there by raft some 60,000 years ago. (Genetic diversity of our Mars colony could be increased by bringing frozen sperm and egg cells along.) If we just put up into low Earth orbit as much tonnage in the next 48 years as we have in the last 48 years (in Saturn V and Shuttle launches alone) we could deliver 2,304 tons to the surface of Mars. We would need a heavy lift vehicle like the *Ares V*. Four new *Ares V* rockets could be assembled at a time in the vertical assembly building at Cape Canaveral and be ready for launch in sequence during the launch window which opens up once every 26 months. Even if it took 11 years to develop the *Ares V* rocket, we could still deliver 1,808 tons to the surface of Mars in the next 48 years. With no greater commitment in the next 48 years than we have made in the last 48 years we could plant a colony on Mars. The goal

would then be to make the colony self-supporting as soon as possible.

If we fail to establish a self-supporting colony on Mars while we have the chance, it would be a tragedy. The dimensions of that tragedy might not become apparent to us until such time, perhaps many thousands of years from now, when we would find ourselves trapped on Earth with no viable space program, a low population, and our extinction as a species looming near. Moreover, we might end up spending as much money in real terms on the human spaceflight program in the future as we have in the past and *still* never get to Mars. If that happens, it would be a double tragedy. But if we just continue as we are now, without a clear or urgent purpose, this may well be our future.

We should worry that we will not succeed at colonizing off the Earth. Why? Because we are having this conversation on Earth right now. If the human species stays limited to Earth, you and I are entirely typical. You should worry that we might fail to colonize.

The United States has a particular stake in this. It put Neil Armstrong on the Moon. But the importance of that event is yet to be determined. As Kenneth Gatland said in *The Illustrated Encyclopedia of Space Technology*, in 1989, "It is still too early to assess the full significance of the Apollo Moon landings. Did they represent a blind alley of technological advance never to be repeated, or were they the beginning of a bold new era in which mankind eventually will colonize the solar system." If we stay on Earth, then Neil Armstrong’s flight is just another event in the history of exploration, like Edmund Hillary’s ascent of Mount Everest or Roald Amundsen’s visit to the South Pole. But if Neil Armstrong’s flight is just the first step in our becoming a multiplanet species, then he is an important historical figure like Christopher Columbus - someone who was part of changing the course of human history. Indeed, as Representative Robert Torricelli of New Jersey, speaking in favor of the continuation of the manned spaceflight program, once said, if we quit, then “Neil Armstrong’s giant leap for mankind will turn out to have been a small step after all.”

I do not say establishing a colony on Mars would be easy. Small colonies often fail. In North America, the Jamestown colony failed before the Plymouth colony eventually succeeded. Persistence is valuable. Colonizing Mars is a dangerous enterprise for the astronauts who go, but it is what we should be doing. Astronauts are risking their lives every time they take off; we should give them something to do that is worth risking their lives for.

Because the human spaceflight program is not very old we should be colonizing off the Earth as soon as possible, while we still can. In 1961 President Kennedy said: “We choose to go to the Moon in this decade and do the other things not because they are easy but because they are hard” Many people remember that line. But then he added another less well remembered coda: “Because that challenge is one we are willing to accept and unwilling to postpone.” Space colonization is a challenge we should be willing to accept and unwilling to postpone.

With a great recession upon us it is easy to imagine human settlement of Mars being postponed or taken off the table entirely. On the other hand, President Obama now has an opportunity to set forth a new and inspirational objective for the human spaceflight program, one that could change the course of human history.

# Article: Why a Mars Colony Would Be Possible

Drik Schulze-Makuch: ***To Boldly Go: A One-Way Human Mission to Mars***. **October 2010**

The exploration of Mars has been a priority for the space programs of several nations for decades, yet the prospect of a manned expedition continually recedes in the face of daunting and well-recognized challenges. The long travel time to Mars in zero gravity and high radiation conditions would impose a serious health burden on the astronauts. The costs of developing the launch vehicle and assembling the large amount of equipment needed for the astronauts to survive the journey and their long sojourn on the Martian surface, together with a need to send all the fuel and supplies for a return journey make a manned Mars expedition at least an order of magnitude more expensive than the Apollo program.

In our view, however, many of these human and financial problems would be ameliorated by a one-way mission. It is important to realize that this is not a "suicide mission." The astronauts would go to Mars with the intention of staying for the rest of their lives, as trailblazers of a permanent human Mars colony. They would be resupplied periodically from Earth, and eventually develop some "home grown" industry such as food production and mineral/chemical processing (Zubrin and Baker 1992; Zubrin and Wagner 1997). Their role would be to establish a "base camp" to which more colonists would eventually be sent, and to carry out important scientific and technological projects meanwhile. Of course, the life expectancy of the astronauts would be substantially reduced, but that would also be the case for a return mission. The riskiest part of space exploration is take-off and landing, followed by the exposure to space conditions. Both risk factors would be halved in a one-way mission, and traded for the rigors of life in a cramped and hostile environment away from sophisticated medical equipment. On the financial front, abandoning the need to send the fuel and supplies for the return journey would cut costs dramatically, arguably by about 80 percent. Furthermore, once a Mars base has been established, it would be politically much easier to find the funding for sustaining it over the long term than to mount a hugely expensive return mission.

There are several reasons that motivate the establishment of a permanent Mars colony. We are a vulnerable species living in a part of the galaxy where cosmic events such as major asteroid and comet impacts and supernova explosions pose a significant threat to life on Earth, especially to human life. There are also more immediate threats to our culture, if not our survival as a species. These include global pandemics, nuclear or biological warfare, runaway global warming, sudden ecological collapse and supervolcanoes (Rees 2004). Thus, the colonization of other worlds is a must if the human species is to survive for the long term. The first potential colonization targets would be asteroids, the Moon and Mars. The Moon is the closest object and does provide some shelter (e.g., lava tube caves), but in all other respects falls short compared to the variety of resources available on Mars. The latter is true for asteroids as well. Mars is by far the most promising for sustained colonization and development, because it is similar in many respects to Earth and, crucially, possesses a moderate surface gravity, an atmosphere, abundant water and carbon dioxide, together with a range of essential minerals. Mars is our second closest planetary neighbor (after Venus) and a trip to Mars at the most favorable launch option takes about six months with current chemical rocket technology.

In addition to offering humanity a "lifeboat" in the event of a mega-catastrophe, a Mars colony is attractive for other reasons. Astrobiologists agree that there is a fair probability that Mars hosts, or once hosted, microbial life, perhaps deep beneath the surface (Lederberg and Sagan 1962; Levin 2010; Levin and Straat 1977, 1981; McKay and Stoker 1989; McKay et al. 1996; Baker et al. 2005; Schulze-Makuch

et al. 2005, 2008, Darling and Schulze-Makuch 2010; Wierzchos et al. 2010; Mahaney and Dohm 2010). A scientific facility on Mars might therefore be a unique opportunity to study an alien life form and a second evolutionary record, and to develop novel biotechnology therefrom. At the very least, an intensive study of ancient and modern Mars will cast important light on the origin of life on Earth. Mars also conceals a wealth of geological and astronomical data that is almost impossible to access from Earth using robotic probes. A permanent human presence on Mars would open the way to comparative planetology on a scale unimagined by any former generation. In the fullness of time, a Mars base would offer a springboard for human/robotic exploration of the outer solar system and the asteroid belt. Finally, establishing a permanent multicultural and multinational human presence on another world would have major beneficial political and social implications for Earth, and serve as a strong unifying and uplifting theme for all humanity.

**2. The Concept of a One-Way Mission to Mars**

A human mission to Mars is undoubtedly technologically feasible, but unlikely to lift off in the very near future, because of the enormous financial and political commitments associated with it. As remarked, however, much of the costs and payload of the mission are associated with bringing the astronauts back to Earth. Furthermore, the returning astronauts would have to go through an intense rehabilitation program after being exposed for at least one year to zero gravity and an extended period to reduced gravity on the surface of Mars. Eliminating the need for returning early colonists would cut the costs several fold and at the same time ensure a continuous commitment to the exploration of Mars and space in general.

The first colonists to Mars wouldn’t go in "cold." Robotic probes sent on ahead would establish necessities such as an energy source (such as a small nuclear reactor augmented by solar panels), enough food for two years, the basics for creating home-grown agriculture, one or more rover vehicles and a tool-kit for carrying out essential engineering and maintenance work. In addition, the scientific equipment needed for the colonists to do important research work should be part of the preceding unmanned mission. All this equipment could easily be put into place using current technology before the astronauts set out. The first human contingent would rely heavily on resources that can be produced from Mars such as water, nutrients, and shelter (such as in form of lava tube caves). They also would be continuously resupplied from Earth with necessities that could not be produced from the resources available on Mars. This semi-autonomous phase might last for decades, perhaps even centuries before the size and sophistication of the Mars colony enabled it to be self-sustaining.

The first human contingent would consist of a crew of four, ideally (and if the budget permits) distributed between two two-man space craft to allow for some mission redundancy such as in the Viking mission or for the Mars Exploration Rovers. Also, if any technical malfunction occurs on one space craft, the other craft could come to the rescue. Further, any critical part of equipment after landing would be available in duplicate in case of an emergency.

A one-way human mission to Mars would not be a one-time commitment as was the case with the Apollo program. More than 40 years after the last Apollo mission, no human has set foot on a planetary body beyond Earth. Such a hiatus cannot be afforded if humanity is to commit to a grander vision of space exploration (Davies and Schulze-Makuch 2008; Schulze-Makuch and Irwin 2008). No base on the Moon is needed to launch a one-way human mission to Mars. Given the broad variety of resources

available on Mars, the long-term survival of the first colonists is much more feasible than it would be on the Moon.

While the pragmatic advantages of this approach are clear, we anticipate that some ethical considerations may be raised against it. Some in the space agencies or public might feel that the astronauts are being abandoned on Mars, or sacrificed for the sake of the project. However, the situation these first Martian settlers are in, who would of course be volunteers, would really be little different from the first white settlers of the North American continent, who left Europe with little expectation of return. Explorers such as Columbus, Frobisher, Scott and Amundsen, while not embarking on their voyages with the intention of staying at their destination, nevertheless took huge personal risks to explore new lands, in the knowledge that there was a significant likelihood that they would perish in the attempt. A volunteer signing up for a one-way mission to Mars would do so in the full understanding that he or she would not return to Earth. Nevertheless, informal surveys conducted after lectures and conference presentations on our proposal, have repeatedly shown that many people are willing to volunteer for a one-way mission, both for reasons of scientific curiosity and in a spirit of adventure and human destiny. Others may raise objections based on planetary protection considerations, depending on whether indigenous life exists on Mars or not. However, any Martian biota is almost certainly restricted to microbes that would be adapted to the natural environment of that planet, and would therefore almost certainly not pose a safety concern for the colonists due to their presumably different biochemical make-up (e.g., Houtkooper and Schulze-Makuch 2007). Nevertheless, caution has to be urged since we do not know the biochemistry of the putative Martian biota at this time. Thus, it might be prudent to launch a life detection mission or even a sample return mission prior to a one-way human mission to Mars. On the other hand, if Martian organisms really do pose a hazard to human health, it may be preferable to limit the exposure to the crew of a one-way mission rather than place at risk the entire human population from a botched sample return mission (Rummel et al. 2002).

A much more likely problem is the reverse: that the human habitation would pose a threat to any indigenous Martian micro-organisms, even if all possible precautions would be employed to protect it. Sadly, the battle to protect putative Martian biota from terrestrial organisms has already been compromised by the fact that several unsterilized, or inadequately sterilized, spacecraft have already been sent to Mars. In addition, terrestrial impact ejecta may have conveyed viable Earth microbes to Mars repeatedly over geological time scales (Melosh and Tonks 1993; Davies 1996, 2008; Kirschvink and Weiss 2001). Nor is it clear that terrestrial microbes would be better adapted to life on Mars that they would spread uncontrollably in a way that would completely displace the indigenous organisms. Furthermore, the colonists would likely only affect a small portion of the planet and "nature parks" could be designated with special precautions enforced in respect to human interference. Again, such issues could be addressed by a prior life detection or sample return mission to inform us about any risks to Martian biota and the type of precautions that could be taken to protect it. And while we agree that all reasonable precautions should be taken, we do not think their presence should be an over-riding reason to forever resist sending humans to Mars. Indeed, our presence there would allow us to study indigenous life in detail, further our knowledge about essential characteristics of life, and design methods to actually enhance the prospects of Martian biota (McKay 1982; McKay and Marinova 2001).

**3. First Steps in the Human Colonization of Mars**

The success of the project we are proposing would hinge on the quality of preparation. We envisage

three stages: careful site selection using existing and future probes to gather relevant data, the establishment of an unmanned base with minimum resources necessary for human habitation, and the dispatch of the first astronauts. We shall not dwell here on the astronautics of the mission, as these have been thoroughly discussed elsewhere (e.g., Zubrin and Wagner 1997).

**3.1 Site selection** The final determination of a suitable settlement location would require advance scouting missions that could use geophysical exploration tools like ground penetrating radar to locate subsurface voids from aerial or buoyant platforms. Numerous igneous flow features, including lava tubes (large cave structures formed by rivulets of molten lava) have already been identified on Mars (Boston 2003; Figure 1). Lava tube caves on Mars appear to be much larger than on Earth probably due to the lower gravity on Mars (0.38g compared to 1g on Earth). They are natural caves, and some of them are located at a low elevation in close proximity to the former northern ocean, which means that they could harbor ice deposits inside similar to many ice-containing caves on Earth. Ice caves would go a long way to solving the needs of a settlement for water and oxygen. Mars has a thin but substantial atmosphere mostly consisting of carbon dioxide (95%), but it is approximately 1/100th the density of Earth’s atmosphere, has no ozone shield and no magnetospheric shielding; thus some natural or artificial shielding to protect from ionizing and ultraviolet radiation will be required. Ice caves would also provide shelter from this radiation. After a candidate cave is located, its interior would need to be robotically explored before selecting it for the colony’s first home.

**3.2. Establishing an unmanned base** After a suitable location is identified, preferentially associated with some natural shelter (e.g., lava tube caves as discussed above) and other nearby resources (water, minerals, nutrients), a base should be established using unmanned probes and robots, including small rover vehicles, to prepare for the arrival of the first human contingent. The base would also be equipped to allow for a more thorough investigation of specific localities of interest. The base would not have to be very sophisticated, but could simply consist of a communication relay and a power generator, perhaps together with a remotely operated telescope (Schulze-Makuch and Irwin 2008). The lander craft should be designed to double as a permanent station, in modular form, to allow later expansion following further one-way missions.

**3.3. The first colonists** Crew selection for the initial manned mission would have to take into account several factors. Initially, colonists may be preferred who are beyond their reproductive age, because their life expectancy is likely to be 20 years or less, and secondly, the first settlers will endure some radiation damage to their reproductive organs, both during the trip to Mars and on the Martian surface. One feasible approach for the initial one-way mission would be to send two space probes with two astronauts each. Ideally, one should be a trained physician, and all should have advanced scientific and technical know-how, and show a strong commitment to scientific research and exploration.

Once the humans arrived at the base, their task would be not unlike that of the early settlers in North America – only the underlying technology and utilized tools would be much more sophisticated. Plants could be grown outside of the caves in an enriched soil underneath a robotically constructed dome, thus providing the inhabitants of the outpost with food and an additional supply of oxygen. Microbes could be used to break down and recycle wastes, thus the human base would constitute its own independent biosphere with some additional resources provided by the Martian environment. Certainly, the first colonists would be exposed to multiple challenges, from physical rigor to psychological strains due to isolation and uncertainties. However, the astronauts will have undergone psychological profiling and

training before embarking on the mission, and would remain in constant contact with Earth via normal channels such as email, radio and video links. In the era of modern communications they would in fact feel more connected to home than the early Antarctic explorers (who had no systematic psychological training either). Over time, the human contingent on Mars would slowly increase with follow-up missions. Several cave-centered biospheres would be created, each being in constant communication with other cave-centered biospheres to share experiences on which approaches are working best. At some later time, probably several decades after the first human mission, the colony’s population might have expanded to about 150 individuals, which would constitute a viable gene pool to allow the possibility of a successful long-term reproduction program. New arrivees and possibly the use of genetic engineering would further enhance genetic variety and contribute to the health and longevity of the colonists.

While it would undoubtedly take a tremendous effort over many years to establish multiple settlements on Mars, we see no fundamental reason why this plan is not technologically implementable. Some of the heavy lifting hardware has been developed or is in an advanced stage from the recently cancelled Moon program. Work on the permanent unmanned base could be initiated right away, while the human mission and colonization details could be worked out later. We estimate that a reasonable time line for establishing a permanent unmanned base with robots would be 20 years, with the first human contingent arriving shortly thereafter. The main impediment is the narrow vision and the culture of political caution that now pervades the space programs of most nations.

**4. Conclusions**

Self-preservation considerations in a dangerous universe and the human exploratory spirit compel us to explore space and colonize other planets. Mars is the planet in our solar system, which is reasonably close and provides an abundance of resources and shelter for such a colonization effort. Nevertheless, the first step for the colonization of Mars will be the most difficult. Here, we propose that the most pragmatic approach to achieve this goal is by establishing a small permanent robotic base followed by a series of one-way missions to Mars. The advantages of a one-way human mission are many-fold including a dramatic reduction of costs, the long-term commitment by the space agency, the public, and the crew, and that no rehabilitation program is needed for crew members when remaining on the low-gravity surface of Mars. The challenges are still monumental, though, foremost because political and financial long-term commitments have to be secured.

**Mars Colonization Negative**

# Mars Colonization Negative

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# Glossary

**Accept the inevitability of Earth’s destruction** – To recognize that the Earth will be destroyed and that there is no way to prevent it

**Comparative planetology –** the study of the differences and similarities between planets, including how they evolved

**Galactic ray –** rays that originate in the galaxy, consisting of positively charged protons. They are a form of radiation and can cause harm.

**Wake –** the aftermath or consequences of something

**Prophesy –** messages communicated by a divine source. God communicated prophesies to Moses, for example.

**Prudent –** the timely and responsible course of action

**Species** - a class of living thing. Humans are a species, just like ants or oak trees

**Sustainable –** able to be maintained at a certain rate or level

**Colonialism –** when a country makes it a goal to gain full control over a new territory by sending settlers there.

**Hostilities -** fighting or acts of warfare

**Full spectrum dominance –** attempting to be superior in every form of warfare, whether it is air combat, naval combat, etc.

**Overpopulation –** When an ecosystem cannot support the population that is living in it. Some people think that the Earth is overpopulated with humans, that it cannot continue to support the 6 billion that currently live there.

**Assumption –** an implicit statement that is accepted as true without proof

**Unremittingly –** unrelentingly, uninterrupted and constantly continuing

**Trans-oceanic –** across an ocean

**Neolithic** – A period of ancient human history from approximately 9500 to 6500 BC.

**Quasi religious –** bordering on a religion

**Catastrophe –** A disastrous event causing much disruption or harm to many

**Militarization –** the act of assembling and readying resources for war

**Physiological –** the affects of something on the body

**Psychosocial –** the relationship between aspects of society and their affects on individual behavior

**Interpersonal –** communication between people

**Stressor –** something that causes stress

**Infeasibility –** something that is impossible or not feasible.

# Answers To: Inherency

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Private companies are filling in for the government and will colonize Mars in the status quo.**

**Discovery News, 4/23/2011, “SPACEX AIMS TO PUT MAN ON MARS IN 10-20 YEARS,” http://news.discovery.com/space/spacex-elon-musk-mars-astronauts-20-years-110423.html**

Private US company SpaceX hopes to put an astronaut on Mars within 10 to 20 years, the head of the firm said."We'll probably put a first man in space in about three years," Elon Musk told the Wall Street Journal Saturday. "We're going all the way to Mars, I think... best case 10 years, worst case 15 to 20 years." SpaceX is one of the two leading private space companies in the United States and has won $75 million from the US space agency NASA to help its pursuit of developing a spacecraft to replace the space shuttle.The California-based company last year completed its first successful test of an unmanned space capsule into orbit and back. "Our goal is to facilitate the transfer of people and cargo to other planets, and then it will be up to people if they want to go," said Musk, who also runs the Tesla company which develops electric cars. The US space shuttle program is winding down later this year with final flights of Endeavour set for next week and Atlantis in June, ending an era of American spaceflight that began with the first space shuttle mission in 1981. When the shuttle program ends, the United States hopes private industry will be able to fill the gap by creating the next generation of spacecraft to transport astronauts into space.

# Answers To: Colonization Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Focusing on going to space means we ignore the problems on Earth. We need to keep focusing on our own planet until technology becomes advanced enough for us to leave.**

Lynda Williams, Professor of Physics at San Francisco State University, 2010, “Irrational Dreams of Space Colonization,” *The Peace Review*; Spring 2010; [**http://www.scientainment.com/lwilliams\_peacereview.pdf**](http://www.scientainment.com/lwilliams_peacereview.pdf)

We have much to determine on planet Earth before we launch willy-nilly into another race into space and a potential environmental disaster and arms race in outer space. If we direct our intellectual and technological resources toward space exploration without consideration of the environmental and political consequences, what is left behind in the wake? The hype surrounding space exploration leaves a dangerous vacuum in the collective consciousness of solving the problems on Earth. If we accept the inevitability of Earth’s destruction and its biosphere, we are left looking toward the heavens for our solutions and resolution. Young scientists, rather than working on serious environmental challenges on Earth, dream of Moon or Martian bases to save humanity, fueling the prophesy of our planetary destruction, rather than working on solutions to solve the problems on Earth. Every space faring entity, be they governmental or corporate, will face the same challenges. Star Trek emboldened us all to dream of space, the final frontier. The reality is that our planet Earth is a perfect spaceship. We travel around our star the sun once every year, and the sun pull us with her gravitational force around the galaxy once every 250 million years through star systems, star clusters and all the possible exosolar planets that may host life or be habitable for us to colonize. The sun will be around for billions of years and we have ample time to explore the stars. It would be wise and prudent for us as a species to focus our intellectual and technological knowledge now into preserving our spaceship for the long voyage through the stars, so that once we have figured out how to make life on Earth work in an environmentally and politically sustainable way, we can then venture off the planet into the final frontier of our dreams.

# Answers To: Colonization Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Extinction claims are way overblown.**

**Gregg Easterbrook, senior editor of the New Republic, 07/2003, “We’re All Gonna Die!”**

If we're talking about doomsday - the end of human civilization - many scenarios simply don't measure up. A single nuclear bomb ignited by terrorists, for example, would be awful beyond words, but life would go on. People and machines might converge in ways that you and I would find ghastly, but from the standpoint of the future, they would probably represent an adaptation. Environmental collapse might make parts of the globe unpleasant, but considering that the biosphere has survived ice ages, it wouldn't be the final curtain. Depression, which has become 10 times more prevalent in Western nations in the postwar era, might grow so widespread that vast numbers of people would refuse to get out of bed, a possibility that Petranek suggested in a doomsday talk at the Technology Entertainment Design conference in 2002. But Marcel Proust, as miserable as he was, wrote Remembrance of Things Past while lying in bed. Of course, some worries are truly worrisome. Nuclear war might extinguish humanity, or at least bring an end to industrial civilization. The fact that tensions among the US, Russia, and China are low right now is no guarantee they'll remain so. Beyond the superpowers, India and Pakistan have demonstrated nuclear capability; North Korea either has or soon will have it; Japan may go nuclear if North Korea does; Iran and other countries could join the club before long. Radiation-spewing bombs raining from the sky would, no doubt, be cataclysmic. If you're in the mood to keep yourself up at night, nuclear war remains a good subject to ponder. But reversal of the planet's magnetic field? At a time of global unease, worst-case scenarios have a certain appeal, not unlike reality TV. And it's only natural to focus on danger; if nature hadn't programmed human beings to be wary, the species might not have gotten this far. But a little perspective is in order. Let's review the various doomsday theories, from least threatening to most. If the end is inevitable, at least there won't be any surprises.

# Answers To: Colonization Advantage

**[\_\_\_\_]**

**[\_\_\_\_] History proves that attempts at colonization lead to wars and other conflicts over new territory. Colonization of space would not be any different.**

Peter Dickens, Professor of Sociology at the University of Brighton, UK, 2010, The Monthly Review Volume 62, Issue 6  “The Humanization of the Cosmos—To What End?” <http://monthlyreview.org/2010/11/01/the-humanization-of-the-cosmos-to-what-end> JS).

But even manufactured risks may be minimal in scope, compared with another risk stemming from cosmic colonization. This is outright war. Armed conflict has long been a common feature of past colonialisms; between colonizing nations as well as between the colonizers and aboriginal peoples. Satellites are already a means by which territories and investments on Earth are monitored and protected by governments operating on behalf of their economic interests. But the prospect of galactic colonialisms raises the distinct possibility of hostilities in space. Galactic wars may therefore be the product of galactic colonialism. Such a scenario was prefigured by the *Star Trek* science fiction television series in which the main role of “The Federation” is the protection of capitalist mining colonies. It is a discomforting fact that both China and the United States are now actively developing their own versions of “full spectrum dominance.” China demonstrated its capabilities in January 2007 by shooting down one of its own defunct satellites. In February 2008, the U.S. Navy demonstrated a similar capability, destroying a faulty U.S. satellite with a sea-based missile. An arms race in outer space has already started.

**[\_\_\_\_]**

**[\_\_\_\_] Humans are safe from extinction precisely because there are so many of them. The species that go extinct are the ones that have sparse and fluctuating populations.**

**Darren Curnoe, Senior Lecturer at the University of New South Whales 6/7/2011, “Climate Change, doomsday and the Inevitable Extinction of Humankind”**

Seen in its broadest context, the history of life on Earth soberly demonstrates that the vast majority of organisms that ever lived, perhaps 99% of them, no longer do. It also shows that mammal species normally last 1-2 million years before extinction inevitably bumps them off. Yet, unlike most mammals, including our dozens of extinct hominin cousins, we have escaped the vulnerabilities of a small and massively fluctuating population. The simple, but profound act, of growing our own food delivered us the food security that ensured most of our children survived and our population grew. In effect, farming gave our species level assurance that the biological isn’t always inevitable. The odds have shifted to such a degree that we may now be, with or without climate change, extinction-proof.

# Answers To: Colonization Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Development of space technology will cause wars to be fought in space.**

Kevin Pollpeter, **China Project Manager for Defense Group Incorporated’s Center for Intelligence Research and Analysis, 6/29/2006, “THE CHINESE VISION OF SPACE MILITARY OPERATIONS”, www.defensegroupinc.com/cira/pdf/doctrinebook\_ch9.pdfSimilar**

The development of space technology will inevitably lead to the militarization of space and space militarization will lead to confrontation in space. As the struggle over air and space control is becoming the new focal point of war, space will become the main battlefield of future wars. According to Chinese writings, recent high-technology local wars are evidence that whoever gains air and space control will seize the initiative. Consequently, air and space control will play an increasingly important role in modern war and dominating space will be the one and only principle of winning future wars. Therefore, air and space control will be the new focal point of struggle in future wars.

**[\_\_\_\_]**

**[\_\_\_\_] We have no obligation to save our species down the line – we should be focusing on our own problems right now.**

**Charles Stross, Journalist and Science Fiction Writer, 6/16/2007, 2007 “The High Frontier-Redux,” http://www.antipope.org/charlie/blog-static/2007/06/the-high-frontier-redux.html)**

I'm going to take it as read that the idea of space colonization isn't unfamiliar; domed cities on Mars, orbiting cylindrical space habitats a la [J. D. Bernal](http://en.wikipedia.org/wiki/J._D._Bernal) or [Gerard K. O'Neill](http://en.wikipedia.org/wiki/O%27Neill_cylinder), that sort of thing. Generation ships that take hundreds of years to ferry colonists out to other star systems where — as we are now discovering — there are profusions of planets to explore. And I don't want to spend much time talking about the unspoken ideological underpinnings of the urge to space colonization, other than to point out that they're there, that the case for space colonization isn't usually presented as an economic enterprise so much as a quasi-religious one. "We can't afford to keep all our eggs in one basket" isn't so much a justification as an appeal to sentimentality, for in the hypothetical case of a planet-trashing catastrophe, we (who currently inhabit the surface of the Earth) are dead anyway. The future extinction of the human species cannot affect you if you are already dead: strictly speaking, it should be of no personal concern.

# Answers To: Humans Will Cause Extinction

**[\_\_\_\_] Earth could easily survive a nuclear war.**

**J. R. Nyquist, staff writer in geopolitics and IR,, 5/20/1999, “Is Nuclear War Survivable?” http://www.wnd.com/index.php?pageId=6341**

I patiently reply to these correspondents that nuclear war would not be the end of the world. I then point to studies showing that "nuclear winter" has no scientific basis, that fallout from a nuclear war would not kill all life on earth. Surprisingly, few of my correspondents are convinced. They prefer apocalyptic myths created by pop scientists, movie producers and journalists. If Dr. Carl Sagan once said "nuclear winter" would follow a nuclear war, then it must be true. If radiation wipes out mankind in a movie, then that's what we can expect in real life.

But Carl Sagan was wrong about nuclear winter. And the movie "On the Beach" misled American filmgoers about the effects of fallout. It is time, once and for all, to lay these myths to rest. Nuclear war would not bring about the end of the world, though it would be horribly destructive. The truth is, many prominent physicists have condemned the nuclear winter hypothesis. Nobel laureate Freeman Dyson once said of nuclear winter research, "It's an absolutely atrocious piece of science, but I quite despair of setting the public record straight."

Professor Michael McElroy, a Harvard physics professor, also criticized the nuclear winter hypothesis. McElroy said that nuclear winter researchers "stacked the deck" in their study, which was titled "Nuclear Winter: Global Consequences of Multiple Nuclear Explosions" (Science, December 1983). Nuclear winter is the theory that the mass use of nuclear weapons would create enough smoke and dust to blot out the sun, causing a catastrophic drop in global temperatures. According to Carl Sagan, in this situation the earth would freeze. No crops could be grown. Humanity would die of cold and starvation. In truth, natural disasters have frequently produced smoke and dust far greater than those expected from a nuclear war. In 1883 Krakatoa exploded with a blast equivalent to 10,000 one-megaton bombs, a detonation greater than the combined nuclear arsenals of planet earth. The Krakatoa explosion had negligible weather effects. Even more disastrous, going back many thousands of years, a meteor struck Quebec with the force of 17.5 million one-megaton bombs, creating a crater 63 kilometers in diameter. But the world did not freeze. Life on earth was not extinguished.

**[\_\_\_\_] Biological superweapons would not cause extinction.**

**Gregg Easterbrook, senior editor of the New Republic, 07/2003, “We’re All Gonna Die!”**

3. Germ warfare! Like chemical agents, biological weapons have never lived up to their billing in popular culture. Consider the 1995 medical thriller Outbreak, in which a highly contagious virus takes out entire towns. The reality is quite different. Weaponized smallpox escaped from a Soviet laboratory in Aralsk, Kazakhstan, in 1971; three people died, no epidemic followed. In 1979, weapons-grade anthrax got out of a Soviet facility in Sverdlovsk (now called Ekaterinburg); 68 died, no epidemic. The loss of life was tragic, but no greater than could have been caused by a single conventional bomb. In 1989, workers at a US government facility near Washington were accidentally exposed to Ebola virus. They walked around the community and hung out with family and friends for several days before the mistake was discovered. No one died. The fact is, evolution has spent millions of years conditioning mammals to resist germs. Consider the Black Plague. It was the worst known pathogen in history, loose in a Middle Ages society of poor public health, awful sanitation, and no antibiotics. Yet it didn't kill off humanity. Most people who were caught in the epidemic survived. Any superbug introduced into today's Western world would encounter top-notch public health, excellent sanitation, and an array of medicines specifically engineered to kill bioagents.

# Answers To: Overpopulation Will Cause Extinction

**[\_\_\_\_]**

### **[\_\_\_\_] Earth is sustainable – we haven’t even come close to exhausting our resources yet.**

**Donald G McNeil, science and technology journalist for the New York Times, 6/15/2008 “Malthus Redux: Is Doomsday Upon Us, Again?”http://www.nytimes.com/2008/06/15/world/americas/15iht-15mcneil.13714561.html,**

The whole world has never come close to outpacing its ability to produce food. Right now, there is enough grain grown on earth to feed 10 billion vegetarians, said Joel Cohen, professor of populations at Rockefeller University and the author of "How Many People Can the Earth Support?" But much of it is being fed to cattle, the SUV's of the protein world, which are in turn guzzled by the world's wealthy. Theoretically, there is enough acreage already planted to keep the planet fed forever, because 10 billion humans is roughly where the United Nations predicts that the world population will plateau in 2060. But success depends on portion control; in the late 1980s, Brown University's World Hunger Program calculated that the world then could sustain 5.5 billion vegetarians, 3.7 billion South Americans or 2.8 billion North Americans, who ate more animal protein than South Americans. Even if fertility rates rose again, many agronomists think the world could easily support 20 billion to 30 billion people. Anyone who has ever flown across the United States can see how that's possible: there's a lot of empty land down there. The world's entire population, with 1,000 square feet of living space each, could fit into Texas. Pile people atop each other like Manhattanites, and they get even more elbow room. Water? When it hits $150 a barrel, it will be worth building pipes from the melting polar icecaps, or desalinating the sea as the Saudis do. The same potential is even more obvious flying around the globe. The slums of Mumbai are vast; but so are the empty arable spaces of Rajasthan. Africa, a huge continent with a mere 770 million people on it, looks practically empty from above. South of the Sahara, the land is rich; south of the Zambezi, the climate is temperate. But it is farmed mostly by people using hoes.

**[\_\_\_\_] Overpopulation will soon cease to be an issue, birth rates are falling.**

**Fred Pearce, environment consultant of New Scientist magazine, 2010 “The Coming Population Crash: And Our Planet's Surprising Future" beacon Press Books: Boston, Massachusetts**

But don't despair. There is something you may not have guessed something that may save us all. The population "bomb" is being defused. Only gradually, because the children of the greatest population explosion in history are still mostly of childbearing age, but it is happening. They may be having seven children in Mali, and six in Afghanistan, but half of the world's women are now having two children or fewer-not just in rich countries, but in Iran and parts of lndia, Burma and Brazil, Vietnam and South Africa. Mothers today have fewer than half as many offspring as their own mothers. This is happening mostly out of choice and not compulsion. Women have always wanted freedom, not domestic drudgery and the childbirth treadmill. And now that most of their babies survive to adulthood, they are grabbing it.

# Answers To: Asteroids Will Cause Extinction

**[\_\_\_\_]**

## [\_\_\_\_] Asteroids won’t cause extinction – none will hit earth and we’d be able to deflect it if they did.

**Robert Roy** Britt**, Live Science, 8/7/**2008**, “Will an Asteroid Hit Earth?” http://www.livescience.com/mysteries/070116\_asteroid\_hit.html**

But no, a continent-destroying asteroid is not likely to hit during your lifetime. Most of 1,100 or so that could do the job have been found. And none are on their way. Okay, there is one mid-sized rock—called Apophis—that has a small chance of striking Earth in 2036 and wreaking some regional havoc. But astronomers are watching it and, if future observations reveal it really could hit us, scientists are confident they can devise a mission to deflect it. And if all else fails, some futurists suggests, humanity could simply set up shop elsewhere.

**[\_\_\_\_] No human has ever died from an asteroid strike. Their impact is too improbable.**

**James Bennett, Professor of Economics at George Mason University, 2010, “*The Doomsday Lobby: Hype and Panic from Sputniks, Martians, and Marauding Meteors*,” p. 157-8**

The matter, or manipulation, of odds in regards to a collision between a space rock and Earth would do Jimmy the Greek proud. As Michael B. Gerrard writes in Risk Analysis in an article assessing the relative allocation of public funds to hazardous waste site cleanup and protection against killer comets and asteroids, “Asteroids and comets are… the ultimate example of a low-probability/high-consequence event: no one in recorded human history is confirmed to have ever died from one.” Gerrard writes that “several billion people” will die as the result of an impact “at some time in the coming half million years,” although that half-million year time-frame is considerably shorter than the generally accepted extinction-event period.66 The expected deaths from a collision with an asteroid of, say, one kilometer or more in diameter are so huge that by jacking up the tiny possibility of such an event even a little bit the annual death rate of this never-before experienced disaster exceeds deaths in plane crashes, earthquakes, and other actual real live dangers. Death rates from outlandish or unusual causes are fairly steady across the years. About 120 Americans die in airplane crashes annually, and about 90 more die of lightning strikes. Perhaps five might die in garage-door opener accidents. The total number of deaths in any given year by asteroid or meteor impact is zero — holding constant since the dawn of recorded time.

# Answers To: Overview Effect Advantage

**[\_\_\_\_]**

**[\_\_\_\_] The overview effect is not supported by any scientifically rigorous evidence.**

**William Sims** Bainbridge**, tenured Professor in the Department of Sociology at the University of Washington,** 2006 **(*Goals In Space: American Values and the Future of Technology***,

Several of the Idealistic goals assert that space travel gives a new perspective to the astronauts who look back at Earth from afar and to those Earth-bound enthusiasts who participate vicariously in voyages beyond our world. From the viewpoint of space, we see ourselves, our nations, and our planet in a new light. In a recent book, Frank White (1987) reports that astronauts commonly experience “the overview effect,” a radical shift in consciousness achieved by seeing the Earth as a unity and from outside the traditional limits of human experience. He documents this thesis with material from a number of interviews, but unfortunately his data collection and theoretical analysis were not conducted in a manner that social scientists would consider systematic. Furthermore, although White considers “consciousness” to be the essential ingredient of any culture, he does not draw upon any of the standard literatureon this conceptually slippery topic. Yet, his hypothesis that from the new world-view offered by space exploration will come a series of new civilizations is a stimulating expression of the basic faith of the Idealistic class.

**[\_\_\_\_]**

**[\_\_\_\_] Virtual reality and other technologies on Earth have the same effect as the Overview effect.**

**Jun Okushi and Dudley-Flores, NASA-trained space architect, codeveloper of the International Space Station; policy analyst and space policy expert, 2007“Space and Perceptions of Space in Spacecraft: An Astrosociological Perspective.”**

Author Frank White has mentioned on the radio that he would like to allow more human beings to experience the “Overview Effect” by creating realistic simulations of space travel that go beyond the visual to include the other senses and perhaps create the feeling of isolation as sensed by space travelers. And, if the ordinary individualin Canada, in Italy, in Mozambique, in the Seychelles, in Tajikistan, in Mongolia, in Papua-New Guinea, and in California or any other locale, in his or her space-like isolation, can look out the window to apprehend the Earth, there will likely swell within his or her heart new feelings and new realizations.Such is a paradigm shift, born of humanity abroad in the Cosmos, even if bound to the Earth**.** This shift can be expected to more tightly integrate humans, their machines, and the experiences of all those on Mother Earth. By engaging the challenges of abyssal distances, the humans of the whole Earth can develop a sense of kinship, that “we are in this together,” a perception never fully developed to date by the global population in its history. And, hopefully, one that will be coming soon.

# Answers To: Overview Effect Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Flying in a plane has the same effect as the overview effect.**

**Frank White, space writer and lecturer, 1998, The Overview Effect: Space Exploration and Human Evolution, Second Edition. USA:AIAA,**

There are ways to experience the Overview Effect without going into outer space**.** Anyone who flies in an airplane and looks out the window has the opportunity to experience a mild version of it. My own effort to confirm the reality of the Overview Effect had its origins in a cross-country flight in the late 1970s. As the plane flew north of Washington, D.C., I found myself looking down at the Capitol and Washington Monument. From 30,000 feet, they looked like little toys sparkling in the sunshine. From that altitude, all ofWashington looked small and insignificant. However, I knew that people down there were making life and death decisions on my behalf and taking themselves very seriously as they did so. From high in the jet stream, it seemed absurd that they could have an impact on my life. It was like ants making laws for humans. On the other hand, I knew that it was all a matter of perspective. When the plane landed, everyone on it would act just like the people over whom we flew. This line of thought led to a simple but important realization: mental processes and views of life cannot be separated from physical location.Our "world view" as a conceptual framework depends quite literally on our view of the world from a physical place in the universe. Later, as the plane flew over the deserts and mountains of the western states, the flood of insights continued. I could look down on the network of roads below and actually "see the future." I knew that the car on Route 110 would soon meet up with that other car on Route 37, although the two drivers were not yet aware of it. If they were about to have an accident, I'd see it, but they wouldn't. From the airplane, the message that scientists, philosophers, spiritual teachers, and systems theorists have been trying to tell us for centuries was obvious: everything is interconnected and interrelated, each part a subsystem of a larger whole system. Finally, after I spent several hours looking out at the Earth's surface, all the insights linked into a single gestalt. I expressed it as the following: People living in space settlements will always have an overview! They will be able to see how everything is related, that what appears to be "the world" to people on Earth is merely a small planet in space, and what appears to be "the present" is merely a limited viewpoint to one looking from a higher level. People who live in space will take for granted philosophical insights that have taken those on Earth thousands of years to formulate, They will start at a place we have labored to attain over several millennia.

# Answers To: Solvency

**[\_\_\_\_] We would be better off creating a safe haven on Earth than trying to colonize Mars. We are much closer to creating an underground facility on Earth that would be able to survive a nuclear war or other catastrophic event than we are to colonizing another planet. The sooner we have a haven, the better, because it will allow us to ensure survival in the case of one of the disasters the affirmative mentions.**

**[\_\_\_\_] Another planet would be a poor life insurance policy. We could not get people to Mars fast enough if extinction were to occur on Earth.**

**Donald Rapp, Professor of Engineering at the University of California, Berkeley, 2008,**

**“Human Missions to Mars: Enabling Technologies for Exploring the Red Planet,” P. 11**

In regard to the broader, visionary viewpoint expressed in DRM-1, the drive toward a sustained human presence beyond Earth appears to be premature by a few hundred years. Certainly, the presence of a handful of humans on Mars will not relieve the Earth of any of its pressures due to overpopulation, pollution, or resource depletion. Comparative planetology is a worthwhile goal but it is not clear that a human presence is needed to accomplish this. Surely, there are plenty of opportunities for international cooperation without sending humans into Mars? The conclusion that the investment required to send humans to Mars is “modest” is derived by comparing with larger societal expenditures. But when compared with traditional expenditures for space, it is huge. On the other hand, there may be merit in the claims that the new technologies or the new uses of existing technologies will not only benefit humans exploring Mars but will also enhance the lives of people on Earth, and the boldness and grandeur of Mars exploration “will motivate our youth, will drive technical education goals, and will excite the people and nations of the world.” Here it all boils down to the benefit/cost ratio, which seems likely to be low.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] There are immense health risks to traveling in outer space include muscle degeneration and cosmic radiation.**

**Besty Querna, writer for National Geographic, 05/18/2001, “Health Risks Pose Hurdle for Travel to Mars”** [**http://news.nationalgeographic.com/news/pf/26132202.html**](http://news.nationalgeographic.com/news/pf/26132202.html)

Humans may soon be on their way to Mars. But human safety is paramount in space missions. Depending on its orbit, Mars can be 500 times farther from Earth than the moon. Traveling such a long distance poses health problems never faced before. Being weightless for the entire mission would cause degeneration of muscles, bones, and the heart. And without a vigorous exercise program, an astronaut would likely experience heart problems because his or her heart would become too weak to pump blood upon returning to Earth and its gravitation. Another issue that must be addressed is the huge amount of radiation exposure that occurs outside the atmosphere. Gary Marin, director for advanced programs at the U.S. National Aeronautics and Space Administration (NASA), said, "Being away from Earth for three years would mean that every cell of your body would be transversed by a galactic ray, and we just don't know what that would do to people." Chemically propelled engines, which are currently used for space flights, would not be able to carry enough fuel for the spacecraft to turn around and return to Earth if a problem such as trauma or serious illness occurred on board.

[\_\_\_\_] We do not have the technology to travel to another planet in the status quo. Many would die in the attempt

Donald F. Robertson, Aperospace industry journalist, 3/6/2006, “Space Exploration,” Space News, http://www.space.com/spacenews/archive06/RobertsonOpEd\_030606.html

Two largely unquestioned assumptions long ago took root within the space community. As we prepare to voyage back to Earth's Moon and on to Mars, it is time to question them both. The first assumption is that exploring the Moon, Mars, or any part of the solar system, can be accomplishedin a generation or two and with limited loss of life. The second is that we can use robots to successfully understand another world. Both assumptions are almost certainly wrong, yet many important elements of our civil space program are based on one or both of them being correct. To paraphrase Douglas Adams, even within the space community most people don't have a clue how "mind-bogglingly big space really is." Most of the major worlds in the solar system have surface areas at least as large as terrestrial continents -- a few are much larger -- and every oneof them is unremittingly hostile to human life**.** Learning to travel confidently through former President John F. Kennedy's "this new ocean" will be difficult, expensive, time-consuming and dangerous. Mr. Kennedy's rhetoric was more accurate than he probably knew. The only remotely comparable task humanity has faced was learning to travel across our world's oceans. We take trans-oceanic travel for granted, but getting from Neolithic boats to modern freighters cost humanity well over 10,000 years of hard work and uncounted lives. Even today, hundreds of people die in shipping accidents every year. We and our woefully inadequate chemical rockets are like Stone Age tribesfolk preparing to cast off in canoes, reaching for barely visible islands over a freezing, storm-tossed, North Atlantic.

# Answers To: Solvency

**[\_\_\_\_]**

[\_\_\_\_] The extended time in space will give the crew cabin fever – they won’t be able to handle the pressure.

Kira Bacal, Assistant Professor of Medicine at Ohio University, 1/2/2009, **“Sex in space taken seriously,” http://philosophyofscienceportal.blogspot.com/2009/01/sex-in-space-taken-seriously.html) hss**

The psychosocial implications of in-flight sex and reproduction are at least as problematic as the related physiological challenges. For the foreseeable future, space crews will be relatively small in number. If pairing off occurs within the crew, it can have serious ramifications on the crew's working relationships, and therefore, on mission success and crew operations.[4,11,14,15] Former astronaut Norman Thaggard commented, "[Issues associated with romantic relationships are] just one more problem that can potentially cause the whole thing to come apart."[4]

As we have seen in recent years, even professional astronauts on active flight status can develop serious mental health issues related to interpersonal relationships,[2,16] and the extreme, prolonged stressors of the long-duration spaceflight environment will only make such situations worse.[4] Previous long-duration missions have demonstrated that minor nuisances can lead to huge conflicts, and the addition of sexual tension will create even more challenges for the crew.[17] The limited social networks can lead to problems, such as privacy issues, the odd man out, and triangles.[15] Break-ups, which must be considered an inevitable corollary to romantic pairings, can further contribute to widespread inter-personal conflicts.[11,17] Behavioral health has long been recognized as a major challenge to long-duration spaceflight.[17-20] An International Space Station astronaut Dan Bursch commented, "Most of the challenges are more mental and psychological." In this, he echoed the earlier sentiments of cosmonaut Valerie Ryumin, "All one needs to effect a murder is lock two men into a cabin, 18 ft by 20 ft, and keep them there for two months.[17]" How much more challenging will it be to maintain crew performance and healthy interpersonal relationships when the group becomes coeducational, semi-permanent, and sexually involved?

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] We don’t have the technology for humans to return from Mars. We would be sending them on a suicide mission.**

Lynda Williams. Professor of Physics at San Francisco State University, 2010, “Irrational Dreams of Space Colonization,” *The Peace Review*; Spring 2010; [**http://www.scientainment.com/lwilliams\_peacereview.pdf**](http://www.scientainment.com/lwilliams_peacereview.pdf)

Moon base is envisioned as serving as a launch pad for Martian expeditions, so the infeasibility of a lunar base may prohibit trips to Mars, unless they are launched directly from Earth. Mars is, in its closest approach, 36 million miles from Earth and would require a nine-month journey with astronauts exposed to deadly solar cosmic rays. Providing sufficient shielding would require a spacecraft that weighs so much it becomes prohibitive to carry enough fuel for a roundtrip. Either the astronauts get exposed to lethal doses on a roundtrip, or they make a safe one-way journey and never return. Either way, no one can survive a trip to Mars and whether or not people are willing to make that sacrifice for the sake of scientific exploration, human missions to Mars do not guarantee the survival of the species, but rather, only the death of any member who attempts the journey.

# Article: Why We Should Not Seek to Colonize Mars

**Lynda Williams: *Irrational Dreams of Space Colonization*. Spring, 2010.**

Since Sputnik was launched over 50 years ago and the first human walked on the moon 12 years later, we have associated the exploration and colonization of space, specifically the Moon and Mars, as a necessary pursuit to guarantee our survival as a species, and to satisfy an evolutionary drive to explore and inhabit worlds beyond our own. Space enthusiasts claim that it is our manifest destiny, an expression of the human spirit, to explore and colonize the solar system. World-renowned scientists such as Stephen Hawking have made calls to colonize the Moon and Mars in order to preserve the species due to the inevitability of certain future doom on Earth by environmental destruction, plague or warfare. Commercial space developers promise private trips to space and beyond, infusing dreams of space wanderlust and enthusiasm for space travel in citizens who could never even afford such expensive and lofty excursions. Corporate space interests promise the certainty of achieving these goals along with new technological advances and resource riches from space exploration that will rival those gained from the Apollo moon missions. This article will examine the validity of these threats and promises, and their environmental and ethical consequences to life on Earth.

**The Destruction of Earth Threat**

According to scientific theory, the destruction of Earth is a certainty. About five billion years from now, when our sun exhausts its nuclear fuel, it will expand in size and envelope the inner planets, including the Earth, and burn them into oblivion. So yes, we are doomed, but we have 5 billion years, plus or minus a few hund red million, to plan our extraterrestrial escape. The need to colonize the Moon or Mars to guarantee our survival based on this fact is not pressing. There are also real risks due to collisions with asteroids and comets, though none are of immediate threat and do not necessitate extraterrestrial colonization. There are many Earth-based technological strategies that can be developed in time to mediate such astronomical threats such as gravitational tugboats that drag the objects out of range. The solar system could also potentially be exposed to galactic sources of high-energy gamma ray bursts that could fry all life on Earth, but any Moon or Mars base would face a similar fate. Thus, Moon or Mars human based colonies would not protect us from any of these astronomical threats in the near future.

**The Destruction of Earth’s Biosphere**

Life on Earth is more urgently threatened by the destruction of the biosphere and its life sustaining habitat due environmental catastrophes such as climate change, ocean acidification, disruption of the food chain, bio-warfare, nuclear war, nuclear winter, and myriads of other man-made doomsday prophesies. If we accept these threats as inevitabilities on par with real astronomical dangers and divert our natural, intellectual, political and technological resources from solving these problems into escaping them, will we playing into a self- fulfilling prophesy of our own planetary doom? Seeking space based solutions to our Earthly problems may indeed exacerbate the planetary threats weface. This is the core of the ethical dilemma posed by space colonization: should we put our recourses and bets on developing human colonies on other worlds to survive natural and man-made catastrophes or should we focus all of our energies on solving the problems that create these threats on Earth?

**Human Life on The Moon and Mars**

What do the prospects of colonies or bases on the Moon and Mars offer? Both the Moon and Mars host

extreme environments that are uninhabitable to humans without very sophisticated technological life supporting systems beyond any that are feasible now or will be available in the near future. Both bodies are subjected to deadly levels of solar radiation and are void of atmospheres that could sustain oxygen-based life forms such as humans. Terra- forming either body is not feasible with current technologies or within any reasonable time frames so any colony or base would be restricted to living in space capsules or trailer park like structures which could not support a sufficient number of humans to perpetuate and sustain the species in any long term manner.

Although evidence of water has been discovered on both bodies, it exists in a form that is trapped in minerals, which would require huge amounts of energy to access. Water can be converted into fuel either as hydrogen or oxygen, which would eliminate the need to transport vast amounts of fuel from Earth. However, according to Britain's leading spaceflight expert, Professor Colin Pillinger, "You would need to heat up a lot of lunar soil to 200C to get yourself a glass of water." The promise of helium as an energy source on the moon to is mostly hype. Helium-3 could be used in the production of nuclear fusion energy, a process we have yet to prove viable or efficient on Earth. Mining helium would require digging dozens of meters into the lunar surface and processing hundreds of thousands of tons of soil to produce 1 ton of helium-3. (25 tons of helium-3 is required to power the US for 1 year.) Fusion also requires the very rare element tritium, which does not exist naturally on the Moon, Mars or on Earth in abundances needed to facilitate nuclear fusion energy production. There are no current means for generating the energy on the Moon to extract the helium-3 to produce the promised endless source of energy from helium-3 on the Moon. Similar energy problems exist for using solar power on the Moon, which has the additional problem of being sunlit two weeks a month and dark for the other two weeks.

A Moon base is envisioned as serving as a launch pad for Martian expeditions, so the infeasibility of a lunar base may prohibit trips to Mars, unless they are launched directly from Earth. Mars is, in its closest approach, 36 million miles from Earth and would require a nine- month journey with astronauts exposed to deadly solar cosmic rays. Providing sufficient shielding would require a spacecraft that weighs so much it becomes prohibitive to carry enough fuel for a roundtrip. Either the astronauts get exposed to lethal doses on a roundtrip, or they make a safe one-way journey and never return. Either way, no one can survive a trip to Mars and whether or not people are willing to make that sacrifice for the sake of scientific exploration, human missions to Mars do not guarantee the survival of the species, but rather, only the death of any member who attempts the journey.

**Space Law and Space Ethics**

The technological hurdles prohibiting practical space colonization of the Moon and Mars in the near future are stratospherically high. The environmental and political consequences of pursuing these lofty dreams are even higher. There are no international laws governing the Moon or the protection of the space environment. The Moon Treaty, created in 1979 by the United Nations, declares that the Moon shall be developed to benefit all nations and that no military bases could be placed on the moon or on any celestial body, and bans altering the environment of celestial bodies. To date, no space faring nation has ratified this treaty, meaning, the moon, and all celestial bodies, including Mars and asteroids are up for the taking. If a nation did place a military base on the moon, they could potentially control all launches from Earth. The Moon is the ultimate military high ground. How should we, as a species, control the exploration, exploitation and control of the Moon and other celestial bodies if we can not even agree on a legal regime to protect and share its resources?

Since the space race began 50 years ago with the launch of Sputnik, the space environment around Earth

has become overcrowded with satellites and space debris, so much so, that circumterrestrial space has become a dangerous place with an increasing risk of collision and destruction. Thousands of pieces of space junk created from launches orbit the Earth in the same orbit as satellites, putting them at risk of collision. Every time a rocket is launched, debris from the rocket stages are put into orbital space. In 2009 there was a disastrous collision between an Iridium satellite and a piece of space junk that destroyed the satellite. In 2007 China blew up one of its defunct satellites to demonstrate its antiballistic missile capabilities, increasing the debris field by 15%. There are no international laws prohibiting anti-satellite actions. Every year, since the mid 1980s, a treaty has been introduced into the UN for a Prevention of an Arms Race in Outer Space (PAROS), with all parties including Russia and China voting for it except for the US. How can we hope to pursue a peaceful and environmentally sound route of space exploration without international laws in place that protect space and Earth environments and guarantee that the space race to the moon and beyond does not foster a war over space resources? Indeed, if the space debris problem continues to grow unfettered or if there is war in space, space will become too trashed for launches to take place without risk of destruction.

The private development of space is growing at a flurried rate. Competitions such as the X-Prize for companies to reach orbit and the Google Prize to land a robot on the Moon has launched space wanderlust in citizens throughout the country who dream of traveling to space. The reality is that there are few protections for the environment and the passengers of these flights of fancy. The FAA, which regulates space launches, is under a Congressional mandate to foster the industry. It is difficult if not impossible to have objective regulation of an industry when it enjoys government incentives to profit.

We have much to determine on planet Earth before we launch willy nilly into another race into space and a potential environmental disaster and arms race in outer space.

**Spaceship Earth**

If we direct our intellectual and technological resources toward space exploration without consideration of the environmental and political consequences, what is left behind in the wake? The hype surrounding space exploration leaves a dangerous vacuum in the collective consciousness of solving the problems on Earth. If we accept the inevitability of Earth’s destruction and its biosphere, we are left looking toward the heavens for our solutions and resolution. Young scientists, rather than working on serious environmental challenges on Earth, dream of Moon or Martian bases to save humanity, fueling the prophesy of our planetary destruction, rather than working on solutions to solve the problems on Earth.

Every space faring entity, be they governmental or corporate, face the same challenges. Star Trek emboldened us all to dream of space, the final frontier. The reality is that our planet Earth is a perfect spaceship. We travel around our star the sun once every year, and the sun pull us with her gravitational force around the galaxy once every 250 million years through star systems, star clusters and all the possible exosolar planets that may host life or be habitable for us to colonize. The sun will be around for billions of years and we have ample time to explore the stars. It woukd be wise and prudent for us as a species to focus our intellectual and technological knowledge now into preserving our spaceship for the long voyage through the stars, so that once we have figured out how to make life on Earth work in an environmentally and politically sustainable way, we can then venture off the planet into the final frontier of our dreams.

# Article: Space Travel Has Many Health Risks

**National Geographic Magazine: *Health Risks Pose Hurdle for Mission to Mars.* May, 18th, 2001.**

Humans may soon be on their way to Mars. But human safety is paramount in space missions.

Depending on its orbit, Mars can be 500 times farther from Earth than the moon. Traveling such a long distance poses health problems never faced before.

Being weightless for the entire mission would cause degeneration of muscles, bones, and the heart. And without a vigorous exercise program, an astronaut would likely experience heart problems because his or her heart would become too weak to pump blood upon returning to Earth and its gravitation.

Another issue that must be addressed is the huge amount of radiation exposure that occurs outside the atmosphere. Gary Marin, director for advanced programs at the U.S. National Aeronautics and Space Administration (NASA), said, "Being away from Earth for three years would mean that every cell of your body would be transversed by a galactic ray, and we just don't know what that would do to people."

Chemically propelled engines, which are currently used for space flights, would not be able to carry enough fuel for the spacecraft to turn around and return to Earth if a problem such as trauma or serious illness occurred on board.

NASA is now looking into ways to deal with some of the physical risks. But psychological problems are harder to solve with technology.

Astronauts would be confined in the spacecraft for most of the mission. As Richard Berendzen, a scientist at American University, observed, "Five or six of your closest friends in a room the size of your living room for three years, that's a tough thing to do."

Scientists have discovered evidence that water may have existed on Mars, and may still be present under the surface. The availability of water is crucial to a mission to Mars because it might help provide the basic elements people need to remain on the planet for an extended period.

"That water is very important to us," said Berendzen speaking on *National Geographic Today.* "Not only to drill down and drink, but to pump up, break the H2O apart, use the oxygen to breath and the hydrogen for fuel."

The possibility that there is water on Mars suggests that even more intriguing findings may lie ahead. The presence of water is an indication of energy sources, and very likely organic matter.

Berendzen said that if evidence of past forms of life were found, "It would probably be the most stunning discovery in the history of humankind."

While going to Mars would clearly offer a minefield of discoveries, carrying out such a mission at this time has too high a risk for the people who would make such a journey. As research continues, however, the dream of a trip to Mars will inevitably become a reality.

**SETI Affirmative**

# SETI Affirmative

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# Explanation

Are we alone in the universe? This affirmative is designed to answer that exact question. Until recently, there were programs in the status quo funded by the government that used radio telescopes located on the Earth to listen for signals emitted by possible alien cultures. Recently however, due to the economic recession, the government has cancelled the funding for the Allen Telescope Array, the first set of radio telescopes created entirely for the purpose of searching for alien life. The ATA has been put into hibernation because of the funding cut and no other sources of funding seem apparent.

This affirmative has two advantages. The first argues that not only does alien life exist, but it is likely to be biologically similar to ours, allowing for the possibility of communication. Ecology suggests that any civilization that would be able to survive long enough to broadcast a signal into space has likely evolved to be peaceful and altruistic. If we made contact with aliens, the end result would likely be an exchange of technology, where we would inherit the benefit of centuries of research that would likely revolutionize our society and help solve the problems of overpopulation and environmental degradation.

However, even if we were unable to make contact, continuing search for extraterrestrial life forces us to re-evaluate how we look at humanity. Acknowledging that we may not be alone in the universe makes it more likely that we will begin to see ourselves less as members of a specific country or nation but instead citizens of earth. This broad and inclusive view of humanity as a whole will allow for greater cooperation on important issues and lessen the likelihood of conflict.

Finally, the affirmative argues that searching for life with radio telescopes is the most effective means of trying to contact extraterrestrials. Radio telescopes can search a much broader area at any given time, which is important to maximize the possibility that we will find pick up a foreign signal.

# Glossary

**Radio telescope** – a telescope that searches for radio waves, as opposed to traditional telescope that look at visible light

**Galaxy –** the system of millions of stars that contains the solar system

**Quanta –** a small amount of energy

**Cosmos** – the universe

**Moore’s law** – the idea that technology doubles in power every two years

**Space debris / junk** – small pieces of debris such as rock moving very quickly that pose a danger to orbiting satellites

**Astrobiology** – study of life in space

**Cooperative –** working with others to achieve a goal

**Extant** – currently existing

**Sustainable** – Something that is sustainable can continue to exist without external inputs.

**Ecosystem** – a large biological community of many organisms. An ocean is an ecosystem, for example

**Degraded** – to degrade something is to lower its quality

**Pioneer –** Someone who is among the first to settle a new area

**Dehumanizing** – degrading people and thinking less of them to the point where they no longer seem human.

**Publichealth** – The health of an entire country or nation. Factors that determine public health include amount of exercise, occurrence of disease, life expectancy, etc.

**Tangible** – Something concrete. A tangible benefit is usually material, such as money or resources

**Forlorn** – lonely, abandoned

**Species** - a class of living thing. Humans are a species, just like ants or oak trees

**Ideological** – a person who is ideological will adhere to the position she already believes in very strongly and is often unwilling to consider alternate points of view

**Transcend** – overcome or surpass a particular obstacle or standard

**Conceits** – excessive pride in oneself

**Flourish** – to grow or develop in a healthy or vigorous way

**Foibles** – a minor weakness

**Scarcity** – a small or inadequate amount

**Surveillance** – continual observing and watching a particular object

**Extremists –** people that hold extreme or fanatical political or religious views

**Financial crisis** – an economic crisis caused by banks or other large financial institutions in a country

**Academia** – another word for the world of universities and professors, as opposed to the world of business or government

**Sophisticated** – very complex

**Encephelization** – referring to an animal’s large brain in relation to its size

**Omniscient** – all knowing

**Propagate** – reproduce and spread

**ATA –** Allen Telescope Array

**ET -** Extraterrestrial

**ETI –** Extraterrestrial intelligence

**AF –** Air Force **SSN –** Space Surveillance Network

**AFSPC –** Air Force Space Command

**ASAT –** Anti Satellit

# 1AC [1/6]

**Contention 1: Inherency**

**The federal government has cut the funding of the Allen Telescope Array, a cluster of radio telescopes attempting to find life in other parts of the galaxy. This has caused the operation to shut down.**

**Associated Press, 4/27/2011, “Shrinking Funds Pull Plug on Alien Search Devices,” http://www.foxnews.com/scitech/2011/04/27/shrinking-funds-pull-plug-alien-search-devices/**

In the mountains of Northern California, a field of radio dishes that look like giant dinner plates waited for years for the first call from intelligent life among the stars. But they're not listening anymore. Cash-strapped governments, it seems, can no longer pay the interstellar phone bill. Astronomers at the SETI Institute said a steep drop in state and federal funds has forced the shutdown of the Allen Telescope Array, a powerful tool in the search for extraterrestrial intelligence, an effort scientists refer to as SETI. "There's plenty of cosmic real estate that looks promising," Seth Shostak, senior astronomer at the institute, said Tuesday. "We've lost the instrument that's best for zeroing in on these better targets." The shutdown came just as researchers were preparing to point the radio dishes at a batch of new planets. About 50 or 60 of those planets appear to be about the right distance from stars to have temperatures that could make them habitable, Shostak said. The 42 radio dishes had scanned deep space since 2007 for signals from alien civilizations while also conducting research into the structure and origin of the universe. SETI Institute chief executive Tom Pierson said in an email to donors recently that the University of California, Berkeley, has run out of money for day-to-day operation of the dishes. "Unfortunately, today's government budgetary environment is very difficult, and new solutions must be found," Pierson wrote. The $50 million array was built by SETI and UC Berkeley with the help of a $30 million donation from Microsoft Corp. co-founder Paul Allen. Operating the dishes cost about $1.5 million a year, mostly to pay for the staff of eight to 10 researchers and technicians to operate the facility. An additional $1 million a year was needed to collect and sift the data from the dishes. The Paul G. Allen Family Foundation, the billionaire's philanthropic venture, had no immediate plans to provide more funding to the facility, said David Postman, a foundation spokesman. The institute, however, was hopeful the U.S. Air Force might find the dishes useful as part of its mission to track space debris and provide funding to keep the equipment operating. The SETI Institute was founded in 1984 and has received funding from NASA, the National Science Foundation and several other federal programs and private foundations. Other projects that will continue include the development of software and tools to be used in the search for extraterrestrial life.

# 1AC [2/6]

**Contention 2: Harms**

**We could discover proof of alien life in the next 25 years. The Drake Equation proves that the universe is too massive for humans to be alone.**

**Clara Moskowitz, Space.com senior staff writer, 8/16/2010, “Proof of Aliens Could Come Within 25 Years, Scientist Says,” http://www.msnbc.msn.com/id/38727371/ns/technology\_and\_science-space/t/chances-well-find-et-are-pretty-good/**

SANTA CLARA, Calif. ? Proof of extraterrestrial intelligence could come within 25 years, an astronomer who works on the search said Sunday. "I actually think the chances that we'll find ET are pretty good," said Seth Shostak, senior astronomer at the Search for Extraterrestrial Intelligence Institute in Mountain View, Calif., here at the SETI con convention. "Young people in the audience, I think there's a really good chance you're going to see this happen." Shostak bases this estimation on the Drake Equation, a formula conceived by SETI pioneer Frank Drake to calculate the number (N) of alien civilizations with whom we might be able to communicate. That equation takes into account a variety of factors, including the rate of star formation in the galaxy, the fraction of stars that have planets, the fraction of planets that are habitable, the percent of those that actually develop life, the percent of those that develop intelligent life, the fraction of civilizations that have a technology that can broadcast their presence into space, and the length of time those signals would be broadcasted. Reliable figures for many of those factors are not known, but some of the leaders in the field of SETI have put together their best guesses. Late great astronomer Carl Sagan, another SETI pioneer, estimated that the Drake Equation amounted to N = 1 million. Scientist and science fiction writer Isaac Asimov calculated 670,000. Drake himself estimates a more conservative 10,000. But even if that lower value turns out to be correct, at the rate they're going, it wouldn't take scientists too long to discover an alien signal**,** Shostak said. "This range, from Sagan's million down to 10,000 ? that's the range of estimates from people who have started and worked on SETI," said Shostak. "These people may know what they're talking about. If they do, then the point is we trip across somebody in the next several dozen or two dozen years." The SETI quest is set to take a leap forward when the Allen Telescope Array, a network of radio dishes under construction in northern California, is fully operational. By 2015, the array should be able to scan hundreds of thousands of stars for signs of extraterrestrial intelligence, Shostak said. But while humans might be able to discover an alien signal within that timeframe, interpreting what ET is trying to tell us could take much, much longer. Shostak admitted such a task would be very difficult. An alien civilization may be as technologically advanced compared to us as Homo sapiens are to our hominid relatives Neanderthals. "We could give our digital television signals to the Neanderthals, and they’ll never figure it out. And they're not stupid," he said. Yet simply having proof that we are not alone in the universe would likely be a world-changing achievement, Shostak added.

# 1AC [3/6]

**Furthermore, Aliens would not be hostile to humans. In order to survive to the point where they could make contact with us, they must be peaceful beings.**

**Seth Bauman et al 10, Phd Candidate in Geography at Penn State University, Acta Astronautica Volume 68, Issues 11-12, June-July 2011, Pages 2114-2129, “Would contact with extraterrestrials benefit or harm humanity? A scenario analysis”**

We do not know if ETI would be cooperative, but we have several reasons to suspect that they would be.Noncooperation can be a risky and harmful strategy, and noncooperative civilizations may tend to have shorter lifetimes as their noncooperation eventually leads to their demise. For this reason, a long-lived civilization that explores the galaxy may have transcended any aggressive patterns out of the need to maintain long-term survival [36] and [46]. It is also possible that intelligent civilizations may inevitably develop cooperative tendencies as part of their evolutionary process [44] and [47]. However, there are also reasons to suspect that evolution would proceed along different, less desirable trajectories [48]. Another reason to suspect that ETI would be cooperative follows fromthe Sustainability Solution to the Fermi paradox. A corollary of the Sustainability Solution is that extant ETI civilizations in the galaxy may be less prone to violence and destruction in the event of contact. This corollary follows from the tendencies of sustainable human populations. On Earth, **s**ustainable human populations tend to be more protective of their ecosystems. This protectiveness can be for either of two reasons. First, humans can protect ecosystems for their own benefit. This protection is known as conservationism and involves humans placing intrinsic value on themselves. Second, humans can protect ecosystems for the ecosystems’ benefit. This protection is known as preservationism and involves humans placing intrinsic value on the ecosystems. (See [49] for a similar approach to environmental ethics in the context of terraforming Mars.) In either case, human populations that follow a sustainable mode of development are less likely to expand for lack of resources, although they may choose to explore out of sheer curiosity. ETI populations may be similar in this regard [50]. Thus, if exponential growth is in fact unsustainable on the galactic scale as Haqq-Misra and Baum [19] suggest, then we are much more likely to encounter a long-lived ETI civilization that follows a sustainable development pattern. Such a civilization may have no need to consume Earth systems (or humans) because they will have already found a way to effectively manage their resources over long timescales. Therefore, the possible unsustainability of long-term rapid expansion decreases the probability that ETI will destroy us. However, there is a scenario in which sustainable ETI would destroy us—specifically if the ETI is expanding at the maximum rate possible given its sustainability constraints. This “maximally expansive” scenario is one of the “harmful to humanity” scenarios discussed below.

# 1AC [4/6]

**The application of Alien technology has the potential to solve resource crises and poverty.**

**Steven M. Greer, M.D., member of Alpha Omega Alpha medical honor society, director of CSETI, 8/30/95, http://www.cseti.org/position/greer/national.htm**

Putting this debate aside for now, let us contemplate a "downloading" of these advanced extraterrestrial technologies in a setting of international stability and peace. These technologies are not polluting fossil fuels or radioactive nuclear power, but are completely revolutionary energy systems which are non-linear, zero-point type technologies. That is, there is a background source of limitless energy which is omni- present in the universe, even in deep space, and these devices "tap into" this energy. The result is vast amounts of energy generated, and, in defiance of the "law of thermodynamics", more energy is obtained than is put into the system.

Without going into a long discussion of propulsion systems which propel vehicles at beyond the speed of light (allegedly impossible according to 20th century physics) or of "bending" space-time, or of negating the effects of gravity and mass inertia, or of non-linear communications systems which interface directly with mind or thought, or a myriad other considerations related to advanced ET technology, let us simply state that these technologies are many quanta ahead of current technology on earth.

What are the implications of such technologies being applied around the world?

- The environment, which is being degraded at an alarming rate primarily due to the burning of fossil fuels and the relative scarcity of energy, would be greatly assisted, if not saved, by the widespread application of such technology. For the most part, the earth is still in the 1800s as far as energy generation, transportation and related technologies are concerned. The internal combustion engine reigns supreme, as does gas, oil and coal as sources of energy. Aside from being the chief sources of pollution of the air and water, their relative scarcity results in a further cost- and efficiency-related inability to "scrub" other sources of pollution from waterways, chemical processing, manufacturing and the like. Such inefficiencies, scarcity and intrinsically polluting qualities of the current world energy system are literally killing the earth. The application of advanced ET energy systems would completely reverse this situation.

- When it takes only minutes - instead of 12-14 hours - to go from Asia to New York, the world will truly be a global village. Indeed, the need for vast, inefficient and dehumanizing metropolises will no longer exist, since both communications and transportation will allow small towns and villages to have access to each other instantly. This will result in a transformation in the nature and function of society unequaled in recorded history.

- The relative scarcity of energy, and hence of resources generally, has resulted in a vast inequality among the poor and rich nations of the world. The application of these ET technologies will alter this situation radically, and eventually abundance and an economic equilibrium will emerge. This will alter the world socio-economic situation and mitigate the economic pressures and inequalities which create so much strife and conflict in the world. With zero-point and related technologies in every village and every home, the consciousness of scarcity and a "zero sum game" will give way to one of abundance. And with this, the human race will be freed from the oppressive mentality of material acquisitions and survival to a larger vision of developing the full potential of each human.

- Public health and medical advances will result both directly and indirectly from these new technologies. For example, imagine a world where abundance of clean water and energy removes the specter of famine and disease from the entire earth

# 1AC [5/6]

**Thus my partner and I propose the following plan:**

**The United States federal government should fully fund the Allen Telescope Array.**

**Contention 3: Solvency**

**The rapid advance of radar technology means that the ATA will be able to find life in the next few decades.**

**Alok Jha, Science Correspondent for the Guardian Newspaper, 4/26/2011 “Alien finding institute Seti runs out of cash to operate telescope,” The Guardian, accessed 5-17-11, http://www.guardian.co.uk/science/2011/apr/26/alien-institute-seti-cash-telescope**

The ATA is the Seti Institute's biggest facility by far, and its only dedicated one. Its shutdown means astronomers will need to rely on data collected during downtime from other telescopes around the world and this will reduce its chances of finding that elusive alien signal. Shostak said the future of the ATA had to be decided sooner rather than later, as there was only enough money to keep it in hibernation mode for a few months. Until the funding crisis can be solved, the institute said it would continue its work on developing equipment and software that supports the overall search for alien signals. This includes an increased focus on involving citizens in its work: astronomers have already developed the successful Seti@Home project, a programme that uses the downtime on people's home computers to sort through the masses of data collected by the institute's experiments. The next step is SetiQuest.Org, an application that allows "citizen scientist volunteers to look for patterns in data from the ATA that might be missed by current algorithms, and help us explore frequency bands that are so full of signals that our detectors get confused", said Pierson. Given the improvements in radar technology, Shostak said it would be a shame to stop searching now for signals from ET. "If this experiment is going to work, it's going to work in a few dozen years, simply on the basis of the rapid improvement of the technology afforded by Moore's Law. The equipment keeps getting faster and faster, so I think success is not very far off if you keep doing this."

# 1AC [6/6]

**The strategy of the Allen Telescope Array solves best. We should use radio signals to cast a wide net and search the most stars.**

**Nathan Cohen and Robert Hohlfeld, professors at Boston University in telecommunications and computational science, 2001, “Smarter SETI Strategy” http://www.skyandtelescope.com/resources/seti/3304536.html?page=1&c=y**

They are not. Recent work confirms long-standing suspicions that star-by-star targeting should be abandoned in favor of scanning the richest star fields to encompass very large numbers of stars, even if most of them are very far away. To see why, we flash back 30 years to when Frank Drake did the basic mathematics that still governs the field. He showed that finding an ET signal is similar to certain problems in surveying natural radio sources. Some sources are intrinsically strong; a greater number are intrinsically weak. The steepness of the ratio between them determines which category will dominate our sky. For example, many of the first sources found by early, primitive radio telescopes are at extreme, cosmological distances. This is because inherently strong radio sources (such as quasars and radio galaxies) are powerful enough to more than make up for their scarcity compared to the abundant weak sources(such as the coronas of stars). Similarly, it was clear that if even just a few rare, very distant alien radio beacons are very powerful, they will dominate the detectable population in our sky, and a wide-sky survey will succeed first. If, on the other hand, ET transmitters are common and all of them are relatively weak and similar to each other, a star-by-star targeted survey starting nearby will work best. Recently we revisited this 30-year-old problem with the advantage of more sophisticated mathematical models (and computers capable of running them!) covering all reasonable scenarios. The outcome is clear, surprising, and overwhelming. Unless ETs truly infest the stars like flies (very unlikely), the first signals we detect will come from the very rare, very powerful transmitters very far away. The 1971 model, which lent too much weight to nearby stars, turns out to be a naive case, the best that could be calculated at the time. In practical terms, this means that SETI searchers should use their limited resources to scan great numbers of stars first and worry about sensitivity per star second. Given real radio telescopes under the real sky, the best use of SETI time actually turns out to be a "hybrid," semi-targeted strategy: one that targets the richest star fields. These might include selected parts of the Milky Way's plane, certain star clusters, and even nearby galaxies. The idea is to fill the radio telescope's beam (listening area) with many stars, then dwell on this spot long enough to build up sensitivity**.** With, say, just 100 carefully selected patches of sky on the list, millions of Milky Way stars and many billions in other galaxies can be scrutinized in significant depth. It makes no sense to dwell on nearby stars one by one if they have sparse backgrounds. We need to look deep and long and bet on the numbers. Thus it was heartening to hear SETI Institute chair Frank Drake say that such thinking should carry the day and that the strategy for the ATA should emphasize searches near the galactic plane.

# Extraterrestrial Perspective Advantage

**[\_\_\_\_] The search for extraterrestrial life itself means that humanity will recognize its place in the universe and become less hostile toward one another.**

**Allen Tough, Professor Emeritus at the University of Toronto, 1998, “Positive consequences of SETI before detection,” Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]**

Cosmic evolution over billions of years has led to our present period, which is characterized by diverse life on Earth and probably throughout the universe. Eric Chaisson calls this period “the Life Era”[2]and Steven Dick calls this view “the biological universe”[3]. The SETI enterprise makes the likelihood of intelligent life throughout the galaxy feel more tangible and real**.** Instead of just talking or writing about the possibility, someone is actually doing something about it. As a result, humanity is gradually shifting toward a fresh image of who we are as a species. Increasingly we see ourselves as one of the abundantly diverse intelligent species that have arisen in the universe. That is how we fit into the universe. We feel part of the cosmic family; we feel a bond or kinship with others. We are one of the species that have developed a civilization marked by curiosity, inquiry, knowledge, meaning and purpose. We are not alone in the universe. Although we are unique, we may be one of billions of civilizations in the universe (just as each person and each snowflake is unique, but is also one of billions). As they learn about cosmic evolution and SETI activities, more and more people are developing a deeper sense of themselves as citizens of the universe—as part of intelligent life and evolving culture throughout the cosmos. We begin to move from forlorn isolation to a “feeling of genuine biological and spiritual unity with the universe” and that universe feels “friendlier”[4]. We begin to see ourselves within a galactic frame of reference. To use Michael Michaud’s words, we are about to “leave the era of Earth history, and enter an era of cosmic history**”[**5]. More recently he noted that “many of us are involved in SETI because we hope that detection, and even the search itself, will introduce a new and positive factor in human affairs. We are involved because SETI defines us as a species with shared interests. We are involved because SETI forces humanity to think big”[6]. According to Frank White, SETI may be, at its deepest levels**,** an effort to achieve a new kind of connection with the universe—to regain an integration or connectedness that has been shattered by standing apart from the cosmos and examining it as something that is not alive, not intelligent, and separate from ourselves[7].

**[\_\_\_\_] Even if we don’t actually find extraterrestrials, acknowledging that they could exist will allow us to be more cooperative with one another.**

**Ben Finney, Professor of Anthropology at the University of Hawaii, 1990 “The Impact of Contact,” Acta Astronautica, Volume 21, Issue 2, accessed 5-19-11, p.**

First, even in if we did not make contact, we might well benefit from an extraterrestrial perspective. The recent stimulus investigations about such extraterrestrial phenomena as cometary showers have had on thinking about the evolution of life on Earth provides a mode[14]. Just thinking about how other intelligent civilizations might develop, and about how we might relate to such civilizations, could stimulate us to take a detached and non ideological perspective on our own global civilization and its problems. It is often said that those first photos of earth taken from space made us fully realize the significance and value of our ecosphere. A view from an extraterrestrial civilization, even an imaginary one, might help us to transcend our cultural conceits and political divisions and think constructively about our own global civilization.

# Extraterrestrial Perspective Advantage

**[\_\_\_\_] This new global perspective would help solve the problems of warfare and environmental degradation.**

**Allen Tough, Professor Emeritus at the University of Toronto, 1998, “Positive consequences of SETI before detection,” Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]**

Photographs of the whole earth from the early space missions gave us a fresh perspective. A more recent photograph from even further away in our solar system gives us the sense of being a small fragile planet--a pale blue dot surrounded by space [9]. SETI provides a third fresh perspective by encouraging us to think about how extraterrestrials might perceive us**.** As we view ourselves through the ``eyes'' of distant extraterrestrials, this fresh perspective leads in turn to a fresh way of looking at our society's values, goals, priorities and foibles. Three aspects of SETI stimulate this fresh perspective by encouraging us to put ourselves ``in the shoes'' of remote extraterrestrials. (a) In order to choose search strategies, scientists must first think through the likely characteristics of whoever is out there, and their likely behaviour toward all other civilizations--in particular toward us since they may somehow be aware of our existence or even have some information about us. (b) During the past few years, at astronautics and SETI meetings, some attention has focused on what we should do about sending a reply after we detect a signal. Such thinking inevitably requires attention to how ``they'' might react to various sorts of replies that we might send. (c) In general, the whole SETI enterprise stimulates a wide variety of people to begin thinking more seriously about who might be out there and how they might view our society. By thinking about how a remote civilization might view us, we gain a fresh perspective on our own civilization. Various specific implications may occur to us. We may wonder why our society places such emphasis on differences among people when, compared with any extraterrestrial species, we are all quite similar and should feel deeply connected. We may see more sharply the importance of such priorities as ensuring our long-term survival and flourishing, caring about future generations, accumulating significant knowledge, protecting that knowledge from potential catastrophes, developing a set of universal goals and laws that might apply throughout the galaxy**,** and reducing our worst foibles and errors (warfare, population growth, environmental degradation). Surely extraterrestrials would wonder why we have not shifted our attention, resources, and efforts towards these key priorities.

# Space Debris Advantage

**[\_\_\_\_] The ATA would also be used to help the air force track space debris – small particles that are extremely dangerous to orbiting satellites.**

**Tom Pierson, CEO of the SETI institute, 4/22/2011, “Status of the Allen Telescope Array” http://archive.seti.org/pdfs/ATA-hibernation.pdf**

As a significant supporter of the Allen Telescope Array (ATA), you are already familiar with its unique capabilities. Not only does the Array enable our SETI search, but it also has been used to make considerable strides in radio astronomy and, most recently, in the development of the ability to detect space debris. With leadership funding by Paul Allen and the significant contributions by you and many others, the array has achieved much. Perhaps most important, the ATA is the world’s best instrument to search for possible signals from the thousands of planets being identified by NASA’s *Kepler Mission*.

However, the ATA faces some serious challenges. I am writing to personally alert you to them. We wanted you to hear this directly from us, rather than learn about it in the news or by other means. Effective this week, the ATA has been placed into hibernation due to funding shortfalls for operations of the Hat Creek Radio Observatory (HCRO) where the ATA is located. As a long time participant in supporting our work, you know that the Array is a partnership between the SETI Institute and the Radio Astronomy Lab of the University of California, Berkeley (UCB). Consistent with the original partnership understandings, the SETI Institute raised the funds to construct the Array, while the operations of the Observatory have been the responsibility of UCB. The UC Berkeley Radio Astronomy Lab has operated the Hat Creek Observatory for more than five decades, hosting several generations of radio astronomy instruments, the most recent being the ATA. Historically, the costs of HCRO operations were supported from two primary sources: 1) major “*University Radio Observatory”* grants from the National Science Foundation, and 2) supplemental budgetary support from the State of California via Berkeley’s Radio Astronomy Lab. Unfortunately, today’s government budgetary environment is very difficult, and new solutions must be found. NSF University Radio Observatory funding for HCRO has been reduced to approximately one-tenth of its former level. This is compounded by growing State of California budget shortfalls that have severely reduced the amount of state funds available to the Radio Astronomy Lab. Combined, these factors have resulted in the current decision by UCB to reduce operations of the Hat Creek site to a hibernation mode, pending future funding or some alternative solution. Hibernation means that, starting this week, the equipment is unavailable for normal observations and is being maintained in a safe state by a significantly reduced staff.

More than two years ago, seeing the early effects of these funding difficulties, the SETI Institute began an effort to replace the lost funds by seeking a partnership with the United States Air Force to conduct experiments to see how the ATA could serve as a collaborating sensor to the USAF space surveillance network, helping track space debris. This effort is ongoing and showing much promise, but near term funding has been delayed due to the same, highly publicized large scale federal budget problems we all read about in the news.

# Space Debris Advantage

[\_\_\_\_] The radio monitoring of the ATA is well suited to monitoring debris. It would also track debris during the day, which would not detract from its mission to seek out ETs.

The SETI Institute, 5/19/2009 “AFSPC explores Allen Telescope Array for Space Surveillance,” http://www.seti.org/afspc

The unique design of the Allen Telescope Array (ATA) is intriguing to the Air Force because it provides a similar sensitivity to a very large dish antenna, but at a cheaper cost for the same collecting area. This is known as a Large-Number Small-Diameter concept, and fits well with the Air Force’s goal of conducting its mission in a fiscally responsible manner. The AF working with the ATA may be a natural win-win relationship. Specifically, the AF requires additional sensors to observe orbiting objects during the daytime, because many of its Electric-Optical (EO) sensors are affected by light pollution during the day, which limits the observations that can be conducted at that time. The ATA's primary missions, searching for extraterrestrial life and scientific research, are most often conducted at night, because this gives them the best pointing stability and avoids decrease in the strength of narrow band signals due to scattering by the solar wind. Operating the ATA during the daylight hours for the AF allows the array to be more fully utilized while not detracting from its scientific and SETI goals, and may provide the AF with vital daytime observations. To be utilized as a viable long-term sensor for the SSN, the ATA has to demonstrate many characteristics besides accurately being able to observe orbiting satellites. Its data have to be consistent, timely, precise, sensitive, and have a throughput that makes it worth the cost of a long-term investment by the Air Force. If these factors demonstrate themselves, the ATA may be integrated into the SSN to help to ensure the safety of flight of objects in space.

**[\_\_\_\_] Tracking space debris is critical to protecting our satellites, which perform a variety of essential economic functions.**

**Megan Ansdell, Consultant at Booz Allen Hamilton for Space Policy, Former Graduate Student Intern at NASA, 2010 “Active Space Debris Removal: Needs, Implications, and Recommendations for Today’s Geopolitical Environment,”** [**www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf**](http://www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf)

There are currently hundreds of millions of space debris fragments orbiting the Earth at speeds of up to several kilometers per second. Although the majority of these fragments result from the space activities of only three countries—China, Russia, and the United States—the indiscriminate nature of orbital mechanics means that they pose a continuous threat to all assets in Earth’s orbit. There are now roughly 300,000 pieces of space debris large enough to completely destroy operating satellites upon impact (Wright 2007, 36; Johnson 2009a, 1). It is likely that space debris will become a significant problem within the next several decades. Predictive studies show that if humans do not take action to control the space debris population, an increasing number of unintentional collisions between orbiting objects will lead to the runaway growth of space debris in Earth’s orbit (Liou and Johnson 2006). This uncontrolled growth of space debris threatens the ability of satellites to deliver the services humanity has come to rely on in its day-to-day activities. For example, Global Positioning System (GPS) precision timing and navigation signals are a significant component of the modern global economy; a GPS failure could disrupt emergency response services, cripple global banking systems, and interrupt electric power grids (Logsdon 2001).

# Space Debris Advantage

**[\_\_\_\_] Another major economic shock would lead to war.**

**Walter Russell Mead, the Henry A. Kissinger Senior Fellow in U.S. Foreign Policy at the Council on Foreign Relations, 2/4/2009, “Only Makes You Stronger,” The New Republic,** h**ttp://www.tnr.com/politics/story.html?id=571cbbb9-2887-4d81-8542-92e83915f5f8&p=2**

So far, such half-hearted experiments not only have failed to work; they have left the societies that have tried them in a progressively worse position, farther behind the front-runners as time goes by. Argentina has lost ground to Chile; Russian development has fallen farther behind that of the Baltic states and Central Europe. Frequently, the crisis has weakened the power of the merchants, industrialists, financiers, and professionals who want to develop a liberal capitalist society integrated into the world. Crisis can also strengthen the hand of religious extremists, populist radicals, or authoritarian traditionalists who are determined to resist liberal capitalist society for a variety of reasons. Meanwhile, the companies and banks based in these societies are often less established and more vulnerable to the consequences of a financial crisis than more established firms in wealthier societies. As a result, developing countries and countries where capitalism has relatively recent and shallow roots tend to suffer greater economic and political damage when crisis strikes--as, inevitably, it does. And, consequently, financial crises often reinforce rather than challenge the global distribution of power and wealth. This may be happening yet again. None of which means that we can just sit back and enjoy the recession. History may suggest that financial crises actually help capitalist great powers maintain their leads--but it has other, less reassuring messages as well. If financial crises have been a normal part of life during the 300-year rise of the liberal capitalist system under the Anglophone powers, so has war. The wars of the League of Augsburg and the Spanish Succession; the Seven Years War; the American Revolution; the Napoleonic Wars; the two World Wars; the cold war**:** The list of wars is almost as long as the list of financial crises**.** Bad economic times can breed wars**.** Europe was a pretty peaceful place in 1928, but the Depression poisoned German public opinion and helped bring Adolf Hitler to power. If the current crisis turns into a depression, what rough beasts might start slouching toward Moscow, Karachi, Beijing, or New Delhi to be born? The United States may not, yet, decline, but, if we can't get the world economy back on track, we may still have to fight.

# Inherency Extensions

**[\_\_\_\_]**

[\_\_\_\_] The Allen Telescope search for extra – terrestrial intelligence has been taken off line die to funding shortfalls.

Lisa Krieger, Reporter for the San Jose Mercury News 4/25/2011 **“SETI Institute to shut down alien-seeking radio dishes”**

If E.T. phones Earth, he'll get a "disconnect" signal. Lacking the money to pay its operating expenses, Mountain View's SETI Institute has pulled the plug on the renowned Allen Telescope Array, a field of radio dishes that scan the skies for signals from extraterrestrial civilizations. In an April 22 letter to donors, SETI Institute CEO Tom Pierson said that last week the array was put into "hibernation," safe but nonfunctioning, because of inadequate government support. The timing couldn't be worse, say SETI scientists. After millenniums of musings, this spring astronomers announced that 1,235 new possible planets had been observed by Kepler, a telescope on a space satellite. They predict that dozens of these planets will be Earth-sized -- and some will be in the "habitable zone," where the temperatures are just right for liquid water, a prerequisite of life as we know it. "There is a huge irony," said SETI Director Jill Tarter, "that a time when we discover so many planets to look at, we don't have the operating funds to listen." SETI senior astronomer Seth Shostak compared the project's suspension to "the Niña, Pinta and Santa Maria being put into dry dock. "... This is about exploration, and we want to keep the thing operational. It's no good to have it sit idle. "We have the radio antennae up, but we can't run them without operating funds," he added. "Honestly, if everybody contributed just 3 extra cents on their 1040 tax forms, we could find out if we have cosmic company." The SETI Institute's mission is to explore the origin, nature and prevalence of life in the universe. This is a profound search, it believes, because it explains our place among the stars. The program, located on U.S. Forest Service land near Mount Lassen, uses telescopes to listen for anything out of the ordinary -- a numerical sequence of "beeps," say, or crackly dialogue from an alien version of a disembodied "Charlie" talking to his "Angels." The entire program was set up to prove what once seemed unthinkable: In the universe, we are not alone.

# Alien Contact Extensions – Aliens Exist

**[\_\_\_\_] A consensus of astrobiologists believes that alien life similar to ours exists.**

Mark Kauffman, Astrobiology Correspondent, 6/11/2011, **“It’s Alive Out There!” Saint Paul Pioneer Press**

This hidden-in-plain-sight campaign is the renewed scientific push to find signs of life, or of past life, beyond the confines of our planet. The umbrella science that organizes the effort is called astrobiology, and the field is making surprising and compelling progress. It still may well be years before science finds anything that is clearly extraterrestrial life, but scientists are more convinced than ever of the existence of alien life, and they have the newly sophisticated (and still quickly evolving) tools and knowledge to actually find it. The scientific breakthroughs of the field reflect its breadth: Astrobiology takes in fields ranging from microbiology to chemistry, astronomy and planetary science to cosmology. From the world of microbiology, for instance, scientists have learned that microbial life is far more tenacious than ever imagined, and able to survive deep underground, in glaciers, alongside hydrothermal vents, and even floating in the atmosphere. From astrochemistry we have learned that all of the elements and molecules needed for life as we know it - hydrogen, oxygen, nitrogen, water, and complex carbons - are present throughout the universe. These non-living building blocks need planets to land on where they can possibly interact in ways that can lead to biology and life, and now we know that such planets (or exoplanets, as they're called) are common. More than 500 have been positively identified in the past 15 years, 1,200 new candidate planets were discovered by NASA's Kepler mission this year, and astronomers now are convinced there are billions, and maybe hundreds of billions, of exoplanets in the Milky Way and beyond. What's more, techniques for finding exoplanets have evolved to the point that several groups have claimed to have located "Goldilocks" planets - those orbiting their suns at a distance where water won't always be either boiling or freezing.

**[\_\_\_\_] Like physics, the principles of biology are universal. Life exists outside the solar system.**

David Shwartzman, professor of biology at Howard University, 5/21/2010, **“SETI Redux: Joining The Galactic Club,” *Astrobiology Magazine***

The first explanation is contrary to the subtext of astrobiology, the belief in quasi-deterministic astrophysical, planetary and biologic evolution. This view of life's inevitability in the cosmos is a view (or, shall I admit, a prejudice) I heartedly endorse. Most scientists active in the astrobiological research program would support an optimistic estimate of all the probabilities leading up to multicellular life on an Earth-like planet around a Sun-like star. I happen to be an optimist on this issue too. I have argued that encephalization - larger brain mass in comparison to body mass - and the potential for technical civilizations are not very rare results of self-organizing biospheres on Earth-like planets around Sun-like stars. Biotically-mediated climatic cooling creates the opportunity for big-brained multicellular organisms, such as the warm-blooded animals we observe on our planet. Note that several such animals have now been shown to pass the "mirror test" for self-consciousness: the great apes, elephants, dolphins and magpies, and the list is growing. But some, like my occasional collaborator Charley Lineweaver, an astrophysicist at Australian National University, are deep pessimists regarding the chances for other technical civilizations to emerge in the galaxy. He has argued, "humans and dolphins have 3.5 billion years of shared common ancestry. For 98 percent of our history, humans and dolphins were the same. The genes needed to develop those big brains had been fine-tuned over billions of years of evolution and were already in place." Lineweaver says that if advanced civilizations do emerge elsewhere in the galaxy, we can't expect they'll have human-like intelligence. This deserves an essay in itself. But if the pessimists concede just one of the millions if not billions of Earth-like planets is the platform for just one technical civilization that matures to a planetary stage, advancing beyond our present primitive self-destructive stage, just one advanced civilization with the curiosity to spread through the galaxy, at sub-light speeds with Bracewell probes to explore and document an Encyclopedia Galactica, then what should we expect?

# Alien Contact Extensions – Alien Contact Good

**[\_\_\_\_]**

**[\_\_\_\_] Alien societies will be far more advanced than ours and share their technology, allowing us to thrive and benefit from their research**

**Matt Smith, writer for the San Francisco Weekly, 4/1/1998, “Heavenly Secrets,” SF Weekly**

If the musings of the more enthusiastic scientists who conduct the Search for Extra Terrestrial Intelligence are any guide, once we know we have company in the universe, astonishing advances will occur. Then, because the civilization communicating with Earth will most certainly be thousands of years more advanced than our own, we will instantly become privy to the wisdom of the ages. That civilization will have learned how to cure disease, outlive nuclear weapons, and solve the countless other quandaries haunting our species, so life expectancy on Earth will skyrocket. Earthlings will wire into an intergalactic Internet, through which far-flung civilizations communicate across time and space. As earthlings are freed from planetary tethers, eons of alien science will make us immortal, omniscient, and transcendentally wise.

**[\_\_\_\_]**

**[\_\_\_\_] There’s no reason for aliens to be aggressive or try to exploit us – it’s not practical to travel so far for the resources Earth has.**

**Jeff Foust, Space Review Editor**, **8/23/2010, “SETI at 50,” Space Review, http://thespacereview.com/article/1686/1**

Others, though, noted that we have been broadcasting, as radio broadcasts and other emissions that have “leaked” out from Earth over the decades that could be easily detected by an extraterrestrial civilization. “This horse has left the barn,” Shostak said. “Any society that could possibly be a threat to us can easily know that we’re here.” Shostak and others also took issue with the claim that such civilizations, alerted to our presence, would go after us for our resources. “To me it is almost inconceivable that there is a material resource worth traveling light-years to collect,” said science fiction writer Robert J. Sawyer. “The energy required to collect it will almost always be more expensive than the cost of making it at home.” An advanced civilization would likely have to get any warlike instincts under control if it is to survive, added social scientist Douglas Vakoch. And even if they didn’t, “can they do us any harm at interstellar distances?”

# Extraterrestrial Perspective Extensions

**[\_\_\_\_]**

**[\_\_\_\_] Even insignificant contact with extraterrestrial life will revolutionize humanity**

**Allen Tough, Professor Emeritus at the University of Toronto, 2000**, “**When SETI Succeeds: The Impact of High-Information Contact”, http://ieti.org/tough/books/succeeds/sectII.pdf**

Post-contact society is likely to affect our views of ourselves in at least three ways. First, it will speed awareness that we are part of the biological universe (Dick, 1996). Contact, even under minimum detection scenarios, is likely to accelerate our views of our selves as a part of a larger, interstellar humanity,” to extend the terminology of Olaf Stapleton’s “ interplanetary man” (Dick, this volum ) . Many other factors—such as our progress in spacefaring—will contribute to our consciousness of the cosmos. Second, knowledge of relationships among extraterrestrial subpopulations could help us gain insight into intergroup relations on Earth. We may learn, for example, from how ETI societies treat different societies as well as their own subpopulations. This discovery could cause us to reﬂect on how we ourselves treat people from different cultures and subcultures. By seeing how ETI manages diversity, we may learn new models for group relations on Earth. Almost a century of work in psychology and sociology shows that other people’s treatment of us shapes our views of ourselves. People who are treated as competent and worthwhile individuals tend to develop high self-conﬁdence and perform well. Selfconﬁdence and success tend to feed upon each other and generate an upward spiral of events. People who are treated as inferior and incompetent lose self-conﬁdence and motivation, and perform poorly. Low self-conﬁdence and poor performance also feed on each other, in this case creating a downward spiral.

**[\_\_\_\_]**

**[\_\_\_\_] Whether or not we find life, SETI will help answer questions about our place in the universe.**

David L. Chandler, science writer for the Boston Globe, 6/25/1984, **“ASTRONOMY; LISTENING TO THE STARS GETS RESPECT,” Boston Globe**

But for the most part, the scientists gathered here were not interested in such practical spinoffs from their work. "I wouldn't want to justify it on those grounds," Morrison said. The justification the SETI scientists prefer seems to be more philosophical than practical. Michael Papagiannis, BU astronomy professor, president of the IAU's SETI commission and organizer of the symposium, summed it up thus: "We stand at a historic threshold. We have the chance to open the windows of our tiny planet. We can now seek experimentally the answers to ancient and fundamental questions." Morrison adds that one of the benefits of SETI research is that it causes us to take a "broad look at our own history." Sagan says that "provided we play the game, we win whether we find extraterrestrial intelligence or not. Suppose we do a comprehensive search and find nothing. Is this a failure? I don't think so." Whether we find signals or not, he says, it will teach us valuable lessons about our place in the universe.

# Space Debris Extensions – ATA Helps Tracking

[\_\_\_\_]

**[\_\_\_\_] The ATA can track debris in daylight, something that current technology cannot.**

THE SETI Institute, 5/19/2009 “AFSPC explores Allen Telescope Array for Space Surveillance,” http://www.seti.org/afspc

Future tasks for the ATA will include demonstrating the capability to track objects besides GPS. Additionally, tasks such as tracking objects during the daylight hours, or with the sun or moon in field of view, will further demonstrate the capabilities of the ATA as a sensor for the SSN. These demonstrations are important because many of the current sensors have difficulty with light-pollution, which hampers observations. If the ATA can demonstrate its capability to precisely locate satellites in all orbits, during day or night, it increases it significance as a SSN sensor, and increases the overall safety of space.

[\_\_\_\_] The ATA could be used by the Air Force Space Command to improve space safety.

THE SETI Institute, 5/19/2009 “AFSPC explores Allen Telescope Array for Space Surveillance,” <http://www.seti.org/afspc>

AFSPC is one of a few organizations responsible for obtaining and maintaining the awareness needed for successful and safe space operations. The command develops, maintains and shares a comprehensive and accurate catalog of orbiting space objects, while constantly seeking methods to improve their Space Surveillance Network (SSN), a global network of radar and optical sensors that detect and track orbiting space objects. AF Space Command is exploring opportunities in academia and the commercial sector that could provide suitable cost-effective means for augmenting the Space Command's Space Surveillance mission. The Allen Telescope Array (ATA), located at the Hat Creek Radio Observatory, 290 miles northeast of San Francisco, California is a tool with strong potential for use by AFSPC in support of the Department of Defense’s Space Surveillance mission**.** The ATA is a radio interferometer that is dedicated to cutting-edge astronomical research. This array of antennas is optimized to receive and process a very wide portion of the radio spectrum and can stare at many areas of the sky at once. AFSPC, through the Space Innovation and Development Center (SIDC), is currently researching the possible use of the ATA to augment the already extensive sensors of the Space Surveillance Network, potentially leveraging the array to help increase space situational awareness. Initial demonstrations show promise for the ATA to track transmitting satellites in Low Earth Orbit, Medium Earth Orbit and, most promising, in Geosynchronous Orbit (GEO), which is home to the most costly, highly-utilized, and vital satellites that orbit the earth.A collision and subsequent debris field in GEO could permanently remove the GEO belt from worldwide use. AFSPC is working with the SETI Institute, and its partner, the Radio Astronomy Laboratory at the University of California, Berkeley. These partners currently operate the ATA. The effort is to demonstrate the array’s capability of accurately surveying the GEO belt by demonstrating the array’s capability of precisely locating objects in that area, in an effort to avoid a devastating collision in GEO. The ATA may prove to be a viable and sensitive SSN sensor, capable of all-weather, day and night operations, and will hopefully lead to improved space safety.

# Space Debris Extensions – Plan Mitigates Debris

**[\_\_\_\_]**

**[\_\_\_\_] A tracking system is key to alleviate space debris.**

**Sarah D. Dahl, Major, United States Air Force, 04/2009, “ Is it time for space debris removal?”**

With all the increased activities in space, it has become critical that debris is detected and tracked to protect the spacecraft. Depending on the altitude and radar cross-section of the debris, our detection and tracking capabilities are limited to the LEO and GEO orbits (with GEO being the most challenging due to the altitude), which isn’t necessarily bad given that these are the most congested orbits. Debris is tracked using a combination of optical telescopes (most effective for objects in GEO) and radar (most effective for objects in LEO). Currently, an international space surveillance system does not exist. However, several countries have established their own systems to track objects, and in some cases have been willing to share the data. The countries most involved with tracking are the United States, United Kingdom, Germany, and France. The U.S. Space Surveillance Network (SSN) is the leading mechanism 8 for tracking debris and maintaining a catalogue of its location (which is critical information to satellite operators to provide early warning to conduct collision avoidance maneuvers or launch notifications). This system consists of around 30 radar and optical sensors, located at 16 sites around the world. 30 It is capable of reliably tracking objects that are ten centimeters or larger (currently tracking over 17,300 objects of this size). 31 “About seven percent are operational satellites, 15 percent are rocket bodies, and about 78 percent are fragmentation and inactive satellites.” 32 However, there are over 300,000 objects between one and 10 cm in size, and billions more even smaller (especially in LEO). 33 Debris this small can only be observed using such systems as the Haystack Radar, which is a 37-meter telescope that can detect objects in LEO down to 5-mm in size if in the radar’s line of sight. 34 To put all this into perspective, we currently track about 17,300 objects the size of a grapefruit or larger (10-cm), but can only observe anything smaller at a specific place and time at best. To complicate matters, the reliability of these systems is dependent on the space environment. Solar flares can cause these systems to lose objects for days. This can be concerning when planning launches and forecasting where the debris will be with respect to the launch trajectory. Given the increasing amount of debris (and debris creating activities such as ASAT tests), it is even more critical that our detection and tracking capabilities become more accurate, reliable and able to track debris less than 10 cm. Additionally, an international tracking system should be established and funded among all space-faring nations to share the burden of developing this capability.

# Space Debris Extensions – Debris Impacts

**[\_\_\_\_]**

**[\_\_\_\_] Top experts confirm the military would collapse without satellites**

**Kevin Johnson and John G. Hudson, Lieutennant and project supervisor at the Global Innovation and Strategy Center (GISC) Internship program, Fall 2007, “Eliminating Space Debris – Applied Technology and Policy Perscriptions”** [**http://www.slideshare.net/stephaniclark/giscinternpaperspacedebriselimination**](http://www.slideshare.net/stephaniclark/giscinternpaperspacedebriselimination)

General Kevin P. Chilton, Commander of United States Strategic Command, recently wrote: “Military and civilian entities are heavily reliant on services that satellites provide, and space operations are so pervasive that it is impossible to imagine the U.S. functioning without them.”4 During Operation Desert Storm, commercial satellites provided 45% of all communications between the theater and the continental United States.5 Today, according to General Chilton, “We rely on satellites to verify treaty compliance, monitor threats and provide advance warning of missile attacks. It's important to remember that every soldier, sailor, Marine and airman in Iraq and Afghanistan relies on space technology for crucial advantages in the field.”6

**[\_\_\_\_]**

**[\_\_\_\_] Satellites collisions would cause economic panic.**

**Space Daily, 8/31/2009, “Space Debris – Problem Solved,”** [**http://www.spacedaily.com/reports/Space\_Debris\_Problem\_Solved\_999.html**](http://www.spacedaily.com/reports/Space_Debris_Problem_Solved_999.html)

Upper stages must vent tanks to rid them of residual propellant that might later result in explosions. Many satellites are maneuvered to avoid close-conjunction events. JSpOC is beefing up its satellite and debris tracking capabilities. National and international working groups are meeting regularly to assess the threat and to recommend actions for all space-faring nations. The world is just one major satellite collision event away from panic. Instances of close conjunction events in highly congested orbital bands have increased dramatically in the past few years. In fact, the frequency of close encounters between active satellites and large debris objects within the Iridium constellation has reached a frighteningly high level. Odds are that there will be another Iridium/Cosmos type of event in the near future. Should such an event occur, several bad things will happen to many satellite operators. If another Iridium satellite is involved the company would be forced to replace the lost satellite. The frequency of close encounters in orbits near that of Iridium's constellation would suddenly increase to levels that would cause several operators to reassess the viability of existing space applications. Satellite insurance providers might be forced to raise premiums on in-orbit performance to record high levels. Future launch plans for almost all low orbit satellites may be curtailed. Space-based services to the world would diminish over time. The economic impact is not even calculable. This is scary!

# Solvency Extensions – ATA Leads to Contact

[\_\_\_\_]

[\_\_\_\_] Fully functioning telescope array means that alien contact could happen in the next 25 years.

**United Press International, source for science news, 8/16/2010, “Scientist: SETi success within 25 years?”**

The search for extraterrestrial intelligence could yield proof of its existence with 25 years, a U.S. scientist involved in the quest says. Speaking at the SETI Con convention in Santa Clara, Calif., Seth Shostak -- senior astronomer at the Search for Extraterrestrial Intelligence Institute in Mountain View, Calif. -- said, "I actually think the chances that we'll find ET are pretty good," SPACE.COM reported Monday. "Young people in the audience, I think there's a really good chance you're going to see this happen," he said. The SETI search will take a giant step forward when the Allen Telescope Array, a network of radio dishes under construction in northern California, is fully operational, Shostak said. By 2015, the array should be able to scan hundreds of thousands of stars for signs of extraterrestrial intelligence, he said. Detecting an alien signal within 25 years is one thing, but figuring out the message could take much longer, Shostak said. An alien civilization would likely be as technologically advanced compared to us as Homo sapiens are to our hominid relatives Neanderthals, he said. "We could give our digital television signals to the Neanderthals, and they'll never figure it out. And they're not stupid," he said.

**[\_\_\_\_]**

[\_\_\_\_] The ATA means that we will encounter alien communications soon.

Michael Shermer, Columnist for Scientific American, 06/2011, Scientific American, Volume 304, Issue 6, p86-89, EBSCO, “The Myth of the Evil Aliens”

With the Allen Telescope Array run by the SETI Institute in northern California, the time is coming when we will encounter an extraterrestrial intelligence (ETI). Contact will probably come sooner rather than later because of Moore's Law (proposed by Intel's co-founder Gordon E. Moore), which posits a doubling of computing power every one to two years. It turns out that this exponential growth curve applies to most technologies, including the search for ETI (SETI): according to astronomer and SETI founder Frank Drake, our searches today are 100 trillion times more powerful than 50 years ago, with no end to the improvements in sight. If E.T. is out there, we will make contact. What will happen when we do, and how should we respond?

# Solvency Extensions – Radio Searching Best

**[\_\_\_\_]**

[\_\_\_\_] Radio experiments are better than observational experiments because they have a lower energy cost.

Seth Shostak, **senior astronomer at the SETI institute**, 04/2001, Vol. 101, Issue 4, Sky & Telescope, EBSCO, “The Future of SETI”

Radio works. And 30 years ago, researchers were convinced it works best -- better than light, for instance. The argument was twofold. Microwaves handily penetrate interstellar dust, whereas visible light is blocked. But a subtler point is that radio requires less energy per bit of information, which ought to make it the communication medium of choice for any alien engineers. In the radio regime, the minimum background noise you'll encounter is the faint**,** 2.7 degrees Kelvin afterglow of the Big Bang. In the microwave part of the spectrum this means you typically need to receive just 50 photons per bit to stand out from the noise**.** No problem. But at higher, optical frequencies, a photon is more energetic and expensive. Even a single infrared photon packs 5,000 times more punch than the group of 50 necessary to send one bit at microwave frequencies. So higher frequencies mean higher energy costs.

**[\_\_\_\_]**

[\_\_\_\_] Radio searching is the best method, the improving technology means it will be successful.

Seth Shostak, **senior astronomer at the SETI institute**, 04/2001, Vol. 101, Issue 4, Sky & Telescope, EBSCO, “The Future of SETI”

Radio SETI may no longer be the only game in town, but it's still the game to which most researchers belly up. That's because the odds of a jackpot, though quite unknown, are unquestionably getting better all the time -- because the instruments are growing more capable by leaps and bounds. The ideal SETI radio telescope can only be imagined. It would monitor every point on the sky, in every radio channel from one end of the microwave window to the other (about 1,000 to 11,000 megahertz), all the time -- a true Omnidirectional Search System, or OSS. Unfortunately, this ideal is a very long way off. But it'sno longer impossible to work toward. The STWG team considered what it would take to build a reasonable interim OSS. They were seduced by the thought of a telescope able to find powerful but intermittent signals, the kind that none of the current large SETI experiments has a hope of detecting.

# Solvency Extensions – Can Identify Alien Signals

**[\_\_\_\_]**

[\_\_\_\_] SETI scientists have the tools to distinguish alien transmissions from noise.

Tim Folger, Editor at Discover, 01/2011, Scientific American, Volume 304, Issue 1, p40-45,

EBSCO, “Contact the Day After”

SETI SCIENTISTS THINK they know, in broad terms, what an ET signal will look like. To stand out as obviously artificial against a background of natural cosmic radio emissions, the signal would have to be narrow, with a lot of energy packed into a few frequencies. Natural phenomena, such as pulsars and interstellar gases, spew out radio emissions at many different frequencies. If an observatory ever receives a narrowband signal coming from an astronomical distance, the source would almost certainly be from an artificial source.

**[\_\_\_\_]**

**[\_\_\_\_] Our own history proves that there are plenty of reasons for aliens to broadcast a signal.**

Gregory Benford and James Benford, astrophysicist in the department of Physics and Astronomy at UC Irvine and expert in high powered microwaves, 04/2011**, “Smart SETI,” Analog Science Fiction & Fact, 131:4, p.33,**

What could motivate a Beacon builder? Here we can only reason from our own historical experience. Other possible high intelligences on Earth (whales, dolphins, chimpanzees) do not have significant tool use, so they do not build lasting monuments. Sending messages over millennia or more connects with our own cultures. Human history suggests (Benford G., 1999) that there are two major categories of long-term messages that finite, mortal beings send across vast time scales: • Kilroy Was Here: These can be signatures verging on graffiti. Names chiseled into walls have survived from ancient times. More recently, we sent compact disks on interplanetary probes, often bearing people’s names and short messages that can endure for millennia. • High Church These are designed for durability, to convey the culture’s highest achievements. The essential message is this was the best we did; remember it. A society that is stable over thousands of years may invest resources in either of these paths. The human prospect has advanced enormously in only a few centuries; the lifespan in the advanced societies has risen by 50% in each of the last two centuries. Living longer, we contemplate longer legacies. Time capsules and ever-proliferating 5 monuments testify to our urge to leave behind tributes or works in concrete ways (sometimes literally). The urge to propagate culture quite probably will be a universal aspect of intelligent, technological, mortal species (Minsky, 1985). Thinking broadly, high-power transmitters might be built for wide variety of goals other than two-way communication driven by curiosity. For example: • The Funeral Pyre: A civilization near the end of its life announces its existence.

# Answers To: Privatization DA / CP

**[\_\_\_\_]**

**[\_\_\_\_] Government action is key to coordinate SETI, otherwise we will not have a unified response when we actually make contact with aliens.**

**Martin Dominik and John C. Zarnecki, Royal Society University Research Fellow at the School of Physics and Astronomy at the University of St Andrews, Arthur Clarke Professor of Space Science at Open University, 2011, consequences for science and society and The detection of extra-terrestrial life, Philosophical Transactions of the Royal Society,**

While scientists are obliged to assess benefits and risks that relate to their research, the political responsibility for decisions arising following the detection of extra-terrestrial life cannotand should not rest with them. Any such decision will require a broad societal dialogue and a proper political mandate. If extraterrestrial life happens to be detected, a coordinated respons**e** that takes into account all the related sensitivities should already be in place. In 1989, the International Academy of Astronautics (IAA) approved a SETI post-detection protocol [51], which was developed by one of its committees. Despite the fact that it has subsequently been endorsed by the International Institute of Space Law (IISL), the Committee on Space Research (COSPAR) of the International Council for Science (ICSU), the International Astronomical Union (IAU) and the International Union of Radio Science (URSI), the procedures laid out in that document are not legally enforceable. If it remains a voluntary code of practice, it will probably be ignored in the event to which it should apply. Will a suitable process based on expert advice from proper and responsible scientists arise at all, or will interests of power and opportunism more probably set the scene (cf. [52])? A lack of coordination can be avoided by creating an overarching framework in a truly global effort governed by an international politically legitimated body. The United Nations fora constitute a ready-made mechanism for coordination. Member States of the Committee on the Peaceful Uses of Outer Space (COPUOS) will need to place ‘supra-Earth affairs’ on the agenda in order to take it further to the General Assembly, with the goal of establishing structures similar to those created for dealing with threats arising from potentially impacting near-Earth objects [53].

# Article: The Allen Telescope Array

**The Guradian: *Alien Finding Institute SETI Runs Out of Cash to Operate Telescope*. April 26th, 2011.**

It is the scientific institute made famous in Carl Sagan's novel Contact, the organisation for which the main character, Ellie Arroway – played by Jodie Foster in the 1997 film version – worked day and night looking for signs of intelligent life in outer [space](http://www.guardian.co.uk/science/space).

In real life, the Seti Institute has spent five decades hunting the skies for radio signals from deep space, possible communications which may indicate we are not alone in the universe. Now it has fallen prey to a very earthly problem: it has run out of cash. The institute's chief executive, Tom Pierson, has announced that there are "serious challenges" in finding operating funds and that from this week the organisation's brand new $50m (£30m) telescope array will be placed into hibernation. "This means that the equipment is unavailable for normal observations and is being maintained in a safe state by a significantly reduced staff," he said in a letter to private donors to the institute.

The problems revolve around the operation of the Allen Telescope Array (ATA), a set of radio dishes dedicated to looking for alien signals. Though it was paid for by the Seti Institute, the array, at the Hat Creek Radio Observatory, 300 miles north-east of San Francisco, is managed and operated by the radio [astronomy](http://www.guardian.co.uk/science/astronomy) lab of the University of California, Berkeley.

According to Seti senior astronomer Seth Shostak, the facility needs about $2m-$3m a year to function and to keep the scientific research programmes going. The scientists need an additional $5m to fund a two-year project to listen for possible radio signals coming from the Earth-like exoplanets found by Nasa's Kepler satellite. Launched in 2009, it has already identified more than 1,000 candidate planets, which the Seti Institute wants to use to narrow its search.

The money needed to operate the observatory has until now come from a mixture of private donations, the US National Science Foundation (NSF) and the state government of California. "As it happens, Berkeley's budget is way down – the state of California is in terrible financial circumstances because of the economic downturn," Shostak said. "Consequently, they don't have the money to keep the doors open and pay the electric bills and pay the staff at the antenna. And we don't either, because we run our Seti projects mostly based on private donations, and those are down as well." Funding from the NSF has also been cut, to about a tenth of its former level.

Paul Davies, an astrophysicist at Arizona State University, said the ATA facility was "the gold standard for Seti observations and acts as an emblem for the entire worldwide research effort. It would be an utter tragedy if a unique research programme is abandoned for the cost of a few miles of motorway". He added: "Our society squanders vast sums on trivia and entertainment, yet cannot find some small change to address the burning issue of whether we are alone in the universe."

There is some hope of raising funds by working with the US air force on future projects, according to Pierson, with one idea being to use the ATA in collaboration with the USAF's space surveillance network to track debris in space, which can damage satellites and space vehicles. But this is also uncertain, given impending cuts in federal funding for the military.

"The other possibility is that private donations could bring the telescope back to life and keep it working," said Shostak. In the past, science fiction author Arthur C. Clarke and Silicon Valley

entrepreneurs Bill Hewlett and David Packard had helped fund Seti, he said, and "if Richard Branson or somebody … wanted to help us out now, they can get in touch".

The ATA is the Seti Institute's biggest facility by far, and its only dedicated one. Its shutdown means astronomers will need to rely on data collected during downtime from other telescopes around the world and this will reduce its chances of finding that elusive alien signal.

Shostak said the future of the ATA had to be decided sooner rather than later, as there was only enough money to keep it in hibernation mode for a few months.

Until the funding crisis can be solved, the institute said it would continue its work on developing equipment and software that supports the overall search for alien signals.

This includes an increased focus on involving citizens in its work: astronomers have already developed the successful Seti@Home project, a programme that uses the downtime on people's home computers to sort through the masses of data collected by the institute's experiments.

The next step is SetiQuest.Org, an application that allows "citizen scientist volunteers to look for patterns in data from the ATA that might be missed by current algorithms, and help us explore frequency bands that are so full of signals that our detectors get confused", said Pierson.

Given the improvements in radar technology, Shostak said it would be a shame to stop searching now for signals from ET. "If this experiment is going to work, it's going to work in a few dozen years, simply on the basis of the rapid improvement of the technology afforded by Moore's Law. The equipment keeps getting faster and faster, so I think success is not very far off if you keep doing this."

He added: "In the grand scheme of things, this is not a whole lot of money and, clearly, Seti is an uncertain proposition. But Seti has a long lever-arm because, clearly, if we were to find a signal showing there was intelligent life, that would be an extraordinarily interesting thing. Not only for us but for every generation that follows us."

**Seti history**

Seti, the Search for Extraterrestrial Intelligence, was conceived in 1960 by astronomer Frank Drake. He pointed the Green Bank radio telescope in West Virginia towards the star Tau Ceti and began looking for anomalous radio signals that might have been sent by intelligent life. Eventually, the Seti Institute was set up in California and began to use the downtime on radar telescopes around the world to scour for signals.

Most recently, the search has been helped by building a dedicated set of antennae, the $50m Allen Telescope Array, 300 miles north-east of San Francisco. Part-funded by Microsoft co-founder Paul Allen, the array has 42 radio dishes, each 6m in diameter, and is the first step in an ambitious plan to build up to 350 antennae to look for radio signals day and night.

# Article: Overview of SETI’s History

**The Space Review: *SETI at 50*. August 23rd, 2010**

Fifty years ago this spring, a young astronomer turned a West Virginia radio telescope towards a pair of nearby stars and listened. That in and of itself was hardly unusual, but the reason for these particular observations was: that astronomer, Frank Drake, was listening for signals from those stars that might be artificial in origin, evidence of an extraterrestrial civilization. And almost immediately he found something.

As it turned out, what Drake detected that night *was* artificial, but merely terrestrial: a military radar jammer of some kind, most likely. In the intervening 50 years, the Search for Extraterrestrial Intelligence (SETI) has continued without finding definitive evidence of such broadcasting civilizations. SETI itself has persisted despite, for most of its history, lacking an official government imprimatur and funding, and while being consigned by many scientists to the fringes of respectability, just a step or two from those who claim to have evidence of UFOs.

SETI researchers and their supporters, though, have managed to carry on despite the institutional obstacles and lack of success. Earlier this month several hundred people, from scientists to enthusiasts, came to Santa Clara, California, for the first [SETICon](http://www.seticon.com/), a weekend conference organized by the SETI Institute to honor SETI’s 50th anniversary, as well as the 80th birthday of Drake and the institute’s own 25th anniversary. The conference—which had more of the flavor of a science fiction “con” than a traditional scientific conference—was an opportunity to reflect on SETI’s past while also chart a course for future efforts to answer that fundamental question: are we alone?

**SETI’s humble origins**

That initial SETI survey 50 years ago, called Project Ozma, took place at a time when mainstream science had turned away from the idea of life in space. “In the 1950s it was considered a very dangerous thing for a scientist to embark on anything to do with life in space,” Drake recalled in one session. “It was considered a flaky subject that only people who couldn’t do legitimate science might do.”

Drake said he got support for carrying out Project Ozma from the director of the new National Radio Astronomy Observatory (NRAO), the eminent astronomer Otto Struve, who was one of the few scientists of the era not disinclined to the subject of extraterrestrial life. “It so happened that Struve himself was very interested in life in space,” Drake said. “He didn’t have to defend himself against the taboo; he was too great a man.”

Drake said he approached Struve, noting that larger radio telescopes and advances in detector technology allowed them to detect signals from nearby stars of comparable strength of what Earth was transmitting. Struve was interested, and allowed the project to proceed on two conditions: that it not cost a lot, and that it would have utility for ordinary radio astronomy. Drake complied by developing a detector that operated at the 21-centimeter line of hydrogen, which had considerable scientific applications, and cost $2,000, “not an amount that would offend anybody.”

The first two stars targeted by the project were Tau Ceti and Epsilon Eridani. Tau Ceti didn’t yield anything, but when then turned to Epsilon Eridani, “within a minute we suddenly heard out of the loudspeaker this huge sound, one that we had never heard before.” Drake said it was a pulsing sound, repeating at about ten times a second. “Was it that easy?” he wondered about detecting was appeared to be an artificial signal on almost their first try. The signal went away, though, before they could complete

tests to see if the signal was, in fact, coming from that star.

Drake said they tried to keep the detection quiet until they could do follow up observations, but word nonetheless leaked out. “Sure enough, by the next morning the phone was ringing off the hook,” he said. Eventually, he said, the signal came back. This time it was detected by both the main radio telescope and a separate omnidirectional telescope, which meant that it was terrestrial in origin, not a signal from a civilization on Epsilon Eridani. “We never really knew what the source of this was,” he said, although it did have the characteristics of a military radar jammer.

**Are we searching the right way?**

In the 50 years since Project Ozma, the vast majority of SETI searchers have focused on radio transmissions. The technology and the telescopes have improved, but other than a small amount of work in optical SETI—looking for laser pulses deliberately transmitted towards us—SETI continues to remain focused on radio wavelengths. But is this the best approach?

A lot of approaches have been suggested over the years, from gravity waves to neutrinos, said Seth Shostak, senior astronomer at the SETI Institute. Many, though, appear infeasible or too expensive from an energy standpoint to be worthwhile. There are, though, other, simpler searches that are possible: one possibility he suggested was looking for stars with an excess of infrared emission—evidence, perhaps, of waste heat from astroengineering projects.

An analogous approach suggested by Drake is to look for stars with spectral lines created by compounds that don’t exist in nature. One example he suggested was chlorofluorocarbons, as they are artificially produced and create strong spectral lines even in trace amounts. It was something that even our civilization could do relatively easily: 100 tons of Freon dumped into the Sun would be enough to create discernable spectral lines, Drake estimated. (“Of course, the EPA would be climbing the walls,” he joked.)

That “one-bit” signal wouldn’t at first seem particularly useful, given the ability to encode much more information into a radio signal, but Shostak said it would serve as something of a beacon. “The assumption is that there’s something more interesting to be found now that you’re going to be spending a lot of time looking at that spot in the sky,” he said.

And, while a half-century of radio searches have turned up empty, there’s a lot more that can be wrung out of the radio part of the electromagnetic spectrum. That’s the direction the SETI Institute is going with its Allen Telescope Array, an array of 42 small dishes (eventually planned to go to 350) located in northern California. “It’s really turning this into a computational problem,” said Greg Papadopoulos, former CTO of Sun Microsystems and a member of the institute’s board of trustees. “Let’s look for progressively more complex signals.”

**SETI goes open source**

The challenge with increasingly complex SETI search techniques is that the resources and expertise of the SETI community is fairly limited. “The number of people in the world actively involved in SETI could fit into a phone booth,” said Jill Tarter, director of the Center for SETI Research at the SETI Institute.

Without access to additional funding, Tarter and others are turning to another approach to increase the

size and expertise of the field: the open source model best known for developing the Linux operating system and thousands of other applications widely used today. At SETICon Tarter announced a new project, called [setiQuest](http://www.setiquest.org/), designed to open up the code and algorithms used by SETI to the public, in the hopes that people will use and build upon them, providing a new source of innovation for SETI efforts.

The setiQuest effort will be providing access to existing code and algorithms (posted on [GitHub](http://github.com/), a site that hosts a wide range of open source coding projects), cloud computing resources for developing new algorithms, and even raw data sets. The hope is to attract both people interested in SETI as well as those who may not be interested in the concept but are looking for specific routines, such as in digital signal processing, who would use the SETI code in their own projects, make improvements, and submit that changed code for potential use in SETI projects.

The project is just getting started, and Tarter and others said they are still trying to determine the best way to run this effort. (A closed-door meeting during SETICon was devoted to working on issues of governance and organization for setiQuest.) She and others are looking to other open source software projects for lessons and best practices; one topic of discussion is whether the project needs a single overarching leader, or “benevolent despot”, such as Linux had in its early development with its founder, Linus Torvalds, personally accepting or rejecting additions to the code developed by others.

SetiQuest is following a similar path as another project, [SETI@home](http://setiathome.ssl.berkeley.edu/), which starting in 1999 has allowed the public to get involved by helping process data sets for SETI projects. However, Tarter and others emphasized that setiQuest would be more participatory that SETI@home, which is primarily a distributed computing project. SETI@home, she said, was “fantastic”, but “that’s not an arena that you can actually change. We want to set up a community where your creativity can in fact lead to capabilities.”

“SETI@home uses your resources to do computing,” said Avinash Agrawal, director of innovation at the SETI Institute. “We are giving you resources to allow us to extend what we do.”

**Should we talk back?**

Another topic of discussion and debate revolves around what is often called “active SETI”: deliberately sending out transmissions to other stars to let any civilizations there that might be listening of our existence. Earlier this year in a Discovery Channel documentary Stephen Hawking [warned that such communication was ill-advised](http://www.timesonline.co.uk/tol/news/science/space/article7107207.ece), fearing the worst of any direct contact with an alien civilization that might arise if we let them know we exist: “If aliens ever visit us, I think the outcome would be much as when Christopher Columbus first landed in America, which didn’t turn out very well for the Native Americans.”

John Billingham, a retired NASA scientist who led SETI programs there in the early 1990s, endorsed Hawking’s caution about broadcasting our presence. “No one can say that there’s no risk to transmitting,” he said in a statement read at the conference. He endorsed the concept of a global conference to discuss the merits and concerns of such transmissions, perhaps leading to a treaty to determine who should transmit such messages and their contents.

Others, though, noted that we have been broadcasting, as radio broadcasts and other emissions that have “leaked” out from Earth over the decades that could be easily detected by an extraterrestrial civilization. “This horse has left the barn,” Shostak said. “Any society that could possibly be a threat to us can easily

know that we’re here.”

Shostak and others also took issue with the claim that such civilizations, alerted to our presence, would go after us for our resources. “To me it is almost inconceivable that there is a material resource worth traveling light-years to collect,” said science fiction writer Robert J. Sawyer. “The energy required to collect it will almost always be more expensive than the cost of making it at home.”

An advanced civilization would likely have to get any warlike instincts under control if it is to survive, added social scientist Douglas Vakoch. And even if they didn’t, “can they do us any harm at interstellar distances?”

**So where are they?**

The fact remains, though, that 50 years of SETI searches have failed to turn up any evidence yet that there are other civilizations out there—at least any we can detect with our current technologies and methodologies. Does that mean that there’s no one out there at all, no one out there bothering to communicate, or that we haven’t given the search enough time yet?

Most at SETICon gravitated towards the last explanation. “We still have only scratched the surface of a multidimensional search space of SETI,” Billingham said in his statement. Any dismissal of SETI as a failure “reflects the lack of understanding of the magnitude of the search,” added Vakoch. “It’s very plausible that it may take decades for traditional passive SETI searches to succeed.”

Others, though, argued that other civilizations simply might not be interested in communicating with others. “Is in fact the most dangerous thing to the long-term survival of a race individuality?” asked Sawyer. Civilizations that do survive may need to sacrifice individuality in order to avoid threats to their survival like terrorism, and are thus less interested in communicating with others. “This notion that we need someone to talk to may very well be an adolescent notion.”

Drake, the father of modern SETI, remains positive about not just the prospects of finding a signal from another civilization but the impact it will have on our own. “The impact of this will be great for every person on Earth in the long run,” he said. Any civilization we detect, he argued, will likely be far more advanced than our own, and thus we would have much to learn from them; he described the “wonderful turmoil” of information that could come from such a signal.

“I’m always an optimist,” Drake said. Optimism—and persistence—may be the critical elements of the next 50 years of SETI.

**SETI Negative**

# SETI Negative

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# Glossary

**Linguistic –** relating to language

**Ubiquitous –** universal, everywhere, permeating

**Sanguine –** cheerfully optimistic

**Immodest –** lacking humility

**Premature –** occurring or done before the proper time; too early

**Fathom** – difficulty in understanding a problem or idea

**Alruistic –** showing unselfish concern for the welfare of others

**Astronomer –** a scientist who studies celestial bodies such as planets, asteroids, and stars

**Extra-terrestrial –** Something that originates from outside the Earth

**Telescope** – an instrument designed to make distant objects appear nearer

**Cryptographers –** someone with expertise in solving codes and decryption

**UFOlogists –** term used to describe those that collect, interpret, and believe accounts that extraterrestrials exist, frequently believing in a conspiracies involving government cover up of aliens on Earth

**Tragedy of the commons –** the idea that a good that can be freely accessed by all is likely to be used up or degraded because no individual has an incentive to take care of it.

**Geostiationary objects –** objects that orbit the Earth and rotate at the same speed that the Earth does, so from Earth, the object appears not to move

**White noise –** random and meaningless static picked up by a receiver

**SETI –** Search for Extraterrestrial Intelligence

**GEO –** Geostationary Orbit

**METI –** Messaging to Extraterrestrial Intelligence

# Answers to: Inherency

**[\_\_\_\_]**

**[\_\_\_\_]**

[\_\_\_\_] SETI will continue even without proper funding. There is plenty of data to analyze even without continuing to search.

**Australian Broadcasting Company, 4/27/2011, “SETI will survive cuts says astronomer” , http://www.abc.net.au/science/articles/2011/04/27/3201466.htm , Lexis 4-27-2011 MLF 6-24-11**

A top astronomer searching for extra-terrestrial intelligence is optimistic SETI will survive, despite its main telescope being shut down. The University of California Berkeley's Allen Telescope Array (ATA) has been placed in hibernation due to funding cuts, according to an announcement on the SETI Institute's website. The SETI (Search for Extraterrestrial Intelligence) Institute, a private organisation, built the radio telescope array at the UC Berkeley observatory site at Hat Creek. SETI operates the array in partnership with the university, and the project relies on ongoing federal and state government funding. Dr Seth Shostak, SETI senior astronomer, says that funding cuts have hit radio astronomy particularly hard, and that the SETI project is a part of the radio astronomy research being done at the UC Berkeley observatory site. "It's certainly not the end of SETI," says Shostak, "but it is an unfortunate development because while our telescope is on hold, we're not moving forward with it unless we can find some money to operate it." Shostak says it costs around US$2.5 million per annum to maintain the telescope. "For basic research, that's not a terribly expensive project," says Shostak. He says he hasn't thrown in the towel just yet. "The first thing we're going to do is try and find that money and reinstate the telescope, get it out of park and into gear. That would be the best solution because this is the best instrument for checking out some of the planets that are being found by NASA's Kepler telescope that are reckoned to be somewhat similar to Earth, planets that might be cousins of our own and might have life." "Clearly you want to know if they have intelligent life and the best instrument to answer that question would be the Allen Telescope Array," he says. Shostak says that there are still some smaller scale SETI experiments going on in different countries, searching for radio waves and laser light pulses from far off places in the universe. In the meantime, he says, there is plenty of work to be done analysing the data the ATA has already gathered. "We're proceeding with our plans to make some of the data collected by this telescope available to the public [via our] SETI Quest program, and anyone can get involved in looking at these data on the web." "The long term outlook is either get this telescope going again or think of other experiments that can take advantage of the equipment that we do have," Shostak says.

# Answers to: Inherency

**[\_\_\_\_]**

[\_\_\_\_] SETI will look to small private donations to continue operating.

Dylan Darling, journalist for the Redding Record, 5/27/2011, **“SETI scours Earth for cash; donations sought to restart deep space search,” *Redding Magazine*,**

Since mid-April, the Allen Telescope Array, a collection of radio dishes about 75 miles east of Redding, has been in hibernation after the state and federal government steeply cut funding. To bring the array back online, the Search for Extraterrestrial Intelligence (SETI) Institute is trying to find $2.5 million a year in support, said Tom Pierson, CEO for the nonprofit organization in Mountain View. "We are basically trying to tap our donor base," he said. So far SETI has about $100,000 for the array, but it's about to launch a new fundraising program called SETI Stars in the next two weeks to a month, Pierson said. While he was tight with details, Pierson said the new program will feature social networking designed by Silicon Valley entrepreneurs. He said the idea is to have donors have a sense of personal participation and feedback. SETI already has "tens of thousands" of supporters and more than 110,000 followers on Twitter, Pierson said.

**[\_\_\_\_]**

SETI will continue by using the equipment of others.

Seth Shostak, senior astronomer at the SETI institute, 6/21/2011, In an interview with **Rachel Saslow - Interviewer, Staff Writer for the Washington Post, “Q-and-A with 'alien hunter' Seth Shostak,”**

What happens now? If the Allen Telescope Array can't be brought back, and I think it can, then we go to Plan B, which is unclear but likely is to use other people's equipment. Do you still feel confident that you'll have success by 2025? The prediction is based on the fact that SETI keeps getting faster because the equipment gets better. If this experiment is going to succeed, then it's going to succeed during a generation, not hundreds of years. It's either going to work rather quickly or there's something wrong with the idea.

# Answers to: Alien Contact Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

[\_\_\_\_] Even if we found ETs, we would not be able to communicate with them because our backgrounds would be so different.

**Albert Harrison and Steven Dick, Professor of Social Psychology at the University of California, Davis, and Chief Historian of NASA, 2000, “When SETI Succeeds: The Impact of High-Information Contact”, www.futurefoundation.org/documents/hum\_pro\_wrk1.pdf**

Or, we could discover an alien probe or artifact that we could not understand. Maybe we will intercept a communication that has high information content but that is indecipherable to us. Given that our two civilizations may be separated by millions of years of evolution, translation and interpretation could be very difficult. Perhaps whole careers and institutes will be devoted to these processes, but with very little progress and very little impact on our descendants’ daily lives. How well could we communicate with humanity of the year 3000, much less with even more advanced beings from entirely different genetic and cultural backgrounds? There may be ethical as well as linguistic barriers to communication. Among the many reasons listed for our current “absence of evidence” are that ETI civilizations consider it unethical to alter the course of a developing civilization, or consider it desirable to preserve some civilizations for future study (Ball, 1973). Our ability to learn from ETI may depend on their perception of our readiness to acquire advanced information or to meet entrance-level requirements for the Galactic Club. We must be prepared for the possibility that we are not considered worth talking to, or that we will receive limited information that does not put the continuity of our physical, scientific, and moral evolution at risk.

# Answers To: Alien Contact Advantage

**[\_\_\_\_]**

**[\_\_\_\_] We are alone in the universe. Earth is a unique location that allowed the stability necessary for life to develop.**

**Robin McKie, Science Editor for the Observer, 7/16/2000, “There's life out there ... but not as we dreamt it,” http://www.guardian.co.uk/science/2000/jul/16/spaceexploration.theobserver**

WE ARE alone. Mankind may be the sole intelligent occupier of the entire galaxy, according to a growing number of scientists involved in the Search for Extraterrestrial Intelligence (Seti). After decades of employing radio telescopes in vain bids to hear E.T. phoning home, and after studying patterns of evolution on Earth, they believe that complex, brainy extraterrestrials must be rare, if not non-existent. Life may be ubiquitous, they admit, but only on our planet did it evolve into beings capable of rational thought, sophisticated behaviour and powerful civilisations. On other worlds, it has remained rooted at the level of amoebas, microbes, and primitive pond life.

All aliens are scum, in other words an observation with crucial implications. As UK astronomer Ian Crawford points out in the latest issue of Scientific American, we may be 'the most advanced life-forms in the galaxy'.

'We used to think that once life emerged on a planet, intelligent beings would inevitably appear,' added Dr Ian Morison, director of Seti research at Britain's Jodrell Bank radio telescope. 'Now, it seems we only evolved thanks to an extraordinary series of fortuitous events.'

The first and most important of these lucky breaks concerns location, as astronomers Peter Ward and Donald Brownlee recently revealed in Rare Earth: Why Complex Life is Uncommon in the Universe (Copernicus). Earth far from being an average world in an unimportant part of the cosmos turns out to be prime galactic real estate.

First, our sun is a highly stable star and is unaffected by wild fluctuations in output of its radiation. Such afflictions emanate from many other stars and would destroy evolving advanced life-forms, allowing only bacteria-like entities to flourish. In addition, ours is a safe suburban part of the galaxy, the astronomical equivalent of Cheltenham. By contrast, in more crowded, 'down-town' galactic neighbourhoods, in stellar Sauchiehall Streets of the universe, jostling stars are likely to have continually dislodged the swathes of comets believed to hover at the edges of most solar systems. These comets would then have crashed into each star's family of planets with devastating consequences for their evolving life-forms. In addition, Earth has a planetary big brother, Jupiter, which sweeps up those few dangerous comets that do make it through to the solar system's inner regions, while our world is further blessed in having a relatively large moon which helped stabilise Earth's rotation, preventing wild swings in our seasons and climate.

# Answers To: Alien Contact Advantage

**[\_\_\_\_]**

**[\_\_\_] The affirmative is naïve - advanced aliens would enslave and eat us just the way that we have done to less developed societies.**

**Jared Diamond, Professor of Geography and Physiology at UCLA, 12/05/1999, http://www.nytimes.com/1999/12/05/magazine/to-whom-it-may-concern.html**

The remaining potential calamity is the one from outer space -- and I'm not talking about asteroids. The existence of so many billions of stars, and the recent discoveries of planets around some of those stars close enough for us to scrutinize with telescopes, make it probable that, somewhere, there are planets supporting intelligent beings capable of space travel. Some scientists have already sent radio signals or space probes to tell those beings about us and our location, so as to open a dialogue; a few others are now continuing those efforts. What will happen if they succeed, and if as a result some intelligent extraterrestrials come to visit us? The astronomers and others hope that the extraterrestrials, delighted to discover fellow intelligent beings, will sit down for a friendly chat. Perhaps the astronomers are right; that's the best-case scenario. A less pleasant prospect is that the extraterrestrials might behave the way we intelligent beings have behaved whenever we have discovered other previously unknown intelligent beings on earth, like unfamiliar humans or chimpanzees and gorillas. Just as we did to those beings, the extraterrestrials might proceed to kill, infect, dissect, conquer, displace or enslave us, stuff us as specimens for their museums or pickle our skulls and use us for medical research. My own view is that those astronomers now preparing again to beam radio signals out to hoped-for extraterrestrials are naive, even dangerous. And so, the Times Capsule might be opened by aliens who have conquered us. As they read our histories of what we did to one another and to apes, the thing that will most impress them about the capsule is the incredible stupidity of our refusal to learn from our own deeds.

# Answers To: Alien Contact Advantage

**[\_\_\_\_]**

[\_\_\_\_] There will be no social impact to alien contact. It will only affect academics and elites.

**Albert Harrison and Steven Dick, Professor of Social Psychology at the University of California, Davis, and Chief Historian of NASA, 2000, “When SETI Succeeds: The Impact of High-Information Contact”, www.futurefoundation.org/documents/hum\_pro\_wrk1.pdf**

Short-term effects of contact will be measured in days, weeks, and months. Long-term effects will be measured in decades, centuries, and perhaps millennia. Short-term effects will be evident in sharp and intense focus in the media, organizations scrambling to redefine themselves and cope with a new reality, and collective behavior. Long-term effects could permeate all aspects of our culture and its institutions. Yet we should not take “an assumption of maximum impact” (White, 1990) for granted, because major scientific discoveries have not necessarily impacted average people who are grappling with the problems of everyday life. It may be that the only people who are really interested are academics and the intellectual descendants of those who are now involved in SETI. If contact is delayed for centuries, it will impact people who may be very different from us. Recent years have seen enormous changes in philosophy, science, and popular beliefs. Certainly, we expect that, compared to people who believed that the Sun circles the Earth, who never heard of evolution, and who never read science fiction, the people of today would respond very differently to ETI. Similarly, the people of tomorrow may have values, interests, and technologies that differ substantially from our own and for this reason react to ETI in ways that we cannot imagine.

**[\_\_\_\_]**

[\_\_\_\_] Even if we made contact the cultural impact would be limited. We would know so little about them that it wouldn’t be revolutionary.

Tim Folger, Editor at Discover, 01/2011, Scientific American, Volume 304, Issue 1, p40-45, EBSCO, “Contact the Day After”

TAKING INTO ACCOUNT political debates and the time needed to build a telescope sensitive enough to analyze the signal, years would pass before astronomers or cryptographers could begin to attempt to decipher a message from the stars. So whereas that first contact with another intelligence would in itself be one of the most important scientific discoveries of all time, the lack of any further knowledge about the nature of that alien intelligence would limit the immediate cultural impact**.** The story of the discovery would monopolize headlines for a while, but our collective attention span would inevitably move on while scientists sought to translate the message.

# Answers To: Extraterrestrial Perspective Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Even if the ATA makes contact it would have no effect. Contact would likely just be in the form of simple radio communication, which would underwhelm a society that has been hearing fantastic myths about aliens from fake scientists.**

Lawrence Squeri, professor of history at East Stroudsburg University, 2004

**“When ET Calls: SETI Is Ready,” Journal of Popular Culture, 37:3, p. 478, February**

SETI scientists have demanded hard evidence of alien visitations. According to Albert Harrison, a psychologist at the University of California at Davis, who has written extensively on SETI, there must be "(a) skepticism, verification, peer review, and the scientific method, (b) strict safeguards against hoaxes, self-delusion, and erroneous data, and (c) protocols to avoid premature and immodest claims." This scientific rigor may give academic respectability to SETI but is simply ignored by much of the public. Like all elites with professional credentials, SETI has to suffer the existence of self-styled experts. Ufologists who write and lecture on alleged human contacts with extraterrestrials have captivated much of the public. These ufologists do not write and speak with the precision of the scientific community; they do not use its specialized jargon, nor do they have the facility with mathematical formulae-and they do not care. By insisting that extraterrestrials have visited the Earth, they proclaim a greater insight into the cosmos than SETI, whose admission of not having contacted extraterrestrials can be seen as an admission of failure. In our nonjudgmental, postmodern culture, ufologists even manage to share the spotlight with SETI. Popular documentaries on television pay attention to alleged government cover-ups of flying saucer crashes, autopsies of alien visitors, abductions into spaceships, and other strange tales.

# Answers To: Extraterrestrial Perspective Advantage

**[\_\_\_\_]**

[\_\_\_\_] Discovery of extraterrestrials would not lead to peaceful cooperation among humans – instead it would cause painful culture shock as we realized we were inferior.

Lawrence Squeri, professor of history at East Stroudsburg University, 2004

**“When ET Calls: SETI Is Ready,” Journal of Popular Culture, 37:3, p. 478, February**

SETI activists assume that extraterrestrials have the best of human traits, especially altruism, and have outgrown the negatives. The reality may not be so sanguine. Creatures that have evolved in different physical contexts may have different body chemistries and modes of thinking. Contact with these creatures may not be pleasant. How will humanity react if extraterrestrials inform us that their religion mandates the eating of first-born children? Even a gentle extraterrestrial culture may cause problems. Earth's history shows that technologically superior people can inflict enormous culture shock on backward societies. Contact between the West and non-Western peoples have resulted in loss of confidence, enervation, and cultural despair. Will the knowledge that human science and medical knowledge are clearly inferior to ET's make us feel that our culture is also inferior? Will humans split between those who wish to adopt "alien" ways and those who believe in traditional culture? The different forms of stress that contact can precipitate are endless.

# Answers To: Space Debris Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] The Space Debris problem can only be solved by removing them, something that international governments are unwilling to do.**

**Megan Ansdell, Consultant at Booz Allen Hamilton for Space Policy, Former Graduate Student Intern at NASA, 2010 “Active Space Debris Removal: Needs, Implications, and Recommendations for Today’s Geopolitical Environment,”** [**www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf**](http://www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf)

The biggest challenge, however, will be simply starting the process of active debris removal. Despite growing consensus within the space debris community that active removal will be needed over the next several decades, the fact that space activities continue today without significant interference causes the larger global community to not see space debris as an issue. Moreover, space suffers from the “tragedy of the commons,” a phenomenon that refers to the overexploitation of a shared resource when there is no clear ownership over it. This, in addition to the abovementioned challenges facing debris removal systems, means that the natural tendency of those in power will likely be to do nothing until they absolutely must. This is reminiscent of responses to climate change, where the failure of governments to take responsibility for their past actions and act preemptively is compromising the larger global good. Policy makers must therefore take necessary actions, as recommended in next section of this paper, to prevent what is now happening on Earth from also occurring in space.

# Answers To: Space Debris Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Our space satellites are resilient. Others would fill in if debris impacted one.**

**David Perera, Special Contributor to Government Computer News, 2/22/2008, “'Space Pearl Harbor' overstated,”**

[**http://www.gcn.com/online/vol1\_no1/45866-1.html?topic=geospatial#**](http://www.gcn.com/online/vol1_no1/45866-1.html?topic=geospatial)

However, even if the United States should find itself fighting an enemy with the will and capacity to destroy U.S. satellites, high-bandwidth communications would continue to operate, Mosher said. 'The key here is not to protect satellites. The key is to protect the function,' he added. That could be accomplished many ways, including ensuring that satellite systems are robust enough to survive the loss of some of their units. A prime example is the Global Positioning System, which consists of at least 24 satellites in medium Earth orbit. 'It would take a whole lot to significantly degrade GPS,' Mosher said. 'You'd have to shoot a lot of satellites.' Increased use of transoceanic fiber-optic cables could also make the military less dependent on satellites. Such cabling has already proven to be reliable and has done a great deal to reduce satellite use in the private sector, Mosher said. In any event, if a satellite-shooting war occurs, air vehicles with sensors and routers located lower in the atmosphere than satellites would already be active. 'That just makes sense in regional warfare anyway,' he said. A shot-down satellite would be a loss because alternatives would not perfectly compensate for the missing capacity, 'but it's not the end of the world,' Mosher said.

**[\_\_\_\_]**

**[\_\_\_\_] Some space debris is too small to be tracked with current technology.**

**Megan Ansdell, Consultant at Booz Allen Hamilton for Space Policy, Former Graduate Student Intern at NASA, 2010 “Active Space Debris Removal: Needs, Implications, and Recommendations for Today’s Geopolitical Environment,”** [**www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf**](http://www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf)

The most dangerous pieces of space debris are those ranging in diameter from one to ten centimeters, of which there are roughly 300,000 in orbit. These are large enough to cause serious damage, yet current sensor networks cannot track them and there is no practical method for shielding spacecraft against them. Consequently, this class of orbital debris poses an invisible threat to operating satellites (Wright 2007, 36). Debris larger than ten centimeters, of which there are roughly 19,000 in orbit, can also incapacitate satellites but they are large enough to be tracked and thus potentially avoided. Debris smaller than one centimeter, in contrast, cannot be tracked or avoided, but can be protected against by using relatively simple shielding (Wright 2007, 36).

# Answers To: Space Debris Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Scientists are already working on techniques to deal with space debris.**

**Asian News International 4/28/2011, “Technique to trace space junk with help of stars developed”**

Washington, May 27 (ANI): A team of researchers have developed a method to track the movement of geostationary objects using the position of the stars, which could help to monitor space debris. The technique of researchers from the Royal Institute and Observatory of the Navy (ROA) in Cadiz (Spain) can be used with small telescopes and in places that are not very dark. Objects or satellites in geostationary orbit (GEO) can always be found above the same point on the Equator, meaning that they appear immobile when observed from Earth. By night, the stars appear to move around them, a feature that scientists have taken advantage of for decades in order to work out the orbit of these objects, using images captured by telescopes, as long as these images contain stars to act as a reference point. "Against this backdrop, we developed optical techniques to precisely observe and position GEO satellites using small and cheap telescopes, and which could be used in places that are not particularly dark, such as cities", Francisco Javier Montojo, a member of the ROA and lead author of the study, told SINC. The method can be used for directly detecting and monitoring passive objects, such as the space junk in the geostationary ring, where nearly all communications satellites are located. At low orbits (up to around 10,000 km) these remains can be tracked by radar, but above this level the optical technique is more suitable. The team has created software that can precisely locate the centre of the traces or lines that stars leave in images (due to photograph time exposure). The study is detailed in the journal Advances in Space Research.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_]**

[\_\_\_\_] The Antennas on the ATA are not big enough to decipher any alien transmission.

Tim Folger, Editor at Discover, 01/2011, Scientific American, Volume 304, Issue 1, p40-45, EBSCO, “Contact the Day After”

Even if the signal is confirmed as an authentic transmission from an extraterrestrial civilization, it is unlikely that astronomers would be able to extract any information from it for many years. SETI's instruments are designed to search for steady, periodic narrowband radio pulses--carrier waves powerful enough to be detectable across many light-years. The pulse itself would yield no information, other than its artificial nature. Any message content would likely be in the form of changes in amplitude or frequency buried within the pulse. Even a large radio telescope would need to repeatedly scan a small patch of sky to build up the signal pulse above background radio noise. In doing so, it would average out modulations on finer time-scales that might contain a message. Resolving the message would require an antenna far more powerful than Earth's largest, the 305-meter dish at Arecibo, Puerto Rico. "You would need something on the order of 10,000 times bigger than Arecibo," Shostak says. Rather than a single enormous dish, such a telescope would probably consist of many smaller antennas spread across a large area and linked electronically. Constructing such an instrument would require international collaboration and funding, with no guarantee that the message--if the signal contained one--could ever be deciphered. "That's not something you'd do overnight," Shostak observes. "That's a big project. I think we would do it, because--gosh darn it--we would want to know what they're saying."

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] The ATA will not be able to filter human transmissions from Earth from alien ones.**

**Bob Hirshon, Senior Project Director, Media Programs American Association for the Advancement of Science, 6/20/2011 “SETI at Home Upgrade” http://www.sciencenetlinks.com/sci\_update.php?DocID=342**

So SETI, the Search for Extraterrestrial Intelligence, isn't looking for alien spaceships. Instead, it's looking for radio waves that might be being sent, probably unintentionally, by other civilizations. (Our own radio and television signals, which leak from Earth and drift across the universe, have already passed by thousands of stars; if there are any alien civilizations in those neighborhoods, they could theoretically be watching early Earthling TV shows like I Love Lucy.) SETI looks specifically for something called “narrow band transmissions,” which as far as we know can be produced only by artificial equipment. No matter where you are in the universe, these transmissions will be most efficient at broadcasting signals that can be received at the other end. So SETI believes that even extraterrestrials who are very different from us will probably make use of these radio waves for communication, if they have the intelligence and technology to do so. However, it's very hard to look for these narrow band transmissions, because we produce so many of them here on Earth. Sifting out all that noise, along with natural radio waves that bounce around in space, is a task that the world's biggest supercomputers couldn't manage.

[\_\_\_\_]

**[\_\_\_\_] There’s no chance of a conversation between Earth and the ETs, we would have to wait thousands of years for a simple reply.**

**Roger Highfield, Editor of New Scientist, 10/5/2005, The Daily Telegraph, “’The greatest discovery of all time’ The chances are there’s life out there, but any message could be thousands of years old and indecipherable. Roger Highfield reports,”**

There is, of course, a chance, that an incoming message may be sent in response to messages extraterrestrials have already received from Earth. Some of our radio and television from the Thirties and Forties is just now reaching some of the nearer stars. What would aliens make of news of Neville Chamberlain's return from his Munich meeting with Adolf Hitler? The problem is, however, that these signals have only travelled around 80 light years, too little for even the most optimistic SETI sage to raise the chance of meeting up with another civilisation. We may have to wait millennia for a reply, and Prof Davies speculates that it would probably come from an "information processor" that will blur the distinctions we make today between living organisms and artificial non-living machines.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] Our technology is too primitive to pick up alien forms of communication.**

**Casey Kazan, writer for The Telegraph, 5/11/2011, “Earth's Technology May be Too Primitive to Detect Advanced ET Life” pg online @ [http://www.dailygalaxy.com/my\_weblog/2011/05/earths-technologies-may-be-too-primitive-to-detect-advanced-et-life.html**

Some of the world's leading astronomers -- including Great Britain's astronomer royal, Sir Martin Rees -- believe aliens, rather than using different radio waves or visible light to signal, may be using an entirely different communication medium such as ghostly neutrinos or with gravitational waves (ripples in the fabric of space-time) or using communication mechanisms we cannot begin to fathom. “The fact that we have not yet found the slightest evidence for life -- much less intelligence -- beyond this Earth," said Arthur C. Clarke, "does not surprise or disappoint me in the least. Our technology must still be laughably primitive, we may be like jungle savages listening for the throbbing of tom-toms while the ether around them carries more words per second than they could utter in a lifetime." Lord Rees, a leading cosmologist and astrophysicist who is the president of Britain’s Royal Society and astronomer to the Queen of England believes the existence of extraterrestrial life may be beyond human understanding. “They could be staring us in the face and we just don’t recognize them. The problem is that we’re looking for something very much like us, assuming that they at least have something like the same mathematics and technology." “I suspect there could be life and intelligence out there in forms we can’t conceive. Just as a chimpanzee can’t understand quantum theory, it could be there as aspects of reality that are beyond the capacity of our brains.” Frank Drake, the founder of SETI and Drake's Equation, believes that satellite TV and the “digital revolution” is making humanity invisible to aliens by cutting the transmission of TV and radio signals into space. The earth is currently surrounded by a 50 light year-wide “shell” of radiation from analogue TV, radio and radar transmissions. According to Drake, digital TV signals would look like white noise to a race of observing aliens.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] Just like on Earth, economics dictates that Aliens probably aren’t broadcasting their signal because it is expensive with a very low probability of payoff. The plan’s inherency proves this because the government is cutting SETI’s funding.**

**Gregory Benford, James Benford and Dominic Benford , Physics and Astronomy Department, University of California Irvine, Irvine, California, Employee at Microwave Sciences, Inc., Employee at the Observational Cosmology Lab, NASA Goddard Space Flight Center, Greenbelt, Maryland, 5/12/2010, “Smart SETI,” Analog Science Fiction & Fact, 131:4, p.33, April, http://www.liebertonline.com/doi/abs/10.1089/ast.2009.0394**

Traditional SETI research takes the point of view of receivers, not transmitters. This neglects the implications for what signals should look like in general, and especially the high emitting costs, which a receiver does not pay. 6 We shall assume, like conventional SETI, that microwaves are simpler for planetary societies, since they can easily outshine their star in microwaves. Microwaves are probably better for Beacons (Tarter, 2001). Whatever the life form, evolution will select for economy of resources. This is an established principle in evolutionary theory (Williams, 1966). Further, Minsky (1985) argues that a general feature of intelligence is that it will select for economy of effort, whatever the life form. Tullock (1994) argues that social specie evolve to an equilibrium in which each species unconsciously carries out “environmental coordination” which can follow rules like those of a market, especially among plants. He gives many such examples. Economics will matter. A SETI broadcaster will face competing claims on resources. Some will come from direct economic competition. Standing outside this, SETI beaming will be essentially altruistic, since replies will take centuries if not millennia, or else are not even an issue. SETI need not tax an advanced society’s resources. The power demands in our companion paper are for average powers ≦GW, far less than the 17 TW now produced globally (Hoffert et al., 2002) But even altruistic Beacon builders will have to contend with other competing altruistic causes, just as humans do (Lemarchand and Lomberg, 1996). They will confront arguments that the response time for SETI is millennia, and that anyway, advanced societies leak plenty of microwaves etc. into deep space already. We take up these issues below. It seems clear that for a Beacon builder, only by minimizing cost/benefit will their effort succeed. This is parsimony, meaning ‘less is better’ a concept of frugality, economy. Philosophers use this term for Occam’s Razor, but here we mean the press of economic demands in any society that contemplates long term projects like SETI. On Earth, advocates of METI (Messaging to Extraterrestrial Intelligence) will also face economic constraints (Benford et al., 2010).

# Article: Aliens Don’t Exist

**The Guardian: *There’s Life Out There… but not as we dreamt it.* July 16th, 2000.**

We are alone. Mankind may be the sole intelligent occupier of the entire galaxy, according to a growing number of scientists involved in the Search for Extraterrestrial Intelligence (Seti).

After decades of employing radio telescopes in vain bids to hear E.T. phoning home, and after studying patterns of evolution on Earth, they believe that complex, brainy extraterrestrials must be rare, if not non-existent.

Life may be ubiquitous, they admit, but only on our planet did it evolve into beings capable of rational thought, sophisticated behaviour and powerful civilisations. On other worlds, it has remained rooted at the level of amoebas, microbes, and primitive pond life.

All aliens are scum, in other words - an observation with crucial implications. As UK astronomer Ian Crawford points out in the latest issue of Scientific American , we may be 'the most advanced life-forms in the galaxy'.

'We used to think that once life emerged on a planet, intelligent beings would inevitably appear,' added Dr Ian Morison, director of Seti research at Britain's Jodrell Bank radio telescope. 'Now, it seems we only evolved thanks to an extraordinary series of fortuitous events.'

The first and most important of these lucky breaks concerns location, as astronomers Peter Ward and Donald Brownlee recently revealed in Rare Earth: Why Complex Life is Uncommon in the Universe (Copernicus). Earth - far from being an average world in an unimportant part of the cosmos - turns out to be prime galactic real estate.

First, our sun is a highly stable star and is unaffected by wild fluctuations in output of its radiation. Such afflictions emanate from many other stars and would destroy evolving advanced life-forms, allowing only bacteria-like entities to flourish.

In addition, ours is a safe suburban part of the galaxy, the astronomical equivalent of Cheltenham. By contrast, in more crowded, 'down-town' galactic neighbourhoods, in stellar Sauchiehall Streets of the universe, jostling stars are likely to have continually dislodged the swathes of comets believed to hover at the edges of most solar systems. These comets would then have crashed into each star's family of planets - with devastating consequences for their evolving life-forms.

In addition, Earth has a planetary big brother, Jupiter, which sweeps up those few dangerous comets that do make it through to the solar system's inner regions, while our world is further blessed in having a relatively large moon which helped stabilise Earth's rotation, preventing wild swings in our seasons and climate.

All these improbable conditions, in combination, provided the stability that allowed four-billion-year-old primitive slime to evolve - about 250,000 years ago - into the only intelligent creatures known to science, ourselves. Humanity may therefore be viewed as the outcome of the biggest accumulator bet in the universe. As Professor Brownlee, of Washington University, Seattle, puts it: 'Earth is a charmed place. We know of no other body that is even remotely like it.'

The idea that Earth is special runs counter to the entrenched astronomical assumption that our planet is not even mildly important. It also reverses a trend that was begun in the Sixties by astronomers, including Carl Sagan, who argued that ET civilisations must be two-a-penny, and that there should be thousands, possibly millions, in our galaxy.

For the past 30 years, astronomers have tried to pick up radio signals from these alien worlds - either from their TV broadcasts, or from radio beacons deliberately sent into space. But scientists have detected nothing but hiss and static.

The Astronomer Royal, Sir Martin Rees, believes the jury is still out on ETs. 'We still have only searched a relatively small part of our galaxy. There is still plenty of time and space to find extraterrestrial intelligences. In any case, intelligent beings may simply not want to talk to us, or have any way of knowing about us. For example, they could be dolphin-like beings having a calm time, thinking deep thoughts on an aquatic world.'

Or as the Open University astronomer Professor Colin Pillinger - designer of the British Beagle 2 probe scheduled to land and seek life on Mars in 2003 - points out: 'We may simply not realise that aliens are trying to contact us now. When astronomers first detected regular pulses that were emanating from rotating neutron stars, they thought they were listening to little green men. For all we know, we could be listening to alien messages, thinking they are bursts of radiation being produced by stars or galaxies.'

Nevertheless, the sceptics insist we should have seen some sign of alien life by now. Even if only a few extraterrestrials achieved complex, intelligent status, their existence should have become apparent, they argue. Armed with only relatively crude interstellar rocket drives, aliens should have been able to 'colonise the entire galaxy on a cosmically short timescale,' states Crawford in Scientific American .

One answer, according to evolutionist Stephen Jay Gould, has chilling implications. 'Perhaps any society that could build a technology for such interplanetary travel must first pass through a period of potential destruction where technological capacity outstrips social or moral restraint. Perhaps, no, or very few, societies can ever emerge intact from such a crucial episode.'

# Article: Problems With Alein Communication

**The Daily Galazy: *Today’s Technology May be Too Primitive to Detect Advanced ET Life*. 5/11/2011**

Some of the world's leading astronomers -- including Great Britain's astronomer royal, Sir Martin Rees -- believe aliens, rather than using different radio waves or visible light to signal, may be using an entirely different communication medium such as ghostly neutrinos or with gravitational waves (ripples in the fabric of space-time) or using communication mechanisms we cannot begin to fathom.

“The fact that we have not yet found the slightest evidence for life -- much less intelligence -- beyond this Earth," said Arthur C. Clarke, "does not surprise or disappoint me in the least. Our technology must still be laughably primitive, we may be like jungle savages listening for the throbbing of tom-toms while the ether around them carries more words per second than they could utter in a lifetime."

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“They could be staring us in the face and we just don’t recognize them. The problem is that we’re looking for something very much like us, assuming that they at least have something like the same mathematics and technology."

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Frank Drake, the founder of SETI and Drake's Equation, believes that satellite TV and the “digital revolution” is making humanity invisible to aliens by cutting the transmission of TV and radio signals into space. The earth is currently surrounded by a 50 light year-wide “shell” of radiation from analogue TV, radio and radar transmissions. According to Drake, digital TV signals would look like white noise to a race of observing aliens.

Although the signals have spread far enough to reach many nearby star systems, they are rapidly vanishing in the wake of digital technology, said Drake. In the 1960s, Drake spearheaded the conversion of the Arecibo Observatory to a radio astronomy center. As a researcher, Drake was involved in the early work on pulsars. Drake also designed the Pioneer plaque with Carl Sagan in 1972, the first physical message sent into space. The plaque was designed to be understandable by extraterrestrials should they encounter it.

Milan Cirkovic of the Astronomical Observatory in Belgrade, points out that the median age of terrestrial planets in the Milky Way is about 1.8 gigayears (one billion years) greater than the age of the Earth and the Solar System, which means that the median age of technological civilizations should be greater than the age of human civilization by the same amount. The vastness of this interval indicates that one or more processes must suppress observability of extraterrestrial communities.

  Since at this point, there is no direct and/or widely apparent evidence that extraterrestrial life exists, it likely means one of the following:

We are (A) the first intelligent beings ever to become capable of making our presence known, and leaving our planet. At this point, there are no other life forms out there as advanced as us. Or perhaps extraterrestrial life does exists, but for some reason extraterrestrial life is so very rare and so very far away we’ll never make contact anyway -- making extraterrestrial life nonexistent in a practical sense at least.

Or is it (B) that many advanced civilizations have existed before us, but without exception, they have for some unknown reason, existed and/or expanded in such a way that they are completely undetectable by our instruments.

Or is it (C) There have been others, but they have all run into some sort of “cosmic roadblock” that eventually destroys them, or at least prevents their expansion beyond a small area.

Since Earth’s placement in space and time appears to be unremarkably random, proposition “A” seems fairly unlikely. Assuming humans evolved like other forms of life into our present state due to natural selection, then there's really nothing all that mystical, special or remarkable about our development as a species either. Due to the sheer numbers, there are almost certainly other planets capable of supporting at least some form of life. If that is so, then for Earthlings to be the very first species ever to make a noticeable mark on the Universe, from a statistical perspective, is incredibly unlikely.

For proposition “B” to be correct would defy all logic. If potentially thousands, or even millions of advanced extraterrestrial civilizations exist in the known Universe, then why would all of them, without exception, choose to expand or exist in such a way that they are completely undetectable? It’s conceivable that some might, or perhaps even the majority, but for all of them to be completely undetectable civilizations does not seem likely either.   Proposition C in some ways, appears to be more likely than A or B. If “survival of the fittest” follows similar pathways on other worlds, then our own “civilized” nature could be somewhat typical of extraterrestrial civilizations that have, or do, exist. Somehow, we all get to the point where we end up killing ourselves in a natural course of technological development and thereby self-inflict our own “cosmic roadblock”.

**Asteroids Affirmative**

# Asteroids Affirmative

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# Explanation

Major asteroid impacts are, within our life times, extremely rare events. Even though many small rocks from space collide with the Earth every year, the vast majority burn up in the atmosphere and never actually reach the Earth. Most of us cannot remember a time when an asteroid hit the Earth, because they happen so infrequently. Despite this, we know for certain that large asteroids exist and have the potential to do great harm. The most famous example is something many learned in school – that an enormous asteroid collided with Earth 65 million years ago and resulted in the extinction of the dinosaurs, as well as much of the other life at the time

Can the same fate befall humans? Currently, NASA is tasked with answering that very question. Congress has asked NASA to keep track of asteroids with the potential to hit the Earth, called Near Earth Objects (NEOs). However, due to inadequate funding, NASA will not be able to say with certainty that the Earth is safe from one of these major impacts. The affirmative argues that restoring funding and placing new instruments in orbit around Venus will allow us to find any asteroid that will impact the Earth. This will give us adequate time, if necessary, to develop a strategy to deflect an incoming asteroid so that it does not damage the Earth. In addition to this, further study of asteroids as a result of the plan will lay the foundation for visits to resource rich NEOs and open up the possibility of mining asteroids.

The solvency of this affirmative argues that telescopes placed in orbit are the best way to locate potential impactors because they can view the solar system from an angle that telescopes on Earth cannot. It also argues that the technology to deflect asteroids and avert disaster exists in the status quo – provided that we have enough advance warning to put these measures into action.

# Glossary

**Asteroid –** A small rocky object orbiting the earth

**Telescope** – an instrument designed to make distant objects appear nearer. Telescopes exist that search for many different frequencies of waves, from radio waves to light waves to ultraviolet waves

**Tunguska –** Refers to the last major asteroid impact on Earth, happening in 1908 over Tunguska, Siberia. The impact flattened 830 square miles of forest and could be heard all the way in England

**Chicxulub** **–** Refers to an enormous impact crater 110 miles in diameter found beneath the ocean in the Yucatan peninsula. The meteorite that crashed to create the Chicxulub crater is believed to be the one that caused the dinosaurs to go extinct 65 million years ago.

**Ejecta** – Material that is forced out of the ground as the result of a meteorite striking a surface.

**Planetary defense** – attempts to protect planet Earth from asteroid strikes

**Deflection** – Deflection of an asteroid refers to the process of altering its course or attempting to destroy it so that it cannot hit the Earth

**Hayabusa** – Hayabusa is the name of an unmanned spacecraft launched by Japan. It was the first spacecraft from any country that successfully traveled to a near Earth asteroid and returned to Earth with a sample.

**Teleoperated** – operated remotely. Robotic spacecraft are teleoperated from Earth.

**Impactor –** an object that collides with another body. A meteor is an impactor

**Albedo –** The tendency of an object in space to reflect light. An object with a high albedo will appear bright in the night sky because it reflects a lot of light.

**Orbital plane** – the imaginary plane on which something orbits the sun.

**Testament** – in this context, a testament to something is a tribute or a symbol of what it represents

**Trajectory –** the path of a projectile as it moves through the sky

**Crop failure** – when the crops planted by a farmer fail to grow, possibly leading to starvation

**Political hot-spot** – an area marked by instability, perhaps due to protests or weakness in the government

**Tel Aviv –** the second most populous city in Israel

**Islamabad –** Capital of Pakistan

**Industrial base –** the companies that collectively make a product. For example, the space industrial base includes companies like Boeing and Lockheed Martin that produce planes and other missile technology

**Deterministically** – An inevitable consequence of something. If something is deterministic, it is known with certainty

**Infrared** – Part of the wave spectrum. Most heat emissions show up in infrared. Thermal vision technology is designed to pick up infrared vision, for example

**Hazard** – a danger or risk

**Metallurgical –** metallurgy is the science and chemistry of the properties of metals. Something metallurgical refers to this science.

**Extraction** – to extract is to remove something useful from where it is contained.

**Viable –** capable of working successfully, feasible

**Nominal** – a minor or merely formal change that does alter the fundamental idea or original process greatly

**Mitigation –** the action of reducing the severity, seriousness, or painfulness of something

Acronyms:

**NEA –** Near Earth Asteroid

**NEO –** Near Earth Object

**NRC –** National Resource Council

**DFW –** Dallas Fort-Worth

**NASA –** National Aeronautics and Space Administratio

# 1AC [1/7]

**Contention 1: Inherency**

**NASA is currently attempting to create a record of and track Asteroids that could potentially hit Earth, also known as “Near Earth Objects.” However, it lacks both the funding and space based telescope technology necessary to do this.**

**Associated Press, 8/12/2009, “Lack of funds hampers killer asteroid hunt”,**

**http://news.ninemsn.com.au/technology/849147/nasa-cant-cope-with-killer-asteroids**

Top of Form

NASA is supposed to seek out almost all the asteroids that threaten Earth, but lacks the money to do the job. That's because even though US Congress gave the space agency this mission four years ago, it never gave NASA money to build the necessary telescopes, says a report released this week by the National Academy of Sciences. Specifically, NASA has been ordered to spot 90 per cent of potentially deadly rocks hurtling through space by 2020. Even without the money, NASA says it has completed about one-third of its assignment with its current telescope system. The agency estimates about 20,000 asteroids and comets in Earth's solar system bigger than 140m in diameter are potential threats to the planet. So far, scientists know where about 6000 of the objects are. Rocks between 140m and 1000m in diameter can devastate an entire region but not the whole planet, said Lindley Johnson, NASA's manager of the near-Earth objects program. Objects bigger than that are even more threatening. Just last month, astronomers were surprised when an object of unknown size and origin bashed into Jupiter and created an Earth-sized bruise that is still spreading. Jupiter gets slammed more often than Earth because of its immense gravity, enormous size and location. Near misses in previous years have alerted people to the threat. But when it comes to doing something about monitoring the threat, the academy concluded: ``There has been relatively little effort by the US Government.'' And the US Government is practically the only government doing anything at all, the report found. ``It shows we have a problem we're not addressing,'' said Louis Friedman, executive director of the Planetary Society, an advocacy group.

# 1AC [2/7]

**Contention 2: Harms**

**Earth has suffered over 100 major impacts in its history with the capacity to do serious damage to the planet, and another could come this century.**

**The Australian, Magazine, 10/17/2009, “'Roid rage - SCIENCE WATCH”**

It may sound like the plot of a bad science-fiction movie from the 1990s (think Deep Impact or Armageddon) but there is a one in ten chance Earth will be struck by a dangerous object from space sometime this century, according to a report just published in New Scientist. Advances in telescope technology over the past decade have enabled astronomers to identify at least 20,000 asteroids and comets that pose a risk to our planet. So real is the threat that, for the first time, the US air force recently assembled a team of scientists, military and emergency-response officials to assess the nation's ability to cope should an asteroid or comet strike. Because they're travelling at such great speed (something like 20km a second) asteroids don't have to be huge to do a lot of damage. In 1908 an asteroid estimated to have been 60m across - a mere rock by cosmic standards - exploded as it hit the lower atmosphere over Tunguska, Siberia, flattening hundreds of square kilometres of forest. And a year ago an asteroid the size of a car broke up over Sudan; a telescope observer spotted it just 20 hours before impact. If an asteroid or comet does strike, let's hope it hits land rather than sea: a two-km-wide object hitting an ocean would trigger tsunamis that would turn many of the world's coastal cities into mudflats. Earth has suffered at least 130 major impacts that scientists know of, and at least a handful have been ELEs - "extinction level events", wiping out more than 80 per cent of life on the planet. The greatest threat are from "rogue" comets dislodged by gravity from their orbits in the Oort Cloud, on the outer edge of our solar system. If one of these icy stumps were to hurtle towards Earth millions of us could be at risk. So if a killer asteroid was on a collision course with Earth, what could be done about it? Detonating a nuclear device on it, as in Armageddon, isn't a realistic option. To deflect an asteroid sufficiently from its trajectory, force would need to be applied years in advance, reports New Scientist. The best we can hope for is an early warning system that would allow us to predict the time and location of the impact. Then what? Run like hell.

# 1AC [3/7]

**An asteroid impact would darken the sky for months, cause acid rain and eventually end all life on Earth.**

John Kunich, Lieutenant Colonel in the US Air Force, “**Staff Judge Advocate 50th Space Wing, Falcon Air Force Base,** 1997**, “Planetary Defense: The Legality of Global Survival,” 41 Air Force L. Rev. 119, lexis)**

Horrific as such phenomena are, they are dwarfed by a potentially far greater hazard. The impact of a sufficiently large object on land may cause  a blackout scenario in which dust raised by the impact prevents sunlight from reaching the surface [of the Earth] for several months. Lack of sunlight terminates photosynthesis, prevents creatures from foraging for food, and leads to precipitous temperature declines... Obviously even much  [\*125]  smaller impacts would have the potential to seriously damage human civilization, perhaps irreparably.

In addition to the dust raised from the initial impact, smoke and particulate matter from vast, uncontrollable fires may greatly exacerbate this blackout effect. A large space object generates tremendous heat, regardless of whether it is destroyed in the atmosphere or physically hits the surface of the Earth. These fires can reach far beyond the impact area, due to atmospheric phenomena associated with the entry of a huge, ultra-high speed object. A huge mass of dust, smoke, and soot lofted into Earth's atmosphere could lead to effects similar to those associated with the "nuclear winter" theory, but on a much larger, much more deadly scale. Such effects are now widely believed to have been a major factor contributing to the mass extinction spasms. These cataclysmic effects may have been worsened still further by other collateral phenomena associated with the impact. For example, acid rain, pronounced depletion of the ozone layer, and massive injections of water vapor into the upper atmosphere may be indirect effects, each with its own negative consequences for life on Earth.

# 1AC [4/7]

**Even though an asteroid impact is very unlikely, we should still act. Even though it is improbable over our lifetimes, the impact is guaranteed if we wait long enough. Inaction is not worth the gamble.**

John Kunich, Lieutenant Colonel in the US Air Force, “**Staff Judge Advocate 50th Space Wing, Falcon Air Force Base,** 1997**, “Planetary Defense: The Legality of Global Survival,” 41 Air Force L. Rev. 119, lexis)**

It is true that destructive impacts of gigantic asteroids and comets are extremely rare and infrequent when compared with most other dangers humans face, with the intervals between even the smallest of such events amounting to many human generations... No one alive today, therefore, has ever witnessed such an event, and indeed there are no credible historical records of human casualties from impacts in the past millennium. Consequently, it is easy to dismiss the hazard as negligible or to ridicule those who suggest that it be treated seriously. On the other hand, as has been explained, when such impacts do occur, they are capable of producing destruction and casualties on a scale that far exceeds any other natural disasters; the results of impact by an object the size of a small mountain exceed the imagined holocaust of a full-scale nuclear war... Even the worst storms or floods or earthquakes inflict only local damage, while a large enough impact could have global consequences and place all of society at risk... Impacts are, at once, the least likely but the most dreadful of known natural catastrophes. What is the most prudent course of action when one is confronted with an extremely rare yet enormously destructive risk? Some may be tempted to do nothing, in essence gambling on the odds. But because the consequences of guessing wrong may be so severe as to mean the end of virtually all life on planet Earth, the wiser course of action would be to take reasonable steps to confront the problem. Ultimately, rare though these space strikes are, there is no doubt that they will happen again, sooner or later. To do nothing is to abdicate our duty to defend the United States, and indeed the entire world, and place our very survival in the uncertain hands of the false god of probabilities. Thus, the mission of planetary defense might be considered by the United States at some point in time, perhaps with a role played by the military, including the United States Air Force.

# 1AC [5/7]

### **Plan: The United States federal government should develop and deploy a space-based Near Earth Object detection system operating on a Venus-like orbit.**

**Contention 3: Solvency**

**The plan will be able to ensure the US is safe from Near Earth Objects for the next 100 years.**

**Robert Arentz et al, engineer who has worked at Ball Aerospace and Technologies Corp. for 34 years and presently works in Ball’s Civil and Operational Space division, 2010 “NEO Survey: An Efficient Search for Near-Earth Objects by an IR Observatory in a Venus-like Orbit,” Space, Propulsion & Energy Sciences International Forum, American Institute of Physics, http://www.astrosociology.org/Library/PDF/SPESIF2010\_Arentz-etal\_NEO-Survey.pdf**

All of this modeling supports the 2003 Science Definition Team’s (SDT) **c**onclusion that a half-meter, infrared system operating in a Venus-like orbit, by itself, will find 90 percent of all the greater than 140 meter diameter NEOs in just over seven years. While doing so, it willalso find about 70 percent of all the greater than 100 meter diameter NEOs and about 50 percent of all the greater then 50 meter diameter NEOs. Adding a groundbased visible light telescope such as Pan-STARRS1 to this spacebased infrared mission reduces the time-to-90% completion from a little over seven years to a little over five years. It is especially relevant that deep-space-based infrared is the only approach that will meet the performance levels stated above regarding the smaller NEOs**,** and is the only design that finds them in such numbers at such a high rate. Note well that these smaller NEOs constitute Boslough’s (2009) newly discovered threat régime. If, as moral societies wishing to mitigate the threat of a large-scale loss of human life, unforeseen economic disruption and massive physical infrastructure damage, coupled to the unpredictable reaction of societies to such a trauma, we look at the NEO situation from this new perspective, then for the first time in human history NASA and its industrial base (or ESA and its technical base) have the unprecedented chance, for close to $600M, to deterministically answer the question: are we safe for the next 100 years?Ifwe are, then we, as a population, will have at least attained an extensive data set regarding NEOs for future use. If we are not, then any mission like the one described herein becomes the first vital link for preventing a natural disaster of this scale**—**the only kind of natural disaster of this scale which humans can prevent**,** at least in principle. Stated another way, with enough warning time, humans can move an impact off the Earth,thus mitigating a global, life-altering threat. But like treating cancer, the key to survival is early discovery.A mission such as thisonerepresents the fastest possible means to discover, initially track, and then successfully mitigate the threat. This is no longer an arcane scientific discussion—this is now a matter of doing something relatively small and affordable that can act as an insurance policy for everyone on Earth, or in the safest outcome will yield a very large data set about NEOs for future work

# 1AC [6/7]

**The plan is key - space-based detection combined with ground assets is critical to detect potential collisions.**

**National Advisory Council, 10/6/2010, “Report of the NASA Advisory Council Ad Hoc Task Force on Planetary Defense,” http://www.nss.org/resources/library/planetarydefense/2010-NASAAdvisoryCouncilOnPlanetaryDefense.pdf**

8. To achieve the NEO search goals in a timely manner as directed by the 2005 George E. Brown NEO Survey legislation, the nation will likely require acquisition and operation of a space-based survey element in addition to ground-based systems. A spacecraft operating with sensors in the infrared band from an orbit sunward of Earth’s (e.g., a Venus-like orbit) offers great advantages in rapid search and repeat observation frequency. 9. When used in conjunction with ground-based optical observations, radar data can dramatically improve orbit knowledge of recently discovered NEOs. However, radars have limited sky coverage and can observe NEOs only at relatively close range. A modest-aperture, space-based infrared telescope with its advantageous orbital geometry (an observing location and direction different than Earth’s) could enable a much larger total of positional observations over much longer orbital tracks. Such tracking from 8 multiple solar system vantage points (e.g. Earth and a Venus-like orbit) will aid in quickly reducing orbit uncertainties when radar follow-up is unavailable. 10. While the search for the NEO population larger than 140 meters is underway and the necessary orbit precision is being obtained, there will be a transition period or window of perceived vulnerability, lasting at least two decades. Some NEOs will present worrisome probabilities of impact, and sufficient orbit precision to rule out an impact may not be obtained before a decision must be made to launch a deflection campaign. The more rapid search enabled by a space-based system will, by aiding early ground-based followup, shorten this window of vulnerability by several years. Impact threats will still appear as the catalog nears completion, but continuing observations will reduce uncertainty and increase warning time.

# 1AC [7/7]

**Also, after asteroid discovery, the technology is in reach to successfully deflected an asteroid and saved humanity.**

**Kunio M. Sayanagi, postdoctoral research fellow in the Division for Geological and Planetary Sciences at the California Institute of Technology, 4/4/08, “How to Deflect an Asteroid”, http://arstechnica.com/science/news/2008/04/how-to-deflect-an-asteroid.ars**

The report presents computer simulations that calculate the minimum orbital velocity change we must impart on the asteroids to deflect them away from Earth. A larger velocity change requires a stronger force, and thus imposes a greater technological and financial challenge. To make the exercise realistic, the authors considered performing their deflection maneuvers only when the asteroids cross the orbit of Earth—as the asteroids under consideration are NEAs, they have repeated Earth orbit crossings leading up to the predicted impact dates. As expected, in general, the authors' calculations show that greater speed changes are needed as the hypothesized impact date comes closer. However, a careful examination also reveals that there are windows of opportunity in which deflection becomes considerably easier largely due to the relative orbital geometry of the asteroids and Earth**.** For example, in the case of 99942 Apophis, estimated to be a 400 meter chunk of rock, an impactor with 300 kg mass can deflect the asteroid to safety with a carefully angled interception on January 27th, 2020, about 16 years before impact. The authors note that such a deflection maneuver is already achievable with currently existing technologies. However, their study illustrates that things are not always that easy.

The other asteroid they considered, 2004 VD17, has an orbit closely overlapping that of Earth's over a longer span than 99942 Apophis does, and such orbital characteristics makes its deflection much more tricky. Still, the scientists found windows of opportunity such as one in 2021, 81 years before its hypothesized collision with Earth, in which an impactor weighing about a ton could deflect the asteroid away from Earth. The authors' findings also come with a bit of bad news. While it may be technologically feasible to exert a force large enough to deflect 2004 VD17, their calculations also reveal that the impactor could shatter the asteroid, which is equivalent to converting an approaching rifle bullet into a shotgun round, with consequences that are unpredictable at best. 99942 Apophis, in contrast, should survive the relatively modest forces required to deflect it.

This study by Carusi et al. shows that deflecting real asteroids is within reach of currently existing technologies, given enough time and planning. By definition, NEAs orbit near Earth, so any that threaten us are expected to have a few close encounters with Earth, during which they are easy to find, before the final collision. Therefore, the long planning period considered in this study is realistic. The current study's strategy will not, however, work well for deflecting objects with highly elliptical orbits such as long period comets; nevertheless, most objects that impose significant threats to Earth are NEAs since their orbits bring them so close to here. The study highlights the importance of efforts such as the SpaceWatch project hosted by the University of Arizona—its goal is to find and track all objects with chances of impacting Earth. It may well turn out that spotting an asteroid heading our way before it is too late is far more difficult than developing technologies to deflect them.

# Small Asteroid Advantage

**[\_\_\_\_] Even a small asteroid on the scale of what hits earth every year could spark an accidental nuclear war.**

**Leonard David, senior space writer, Space.com, 6/7/2002, “First Strike or Asteroid Impact?”, http://abob.libs.uga.edu/bobk/ccc/cc060702.html**

Military strategists and space scientists that wonder and worry about a run-in between Earth and a comet or asteroid have additional worries in these trying times. With world tensions being the way they are, even a small incoming space rock, detonating over any number of political hot-spots, could trigger a country's nuclear response convinced it was attacked by an enemy. Getting to know better the celestial neighborhood, chock full of passer-by asteroids and comets is more than a good idea. Not only can these objects become troublesome visitors, they are also resource-rich and scientifically bountiful worlds. Slowly, an action plan is taking shape. Noted asteroid and comet experts met here May 23-27, taking part in the National Space Society's International Space Development Conference 2002. Being struck by a giant asteroid or comet isn't the main concern for Air Force Brigadier General Simon Worden, deputy director of operations for the United States Space Command at Peterson Air Force Base, Colorado. He sweats the small stuff. Worden painted a picture of the next steps needed in planetary defense. His views are not from U.S. Department of Defense policy but are his own personal perspectives, drawing upon a professional background of astronomy. For example, Worden said, several tens of thousands of years ago an asteroid just 165-feet (50 meters) in diameter punched a giant hole in the ground near Winslow, Arizona. Then there was the Tunguska event. In June 1908, a massive fireball breached the sky, then exploded high above the Tunguska River valley in Siberia. Thought to be in the range of 165-feet (50 meters) to 330 feet (100 meters) in size, that object created a devastating blast equal to a 5 to 10 megaton nuclear explosion. A similar event is thought to have taken place in the late 1940s in Kazakhstan. "There's probably several hundred thousand of these 100-meter or so objects...the kind of ones that we worry about," Worden said. However, these are not the big cosmic bruisers linked with killing off dinosaurs or creating global catastrophes. On the other hand, if you happen to be within a few tens of miles from the explosion produced by one of these smaller near-Earth objects, "you might think it's a pretty serious catastrophe," Worden said. "The serious planetary defense efforts that we might mount in the next few decades will be directed at much smaller things," Worden said. Some 80 percent of the smaller objects cross the Earth's orbit, "some of which are potentially threatening, or could be in the centuries ahead," he said. Nuclear trigger One set of high-tech military satellites is on special round-the-clock vigil. They perform global lookout duty for missile launches. However, they also spot meteor fireballs blazing through Earth's atmosphere. Roughly 30 fireballs detonate each year in the upper atmosphere, creating equivalent to a one-kiloton bomb burst, or larger, Worden said. "These things hit every year and look like nuclear weapons. And a couple times a century they actually hit and cause a lot of damage," Worden said. "We now have 8 or 10 countries around the world with nuclear weapons...and not all of them have very good early warning systems. If one of these things hits, say anywhere in India or Pakistan today, we would have a very bad situation. It would be awfully hard to explain to them that it wasn't the other guy," Worden pointed out. Similarly, a fireball-caused blast over Tel Aviv or Islamabad "could be easily confused as a nuclear detonation and it may trigger a war," Worden said. Meanwhile, now moving through the U.S. Defense Department circles, Worden added, is a study delving into issues of possibly setting up an asteroid warning system. That system could find a home within the Cheyenne Mountain Complex outside Colorado Springs, Colorado. The complex is the nerve center for the North American Aerospace Defense Command (NORAD) and United States Space Command missions. Next steps Where do we go from here? An important step, Worden said, is cataloging all of the objects that are potentially threatening, down to those small objects that could hit and destroy a city. To do this type of charting, military strategists now champion a space-based network of sensors that keep an eye on Earth-circling satellites. These same space sentinels could serve double-time and detect small asteroids, he said.

# Mining Advantage

**[\_\_\_\_] The plan’s technology and identification satellites could be used to explore and ultimately visit these Near Earth objects.**

**National Advisory Council, 10/6/2010, “Report of the NASA Advisory Council Ad Hoc Task Force on Planetary Defense,” http://www.nss.org/resources/library/planetarydefense/2010-NASAAdvisoryCouncilOnPlanetaryDefense.pdf**

2.1. NEO Search: To implement this recommendation, the Task Force recommends that NASA immediately initiate a space-based infrared telescopic NEO search project as the primary means of meeting the congressionally mandated George E. Brown NEO Survey goal. NASA was tasked to discover 90 percent of the NEOs larger than 140 meters by the end of 2020 as part of the NASA Authorization Act of 2005 (Public Law No. 109-155). Both ground- and space-based options for meeting the George E. Brown, Jr. NEO Survey goals have been investigated. Although NASA should continue to assist state-of -the-art ground-based optical surveys, including those coming on line or planned by other agencies (e.g., PanSTARRS, LSST), one or more space-based infrared (IR) telescopes in an orbit interior to Earth’s (e.g., a Venus-like orbit) offers several search efficiency advantages. Compared with ground-based optical systems, such space-based systems possess greater discovery efficiency and can more accurately determine the sizes and orbits of potentially threatening objects. The cost of such a survey asset is comparable to the multiple dedicated ground-based alternatives required, and will rapidly meet the legislated completion goal (probably within seven years). Additionally, a space-based survey, with its advantageous observing geometry and frequency, will enable prompt and precise orbit determination of newly discovered NEOs in collaboration with ground-based optical and radar systems, reducing the need for actual deflection campaigns. NASA should also examine the additional costs and observing advantages of a pair of such Venus-orbit survey telescopes, both to complete the overall survey more rapidly and aid in collapsing the error ellipse of worrisome NEOs. These enhanced capabilities may further reduce unnecessary launches of in situ tracking or deflection spacecraft. Although some NEOs are potentially hazardous, their periodic close approaches to Earth also make them among the most accessible objects in the solar system for robotic and human exploration. A space-based IR survey telescope would efficiently find both exploration targets and threatening NEOs currently inaccessible to observation by ground-based systems.

**[\_\_\_\_] The plan would allow us to mine the asteroids and harvest their resources.**

**Mary Beth Murrill and Mark Whalen, NASA employee and Team Leader, Internal Communications at the Jet Propulsion Laboratory, 7/24/98 “JPL will establish Near-Earth Object Program Office for NASA,” July 24, http://neo.jpl.nasa.gov/program/neo.html**

Yeomans noted that personnel within the program office will maintain an up-to-date database of near-Earth objects and "routinely propagate their motions forward for tens of years to see whether any of these objects will make interesting, close-Earth approaches." This activity is not only for hazard assessment, he said, but also to identify optimal opportunities for ground-and space-based observations of these objects and "to identify which bodies might be exploited for their mineral wealth in the next century. Asteroids offer extraordinary mineral resources for the structures required to colonize the inner solar system and comets, and with their vast supplies of water ice, could provide life-sustaining water as well as the liquid oxygen and hydrogen required for rocket fuel." "It seems ironic that the very objects that bear watching because they could threaten Earth are the same ones that are most easily accessible to future space missions - missions that might exploit their considerable resources," he said.

# Mining Advantage

**[\_\_\_\_] Mining asteroids would provide infinite resources, help to initiate colonization of space, and serve as a fall-back for global disaster.**

**Mark Sonter, dependent scientific consultant working in the Australian mining and metallurgical industries, national space society, 2/9/2006, “Asteroid Mining: Key to the Space Economy”** [**http://www.space.com/2032-asteroid-mining-key-space-economy.html**](http://www.space.com/2032-asteroid-mining-key-space-economy.html)

The Near Earth Asteroids offer both threat and promise. They present the threat of planetary impact with regional or global disaster. And they also offer the promise of resources to support humanity's long-term prosperity on Earth, and our movement into space and the solar system. The technologies needed to return asteroidal resources to Earth Orbit (and thus catalyze our colonization of space) will also enable the deflection of at least some of the impact-threat objects. We should develop these technologies, with all due speed! Development and operation of future in-orbit infrastructure (for example, orbital hotels, satellite solar power stations, earth-moon transport node satellites, zero-g manufacturing facilities) will require large masses of materials for construction, shielding, and ballast; and also large quantities of propellant for station-keeping and orbit-change maneuvers, and for fuelling craft departing for lunar or interplanetary destinations. Spectroscopic studies suggest, and 'ground-truth' chemical assays of meteorites confirm, that a wide range of resources are present in asteroids and comets, including nickel-iron metal, silicate minerals, semiconductor and platinum group metals, water, bituminous hydrocarbons, and trapped or frozen gases including carbon dioxide and ammonia. As one startling pointer to the unexpected riches in asteroids, many stony and stony-iron meteorites contain Platinum Group Metals at grades of up to 100 ppm (or 100 grams per ton). Operating open pit platinum and gold mines in South Africa and elsewhere mine ores of grade 5 to 10 ppm, so grades of 10 to 20 times higher would be regarded as spectacular if available in quantity, on Earth. Water is an obvious first, and key, potential product from asteroid mines, as it could be used for return trip propulsion via steam rocket. About 10% of Near-Earth Asteroids are energetically more accessible (easier to get to) than the Moon (i.e. under 6 km/s from LEO), and a substantial minority of these have return-to-Earth transfer orbit injection delta-v's of only 1 to 2 km/s. Return of resources from some of these NEAs to low or high earth orbit may therefore be competitive versus earth-sourced supplies. Our knowledge of asteroids and comets has expanded dramatically in the last ten years, with images and spectra of asteroids and comets from flybys, rendezvous, and impacts (for example asteroids Gaspra, Ida, Mathilde, the vast image collection from Eros, Itokawa, and others; comets Halley, Borrelly, Tempel-1, and Wild-2. And radar images of asteroids Toutatis, Castalia, Geographos, Kleopatra, Golevka and other... These images show extraordinary variations in structure, strength, porosity, surface features. The total number of identified NEAs has increased from about 300 to more than 3,000 in the period 1995 to 2005. The most accessible group of NEAs for resource recovery is a subset of the Potentially Hazardous Asteroids (PHAs). These are bodies (about 770 now discovered) which approach to within 7.5 million km of earth orbit. The smaller subset of those with orbits which are earth-orbit-grazing give intermittently very low delta-v return opportunities (that is it is easy velocity wise to return to Earth). These are also the bodies which humanity should want to learn about in terms of surface properties and strength so as to plan deflection missions, in case we should ever find one on a collision course with us. Professor John Lewis has pointed out (in Mining the Sky) that the resources of the solar system (the most accessible of which being those in the NEAs) can permanently support in first-world comfort some quadrillion people. In other words, the resources of the solar system are essentially infinite... And they are there for us to use, to invest consciousness into the universe, no less. It's time for humankind to come out of its shell, and begin to grow!! So both for species protection and for the expansion of humanity into the solar system, we need to characterize these objects and learn how to mine and manage them.

# Inherency Extensions

**[\_\_\_\_]**

### **[\_\_\_\_] There are not enough resources currently allocated to asteroid detection and we are not ready to act if we do find one.**

**Nancy Atkinson, University Today Staff Writer, 1/22/2010, Universe Today staff writer, “Asteroid Detection, Defection Needs More Money, Report Says” ,** [**http://www.universetoday.com/51811/asteroid-detection-deflection-needs-more-money-report-says/**](http://www.universetoday.com/51811/asteroid-detection-deflection-needs-more-money-report-says/)

Are we ready to act if an asteroid or comet were to pose a threat to our planet? No, says a new report from the National Research Council. Plus, we don’t have the resources in place to detect all the possible dangerous objects out there. The report lays out options NASA could follow to detect more near-Earth objects (NEOs) that could potentially cross Earth’s orbit, and says the $4 million the U.S. spends annually to search for NE Os is insufficient to meet a congressionally mandated requirement to detect NEOs that could threaten Earth. “To do what Congress mandated NASA to do is going to take new technology, bigger telescopes with wider fields,” said Don Yeomans, Manager of NASA’s Near Earth Object Program Office, speaking at the American Geophysical Union conference last month. However, Yeomans said work is being done to improve the quality and quantity of the search for potentially dangerous asteroids and comets. “We have a long term goal to have three more 1.8 meter telescopes,” he said, “and the Large Synoptic Survey Telescope with an 8.4 meter aperture in 2016. Once these new facilities are in place, the data input will be like drinking from a fire hose, and the rate of warnings will go up by a factor of 40.” But getting all these facilities, and more, online and running will take continued and additional funding.

**[\_\_\_\_] Even if funding has been increased telescopes in orbit are key, which do not exist in the status quo.**

**National Research Council, Committee to Review Near-Earth-Object Surveys and Hazard Mitigation Strategies, 2010, “Defending Planet Earth: Near-Earth-Object Surveys and Hazard Mitigation Strategies”**

The pursuit of NEOs as small as 140 meters in diameter requires that more advanced telescope systems be constructed and used to detect these objects. Required- for ground-based telescopes for example, are larger-diameter telescope mirrors to increase light-gathering power in order to observe smaller (therefore fainter at a given loca­tion) objects: imaging instruments with larger fields of view on the sky in order to maximize sky coverage for the surveys: more advanced observing strategies for optimizing NEO detection in the areas of the sky that are searched; faster operating detectors; and large data-storage capabilities. Because of the rate of motion of asteroids across the sky, exposures are limited to about 30 seconds. A telescope needs to be able to gather sufficient light from dim objects in that short time in order to achieve the goal—a smaller telescope using longer exposures to reach that magnitude will not suffice. Multiple smaller telescopes imaging the same field to make up the aperture will work, but smaller telescopes imaging fields nonsimultaneously will not. There are cost, schedule, and technical performance risks involved with the construction of any large-diameter mirror or large detector, although the risk for such ground-based telescopes is less than that for space-based telescopes.

The new systems described below are examples of ones that could contribute significantly to the detection of NEOs that could impact Earth in the future. Such systems thus could support efforts required to meet the mandated goal.

# Inherency Extensions

**[\_\_\_\_]**

### **[\_\_\_\_] There are no status quo programs with enough money to deal with asteroids.**

**US News, 3/7/07, “DIRECTOR OF ASTRONOMY LAB PROGRAM AT UNIVERSITY OF NORTH TEXAS COMMENTS ON CONFERENCE EXAMINING THREAT FROM ASTEROIDS”**

A conference underway this week in Washington D.C. is focusing on the potential threat of an asteroid striking the earth. The director of the astronomy lab program at the University of North Texas says the threat is real, but the problem is there's no money for any tracking efforts. Ron DiIulio says asteroid searches are going on all the time. But he adds to deal with the problem requires a two-step approach. He says, "First, we have to identify the potentially hazardous asteroids. Far too often, we see them when they pass away from the earth, but we didn't know they were coming. Secondly, we have to deflect or alter their path. NASA has plans and methods to do this, but what happens is we need to develop interest in it. An asteroid the size of a football field could take out the entire DFW area." The "Planetary Defense Conference" is specifically concentrating on the threat posed by the asteroid Apophis, which could pass within 18,000 miles of Earth twice between 2029 and 2036. NASA predicts it would cost $1billion to find 90 percent of the 20,000 potentially hazardous asteroids and comets by 2020. DiIulio says UNT is already using telescopes at the Monroe Robotic Observatory near Gainesville to track asteroids. "We are using four of our telescopes at the Monroe observatory to look for asteroids. Just last week, we identified three known asteroids." DiIulio hopes that within a year, UNT will be able to take part in the Telescopes In Education program to help track these asteroids.

# Impact Extensions – Prefer High Magnitude Impacts

**[\_\_\_\_]**

**[\_\_\_\_] Prefer our impact because it is the only one that results in extinction. Even a war that killed 99% of humans is very different than an asteroid because there is still a slim chance of survival.**

**Jason G. Matheny Department of Health Policy and Management, Bloomberg School of Public Health, Johns Hopkins University 2007, “Reducing the Risk of Human Extinction” Risk Analysis, Vol. 27, No. 5, 2007**

Even if extinction events are improbable, the expected values of countermeasures could be large, as they include the value of all future lives**.** This introduces a discontinuity between the CEA of extinction and nonextinction risks. Even though the risk to any existing individual of dying in a car crash is much greater than the risk of dying in an asteroid impact, asteroids pose a much greater risk to the existence of future generations (we are not likely to crash all our cars at once**)** (Chapman, 2004). The “death-toll” of an extinction-level asteroid impact is the population of Earth, plus all the descendents of that population who would otherwise have existed if not for the impact. There is thus a discontinuity between risks that threaten 99% of humanity and those that threaten 100%.

**[\_\_\_\_]**

**[\_\_\_\_] Prioritizing a high probability impact assumes that it is okay to be wrong. One asteroid could cause extinction, which means it is not worth the risk.**

**Brent W. Barbee, Aerospace Engineer and Planetary Defense Scientist with the Emergent Space Technologies company in Greenbelt, Maryland, teaches graduate Astrodynamics in the Department of Aerospace Engineering at The University of Maryland, 4/1/2009 “Planetary Defense”**

It is generally accepted that statistics and probability theory is the best way to handle partial information problems. Gamblers and insurance companies employ it extensively. However, one of the underlying premises is that it is acceptable to be wrong sometimes. If a gambler makes a bad play, the hope is that the gambler has made more good plays than bad ones and still comes out ahead. This however is not applicable to planetary defense against NEOs. Being wrong just once may prove fatal to millions of people or to our entire species. If we trust our statistical estimates of the NEO population and our perceived collision probabilities too much, we risk horrific damage or even extinction. This is how we must define the limit for how useful probability theory is in the decision-making process for defense against NEOs.

# Impact Extensions – Asteroid Killed the Dinosaurs

**[\_\_\_\_]**

**[\_\_\_\_] Geological evidence, including an iridium layer at the same time as the dinosaur extinction, proves that an asteroid was the cause.**

David Sunfellow**, writer for the News Brief, BS in astronomy, 11/17/1995 “Doomsday Asteroids”, http://www.nhne.com/articles/saasteroids.html**

Using the moon's potholed surface as a reference point, Shoemaker set out to see how often celestial objects smashed into the moon and, by extension, also struck the Earth. With the help of modern satellite and aerial surveillance, Shoemaker and other scientists soon identified over 200 impact sites around the planet. One of these impact sites, which measured 100 miles across and which was buried a mile beneath the Earth surface, dated back 64 million years ago--the exact same time dinosaurs mysteriously vanished from the earth. Supporting the idea that whatever struck the Earth 64 million years ago unleashed a global catastrophe, geologists the world over have discovered a dark ring in the geological history of the planet that contains elements very common to asteroids, but very rare on Earth. The geological records above the dark layer contain records of mammals and other recent life forms, while the geological records below contain the records of dinosaurs and other prehistoric creatures. The dark layer also bears witness to some kind of massive global firestorm. And while scientists still aren't sure how, exactly, the dinosaurs were killed off (or, for that matter, how exactly, two thirds of the rest of the Earth's species were killed off and 90% of the Earth's biomass burned up), there is evidence: The skies of the Earth exploded into flames Wild fires engulfed the planet's forests The skies were probably darkened for months, possibly for years All kinds of geological disturbances, such as volcanic eruptions and lava flows, were ignited.

**[\_\_\_\_]**

**[\_\_\_\_] Past impacts prove that asteroids are capable of mass extinction.**

**Michael P. Stone, Visiting Assistant Professor of Economics at Quinnipiac University, 2004, 59 U. Miami L. Rev. 435 (2004-2005), “Anti-Prognostication”**

Among the natural catastrophes, Posner claims that the catastrophic risk with the greatest potential for harm is that of an asteroid collision.55 It is believed that roughly 250 million years ago, an asteroid collision resulted in the extinction of ninety percent of the earth's species (p. 25). Likewise, some sixty-five million years ago, it is believed that an asteroid collision may have resulted in the extinction of the dinosaurs, although paleontologists disagree over the actual cause of extinction (p. 25). The dominant view is that the dust emitted from the asteroid strike impeded photosynthesis and consequently caused the dinosaurs to starve to death (p. 25). An alternative view supposes that the synergy of dust, forest fires, and sulfuric acid emitted from the vaporizing of sulfate rock caused the extinction of the dinosaurs (p. 25). Regardless of which story is correct, the "real world" effect of asteroid impact is clear. Were a large enough asteroid to strike the earth, the extinction or near extinction of the human race could result from a "combination of fire, concussion, enormous tidal waves, and the blocking for several years of the sunlight required for crops and other plant life" (p. 25).

# AT: Focus on Earth’s Problems

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Human extinction is more likely to come from an asteroid, not a man made problem.**

**Dermot Purgavie, Journalist and American Correspondent for the London Daily Mail, 6/12/1994, “Catch a Falling Asteroid”**

It's out there somewhere. A big galactic boulder with bad intentions. The doomsday rock. Travelling at 54,000mph, it is on a collision course with the Earth, packed with 10,000 times more energy than all the world's nuclear weapons. It could hit with the percussive force of 100 million megatons of TNT, punching a crater 25 miles deep and 112 miles wide, creating a vast fireball and a 20,000mph shockwave. Vaporised stone burns a hole through the atmosphere, the nitrogen and oxygen in the air combine as nitric acid and the entire planet is shrouded in a cloud of dust and debris that blocks out sunlight. In the cold and the dark, all plants and animals perish, man becomes extinct, civilisation ends. A killer asteroid, like the one that did for the dinosaurs, has now done for us too. Relax. Do not cancel your holidays. The Earth-crushing, life-quenching asteroid probably won't arrive this year, perhaps not this decade, maybe not in the next century. On the other hand, who knows? It's out there and it's coming. The sky really is falling. It's just a matter of when. In the perilous game of cosmic pinball, there are perhaps 4,000 asteroids on an orbit that intersects with Earth's that are big enough - half a mile in diameter and up - to snuff us out or at least blast us back to the Stone Age. And the experts say that the chances of the world and one of them arriving at the same place at the same apocalyptic moment have become relatively high in celestial terms. Distilled to the comprehensible - Ladbroke's terms - it is not especially comforting. The end may be nigher than we thought. On the index of dismal expectations, it now seems that it may not be nuclear war, global warming or another ice age that finishes us off, but a space rock that has strayed out of its lane between Jupiter and Mars. The odds are, well, not astronomical.

# AT: Focus on Earth’s Problems

**[\_\_\_\_]**

**[\_\_\_\_] An asteroid strike is the only realistic way that humanity could go extinct because of our ability to adapt.**

**Bill McGuire, Professor of Geohazards at University College London, 2002, “A Guide to the End of the World,” p. 173-174)**

Probably the only piece of good news that can be taken away from my brief look at the end of the world as we know it is that although this is going to happen — and soon—the survival of our race seems to be assured, for now at least. Leaving aside the possibility of a major comet or asteroid impact on a scale of the dinosaur-killer 65 million years ago— which only happen every few hundred million years—it is highly unlikely that anything else is going to wipe out every single last one of us—all 6 billion plus—in the foreseeable future. Even the replacement of the world with which we have become so familiar with one of sweltering heat or bitter cold might not seem as scary for those of our descendants likely to be in the thick of things. After all, we are a remarkably adaptable species, and can change to match new circumstances with some aplomb. Familiar 'worlds' have certainly ended many times before, as no doubt a centenarian born and raised while Queen Victoria sat on the throne of the United Kingdom, and who lived to sec man land on the moon, would testify. The danger is, however, that the world of our children and those that follow will be a world of struggle and strife with little prospect of, and perhaps little enthusiasm for, progress as the Victorians viewed it. Indeed, it would not be entirely surprising if, at some future time, as the great coastal cities sink beneath the waves or below sheets of ice, the general consensus did not hold that there had been quite enough progress thank you—at least for a while. While I have tried in these pages to extrapolate current trends and ideas to tease out and examine somewhat depressing scenarios for the future of our planet and our race, I am sure that, to some extent at least, you would be justified in accusing me of a failure of the imagination. After all, I have rarely looked ahead beyond a few tens of thousands of years, and yet our Sun will still be bathing our planet in its life-giving warmth for another 5 billion years or more. Who knows, over that incomprehensible length of time, what Homo sapiens and the species that evolve from us will do and become. Our species and those that follow may be knocked back time and time again in the short term, but provided we learn to nurture our environment rather than exploit it, both here on Earth—before the Sun eventually swallows it up—and later, perhaps, in the solar system and the galaxy and beyond, then we have the time to do and be almost anything. Maybe now is the right time to start.

# AT: No Risk of Small Asteroid Sparking War

**[\_\_\_\_]**

**[\_\_\_\_] Many countries lack the advanced technology to distinguish between nuclear strikes and asteroids, the only way to truly be safe is the detection system of the plan,higher nuclear detonation, plan increases surveillance to prevent this.**

**A.J. Bosker, Air Force Staff Sergeant, 9/18/2002, “Asteroid Impact Could Have Triggered India-Pakistan Nuclear War, General Says”,** [**http://www.freerepublic.com/focus/news/752890/posts**](http://www.freerepublic.com/focus/news/752890/posts)

Although U.S. officials quickly determined that a meteor caused the explosion, neither India nor Pakistan have the sophisticated sensors that can determine the difference between a natural near-Earth object impact and a nuclear detonation, Worden said in written testimony.

This is one of many threats posed by NEOs, especially as more and more nations acquire nuclear weapons, said Worden, who appeared before the commission as a scientist who has studied NEOs and as a space expert familiar with the technologies that can be used to address the NEO threat. In recent years, the Department of Defense has been working to provide data about asteroid strikes to nations potentially under missile attack and to the scientific community; however, it takes several weeks for the data to be released since much of it is gathered from classified systems. Worden suggested that a NEO warning center be established that can assess and release this data as soon as possible to all interested parties while ensuring sensitive data is safeguarded. He recommended to the commission that a natural impact warning clearinghouse could be formed by adding no more than 10 people to current U.S. Space Command early warning centers.

This organization would catalog and provide credible warning information on future NEO impact problems, as well as rapidly provide information on the nature of an impact. In order for this clearinghouse to provide accurate information, NEOs must first be detected, cataloged and their orbits defined. Current ground-based systems are already cataloging large kilometer-sized objects but have a difficult time finding smaller NEOs. Most sail by the earth unnoticed until they have passed, he said. "Just about everyone knows of the 'dinosaur killer' asteroids," Worden said. "These are objects, a few kilometers across, that strike on time scales of tens of millions of years. While the prospect of such strikes grabs people's attention and makes great catastrophe movies, too much focus on these events has been counterproductive. We need to focus our energies on the smaller, more immediate threats."

The smaller strikes, while not exactly commonplace, have occurred on several occasions over the past century, with potentially devastating results, he said. "An object probably less than 100 meters in diameter struck Tunguska in Siberia in 1908, releasing the energy equivalent to a 10-megaton nuclear blast," Worden said. "In 1996, our satellite sensors detected a burst over Greenland equal to a 100-kiloton yield. Had any of these struck over a populated area, perhaps hundreds of thousands might have perished." An even worse catastrophe would be an ocean impact near a heavily populated shore by one of these Tunguska-sized objects. "The resulting tidal wave could inundate shorelines for hundreds of miles and potentially kill millions," Worden explained. "There are hundreds of thousands of objects this size that come near the Earth," he said. "We know the orbits of just a few. New space-surveillance systems capable of scanning the entire sky every few days are needed. They could enable us to completely catalog and warn of objects (less than 100 meters in diameter)."

# AT: Small Impacts Irrelevant

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Smaller asteroids have the potential to destroy entire cities and starting accidental wars.**

**Leon Jaroff, columnist for Time Magazine, 9/17/2002**, **“It’s the Little Asteroids That Get You,” http://www.time.com/time/columnist/jaroff/article/0,9565,351731,00.html?)**

Anyhow, after all that, I had good reason to think that I knew practically everything there was to know about asteroids and their threat to Earth — until this summer, when Brig. Gen Pete Worden, deputy director of the U.S. Space Command, disabused me of that notion. Though the asteroid detection program has so far concentrated on finding the big guys, civilization-ending monsters about six-tenths of a mile across or larger, Worden thinks that the more plentiful, and harder-to-detect smaller ones present a more imminent threat. Many of these asteroids are not massive enough to penetrate the atmosphere and strike Earth. But, as they hurtle into the atmosphere at tens of thousands of miles per hour, friction heats them so rapidly that they explode before reaching the ground. By now, we've all heard of the asteroid, about 300 ft. in diameter, that in 1908 exploded about five miles above the uninhabited Tunguska region of Siberia. The blast, estimated today at 10 megatons, burned and felled trees and killed wildlife over an area of several hundred square miles. And as recently as 1996, an asteroid exploded over Greenland with the equivalent of a 100 kiloton blast. Had either of these intruders from space met their demise over, say, London or New York, hundreds of thousands might have perished. That's bad enough, and we'd certainly better start looking harder for the smaller guys. But, as Worden warns, these diminutive asteroids can trigger a danger even greater that their explosive potential. Last June for example, during the standoff between nuclear powers India and Pakistan, an asteroid no more than 30 feet across exploded over the Mediterranean sea with the force of a one kiloton bomb. Had that blast occurred anywhere over the subcontinent, Worden fears, neither side could have distinguished between a nuclear blast and an exploding asteroid. Mistaking the event as a first strike, they might have launched a nuclear exchange and killed millions.

# Mining Advantage Extenions

**[\_\_\_\_]**

**[\_\_\_\_] Increasing our ability to avert an asteroid strike will also help us mine their minerals.**

**MJ** Sonter**, head of Asteroid Enterprises, “The Technical and Economic Feasibility of Mining the Near-Earth Asteroids”, 10/2/1998, http://www.spacefuture.com/archive/the\_technical\_and\_economic\_feasibility\_of\_mining\_the\_near\_earth\_asteriods.shtml**

Conclusions: Advances in asteroid astronomy and discovery rates give confidence that there are many accessible potential orebodies among the Near-Earth Asteroids. Mining and metallurgical options exist that are simple and robust. The use of NPV is crucial in project concept development. A teleoperated miner for return of volatiles from NEAs is economically feasible, using present technology, with an initial market of about 1000 tonnes per year. ---- Asteroid mining is very close to technical and economic feasibility. The technology needed to avert comet or asteroid impact is similar to that needed to recover the essentially unlimited resources contained in these bodies. Thus it is desirable to develop asteroidal resources, both to achieve wanted outcomes (namely space industrialisation, species security, and long term prosperity) and to build the capacity to avert disaster.

**[\_\_\_\_]**

**[\_\_\_\_] Further research on asteroids will help us use them for precious metals.**

**Josh Hopkins et. al, engineer in Lockheed Martin's Human Space Flight Advanced Programs, June 2010 “ Plymouth Rock An Early Human Mission to Near Earth Asteroids Using Orion Spacecraft,”** [**http://www.lockheedmartin.com/data/assets/ssc/Orion/Toolkit/OrionAsteroidMissionWhitePaperAug2010.pdf**](http://www.lockheedmartin.com/data/assets/ssc/Orion/Toolkit/OrionAsteroidMissionWhitePaperAug2010.pdf)

Asteroids have long been proposed as potential sources for resource extraction. Volatiles such as water could be gathered for use in space as propellant or life support supplies. Some asteroids are enriched in high-value platinum group metals†† which might be worth the cost of transporting them to Earthif that cost can be reduced in the future. Both the cost of extracting these resources and their value once extracted are still mostly speculative. Human missions to a few asteroids could provide data to determine whether or not asteroid mining may some daybe economically viable. Missions to asteroids could determine the abundance of these resourcesand investigate methods for operating on and near asteroids, including methods for extracting valuable material. Data on the chemical composition and geotechnical characteristics of asteroids would be as useful to engineers as to planetary scientists.

# AT: Not Technologically Feasible

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**[\_\_\_\_]**

**[\_\_\_\_] The recent Japanese mission to an asteroid proves that mining is feasible and likely.**

William Crandall, **CEO of Abundant Planet, a company pursuing asteroid mining,** 2010**, “The Age of Asteroid Mining,” http://www.abundantplanet.org/**

First mineral samples: June 2010 The return of the Hayabusa (mission animation; mission overview), bringing mineral samples from near-Earth asteroid (NEA) Itokawa, marks the onset of The Age of Asteroid Mining: Extraterrestrial resource development has begun. Hayabusa faced and overcame many challenges. It successfully returned to Earth on 13 June 2010, plummeting through the atmosphere in a fiery display, and is now scheduled to appear in its own movie. Just as a silken thread, tied to a stone and thrown across a deep gorge, makes it possible to deploy a string, a rope, and eventually a load bearing bridge, the knowledge base that has been created by the JAXA team of engineers will inform all future efforts to mine asteroid mineral wealth. They will forever be the first to have completed the loop: From Earth to asteroid and back. Business opportunities Future NEA sample-return missions are planed by the engineers at JAXA (Hayabusa 2), as well as several other groups in the European Space Agency and at NASA. (NASA’s Dawn spacecraft, launched in September 2007, aims for two main belt asteroids.) Missions to analyze, monitor, respond to, and, if necessary, move potentially hazardous NEAs (PHAs), such as Apophis, have also been planned. One such mission is projected to cost less than $20 million. The Hayabusa mission to Itokawa cost $170 million. To date, over 7,000 NEAs have been identified. Of these, 15% are easier to reach than the moon. New telescopes, such as Pan-STARRS and the LSST (generating “terabytes of data/night”), are expected to detect half a million more (500,000) over the next 15 years. This will significantly increase awareness of both Earth-impact risks and business opportunities.

# AT: Not Technologically Feasible

**[\_\_\_\_]**

**[\_\_\_\_] Asteroid mining is possible and close to feasibility.**

**MJ** Sonter, **head of Asteroid Enterprises, “The Technical and Economic Feasibility of Mining the Near-Earth Asteroids”, 10/2**/98, **http://www.spacefuture.com/archive/the\_technical\_and\_economic\_feasibility\_of\_mining\_the\_near\_earth\_asteriods.shtml**

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**[\_\_\_\_]**

**[\_\_\_\_] Moving an NEA into orbit is possible with capital investment.**

Space Studies Institute, 2002, **“A Space Roadmap: Mine the Sky, Defend the Earth, Settle the Universe”, http://ssi.org/reading/papers/space-studies-institute-roadmap/**

Professor Ed Belbruno of Princeton has discovered a clever technique to return mass from these locations to geostationary orbit for a nominal change in delta V using a lunar resonance capture orbit. Many bodies in these highly accessible earth-crossing orbits will also be easily returnable to geostationary earth orbit. Ed Belbruno has done detailed calculations showing that this is so. NEO’s in halo orbits about the Lagrange points in the Earth sun system are still hypothetical. Nonetheless, if a concerted effort is made to find them, even small ones of the proper composition could be enormously valuable. A metallic asteroid 100 meters in diameter has a mass of roughly eight million tons, this would be sufficient to construct most of the mass of 80 five Gigawatt satellite solar power stations. The research needs here are obvious, how does one move such an asteroid? How does one cut up and maneuver the fragments of metal? How does one formulate the alloys and fabricate the structures? Although there is a large body metallurgical knowledge on hand that has been developed for terrestrial purposes, that knowledge may not be directly translatable to the space environment. We need experiments and we need prototypes, in that order.

# AT: Asteroid Mining Not Profitable

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**[\_\_\_\_]**

**[\_\_\_\_] Extraplanetary mining would contribute enormously to the global economy.**

**Michael D. Campbell, Vice President and Chief Geologist/Hydrogeologist at I2M Associates, 6/9/2009, Developing Industrial Minerals, Nuclear Minerals and Commodities of Interest via Off-World Exploration and Mining”**

The potential rewards in terms of developing new mineral resources with large-scale, off-world mining operations would contribute to the world economy on an unprecedented level making the immense industrial investment worthwhile (after Schmitt, 2006). Identifying and mining nickel, cobalt, and a variety of other commodities that are in short supply on Earth, or those that could be mined, produced, and delivered more cheaply in space than on Earth could contribute to and drive the world’s technology and associated economy to a scale never before contemplated. This is based, of course, on the assumption that the economics are favorable. Large multi-national, quasi-governmental industrial groups are likely to develop over the next few decades to handle projects of such magnitude, if they haven’t already begun to assemble. In the beginning, the economics would likely be underwritten by governmental support, perhaps by a group of governments cooperating in funding and technology but followed later by some governments funding programs to accommodate their own particular self-interests

# AT: Asteroid Mining Not Profitable

**[\_\_\_\_]**

**[\_\_\_\_] Asteroid mining allows limitless growth.**

**John S. Lewis, Professor of planetary science at the University of Arizona’s Lunar and Planetory Laboratory, 1996, Rain of Iron and Ice, p. 183-222)**

Thus we come to our final, and most startling, discovers the stick that threatens Earth is also a carrot. Every negative incentive we have to master the impact hazard has a corresponding positive incentive to reap the bounty of mineral wealth in the would-be impactors by crushing them and bringing them back in tiny, safe packages, a few hundred metric tons at a time, for use both in space and on Earth. Remember that we will almost certainly have hundreds to thousands of years of warning time before a threatening global-scale impact. We need not be driven lo rash and risky actions taken precipitously under threat of death. We will almost certainly have plenty of time to deal with the problem. This approach obviates the hazards of unauthorized deflections, since that technology would be developed only under the very improbable circumstance that a threatening object is discovered onlv a few decades before impact. Then, and only then, should the technology for deflection be developed) for the sufficient purpose of forestalling imminent global disaster. Dealing with near-Earth objects should not be viewed grudgingly as a necessary expense: it is an enormously profitable investment in a limitless future: a liberation from resource shortages and limits to growth; an open door into the solar system—and beyond.

# Solvency – Deflection Successful

**[\_\_\_\_]**

**[\_\_\_\_] We have the technology to deflect asteroids, but an early detection system is essential to give us time to prepare.**

**Nancy Atkinson, , Universe Today staff writer, 1/22/2010, “Asteroid Detection, Defection Needs More Money, Report Says” ,** [**http://www.universetoday.com/51811/asteroid-detection-deflection-needs-more-money-report-says/**](http://www.universetoday.com/51811/asteroid-detection-deflection-needs-more-money-report-says/)

“We have the technology today to move an asteroid,” Schweikart said. “We just need time. It doesn’t take a huge spacecraft to do the job of altering an asteroid’s course. It just takes time. And the earlier we could send a spacecraft to either move or hit an asteroid, the less it will cost. We could spend a few hundred million dollars to avoid a $4 billion impact.” But the report put out by the NRC stresses the methods for asteroid/comet defense are new and still immature. The committee agreed that with sufficient warning, a suite of four types of mitigation is adequate to meet the threat from all NEOs, except the most

**[\_\_\_\_]**

**[\_\_\_\_] Only effective detection provides enough lead-time to deflect the asteroid.**

**Donald K. Yeomans, Manager of the NEO program office at the Jet Propulsion Laboratory, 11/8/2007, “Near-Earth Objects (NEOS) – Status of the Survey Program and Review of NASA’s 2007 Report to Congress,” http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110\_house\_hearings&docid=f:38057.pdf]**

A number of existing technologies can deflect an Earth-threatening asteroid if there is time. The primary goal of the potentially hazardous asteroid survey programs is to discover them early and provide the necessary time. An asteroid that is predicted to hit Earth would require a change in its velocity of only three millimeters per second, if this impulse were applied 20 years in advance of the impact itself. The key to a successful deflection is having sufficient time to carry it out, whether it is a slow, gentle drag of a gravity tractor, or the more impulsive shove from an impacting spacecraft or explosive device. In either case, the verification process will be required to ensure the deflection maneuver was successful, and to ensure the object’s subsequent motion would not put it on yet another Earth-impacting trajectory. While suitable deflection technologies exist, none of them can be effective if we are taken by surprise. It is the aggressive survey efforts and robust radar systems that must ensure that the vast majority of potentially hazardous objects are discovered and tracked well in advance of any Earth-threatening encounters

# Solvency – Deflection Successful

**[\_\_\_\_]**

**[\_\_\_\_] Detection capabilities are key—standing deflection program is unnecessary and expensive.**

**Richard L, Park, President of the American Physical Society PARK et al. 1994, “The Lesson of Grand Forks: Can a Defense against Asteroids be Sustained?”, Hazards Due to Comets and Asteroids ed. Tom Gherels, pg. 1225-1228)**

A standing defense against large asteroid and comet impacts is rendered impractical by the long interval between events. Governments, which are under constant pressure to respond to immediate crises, are unlikely to sustain a defense against an infrequent and unpredictable threat. Nor can it be argued that such short-term priorities are misplaced. Indeed, civilization will do well to survive long enough to be threatened by a major asteroid impact. The emphasis should be on early detection, thus allowing sufficient time to mount a response to a specific threat.

# Solvency – Space Telescopes Best

**[\_\_\_\_]**

[\_\_\_\_] Space-based telescopes provide several advantages over ground based ones.

**National Research Council, Committee to Review Near-Earth-Object Surveys and Hazard Mitigation Strategies, 2010, “Defending Planet Earth: Near-Earth-Object Surveys and Hazard Mitigation Strategies”**

The 2003 NASA NEO Science Definition Team Study concluded that an infrared space telescope is a powerful and efficient means of obtaining valuable and unique detection and characterization data on NEOs (Stokes et al., 2003). The thermal infrared, which denotes wavelengths of light from about 5 to 10 microns, is the most efficient color regime for an NEO search. An orbiting infrared telescope that detects these wavelengths and has a mirror between 0.5 and 1 meter in diameter is sufficient to satisfy the goal of detecting 90 percent of potentially hazardous NEOs 140 meters in diameter or greater. Also, locating an NEO-finding observatory internal to Earth’s orbit is preferable for identifying NEOs with orbits mostly or entirely inside Earth’s orbit.

Specific advantages to space-based observations include the following:

• A space-based telescope can search for NEOs whose orbits are largely inside Earth’s orbit. These objects are difficult to find using a ground-based telescope, as observations risk interference from the Sun when pointing to the areas of the sky being searched;

• Thermal-infrared observations are immune to the bias affecting the detection of low-albedo objects in visible or near-albedo measurements (see the discussion above);

• Space-based searches can be conducted above Earth’s atmosphere, eliminating the need to calibrate the effects introduced by the atmosphere on the light from an NEO; and

• Observations can be made 24 hours a day.

# AT: Deflection Fails – International Cooperation

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] The plan alone solves—the US can deflect with no international assistance.**

**David Morrison, senior scientist at the national astrobiology institute, 2005 “ Defending the Earth Against Asteroids: The Case for a Global Response,” Science and Global Security, 13:87–103** [**http://www.princeton.edu/sgs/publications/sgs/pdf/13%201-2%20Morrision.pdf**](http://www.princeton.edu/sgs/publications/sgs/pdf/13%201-2%20Morrision.pdf)

We do not have today the technology to deflect an asteroid, especially not one of the most dangerous class, which are larger than 1 km. However, it seems reasonable to expect that if such a large asteroid is discovered, one whose impact could kill more than 1 billion people and destabilize world civilization, the space-faring nations would find a way to accomplish the deflection and save the planet. One hopes that this could be accomplished through broadly based international collaboration, but it is also plausible that one nation, such as the United States, might take the lead or even go it alone. Given such a specific threat to our planet, almost any level of expense could be justified. This effort would represent the largest and most important technological challenge ever faced, and whether it is successful or not, world civilization would be forever changed.

# AT: Deflection Fails – International Cooperation

**[\_\_\_\_]**

**[\_\_\_\_] Increasing detection capabilities will allow NASA to take the lead in asteroid detection globally and coordinate deflect efforts with other countries.**

**NASA Advisory Council, 10/6/2010, “Report of the NASA Advisory Council Ad Hoc Task Force on Planetary Defense,” http://www.nss.org/resources/library/planetarydefense/2010-NASAAdvisoryCouncilOnPlanetaryDefense.pdf**

NASA has developed a strong foundation for understanding the NEO hazard and building a long-term capability to counter a potential asteroid impact threat. By taking the steps recommended in this report, the agency can expand this expertise and lead global efforts to develop an effective capability for Planetary Defense. Society now possesses sufficiently mature space technology to provide two of the three elements necessary to prevent future damaging asteroid impacts. NASA currently searches for the largest objects of concern and issues warning information for any asteroid discovered to approach Earth. New ground- and space-based search systems can increase our capability to provide impact warning for the smaller, more numerous asteroids. Although NASA has not demonstrated a specific asteroid deflection capability, the agency’s current spaceflight technology shows that impact prevention is possible. Actual NEO deflection demonstrations are being studied and are excellent candidates to be part of future NEO science and technology missions. The missing third element for NEO impact prevention is the international community’s readiness and determination to respond to a predicted future asteroid collision with Earth. NASA is well20 positioned to take a leading role in this government and international response, but to be ready, the agency must move well beyond search, analysis, and warning to develop the practical means for actually changing a threatening asteroid’s orbit. Without the ability to detect the most numerous asteroids, to alter NEO orbits, and to lead a global effort to plan a deflection campaign, the only possible U.S. response would be evacuation and disaster response. If NASA fails to prepare for Planetary Defense, and then a sizeable random NEO strikes Earth without warning, the damage to the U.S.’s leadership and reputation would swell the tally of the event’s devastating effects. NASA should begin work now on forging its warning, technology, and leadership capacities into a global example of how to effectively shield society from a future impact.

# AT: Nuclear Deflection

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] NASA’s research shows that nuclear deflection is the best option.**

**NASA Report to Congress, 03/2007, “Near-Earth Object Survey and Deflection Analysis of Alternatives”, http://neo.jpl.nasa.gov/neo/report2007.html**

The study team assessed a series of approaches that could be used to divert a NEO potentially on a collision course with Earth. Nuclear explosives, as well as non-nuclear options, were assessed. Nuclear standoff explosions are assessed to be 10-100 times more effective than the non-nuclear alternatives analyzed in this study. Other techniques involving the surface or subsurface use of nuclear explosives may be more efficient, but they run an increased risk of fracturing the target NEO. They also carry higher development and operations risks. Non-nuclear kinetic impactors are the most mature approach and could be used in some deflection/mitigation scenarios, especially for NEOs that consist of a single small, solid body. "Slow push" mitigation techniques are the most expensive, have the lowest level of technical readiness, and their ability to both travel to and divert a threatening NEO would be limited unless mission durations of many years to decades are possible. 30-80 percent of potentially hazardous NEOs are in orbits that are beyond the capability of current or planned launch systems. Therefore, planetary gravity assist swing by trajectories or on-orbit assembly of modular propulsion systems may be needed to augment launch vehicle performance, if these objects need to be deflected.

# AT: Nuclear Deflection

**[\_\_\_\_]**

### **[\_\_\_\_] The only way to deal with asteroids with our current technology is to push them out of orbit with nuclear weapons.**

**Homeland Security News Wire, 6/30/2010, “Scientist says nuclear weapons best bet for saving Earth from asteroids,”** [**http://www.homelandsecuritynewswire.com/scientist-says-nuclear-weapons-best-bet-saving-earth-asteroids**](http://www.homelandsecuritynewswire.com/scientist-says-nuclear-weapons-best-bet-saving-earth-asteroids)

In the current state of human technology, the NRC warns, the only way to be sure is to use nuclear weapons to push these threat out of orbit: “Nuclear explosions are the only current, practical means for dealing with large NEOs (diameters greater than 1 kilometer) or as a backup for smaller ones if other methods were to fail.” Page notes that if this is indeed the case, then the [current plans](http://www.america.gov/st/peacesec-english/2009/April/20090405150637DMslahrelleK0.8071558.html) by President Obama to strive for “a world free of nuclear weapons” would have to be modified to allow for a few nuclear weapons to remain available for planetary defense.

# AT: Privatization DA / CP

**[\_\_\_\_]**

**[\_\_\_\_] The government must be involved. It is the only entity capable of organizing the search for asteroids.**

**Joshua Keating, associate editor of foreign policy magazine, 9/13/2010 “Why is it America's job to save the world from asteroids?”**

The U.S. currently spends about $5.5 million per year to track NEO's and less than a million on researching ways to counter them, but is falling far short of asteroid-detection goals. Some might say that's already too much, given the more terrestrial problems the U.S. faces. On the other hand, the United States spends more than $1 billion -- the amount NASA says it needs to meet its goal of detecting all potentially dangerous objects by 2020 -- on far less lofty goals than saving humanity from the fate of the dinosaurs. Even an asteroid just one kilometer in diameter would be enough to cause worldwide crop failures and a shift in the earth's climate. One just a few meters wide could wipe out a major city. But why, in this supposedly post-American world, is the United States expected to take the lead on this? Unlike, say, missile defense, asteroid detection and deterrence benefits all countries -- if NASA does detect a potentially dangerous asteroid, chances are it's probably going to hit somewhere else. And unlike global warming, smaller developing countries can't say that the United States should accept more of the blame for asteroids. (Though Hugo Chavez could certainly try.) Scientists have been urging the United Nations to coordinate international asteroid detection efforts for years. But despite coordinating work by the U.N. Office for Outer Space Affairs (yes, there is one), progress seems to be slow-going. There are some promising signs of other powers starting to take the lead. The Mexican Ministry of Foreign Affairs hosted a conference on international asteroid tracing earlier this year. Russia's space agency has also proposed a joint asteroid monitoring project with the European Union. The good news is we probably have some time. An object big enough to wipe out a sizeable portion of the earth's population only hits about twice every million years. But the international community's recording in coordinating the international response to much more immediate dangers like global warming its not encouraging for those who would prefer not to rely on Bruce Willis or Morgan Freeman when the big one comes some day.

# Answers To: NASA Tradeoff Disadvantage

**[\_\_\_\_]**

**[\_\_\_\_]** **The plan would save money long term – last minute efforts to deflect an asteroid would cost much more.**

**National Advisory Council, 10/6/2010, “Report of the NASA Advisory Council Ad Hoc Task Force on Planetary Defense,” http://www.nss.org/resources/library/planetarydefense/2010-NASAAdvisoryCouncilOnPlanetaryDefense.pdf**

Our ability to project a NEO’s orbit years into the future is accompanied by considerable uncertainty. The object’s orbital plane will generally be known to good accuracy, such that the intersection of that plane with the orbit of the Earth can be predicted to within a relatively few kilometers. However, except in the case of a NEO observed on its terminal impact trajectory, a threatening NEO’s exact orbital period will generally not be known accurately enough to predict whether an impact many years in the future will actually occur. Decision-makers will thus frequently face the question of how to react to a NEO with a worrisome (but uncertain) probability of impact. For example, a particular NEO may have a 2 percent chance of impacting Earth on a particular day decades in the future. Waiting until ground-based observations improve the impact prediction to, say, 50 percent confidence will make an attempted deflection far more costly, if not physically impossible. Even the prompt launch of a robotic transponder mission to improve our knowledge of the NEO’s orbit will cost several hundred million dollars for each potential impact threat. Decisions of this sort will be very unpleasant for policy-makers. The Task Force recommendations seek to minimize these situations through development and deployment of search and tracking assets that reduce the uncertainty in a NEO’s position, and thus the uncertainty in its impact probability. Reducing the number of such “worrisome probability of impact” situations via better NEO search and track technologies (producing observations that 12 prove the more likely case that the asteroid will miss Earth) will be far less expensive than launching transponder missions or an actual deflection campaign. Parallel efforts to demonstrate cost-effective deflection technologies would help deal with those few objects with impact probabilities that remain too worrisome to ignore. The Task Force recommends that NASA choose search and deflection capabilities that minimize the total combined cost of confronting future impact threats.

# Article: NASA Tasked With Cataloguing Asteroids

MPR News – 2009

(“Report: NASA lacks funding to track asteroids,” Minnesota Public Radio News, 12 August. [Online] http://minnesota.publicradio.org/display/web/2009/08/12/nasa-asteroid-watch/)

NASA is supposed to seek out almost all the asteroids that threaten Earth but lacks the money to do the job, a federal report says.

That is because even though Congress assigned the space agency this mission four years ago, it never gave NASA money to build the necessary telescopes, says the report released on Wednesday by the National Academy of Sciences.

Specifically, NASA has been ordered to spot 90 per cent of potentially deadly rocks hurtling through space by 2020.

Even without the money, NASA says it has completed about one-third of its assignment with its current telescope system.

The agency estimates that about 20,000 asteroids and comets in Earth's solar system bigger than 140 metres in diameter are potential threats to the planet. So far, scientists know where about 6,000 of the objects are.

Rocks between 140 metres and 1,000 metres in diameter can devastate an entire region but not the entire globe, said Lindley Johnson, NASA's manager of the near-Earth objects program. Objects bigger than that are even more threatening, of course.

Just last month, astronomers were surprised when an object of unknown size and origin bashed into Jupiter and created an Earth-sized bruise that still is spreading. Jupiter gets slammed more often than Earth because of its immense gravity, enormous size and location.

Disaster movies like Armageddon and near-misses in previous years frightened people and alerted them to a serious issue. But when it comes to doing something about monitoring the threat, the academy concluded, "There has been relatively little effort by the US government."

And the US government is practically the only government doing anything at all, the report found.

"It shows we have a problem we're not addressing," said Louis Friedman, executive director of the Planetary Society, an advocacy group.

NASA calculated that to spot the asteroids as required by law would cost about $US800 million ($A965 million) between now and 2020, either with a new ground-based telescope or a space observation system, Johnson said. If NASA received only $US300 million ($A362 million), it could find most asteroids bigger than 300 metres across, he said.

But so far NASA has gotten neither.

It may never get the money, said John Logsdon, a space policy professor at George Washington University.

"The program is a little bit of a lame duck," Logsdon said. There is not a big enough group pushing for the money, he said.

At the moment, NASA has identified about five near-Earth objects that pose better than a 1-in-a-million risk of hitting the planet and being big enough to cause serious damage, Johnson said.

That number changes from time to time, usually with new asteroids added and old ones removed as more information is gathered on their orbits.

The space rocks astronomers are most alert to are a 130-metre diameter rock that has a 1-in-3,000 chance of hitting Earth in 2048 and a much-talked about asteroid, Apophis, which is twice that size and has a 1-in-43,000 chance of hitting in 2036, 2037 or 2069.

# Article: Risks From Smaller Asteroids

**The Free Republic: *Near-Earth Objects Pose Threat, General Says*. September 18th. 2002**

Washington - Sep 17, 2002 This summer, much of the world watched as India and Pakistan faced-off over the disputed Kashmir region, worried that the showdown could escalate into a nuclear war.

Coincidentally, U.S. early warning satellites detected an explosion in the Earth's atmosphere June 6, at the height of the tension, with an energy release estimated to be 12 kilotons.

Fortunately the detonation, equivalent to the blast that destroyed Hiroshima, occurred over the Mediterranean Sea.

However, if it had occurred at the same latitude a few hours earlier, the result on human affairs might have been much worse, said Brig. Gen. Simon P. Worden, U.S. Space Command's deputy director for operations at Peterson Air Force Base, Colo.

Had the bright flash, accompanied by a damaging shock wave, occurred over India or Pakistan, the resulting panic could have sparked a nuclear war, Worden recently told members of the congressionally mandated Commission on the Future of the U. S. Aerospace Industry in testimony here.

Although U.S. officials quickly determined that a meteor caused the explosion, neither India nor Pakistan have the sophisticated sensors that can determine the difference between a natural near-Earth object impact and a nuclear detonation, Worden said in written testimony.

This is one of many threats posed by NEOs, especially as more and more nations acquire nuclear weapons, said Worden, who appeared before the commission as a scientist who has studied NEOs and as a space expert familiar with the technologies that can be used to address the NEO threat.

In recent years, the Department of Defense has been working to provide data about asteroid strikes to nations potentially under missile attack and to the scientific community; however, it takes several weeks for the data to be released since much of it is gathered from classified systems.

Worden suggested that a NEO warning center be established that can assess and release this data as soon as possible to all interested parties while ensuring sensitive data is safeguarded.

He recommended to the commission that a natural impact warning clearinghouse could be formed by adding no more than 10 people to current U.S. Space Command early warning centers.

This organization would catalog and provide credible warning information on future NEO impact problems, as well as rapidly provide information on the nature of an impact.

In order for this clearinghouse to provide accurate information, NEOs must first be detected, cataloged and their orbits defined.

Current ground-based systems are already cataloging large kilometer-sized objects but have a difficult

time finding smaller NEOs. Most sail by the earth unnoticed until they have passed, he said.

"Just about everyone knows of the 'dinosaur killer' asteroids," Worden said. "These are objects, a few kilometers across, that strike on time scales of tens of millions of years. While the prospect of such strikes grabs people's attention and makes great catastrophe movies, too much focus on these events has been counterproductive. We need to focus our energies on the smaller, more immediate threats."

The smaller strikes, while not exactly commonplace, have occurred on several occasions over the past century, with potentially devastating results, he said.

"An object probably less than 100 meters in diameter struck Tunguska in Siberia in 1908, releasing the energy equivalent to a 10-megaton nuclear blast," Worden said. "In 1996, our satellite sensors detected a burst over Greenland equal to a 100-kiloton yield. Had any of these struck over a populated area, perhaps hundreds of thousands might have perished."

An even worse catastrophe would be an ocean impact near a heavily populated shore by one of these Tunguska-sized objects.

"The resulting tidal wave could inundate shorelines for hundreds of miles and potentially kill millions," Worden explained.

"There are hundreds of thousands of objects this size that come near the Earth," he said. "We know the orbits of just a few. New space-surveillance systems capable of scanning the entire sky every few days are needed. They could enable us to completely catalog and warn of objects (less than 100 meters in diameter)."

According to Worden, this does not mean other groups, in particular the international scientific community, should not continue their independent efforts. But the United States is likely, for the foreseeable future, to have most of the required sensors to do this job. He added that DOD has the discipline and continuity to ensure consistent, long-term focus.

"I believe various aspects related to NEO impacts, including the possibility that an impact would be misidentified as a nuclear attack, are critical national and international security issues," he said. "The focus of NEO mitigation efforts should shift to smaller objects. The near-term threats are much more likely to come from these 'small' objects, and we might be able to divert such objects without (resorting) to nuclear devices."

The National Defense Authorization Act for Fiscal Year 2001 established the Commission on the Future of the U.S. Aerospace Industry. The commission was formed to study the future of the U.S. aerospace industry in the global economy, particularly in relationship to national security, and provide recommendations to the president and Congress.

**Asteroids Negative**

# Asteroids Negative

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# Glossary

**Astronomer** – a scientist who studies celestial bodies such as planets, stars and asteroids.

**Tunguska –** Refers to the last major asteroid impact on Earth, happening in 1908 over Tunguska, Siberia. The impact flattened 830 square miles of forest and could be heard all the way in England

**Impact winter** – After a major asteroid impact, it is hypothesized that the impact will launch enough dust into the atmosphere to block a significant amount of sun and cool the Earth for a sustained period of time.

**Spherules** – a small sphere

**Synergistically –** when the effect of two things working together is greater than the sum of its parts

**Stagnant** – showing now activity or growth, dull and sluggish

**Retard** – delay or hold back in terms of progress

**Mitigate –** to make less severe, serious, or painful

**Bureaucratic –** a bureaucratic system is one where government functions are run by appointed officials instead of elected representatives. Bureaucracies are frequently criticized for being inefficient because they lack the profit motive that makes many companies seen as more efficient.

**MPC –** Minor Planet Center

**NASA –** National Aeronautics and Space Administration

**NEO –** Near Earth Object

**ROI –** Return on Investment

# Answers To: Inherency

**[\_\_\_\_]**

**[\_\_\_\_]**

[\_\_\_\_] No need for the plan – we’ve already found most of the truly dangerous asteroids.

**David Morrison, senior scientist at the NASA Astrobiology Institute, August 2006, Working Group on Near Earth Objects, International Astronomical Union, “ Asteroid and comet impacts: the ultimate environmental catastrophe ”** [**http://rsta.royalsocietypublishing.org/content/364/1845/2041.full**](http://rsta.royalsocietypublishing.org/content/364/1845/2041.full)

The survey results have already transformed our understanding of the impact threat. If we focus on asteroids larger than 2 km, which is the nominal size for a global catastrophe, then we are already nearly 90 per cent complete. For 5 km diameters, which may be near the threshold for an extinction event, we are complete today. Thus, astronomers have already assured us that we are not due for an extinction-level impact from an asteroid within the next century. Barring a very unlikely strike by a large comet, we are not about to go the way of the dinosaurs. Thus, the rest of this paper focuses on the more frequent impacts by sub-kilometre asteroids, which are still big enough to destroy a large city or a small country, or to devastate a coastline, with possibly world-altering economic and social consequences.

# Answers To: Inherency

**[\_\_\_\_]**

[\_\_\_\_] US already participates in international NEO detection.

**National Research Council, Research Council Committee to Review Near-Earth-Object Surveys and Hazard Mitigation Strategies and Space Studies Board, 2010, “Defending Planet Earth: Near-Earth-Object Surveys and Hazard Mitigation Strategies”, http://site.ebrary.com.proxy.lib.umich.edu/lib/umich/docDetail.action?docID=10405102)/**

Recognizing that impacts from near-Earth objects represent a hazard to humanity, the United States, the European Union. Japan, and other countries cooperatively organized to identify, track, and study NEOs in an effort termed "Spaceguard." From this organization, a nonprofit group named the Spaceguard Foundation was created to coordinate NEO detection and studies: it is currently located at the European Space Agency's (ESA's) Centre for Earth Observation (ESRIN) in Frascati. Italy. The United States input to this collective effort comprises three aspects: telescopic search efforts to find NEOs, the Minor Planet Center (MPC) at the Harvard-Smithsonian Center for Astrophysics, and the NASA NEO Program Office at the Jet Propulsion Laboratory. Existing, retired, and proposed telescopic systems for the U.S. NEO searches are detailed below. Other telescopic survey, detec­tion, and characterization efforts are conducted worldwide and work synergistically with U.S. telescopic searches (e.g.. Asiago-DLR Asteroid Survey, jointly operated by the University of Padua and the German Aerospace Center [DLR|. Campo Imperatore Near-Earth Object Survey at Rome Observatory; and the Bisei Spaceguard Center of the Japanese Spaceguard Association). To date, the U.S. search effort has been the major contributor to the number of known NEOs. The functions of the two U.S. data and information-gathering offices, the MPC and the NEO Program Office, are complementary. A European data- and information-gathering office, the Near-Earth Objects Dynamic Site (NEODyS) is maintained at the University of Pisa in Italy, with a mirror site at the University of Valladolid in Spain. These three services are described below.

**[\_\_\_\_] Most recent NASA budget quadrupled funding to detecting NEOs.**

**Andrew Lawler and Sara Reardon, Writers for Science Insider 2/14/2011, “Climate Science, Asteroid Detection Big Winners in NASA Budget”, http://news.sciencemag.org/scienceinsider/2011/02/climate-science-asteroid-detection.html)/**

NASA will have to live with a stagnant budget—again. The $18.7 billion proposed by the Administration is the same amount as 2010 and 2011, and science funding would continue to hover at about $5 billion. But in the details are significant winners and losers. Earth science would grow from $1.439 billion to $1.797 billion in 2012, though House of Representatives Republicans are sure to attack a program focused on understanding global change. Meanwhile, Mars exploration—which this year stands at $438 million—would spike at $602 million next year, but plummet to less than half that amount by 2016. Funds for near-Earth object observations would quadruple to $20.4 million. And NASA Chief Financial Officer Elizabeth Robinson said the agency will kill a dark-energy mission in the hope that it can collaborate more cheaply with the European Space Agency. She added that details on how the agency will fund a massive cost overrun in the James Webb Space Telescope won't be ready until this summer.

# Answers To: Asteroid Impact Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Prioritizing low probability impacts like a large asteroid would make us paralyzed in everyday life if we followed their logic. We wouldn’t leave the house for fear of dying in a car crash or being struck by lightning.**

**David Meskill, Assistant professor of history at Dowling University, 12/9/2009 “The "One Percent Doctrine" and Environmental Faith,” Dec 9, http://davidmeskill.blogspot.com/2009/12/one-percent-doctrine-and-environmental.html**

Tom Friedman's piece today in the Times on the environment is one of the flimsiest pieces by a major columnist that I can remember ever reading. He applies Cheney's "one percent doctrine" (which is similar to the environmentalists' "precautionary principle") to the risk of environmental armageddon. But this doctrine is both intellectually incoherent and practically irrelevant. It is intellectually incoherent because it cannot be applied consistently in a world with many potential disaster scenarios. In addition to the global-warming risk, there's also the asteroid-hitting-the-earth risk, the terrorists-with-nuclear-weapons risk (Cheney's original scenario), the super-duper-pandemic risk, etc. Since each of these risks, on the "one percent doctrine," would deserve all of our attention, we cannot address all of them simultaneously. That is, even within the one-percent mentality, we'd have to begin prioritizing, making choices and trade-offs. But why then should we only make these trade-offs between responses to disaster scenarios? Why not also choose between them and other, much more cotidien, things we value? Why treat the unlikely but cataclysmic event as somehow fundamentally different, something that cannot be integrated into all the other calculations we make? And in fact, this is how we behave all the time. We get into our cars in order to buy a cup of coffee, even though there's some chance we will be killed on the way to the coffee shop. We are constantly risking death, if slightly, in order to pursue the things we value. Any creature that adopted the "precautionary principle" would sit at home - no, not even there, since there is some chance the building might collapse. That creature would neither be able to act, nor not act, since it would nowhere discover perfect safety.

# Answers To: Asteroid Impact Advantage

**[\_\_\_\_]**

[\_\_\_\_] We should not worry about asteroids right now. Humans are much more likely to cause extinction to themselves than an impact far in the future.

Farhad Manjoo, Staff writer for Slate Magazine, 1/18/2002, “The Sky is Falling? No Sweat,” http://www.wired.com/science/discoveries/news/2002/01/49837

Ever since Armageddon and Deep Impact awakened people to the danger of asteroids three years ago, there is increased worry about a collision each time an asteroid passes nearby. This week on Usenet, for example, it was possible to find people advocating the creation of Martian colonies as a way to make sure the human species survives after a big crash. Some people took issue with this suggestion. One reader of the sci.skeptic newsgroup warned that "a Mars colony would produce a small carbon copy of our Earth habitat but on rather less promising ground," and instead suggested that programs such as Pravdo's be expanded and that governments begin to seriously think about safe asteroid deflection techniques. Asteroid deflection is a well-studied topic, Pravdo said, but the various suggestions made by scientists are not generally known to the rest of the public. In addition to nuclear weapons, there may also be a variety of other ways to prevent disaster. For example, an asteroid expert told Space.com a couple years ago that "attaching a giant solar sail to the asteroid" might guide it away, and using "a giant parabolic mirror to concentrate the sun's rays and vaporize rock on the surface of the asteroid" could also do the trick. For obvious reasons, these ideas are difficult to test. "Even though some technology exists, it would have to be applied in a different way, and we wouldn't know if it would work," Pravdo said. Of course, these days, the fear of an asteroid extinction is not the first thing that comes to mind. "Right now, (humans) are the greatest threat to the survival of the human species," wrote J. Scott Miller in a discussion on Usenet's sci.space.science newsgroup. "We have built enough nuclear weapons to do the job, we have developed the biological and chemical capabilities to do the job. So, let's not point out there for possible extinction until we control down here."

# Answers To: Asteroid Impact Advantage

**[\_\_\_\_]**

**[\_\_\_\_] A large asteroid impact would not cause extinction. The “impact winter” that the affirmative claims is extremely exaggerated.**

**James Marusek, U.S. Navy Nuclear Physicist and Engineer, 3/5/2007**

**“Comet and Asteroid Threat Impact Analysis,” http://www.aero.org/conferences/planetarydefense/2007papers/P4-3--Marusek-Paper.pdf**

It has been theorized that the impact of a large comet or asteroid and the resulting fires would throw up so much dust and ash in the stratosphere that it would shut off sunlight from the surface of the planet. This would plunge the Earth into a period of darkness lasting many months and even years. In the absence of sunlight, solar heating of the Earth’s surface would come to a halt. This will lead to a severe cooling of the continents approximately 70°F (39°C) below normal and lead to an "impact winter".2 An "impact winter" is similar to a "nuclear winter" but more severe, and could lead to a new Ice Age. I feel that the threat of a dust generated "impact winter" is vastly overstated and that any dust generated "impact winter" will not be anywhere near as severe nor last as long as some predict.

• According to research from geologist, Kevin Pope, the K/T impact did not generate the quantities of fine dust needed to block the Sun completely and choke off photosynthesis. Approximately 99% of the debris produced was in the form of spherules, which are too coarse and heavy to remain suspended in the upper atmosphere for very long. Only 1% of the debris is fine dust generated from pulverized rock. If this fine dust were spread out across the entire globe, it would represent a thickness of ~ 0.001 inches (0.03 mm). Therefore the hypothesis of an "impact winter" is vastly overstated.24

• Just as dust that is kicked up into the atmosphere will block sunlight from hitting the earth, the dust will also act as an insulator trapping heat at the Earth’s surface. This includes the heat from (1) the impact and fireball, (2) firestorms, (3) fuel fires – oil, natural gas, coal, timber, methane hydrate, and (4) lava flows and volcanoes. This trapping effect will slow the decent of the temperature fall, and retard the onset of the "impact winter".

# Answers To: Asteroid Impact Advantage

**[\_\_\_\_]**

**[\_\_\_\_] An asteroid did not cause the dinosaurs to become extinct. Large volcanic eruptions fit the evidence better.**

**Michael Oard, former Meteorologist for the National Weather Service with multiple degrees in Atmospheric Science, August, 1997, “The Extinction of the Dinosaurs,” http://www.answersingenesis.org/tj/v11/i2/dinosaur.asp**

The triumph of the meteorite theory has come with much dissent, especially from palaeontologists who opted for a volcanic mechanism, often combined with marine regression, to explain the data.72–75 Even in spite of what seems like impressive confirmation of the meteorite theory and reinforced by the scientific press and news media, the dispute continues.76 If you read only the evidence for the impact theory, you would be impressed. However, if you read further the evidence for the volcanic theory, you would discover that the meteorite theory is not as well supported as it may seem. Volcanic adherents point to the evidence of massive volcanism around the K/T boundary, for instance, the 1 million km3 of Deccan basalts in India and the extensive volcanism in western North America related to the Laramide Orogeny. To them, it is more logical that the dinosaurs died out gradually from all this volcanic activity. As it turns out, iridium is also associated with volcanism, especially with dust injected into the atmosphere from basaltic extrusions.77 For instance, the fine airborne particles above an Hawaiian basaltic eruption were found to be highly enriched in iridium, much higher than in the K/T boundary clays at Gubbio and Stevns Klint.78,79 High iridium has also been associated with other volcanic eruptions and found within volcanic dust bands in the Antarctic ice cores. This fine material is of similar particle size as the K/T boundary clay. Even shocked quartz has been associated with volcanism.80–82 Impact supporters counter that this shocked quartz is only weakly deformed compared with the K/T boundary shocked quartz, and that shocked quartz is associated with known impact craters as well as nuclear bomb test sites.83,84 However, Officer and Page argue that shocked grains are not found at some K/T boundary clays, and some shocked quartz grains are too large to have been transported far by the atmospheric winds.85 Officer adds that evidence of high-pressure shock is now found within rocks formed by explosions within volcanoes.86

**[\_\_\_\_] Jupiter’s gravitational pull checks any major asteroid collisions with earth.**

**Michael Muracco founder of Mount Washington Valley Astronomy, 6/3/2009, “Asteroid 2009 DD45 Barely Misses Earth June 1, 2011,”** [**http://mwvastronomy.net/2011/06/asteroid-2009-dd45-barely-misses-earth-june-1-2011/**](http://mwvastronomy.net/2011/06/asteroid-2009-dd45-barely-misses-earth-june-1-2011/)

What has kept the Earth “safe” at least the past 65 million years, other than blind luck is the massive gravitational field of Jupiter, our cosmic guardian, with its stable circular orbit far from the sun, which assures a low number of impacts resulting in mass extinctions by sweeping up and scatters away most of the dangerous Earth-orbit-crossing comets and asteroids.

# Answers To: Asteroid Impact Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Large asteroids with the potential to cause real harm are easy to find, no risk of them.**

**Thomas Graham & Russell Schweickart, former astronaut and Co-Chair of the NASA Advisory Council Ad-Hoc Task Force on Planetary Defense and former astronaut who flew on Apollo 9, 2/18/2008 NASA's Flimsy Argument for Nuclear Weapons, Scientific American Magazine,** [**http://www.scientificamerican.com/article.cfm?id=nasas-flimsy-argument-for-nuclear-weapons**](http://www.scientificamerican.com/article.cfm?id=nasas-flimsy-argument-for-nuclear-weapons)

Nuclear explosives would be needed only for deflecting the largest NEOs, which are the least common and most easily detectable objects. Scientists are not concerned about a collision with an extremely large NEO—say, 10 kilometers in diameter—because all these objects have been discovered and none currently threatens Earth. Big things are easy for astronomers to find; the smaller objects are what we have to worry about./Of the estimated 4,000 NEOs with diameters of 400 meters or more—which includes all objects that might conceivably require nuclear explosives to divert them—researchers have so far identified about 1,500. And if NASA meets the search goals mandated by Congress, it will locate 98 percent of these objects and calculate 100-year projections of their orbits by 2020. As NASA continues to find big NEOs, the calculations of risk change accordingly. A decade ago, before astronomers began to systematically locate NEOs larger than 400 meters in diameter, they estimated that we faced a statistical risk of being struck by such an object once every 100,000 years. But now that researchers have identified and are tracking about 37 percent of these NEOs, the frequency of being hit by one of the remaining large objects has dropped to once in 160,000 years. Unless NASA finds a large NEO on an immediate collision course by 2020 (a very unlikely event), the frequency of a collision with one of the 80 still undiscovered objects (2 percent of 4,000) will drop to once every five million years. Thus, the probability that nuclear explosives might be needed to deflect an NEO is extremely small. And even this minuscule probability will diminish to the vanishing point as researchers improve nonnuclear interception technologies. After 2020 the need to keep nuclear devices on standby to defend against an NEO virtually disappears. As a result, the decision to move toward the worldwide elimination of nuclear weapons can be made strictly on the basis of human threats to global security. Extraterrestrial dangers need not be considered.

# Extension: Prefer High Probability Impacts

**[\_\_\_\_]**

**[\_\_\_\_] War and disease should be evaluated over an asteroid impact. Money would be better spent preventing probable disasters.**

**James Bennett, Professor of Economics at George Mason University, 2010, “*The Doomsday Lobby: Hype and Panic from Sputniks, Martians, and Marauding Meteors*,” p. 155**

Given that there “is no known incident of a major crater-forming impact in recorded human history,” argues P.R. Weissman of the Jet Propulsion Laboratory, and since “the credibility of the impact hazard” is justifiably low with the public and governmental decision-makers, we ought to defer the development of a defensive system until such time as technological advances permit us to do so at a reasonable cost.55 There is also, he points out — at the risk of being called chauvinist, no doubt, by the more feverish Earth-savers — the “pragmatic and/or parochial” fact that the United States accounts for 6.4 percent of the total land mass of the Earth, and only 1.9 percent of the total area, including water.56 Thus anything short of a civilization-ending asteroid would be exceedingly unlikely to hit the U.S. By contrast, such threats as infectious diseases and nuclear war present a more real and immediate danger to Americans, and to earthlings in general. Perhaps money would be better spent addressing those matters?

**[\_\_\_\_] No human has ever died from an asteroid strike. Their impact is so improbable that small miscalculations lead to wildly incorrect probabilities.**

**James Bennett, Professor of Economics at George Mason University, 2010, “*The Doomsday Lobby: Hype and Panic from Sputniks, Martians, and Marauding Meteors*,” p. 157-8**

The matter, or manipulation, of odds in regards to a collision between a space rock and Earth would do Jimmy the Greek proud. As Michael B. Gerrard writes in Risk Analysis in an article assessing the relative allocation of public funds to hazardous waste site cleanup and protection against killer comets and asteroids, “Asteroids and comets are… the ultimate example of a low-probability/high-consequence event: no one in recorded human history is confirmed to have ever died from one.” Gerrard writes that “several billion people” will die as the result of an impact “at some time in the coming half million years,” although that half-million year time-frame is considerably shorter than the generally accepted extinction-event period.66 The expected deaths from a collision with an asteroid of, say, one kilometer or more in diameter are so huge that by jacking up the tiny possibility of such an event even a little bit the annual death rate of this never-before experienced disaster exceeds deaths in plane crashes, earthquakes, and other actual real live dangers. Death rates from outlandish or unusual causes are fairly steady across the years. About 120 Americans die in airplane crashes annually, and about 90 more die of lightning strikes. Perhaps five might die in garage-door opener accidents. The total number of deaths in any given year by asteroid or meteor impact is zero — holding constant since the dawn of recorded time.

# AT: Small Asteroid Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Countries are building microphones to distinguish asteroid strikes from nuclear launches.**

**Nature News, 7/17/2002,“Microphones tell asteroids from A-bombs,” http://www.nature.com/news/1998/020715/full/news020715-4.html**

Ground-based groups of microphones, called infrasonic arrays, can distinguish atomic blasts from exploding asteroids up to a few hundred kilometres away, say Brown, Tagliaferri and colleagues1. The arrays pick up the very-low-frequency sounds that penetrate hundreds of kilometres of the Earth's atmosphere. Multiple arrays pinpoint the position and size of a blast almost as accurately as the satellites used by US Space Command, the researchers show. Right now, there are 12 such arrays. Sixty will be built within the next 5 years as part of the CTBT International Monitoring Network. The rules of the treaty dictate that their data must be available to all. A global array should spot meteor explosions from most areas of the world, says Brown. The infrasonic network will also be important for research. Meteorites smaller than 10 metres across are hard to detect with telescopes, so scientists have little idea of how often they breach our atmosphere. An idea of how frequently small asteroids occur is important for estimating the likelihood of larger ones, such as the one that devastated thousands of square kilometres of Siberian forest in Tunguska in 1908. The microphone array, says Matthew Genge of the Natural History Museum in London, UK, "will help us tell just how many Tunguskas we can expect".

# Answers To: Asteroid Mining Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Asteroids are not that valuable – economists use faulty means to calculate how much profit one could make.**

**Ronald, Brak, Research scientist, 2/6/06, “The Great Mining Con,”**

**http://ronaldbrak.blogspot.com/2006/02/great-asteroid-mining-con.html**

There are some people who think that mining asteroids is a good idea. And not just for building things to use in space, but to ship metals to earth to sell. They say things like, “The metals in the near-earth iron asteroid Amun are worth 20 trillion dollars.” But is the current market value of metals the proper way to value an asteroid? Wouldn’t it make just as much sense to say that since I can buy meteorites for 25 cents a gram on e-bay, the market value of the asteroid is 25 cents per gram? And since it weighs 30 billion tons, therefore the asteroid is actually worth 7,500 trillion dollars? I mean that’s using the market price, isn’t it? And while these asteroid mining enthusiasts like to tell you how much money Amun is supposed to be worth, they never tell you how much a similar amount of earth dirt is worth. Well according to my calculations 30 billion tons of earth dirt is worth over $1,700,000,000,000,000. Which makes a ton of dirt worth about $57,000. Not bad, hey? Might be a good idea to run outside with a shovel. But wait a minute, you say! How can plain earth dirt be worth that much? Well it’s quite simple. You see 99.9999% pure silicon sells for about $200 per kilogram and the earth’s crust is 27.7% silicon. Of course it’s only worth that much after you have removed and purified the silicon. Before that the dirt is only worth as much as dirt. But counting an asteroid as being worth what it would be if all it’s substances were refined, purified and sold at today’s prices is pretty much just as stupid.

# Answers To: Asteroid Mining Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Asteroid mining would severely impact exporters of minerals on Earth such as China.**

**Robert Lamb, Writer for Discovery News, 2/17/10, “The Ethics Of Planetary Exploration And Colonization,” http://news.discovery.com/space/the-ethics-of-planetary-exploration-and-colonization.html**

Can you put a price tag on an asteroid? Sure you can. We know of roughly 750 S-class asteroids with a diameter of at least 1 kilometer. Many of these pass as near to the Earth as our own moon -- close enough to reach via spacecraft. As a typical asteroid is 10 percent metal, Brother Consolmango estimates that such an asteroid would contain 1 billion metric tons of iron. That's as much as we mine out of the globe every year, a supply worth trillions and trillions of dollars. Subtract the tens of billions it would cost to exploit such a rock, and you still have a serious profit on your hands. But is this ethical? Brother Consolmango asked us to ponder whether such an asteroid harvest would drastically disrupt the economies of resource-exporting nations. What would happen to most of Africa? What would it do to the cost of iron ore? And what about refining and manufacturing? If we spend the money to harvest iron in space, why not outsource the other related processes as well? Imagine a future in which solar-powered robots toil in lunar or orbital factories. "On the one hand, it's great," Brother Consolmango said. "You've now taken all of this dirty industry off the surface of the Earth. On the other hand, you've put a whole lot of people out of work. If you've got a robot doing the mining, why not another robot doing the manufacturing? And now you've just put all of China out of work. What are the ethical implications of this kind of major shift?" Brother Consolmango also stressed that we have the technology to begin such a shift today; we'd just need the economic and political will to do it. Will our priorities change as Earth-bound resources become more and more scarce?

**[\_\_\_\_] Asteroid mining is just a fantasy. There are no markets for many of the products and there is no plan to actually extract the resources.**

**Richard Gertsch and Leslie Gertsch, Member of the Rock Mechanics and Explosive Research Center and Mining Engineering Dept. and Cnter For Space Mining, 2005, Colorado School of Mines “Economic Analysis Tools for Mineral Projects in Space,” http://www.kemcom.net/EconAnal.pdf**

In space, the problem is perhaps the opposite. Many products already have been identified, but the markets are either non-existent or government-dependent. Habitats, metals, concrete, water, air, He-3, etc., have no real demand yet except as government sponsored activities. It becomes very difficult to calculate the true value of a product in this environment. Equation (1) becomes meaningless, and many would-be space entrepreneurs must justify their project by simply pointing out that they may be able to supply a low-demand government mission cheaper than the government can. The basic problem is that we all believe in the promise of space, but economically there is no clear path to what we can do tomorrow. The nearest to a space-based commercial venture now is satellite communications. That market has developed over the past several decades, not in the leaps and bounds foretold by visionaries, but in fits and starts controlled by consumer perceptions and development of supporting technology. In hindsight, trying to leapfrog the erratic steps of this evolution could have been disastrous as a commercial venture. It will be just as difficult, if not more so, to forecast markets for space resources because their realization may be even farther away.

# Answers To: Asteroid Mining Advantage

**[\_\_\_\_]**

**[\_\_\_\_] The long trip time involved in asteroid mining means that no companies will undertake it.**

**Richard Gertsch and Leslie Gertsch, Member of the Rock Mechanics and Explosive Research Center and Mining Engineering Dept. and Cnter For Space Mining, 2005, Colorado School of Mines “Economic Analysis Tools for Mineral Projects in Space,” http://www.kemcom.net/EconAnal.pdf**

The risk involved in exploiting space resources is very high, from risky to wildcatting (Table

2). Terrestrial investors would like a very high ROI and a very short payback period for this level of risk. However, high ROIs makes the project technologically more difficult. In the example project, 100% ROI is basically prohibited by the very high ore tonnage needed, 500 million tonnes. However, lesser ROIs are feasible (Tables3 and 4). The payback period for the example project also is very long for a commercial venture. However, 11 years before any income is long even for a low risk venture. Perhaps it is in the nature of space projects to have long payback periods. Asteroids, in particular, have a long trip time .The very high cost of space transportation alone (both for Earth to LEO and in space itself) is a significant barrier to commercial success. Lowering transportation costs is one key to furthering successful commercial space ventures.

**[\_\_\_\_]**

[\_\_\_\_] Lack of a stable legal framework for profiting means that private companies won’t mine asteroids.

Space Daily, 9/14/1999, “The Challenge of Space Mining,” SpaceDaily, http://www.spacedaily.com/news/asteroid-99i.html

Substantial legal issues have to be addressed before any of this can happen, of course; & for Lunar mining in particular (the issues involving asteroid mining are rather different), these issues are likely to be the most intractable in the short term. Commercial operations on the Moon are currently banned under the Moon Treaty; & - given that only the US-Americans currently claim to have any motivation to industrialise space - there's little or no motivation on the part of the rest of the world to change this situation (Australia has made some noises about trying to change this treat as some bureaucrats can smell a cheap buck here; but noises are all that Australian politicians are generally any good at). Asteroid mining may be legal in the absence of any contradictory precedents; but few financiers are likely to invest in a project where the final product can be legally hijacked by independent parties because there is no legally enforceable ownership.

# Answers To: Asteroid Mining Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Asteroid mining would have to rely on ineffective robotic systems and would not be successful.**

**Charles Gerlach, CEO Gerlach Space Systems, 5/22/2005 “Profitability Exploiting Near-Earth**

**Object Resources,” International Space Development Conference, National Space**

**Society, Washington DC, http://abundantplanet.org/files/Space-Ast-**

**Profitably-Exploiting-NEO-Gerlach-2005.pdf**

Technology issues present many of the greatest challenges to successfully and economically executing an asteroid mining mission. The prohibitively high costs of sending astronauts and potentially long communications delays require that all operations be highly automated. Automated machinery must work perfectly; even minor failures can cause mission failure. However, terrestrial mining experience with automation has generally been poor, and operations will be complex and hard on equipment. New equipment will have to be developed and integrated. To handle industrial quantities of materials, bench-top processes are not sufficient. Developing industrial mining and refining processes will ultimately hinge on deployment of actual working equipment to learn what works and what does not. These systems will be different from those used in traditional robotic space science missions that essentially consist of one-of-a-kind instrument collections designed for generating very specific types of scientific data.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_]**

[\_\_\_\_] The plan isn’t enough – need to research NEOs for successful mitigation.

**National Research Council, 2010, Committee to Review Near-Earth-Object Surveys and Hazard Mitigation Strategies Space Studies Board, “Research” pg. 90,** [**http://www.nap.edu/openbook.php?record\_id=12842&page=90**](http://www.nap.edu/openbook.php?record_id=12842&page=90)

Just as the scope of earthquake research is not limited only to searching for and monitoring earthquakes, the scope of NEO hazard mitigation research should not be limited to searching for and detecting NEOs. A research program is a necessary part of an NEO hazard mitigation program. This research should be carried out in parallel with the searches for NEOs, and it should be broadly inclusive of research aimed at filling the gaps in present knowledge and understanding so as to improve scientists’ ability to assess and quantify impact risks as well as to support the development of mitigation strategies. This research needs to cover several areas discussed in the previous chapters of this report: risk analysis (Chapter 2), surveys and detection of NEOs (Chapter 3), characterization (Chapter 4), and mitigation (Chapter 5). The committee stresses that this research must be broad in order to encompass all of these relevant and interrelated subjects. Recommendation: The United States should initiate a peer-reviewed, targeted research program in the area of impact hazard and mitigation of NEOs. Because this is a policy-driven, applied program, it should not be in competition with basic scientific research programs or funded from them. This research program should encompass three principal task areas: surveys, characterization, and mitigation. The scope should include analysis, simulation, and laboratory experiments. This research program does not include mitigation space experiments or tests that are treated elsewhere in this report.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] Space based systems are expensive and riskier than ground based ones.**

**NASA Report to Congress, March 2007, “Near-Earth Object Survey and Deflection Analysis of Alternatives,” http://neo.jpl.nasa.gov/neo/report2007.html**

Beyond the fact that space-based systems are historically more expensive than ground based systems, these systems offer there are several additional drawbacks. Getting a space-based system into place subjects it to possible launch and deployment failures and places it in a hostile environment that results in a shorter lifetime (7 to 10 years). This shorter lifetime is an important consideration if a NEO program is expected to continue to track objects for extended periods of time. In addition, they are dependent upon spacecraft-to-ground data links and unique onboard software.

**[\_\_\_\_]**

[\_\_\_\_] Deflection efforts would be hindered both by lack of proven technology and international cooperation.

Gregg Easterbrook, Fellow at the Brookings Institution, 06/2008, “The Sky Is Falling,” The Atlantic, http://www.theatlantic.com/magazine/print/2008/06/the-sky-is-falling/6807/

None of this will be easy, of course. Unlike in the movies, where impossibly good-looking, wisecracking men and women grab space suits and race to the launchpad immediately after receiving a warning that something is approaching from space, in real life preparations to defend against a space object would take many years. First the necessary hardware must be built—quite possibly a range of space probes and rockets. An asteroid that appeared to pose a serious risk would require extensive study, and a transponder mission could take years to reach it. International debate and consensus would be needed: the possibility of one nation acting alone against a space threat or of, say, competing U.S. and Chinese missions to the same object, is more than a little worrisome. And suppose Asteroid X appeared to threaten Earth. A mission by, say, the United States to deflect or destroy it might fail, or even backfire, by nudging the rock toward a gravitational keyhole rather than away from it. Asteroid X then hits Costa Rica; is the U.S. to blame? In all likelihood, researchers will be unable to estimate where on Earth a space rock will hit. Effectively, then, everyone would be threatened, another reason nations would need to act cooperatively—and achieving international cooperation could be a greater impediment than designing the technology.

# Answers To: Solvency

[\_\_\_\_] A. NASA would attempt to deflect an impending NEO with a nuclear weapon.

Alan Boyle, Science Editor at MSNBC, 3/21/2007 “Dueling over asteroids,” http://cosmiclog.msnbc.msn.com/archive/2007/03/21/97410.aspx

That's why he's taking the new report so seriously. NASA's official view is that the most efficient way to divert a potentially threatening NEO is by setting off a nuclear bomb nearby, to nudge it into a safe orbit. "The implication is that it is the preferred way to go to deflect essentially any near-Earth object," Schweickart complained. In contrast, Schweickart argues that the so-called "nuclear standoff" option should be used only as a last resort. He contends that 98 percent of the potential threats can be mitigated by using less extreme measures. For example, he favors the development of a "gravity tractor" - a spacecraft that would hover near an asteroid for years at a time, using subtle gravitational attraction to draw the space rock out of a worrisome path. To kick it up a notch, Schweickart said a threatening NEO could first be hit with a kinetic impactor - say, a scaled-up version of the Deep Impact bullet that hit Comet Tempel 1 back in 2005 - and then the orbital track could be fine-tuned using the tractor. Navigational sensors aboard the tractor would check to make sure the NEO was on a completely safe path. "This combination is obviously the way to go," he said. NASA sees it a different way, however. The report said the gravity tractor concept and similar techniques would be the "most expensive" ways to divert an asteroid: "In general, the slow push systems were found to be at a very low technology readiness level and would require significant development methods," it said.

**B. This approach is disastrous. A nuclear strike on an asteroid would break it into small pieces that would cause more damage to the earth.**

**Edward Lu, American Physicist and former astronaut, has been to space twice, 4/7/2004 “Why Move an Asteroid?” Testimony before the Subcommittee on Science, Technology and Space of the Senate Commerce Committee, http://www.astrobio.net/index.php?option=com\_retrospection&task=detail&id=972**

Why does the asteroid need to be moved in a "controlled manner"? If the asteroid is not deflected in a controlled manner, we risk simply making the problem worse. Nuclear explosives for example risk breaking up the asteroid into pieces, thus turning a speeding bullet into a shotgun blast of smaller but still possibly deadly fragments. Explosions also have the drawback that we cannot accurately predict the resultant velocity of the asteroid -- not a good situation when trying to avert a catastrophe. Conversely, moving an asteroid in a controlled fashion also opens up the possibility of using the same technology to manipulate other asteroids for the purposes of resource utilization.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] Bureaucratic inertia means that deflection efforts would be unsuccessful.**

**Russel Schweickart, former astronaut and Co-Chair of the NASA Advisory Council Ad-Hoc Task Force on Planetary Defense, 12/2004, “Asteroid Deflection: An International Challenge,” Presented at the World Federation of Scientists meeting of the Multidisciplinary Core Group on Planetary Emergencies, Rome, Italy**

In any event, the minimal policy decision involved in any asteroid deflection would be whether to deflect it at all or simply suffer the consequences of the nominal impact. If the incoming asteroid were on the order of 100 meters in diameter the resultant impact would be on the order of 80 MT and the resulting damage could lie entirely within the borders of one nation. If this nation were not a space faring nation who would respond to a request to mount such a mission? Conversely if the nominal impact were located within the borders of a space faring nation, would the risk to others along the deflection risk path deter that nation from mounting a deflection mission? Who will make these decisions? Who will pay for a deflection mission? Who will be charged with the responsibility for executing such a mission? How is liability to be assigned? Who will trade off local devastation vs. placing many remote lives at slight risk? Who will determine the planning criteria? Who will monitor and/or control the deflection mission? These and many other difficult and critical policy questions are implicit in the concept of asteroid deflection. In all but the exceptional case the choices to be made involve several**, if not many,** nations. The entire subject is planetary in scope since asteroid impacts may (and eventually will) strike anywhere on the globe. An Alternative to Institutional Inertia The easiest and perhaps most likely course of action for international institutions facing questions of this kind is to simply avoid them. And yet, for those involved in the Spaceguard Survey and others informed on the subject it is clear that addressing these choices only after the announcement of a pending impact will result in great contention, self serving argument, and power politics**.** Once a specific IP is determined the hope for rationale, equitable policies emerging from such a belated undertaking becomes futile. In the limit an asteroid impact which destroys all human civilization is possible, though extremely improbable. No other natural disaster is capable of such destruction, and yet this natural hazard, unlike most others, can actually be prevented by human intervention. We therefore face the daunting challenge of convincing the international community to plan for a highly unlikely but devastating global event, and to do it now. Yet many more immediate problems involving the lives of millions of people face the international community on virtually a continuous basis. It is “natural” to avoid this issue.Risk situations characterized by extreme infrequency and devastating consequences are difficult for individual human beings, let alone bureaucratic institutions to handle**.** This is even more the case when the questions to be addressed are so intractable and without precedent. Yet the time for rational policy to be developed to guide behavior and prepare for such an eventuality is prior to the discovery of an asteroid actually bound for an impact. The reality we face, however, is that there is about a one in twenty chance that within the next decade or so we may in fact discover such a pending impact. Worse still, from the standpoint of alarming the public, is the much higher likelihood that in completing the inventory of NEOs down to 100 meters, the astronomical community will in fact discover one or more objects destined to pass within several Earth radii. The problem in this case will arise in that it may take many years before the telescopic observations are able to distinguish between this near miss and an impact. During this period of time no one will be able to state with certainty whether or not an impact is coming**.** This circumstance**,** with perhaps a 50/50 likelihood of occurrence, will be extremely frustrating to the professionals and alarming to the public.

# Article: Asteroids Not A Threat

**Wired Magazine: *The Sky is Falling? No Sweat.* January 18th, 2002.**

Steven Pravdo hunts asteroids, but he says he hardly ever thinks about the fact that, any day now, he might discover a rock that could collide with Earth, perhaps causing "one of the worst disasters in human history."

Those were Pravdo's alarming words to the Associated Press last week. The project manager of NASA's Near Earth Asteroid Tracking program was describing what might have happened if asteroid 2001 YB5, which passed by Earth on Monday at the relatively close distance of 500,000 miles, had instead smacked into the planet.

Even though the 1,000-foot-long rock was discovered just 10 days before it sneaked by, Pravdo said YB5 didn't merit the attention it received.

"What happened with that was a reporter from the Associated Press. It must have been their beat to look up these things; they saw it was close and thought it was a story. But in this case it was known to be very close, but it was also known that it wouldn't hit anything; it wasn't a danger at all," Pravdo said Thursday.

This worst-calamity sort of story periodically crops up in Pravdo's job. Three years ago, for example, he and his colleagues found themselves explaining to salivating reporters that, contrary to earlier asteroid theories, the world would not end in a collision in 2028.

But there are more such explanations to make these days because the asteroid hunters are finding more hurtling rocks than ever. During the past 10 years, and especially since 1998, advances in technology and increased government funding have significantly improved the rate at which near-Earth objects are detected.

"The current estimate -- and this is just an estimate -- is that there are about 1,200 of these asteroids that come near the Earth and are larger than 1 kilometer in size," Pravdo said. "By 2008, we're trying to find all of these."

As of Wednesday, scientists had discovered 564 near-Earth objects; 471 have been found since 1990.

The process of discovering one of these rocks is akin to looking for a very tiny needle in a stadium-sized haystack that -- just to keep things interesting -- is very far away. Every night, Pravdo and his team aim their powerful electronic cameras at a small patch of the sky. They take three different pictures of the same spot, each one at a different time.

Then the three images are overlaid over each other, and the team uses a computer to see whether any of the objects appear to have moved over time. These moving objects are possible asteroids.

After one of these is discovered, Pravdo said, it takes several days to determine the orbit of the object in order to determine whether it poses any risk to Earth. During these few days, Pravdo says, he never worries that anything calamitous will happen.

"It's like when you buy a lottery ticket, are you ever excited that it's going to win?" he asked, by way of explaining how he keeps his cool. "That's what the odds are like here."

Actually, though, the odds of getting hit by an asteroid are actually better than winning most state lotteries.

Since so many people could perish in a catastrophic asteroid collision, even if such a crash almost never occurs, it turns out that the risk of death-by-interstellar-rock is just about equal to the risk of dying in an airline accident -- about 1 in 20,000.

And currently, Pravdo said, there might not be too much we could do to avert such a disaster. If the YB5 asteroid had been speeding toward Earth and the planet had only 10 days notice, the most humanity could have done, Pravdo said, would have been "to find out what part of the Earth would be hit and then send condolence notes to them."

"A longer lead time would mean that the 'responsible parties' of the Earth could set up a program to institute some technological policy that could try to move the object away," he added, referring to Hollywood’s famous technique of shooing away the asteroid with a nuclear weapon.

Ever since *Armageddon* and *Deep Impact* awakened people to the danger of asteroids three years ago, there is increased worry about a collision each time an asteroid passes nearby.

This week on Usenet, for example, it was possible to find people advocating the creation of Martian colonies as a way to make sure the human species survives after a big crash.

Some people took issue with this suggestion. One reader of the sci.skeptic newsgroup warned that "a Mars colony would produce a small carbon copy of our Earth habitat but on rather less promising ground," and instead suggested that programs such as Pravdo's be expanded and that governments begin to seriously think about safe asteroid deflection techniques.

Asteroid deflection is a well-studied topic, Pravdo said, but the various suggestions made by scientists are not generally known to the rest of the public. In addition to nuclear weapons, there may also be a variety of other ways to prevent disaster.

For example, an asteroid expert told Space.com a couple years ago that "attaching a giant solar sail to the asteroid" might guide it away, and using "a giant parabolic mirror to concentrate the sun's rays and vaporize rock on the surface of the asteroid" could also do the trick. For obvious reasons, these ideas are difficult to test.

"Even though some technology exists, it would have to be applied in a different way, and we wouldn't know if it would work," Pravdo said.

Of course, these days, the fear of an asteroid extinction is not the first thing that comes to mind.

"Right now, (humans) are the greatest threat to the survival of the human species," wrote J. Scott Miller in a discussion on Usenet's sci.space.science newsgroup. "We have built enough nuclear weapons to do the job, we have developed the biological and chemical capabilities to do the job. So, let's not point out there for possible extinction until we control down here."

"Terrorists running willy-nilly over this globe present a much bigger threat (than asteroids)," he added in his message, which was penned in 1998.

# Article: What Caused The Extinction of The Dinosaurs?

**Michael J. Oard: *The Extinction of the Dinosaurs*. August, 1997.**

**Revival of the meteorite extinction theory**

Ever since 1980, the meteorite hypothesis has swept to centre stage, and a large literature now surrounds it. Back in 1979, the meteorite hypothesis was considered outrageous by many geologists. The turnaround came with the discovery of an iridium (Ir) anomaly at the Cretaceous/ Tertiary (K/T) boundary.56 In thin clay layers (1 cm to several tens of centimetres thick) found at Gubbio, Italy, and at Stevns Klint, Denmark, the contained Ir concentrations were increased 30 and 160 times respectively above background levels. The earth’s crust is depleted in iridium and other platinum group elements, while meteorites are enriched in them. A 10 km diameter meteorite was said to have injected 60 times its mass in pulverised rock into the stratosphere, causing a cooling trend that wiped out about 50 percent of the biota, including all the dinosaurs. Conversely, others envision the impact caused a sudden, short-term temperature rise, instead of cooling from a ‘nuclear winter’-like mechanism.57 The sudden heating supposedly was caused by an oceanic impact which injected water into the stratosphere producing a ‘vapour canopy’ effect.

It did not take long to discover Ir anomalies at other K/T sites.58–60 Currently, there are 103 known K/T iridium anomalies from around the world, mostly in marine sediments either on the bottom of the ocean or on land.61 As for the frequency of meteorite bombardment, Eugene Shoemaker estimated that the earth probably was struck 5 to 10 times by meteorites that formed craters greater than 140 km in diameter.62 So an impact at the K/T boundary is not as outlandish within the uniformitarian paradigm as many first thought. Other scientists using computer climate models reinforced the scenario of disastrous climatological and ecological effects.63

The discovery of shocked quartz in eastern Montana, USA, in 1984,64 and at many other sites around the world65 since then, is considered further proof of the meteorite hypothesis. Shocked quartz differs from ordinary quartz, in that the crystal lattice has become compressed and deformed by pressure. Under a scanning electron microscope, the quartz exhibits planar striations in one or more directions on a crystal face.

Various other, more minor and equivocal evidence has been adduced in favour of the meteorite/asteroid extinction hypothesis, such as:

1. -a palynological change from ferns to angiosperms in ‘continental’ deposits;66
2. -the existence of microtektites,67 which are small, droplet-shaped blobs of silica-rich glass;
3. -soot-rich horizons supposedly from global wildfires caused by the heat of impact;68
4. -various isotopic ratios;69
5. -various other platinum group elements;70 and
6. -the discovery of the ‘smoking gun’—the Chicxulub structure on Mexico’s Yucatán Peninsula.71

Thus, the meteorite extinction theory has seemingly been verified by an overwhelming amount of observational data.

**The Volcanic Theory**

The triumph of the meteorite theory has come with much dissent, especially from palaeontologists who opted for a volcanic mechanism, often combined with marine regression, to explain the data.72–75 Even in spite of what seems like impressive confirmation of the meteorite theory and reinforced by the scientific

press and news media, the dispute continues.76 If you read only the evidence for the impact theory, you would be impressed. However, if you read further the evidence for the volcanic theory, you would discover that the meteorite theory is not as well supported as it may seem.

Volcanic adherents point to the evidence of massive volcanism around the K/T boundary, for instance, the 1 million km3 of Deccan basalts in India and the extensive volcanism in western North America related to the Laramide Orogeny. To them, it is more logical that the dinosaurs died out gradually from all this volcanic activity.

As it turns out, iridium is also associated with volcanism, especially with dust injected into the atmosphere from basaltic extrusions.77 For instance, the fine airborne particles above an Hawaiian basaltic eruption were found to be highly enriched in iridium, much higher than in the K/T boundary clays at Gubbio and Stevns Klint.78,79 High iridium has also been associated with other volcanic eruptions and found within volcanic dust bands in the Antarctic ice cores. This fine material is of similar particle size as the K/T boundary clay.

Even shocked quartz has been associated with volcanism.80–82 Impact supporters counter that this shocked quartz is only weakly deformed compared with the K/T boundary shocked quartz, and that shocked quartz is associated with known impact craters as well as nuclear bomb test sites.83,84 However, Officer and Page argue that shocked grains are not found at some K/T boundary clays, and some shocked quartz grains are too large to have been transported far by the atmospheric winds.85 Officer adds that evidence of high-pressure shock is now found within rocks formed by explosions within volcanoes.86

Because the extinctions near the K/T boundary are believed to be either gradual or stepwise,115 some impact enthusiasts have backed off and instead have suggested extinctions by multiple comet impacts over a 3 million year period.116 The main problem with the cometary hypothesis is that comets have a low abundance of iridium.117 Since relatively small iridium spikes have been found associated with 10 other extinction horizons, some investigators have suggested post-depositional mobility of iridium and other platinum group elements.118 This mobility also would render ambiguous any elemental or isotopic ratios.

Adherents to the volcanic hypothesis offer good counter arguments to all the arguments used in support of an impact. However, impact enthusiasts counter all the volcanic arguments. There is evidence both in favour of and against each hypothesis.

**Constellation Affirmative**

# Constellation Affirmative

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# Explanation

In 2004, President Bush articulated a vision for NASA that included a return of humans to the Moon by the year 2020. In order to accomplish this, he proposed a launch vehicle to replace the aging Space Shuttle Program, that was due to be retired in 2011. This program was called Constellation, which borrowed heavily from the Apollo program that first put humans on the moon in the 1960s and was generally viewed as its successor. One supporter specifically described the plan as “Apollo on Steroids.”

However, by 2010, the Constellation program was behind schedule and several billion dollars over budget. President Obama, who articulated his own vision for NASA’s space exploration, cancelled the program, instead advocating that the U.S. begin to rely on the private sector to provide space flight. He also cancelled the goal of returning to the moon, instead stating that the U.S. should focus on sending humans to a near earth asteroid and eventually to place humans on Mars. Despite this, he did not revive the Space Shuttle program, which flew its final flight in July 2011.

The affirmative would restore and fully fund the Constellation program and revive President Bush’s goals. It argues that the United States is currently the leader in space programs. It has the most advanced technology and other countries look to it to provide guidance on what to do with their own space programs. This space leadership is based mainly on the U.S.’s ability to consistently and safely launch humans into space, something that will end under the Obama plan. Until the private sector can come up with a replacement for Constellation, U.S. astronauts will have to pay for rides on Russian spacecraft, a major blow to America’s international prestige.

It also argues that cancelling the Constellation program negatively impacts America’s industrial base, the companies that have traditionally made the rockets that NASA has designed and used to explore space. NASA and the government are the main customers of these companies, and cancelling Constellation means that their business will be negatively impacted. Also, without a clear program to send humans into space, the affirmative argues that students will be less likely to pursue careers in science and engineering, which will further erode the industry.

Restoring the Constellation program will provide an opportunity for Americans to return to the moon. Constellation was behind schedule because it never received adequate funding. Fully funding the program will solve many of the problems that ultimately caused President Obama to cancel it.

# 

# Glossary

**Space Shuttle –** A rocket launched spacecraft used to make repeated human trips into space. It was active from 1981 till 2011.

**Vision for space exploration -** A broad strategy for NASA created by President Bush and delivered in 2004. Key elements included a manned return to the moon by 2020, as well as developing a reusable launch vehicle whose main purpose would be to complete the moon mission (the Constellation program), and eventually to send a human mission to Mars, but without a concrete date.

**Apollo** – The Apollo program ran from 1961 to 1972 and was the NASA program that was tasked with sending humans to the moon.

**Deep space –** The term means several things, but most commonly refers to space outside Earth’s orbit.

**Heavy-lift launch vehicle –** A class of rocket that can move the heaviest payloads into space. Human missions into space exclusively have used heavy-lift vehicles, while the launch of merely a satellite could be accomplished with a smaller rocket

**Saturn V –** The booster rocket that launched the Apollo missions into space. It is a type of Heavy-lift launch vehicle

**Heavy lift booster –** refers to the rocket that sends something into orbit, as opposed to the satellite or space shuttle that it may be delivering

**Hubble –** Space telescope launched in 1990 by the Space Shuttle. It is famous for recording images of space far beyond our Solar System.

**Industrial base -** the companies that collectively make a product. For example, the space industrial base includes companies like Boeing and Lockheed Martin that produce planes and other missile technology

**Privatize –** Allowing businesses to take over tasks in space traditionally performed by the government

**Space Coast –** A region of Florida east of Orlando where many of NASA’s space launches occur

**Sputnik –** A Soviet space program. Sputnik 1 was the first artificial satellite to be put into Earth’s orbit, in 1957

**Forsake –** to abandon or give up on something

**Abdicate –** to renounce or fail to undertake a responsibility

**Abrogate –** to repeal or do away with something (especially a law or formal agreement)

**Unilateral** – an action undertaken without consultation or notification of other relevant parties.

**Prestige -** Respect and admiration felt for someone or something on the basis of their achievements or quality

**Incipient –** beginning to come into being or being apparent

**Hegemony –** Leadership or dominance by a country. Most agree that the US currently has hegemony because ot its strong military and economic power.

**Hyperpower –** Another term for hegemony.

**Globalization –** increasing interconnectedness of the world through advanced communication technology and economic interactions

**Apolarity –** An unstable world without any international order

**Perishable** – likely to decay or go bad quickly

**Trade surplus** – When a country exports to other countries more than it imports.

**Anglophone –** Countries that are Anglophone share basic cultural similarities with England, usually former English colonies. England, Canada, and the United States are Anglophone countries.

**Market creation** – Literally creating a market for a product, usually be many a government or other actor exhibiting a sustained demand for a product that does not yet exist

**NASA** – National Aeronautics and Space Administration

**ISS –** International Space Station

**LEO** – Low Earth Orbit (within 2000 km of the Earth’s surface.) With the exception of the Apollo missions that went to the moon, every mission into space has not left LEO. The International Space Station operates in LEO

**STEM –** Refers to education in the subjects of Science, Technology, Engineering, and Math.

**ASAT –** Anti-Satellite. ASAT Weapons are designed to neutralize or destroy orbiting satellites.

**CEV –** Crew Exploration Vehicle. A component of the Constellation program

# 1AC [1/7]

**Contention 1: Inherency**

**Obama’s most recent budget proposal has cancelled NASA’s Constellation program. This has left NASA confused and without a mission.**

**Jacqui Goddard, writer for the Telegraph Newspaper, 7/02/2011, “Final Lift-off,”** [**http://m.gulfnews.com/news/world/usa/the-last-flight-of-the-atlantis-shuttle-1.831365**](http://m.gulfnews.com/news/world/usa/the-last-flight-of-the-atlantis-shuttle-1.831365)

For every crew that has trained for a shuttle mission since the fleet was launched in 1981, there has been another on its tail ready to fly the next. But this one, Mission STS-135, is the end of the line. Three decades of space flight history are about to end. Nearly 15,000 jobs will be lost at the Kennedy and Florida space centres. NASA would prefer the final flight to be a celebration of the shuttle's considerable accomplishments — among them the construction of the $100 billion (Dh367.3 billion) International Space Station, completed last month, and the launch of the Hubble Space Telescope. But some space flight veterans cannot help thinking of it as more of a wake. George Mueller, a former NASA manager considered the ‘Father of the Space Shuttle' for his role in championing the policies that led to its development, still travels at 92 years old, but cannot bring himself to attend Atlantis' farewell launch. "I'm never enthusiastic about going to funerals," he said. The shuttle has been scheduled for retirement since president George W. Bush set out his Vision for Space Exploration in 2004. After the shuttle would come a new spacecraft, Bush decreed, that would make its first manned mission by 2014, ferrying astronauts initially to the space station and later to "other worlds" including the Moon by 2020, to build a manned base, and Mars by 2030. The programme, which would build Ares rockets and a crew capsule called Orion, was known as Constellation. Seven years and $9 billion later, behind schedule and over budget, President Barack Obama cancelled it. Now, the private sector has instead been tasked with developing vehicles to ferry astronauts to the space station while NASA designs a rocket to haul crew and cargo further afield. But a decision on the design of the rocket will not come before 2015 at the earliest, with construction and a manned launch unlikely before 2020. Orion salvaged In the meantime, NASA has salvaged Orion from the ashes of Constellation and wheeled it out under a new name: the Multi-Purpose Crew Vehicle. But its 4,023km journey from California to Kennedy Space Centre, which began last week, is as far as it can hope to go for now. Last month, Neil Armstrong and Gene Cernan — the first and last men on the moon — along with Apollo 13 commander Jim Lovell, penned an open letter making clear their scorn. "NASA’s human space flight programme is in substantial disarray with no clear-cut mission in the offing. After a half-century of remarkable progress, a coherent plan for maintaining America's leadership in space exploration is no longer apparent," they complained. Citing President John F. Kennedy's 1961 description of space as a "new ocean", they added: "For 50 years we explored the waters to become the leader in space exploration. Today, under the announced objectives, the voyage is over."

# 1AC [2/7]

Contention 2: Harms

The uncertainty created by the end of the Constellation program is creating a crisis in the Aerospace industry, severely damaging a workforce that is key to American competitiveness.

Jim Maser, **Chairman of the Corporate Membership Committee, American Institute of Aeronautics and Astronautics, 3/30/2011, at a Hearing on “A Review of NASA’s Exploration Program in Transition: Issues for Congress and Industry,” Committee on Science, Space and Technology, Subcommittee on Space and Aeronautics, US House of Representatives**, http://www.prattwhitney.com/media\_center/executive\_speeches/jim\_maser\_03-30-2011.asp

Most importantly, if NASA is going to be relived of Constellation obligations, we need to know how the workforce will be transitioned and how the many financial investments will be utilized for future exploration efforts. Whereas the Apollo-Shuttle transition created a gap in U.S. human access to space, this next transition is creating a gap in direction, in purpose, in actual work, and in future capabilities. In order to adequately plan for the future and intelligently deploy resources, the space community needs to have clear goals. And up until two years ago, we had a goal. We had a national space strategy and the plan to support it. Unfortunately, at this point, that plan no longer exists.

This lack of a unified strategy, along with the uncertainty it creates and the fact that the NASA transition is being planned without any coordination with industry, makes it impossible for businesses like mine to adequately plan for the future. How can we right-size our businesses and work towards achieving greatest efficiency if we can’t define the future need? This is an impossible task. So, faced with this uncertainty, companies like mine continue to remain focused on fulfilling Constellation requirements pursuant to the Congressional mandate to capitalize on our investment in this program, but we are doing so at significantly reduced contractual baseline levels, forcing reductions in force at both the prime contractor and subcontractor levels. This reality reflects the fact that the space industrial base is not FACING a crisis; we are IN a crisis right now. And we are losing a national PERISHABLEproduct…our unique workforce. The entire space industrial base is currently being downsized with no net gain of jobs. At the same time, however, we are totally unclear as to what might be the correct levels needed to support the government.

Designing, developing, testing, and manufacturing the hardware and software to access and explore space requires highly skilled people with unique knowledge and technical expertise developed over decades. These technical experts cannot be grown overnight, and once they leave the industry, they rarely return. If the U.S. develops a tremendous vision for space exploration five years from now, but the people with these critical skills have not been preserved and developed, that vision could not be brought to life. We need that vision, that commitment, that certainty right now, not five or ten years from now, if we are going to have a credible chance of bringing it to fruition.

In addition to difficulties in retaining our current workforce, the uncertainty facing the U.S. space program is already having a negative impact on our industry’s ability to attract new talent from critical science, technology, engineering and mathematics. Young graduates who may have been inspired to follow STEM education plans because of their interest in space and space exploration look at the industry now and see no clear future. This will have implications to the space industrial base for years to come.

# 1AC [3/7]

**Furthermore, restoring Constellation will encourage more students to study math and science, allowing the US to maintain economic competitiveness.**

**Frank Slazer, Vice President of the Space Aerospace Industries Association, 5/18/2011**

**“Contributions of Space to National Imperatives”, Senate Hearing, http://commerce.senate.gov/public/?a=Files.Serve&File\_id=e26b4dcb-ee2c-4ada-95fa-b996c307692d**

Investing in NASA Benefits STEM Education

Developing the aerospace workforce of the future is a top issue for our industry. NASA’s space programs remain an excellent source of inspiration for our youth to study the STEM disciplines—science, technology, engineering and math—and to enter the aerospace workforce. In fact, the exciting periods of our space program history are reflected in the demographics of our industry and the influx of young workers they engendered. Unfortunately, the state of education for our young people is today in peril, including poor preparation for STEM disciplines. American students today rank 25th in math and 17th in science internationally. Low graduation rates of students in those fields and an overall lack of interest in STEM education contribute to a looming shortage of workers qualified to become professionals in our high tech industries.

A recent study, Raytheon found that most middle school students would rather do one of the following instead of their math homework: clean their room, eat their vegetables, go to the dentist or even take out the garbage. This lack of interest extends into interest 6 in aerospace. For example, in a 2009 survey 60 percent of students majoring in STEM disciplines found the aerospace and defense industry an unattractive place to work. 2

One of the reasons for the lack of interest in aerospace and defense could be the uncertainty of NASA programs. 3 Just as the recent Wall Street crisis turned young people away from financial careers, lack of job security in aerospace will hurt recruiting efforts. The video gaming industry has captured the magic to attract young people, while space—despite its history and potential—has lagged behind. In some instances, our own employees discourage their children from pursuing careers in aerospace engineering due to the uncertainty of future programs and career prospects. A commitment to a robust human spaceflight program will help attract students to STEM degree programs and help retain the current workforce—which also benefits national security space programs, many of which are not in the open.

# 1AC [4/7]

**A healthy aerospace industry is crucial to airpower and an effective air force.**

**Robert S. Walker et. Al, Chairman of the Commission on the Future of the United States Aerospace Industry, commissioned by the President, November 2002, “FINAL REPORT OF THE COMMISSION ON THE FUTURE OF THE UNITED STATES AEROSPACE INDUSTRY”**

The Contribution of Aerospace to National Security. Defending our nation against its enemies is the first and fundamental commitment of the federal government.2 This translates into two broad missions— Defend America and Project Power—when and where needed. In order to defend America and project power, the nation needs the ability to move manpower, materiel, intelligence information and precision weaponry swiftly to any point around the globe, when needed. This has been, and will continue to be, a mainstay of our national security strategy. The events of September 11, 2001 dramatically demonstrated the extent of our national reliance on aerospace capabilities and related military contributions to homeland security. Combat air patrols swept the skies; satellites supported real-time communications for emergency responders, imagery for recovery, and intelligence on terrorist activities; and the security and protection of key government officials was enabled by timely air transport. As recent events in Afghanistan and Kosovo show, the power generated by our nation’s aerospace capabilities is an—and perhaps the—essential ingredient in force projection and expeditionary operations. In both places, at the outset of the crisis, satellites and reconnaissance aircraft, some unmanned, provided critical strategic and tactical intelligence to our national leadership. Space-borne intelligence, command, control and communications assets permitted the rapid targeting of key enemy positions and facilities. Airlifters and tankers brought personnel, materiel, and aircraft to critical locations. And aerial bombardment, with precision weapons and cruise missiles, often aided by the Global Positioning System (GPS) and the Predator unmanned vehicle, destroyed enemy forces. Aircraft carriers and their aircraft also played key roles in both conflicts.

**Air power is the only way the US can deter major conflicts, including a war with China over Taiwan, which could cause extinction.**

**Maj. Gen. Charles J. Dunlap Jr., deputy judge advocate general of the Air Force, September 2006, “America's asymmetric advantage,”**

This illustrates another salient feature of air power: its ability to temper the malevolent tendencies of societies accustomed to the rewards of modernity. Given air power’s ability to strike war-supporting infrastructure, the powerful impulse of economic self-interest complicates the ability of despots to pursue malicious agendas. American air power can rapidly educate cultured and sophisticated societies about the costs of war and the futility of pursuing it. This is much the reason why air power alone delivered victory in Operation Allied Force in Kosovo in 1999, without the need to put a single U.S. soldier at risk on the ground. At the same time, America’s pre-eminence in air power is also the best hope we have to dissuade China — or any other future peer competitor — from aggression. There is zero possibility that the U.S. can build land forces of the size that would be of real concern to a China. No number of troops or up-armored Humvees, new radios or advanced sniper rifles worries the Chinese. What dominating air power precludes is the ability to concentrate and project forces, necessary elements to applying combat power in hostile areas. As but one illustration, think China and Taiwan. Saddam might have underestimated air power, but don’t count on the Chinese to make the same mistake. China is a powerful, vast country with an exploding, many-faceted economy with strong scientific capabilities. It will take focused and determined efforts for the U.S. to maintain the air dominance that it currently enjoys over China and that, for the moment, deters them. Miscalculating here will be disastrous becasue, unlike with any counterinsurgency situation (Iraq included), the very existence of the U.S. is at risk.

# 1AC [5/7]

**Additionally, returning to the moon under Constellation not only helps the industrial base and the American economy, it also opens up the possibility for the colonizing of Mars and further exploration, resulting in increased wealth and prosperity.**

**Harrison Schmitt, Former U.S. Senator and Former Chair of the NASA Advisory Council, 8/10/2009 “Liberty and Space Leadership,” http://www.spacenews.com/commentaries/liberty-and-space-leadership.html**

Returning to the Moon and to deep space constitutes the right course for the United States. Human exploration of space embodies basic instincts — the exercise of freedom, betterment of one’s conditions and curiosity about nature. These instincts have been manifested in desires for new homelands, trade and knowledge. For Americans particularly, such instincts lie at the very core of our unique and special society of immigrants. Over the last 150,000 years or more, human exploration of Earth has yielded new homes, livelihoods, know how and resources as well as improved standards of living and increased family security. In historical times, governments have directly and indirectly played a role in encouraging exploration efforts. Private groups and individuals often have taken additional initiatives to explore newly discovered or newly accessible lands and seas. Based on their specific historical experience, Americans can expect that the benefits sought and won in the past also will flow from their return to the Moon, future exploration of Mars and the long reach beyond. To realize such benefits, however, Americans must continue as the leader of human activities in space.

With a permanent resumption of the exploration of deep space, one thing is certain: Our efforts will be comparable to those of our ancestors as they migrated out of Africa and into a global habitat. Further, a permanent human presence away from Earth provides another opportunity for the expansion of free institutions, with all their attendant rewards, as humans face new situations and new individual and societal challenges. The competitve international venue remains at the Moon. Returning there now meets the requirements for a U.S. space policy that maintains deep space leadership, as well as providing major new scientific returns and opportunities. Properly conceived and implemented, however, returning to the Moon prepares the way for a new generation to go to Mars.

The current Constellation Program contains most of the technical elements necessary to implement a policy of deep space leadership, particularly development of a heavy-lift launch vehicle, the Ares 5. In addition, Constellation includes a large upper stage for transfer to the Moon and other destinations, two well-conceived spacecraft for transport and landing of crews on the lunar surface, strong concepts for exploration and lunar surface systems, and enthusiastic engineers and managers to make it happen if adequately supported. The one major missing component of a coherent and sustaining architecture may be a well-developed concept for in-space refueling of spacecraft and upper rocket stages. The experience base for developing in-space refueling capabilities clearly exists based on a variety of past activities, including ISS construction.

# 1AC [6/7]

**Human exploration of space and establishment of colonies guarantees the survival of the human race.**

**J. Richard Gott, Professor of Astrophysics at Princeton University, 6/17/2009, “A GOAL FOR THE HUMAN SPACEFLIGHT PROGRAM,” http://www.nasa.gov/pdf/368985main\_GottSpaceflightGoal.pdf**

The goal of the human spaceflight program should be to increase the survival prospects of the human race by colonizing space. Self-sustaining colonies in space, which could later plant still other colonies, would provide us with a life insurance policy against any catastrophes which might occur on Earth.

Fossils of extinct species offer ample testimony that such catastrophes do occur. Our species is 200,000 years old; the Neanderthals went extinct after 300,000 years. Of our genus (Homo) and the entire Hominidae family, we are the only species left. Most species leave no descendant species. Improving our survival prospects is something we should be willing to spend large sums of money on— governments make large expenditures on defense for the survival of their citizens.

The Greeks put all their books in the great Alexandrian library. I’m sure they guarded it very well. But eventually it burnt down taking all the books with it. It’s fortunate that some copies of Sophocles’ plays were stored elsewhere, for these are the only ones that we have now (7 out of 120 plays). We should be planting colonies off the Earth now as a life insurance policy against whatever unexpected catastrophes may await us on the Earth. Of course, we should still be doing everything possible to protect our environment and safeguard our prospects on the Earth. But chaos theory tells us that we may well be unable to predict the specific cause of our demise as a species. By definition, whatever causes us to go extinct will be something the likes of which we have not experienced so far. We simply may not be smart enough to know how best to spend our money on Earth to insure the greatest chance of survival here. Spending money planting colonies in space simply gives us more chances--like storing some of Sophocles’ plays away from the Alexandrian library.

Plan: The United States Federal Government should reinstate and fully fund the Constellation Program.

# 1AC [7/7]

**Contention 3: Solvency**

**The Constellation space ship will be effective and successful – the design went through a rigorous review and incorporates the lessons learned in past space flight.**

**Captain Eugene Cernan, Commander of the Apollo 17 Mission that went to the Moon, 5/26/2010**, **Testimony before the Committee on Science and Technology, United States House of Representatives,** <http://science.house.gov/sites/republicans.science.house.gov/files/documents/hearings/052610_Cernan.pdf>

Constellation itself is an architecture that over a five-year period has gone through several detailed reviews and has been vetted by every government agency from the OMB to the DOD, and certainly by NASA – by every agency that has an ownership interest in any technical, scientific, budget or benefit to be derived from Human Space Exploration. In addition, an arsenal of the best engineers, scientists and management experts in America’s aerospace community added their knowledge and expertise to the review of the proposed Constellation architecture before it ever became an official program worthy of consideration. Constellation follows the Von Braun model in the evolution of the Saturn V, wherein the development of the Ares I is the embryo for the development of the heavy-lift Ares V. This shared DNA, with commonality of critical components throughout, leads to greater cost effectiveness, a higher degree of confidence and safety, and provides the first elements of a heavy lift booster. It is not unlike the Boeing family of jetliners wherein the technology built into the 787 evolved from that of the original 707.

Embedded in the Constellation architecture is the culture of a long-range building block that cannot only service the ISS, extend the life of the Hubble, meet other national priorities in LEO, but additionally can carry us back to the moon and on to Mars. In doing so, it makes use of existing hardware and facilities while developing new technologies with a purpose. Appropriately under the law, both Houses of the Congress of the United States with overwhelmingly bi-partisan support, approved and agreed that Constellation should go forward.

In contrast to the five-year review of the overall Constellation architecture plus the carefully monitored program development, the Augustine Committee was required to provide their report in 90 days. The report contained several suggestions and alternatives to Constellation, few of which were included in the FY2011 budget, but ultimately the Committee came to the conclusion that Constellation’s architecture had been well managed and is indeed executable, providing it has the appropriate funding that had been denied for several years. Important to note is that the Committee was directed to base their conclusions and recommendations not on the FY2009 budget, but rather on the FY2010 budget from which tens of billions of dollars had already been removed between 2010 and 2020. Additionally, their conclusions were based upon a 2015, not 2020, life 5 span for the ISS and did not take into account ongoing requirements for access to LEO at other inclinations. Naturally, the Augustine Committee concluded that Constellation was not doable within the constraints of The Administration’s mandated guidelines and budget restrictions. Under these constraints, one might have expected the conclusions to be predetermined.

# Space Leadership Advantage

**[\_\_\_\_] U.S. leadership of space issues is rapidly waning. The US will be passed by Russia and China and locked out for decades because of the end of the Constellation program.**

**Frank Wolf, ranking member of the U.S. House Appropriations commerce, justice, science subcommittee. House of Representatives, 4/28/2010. “Frank Wolf: Don’t forsake US Leadership in space.”. http://culberson.house.gov/space-news-frank-wolf-dont-forsake-u-s-leadership-in-space/**

Space exploration has been the guiding star of American innovation. The Mercury, Gemini, Apollo and shuttle programs have rallied generations of Americans to devote their careers to science and engineering, and NASA’s achievements in exploration and manned spaceflight have rallied our nation in a way that no other federal program— aside from our armed services — can**.** Yet today our country stands at a crossroad in the future of U.S. leadership in space. President Barack Obama’s 2011 budget proposal not only scraps the Constellation program but radically scales back U.S. ambition, access, control and exploration in space. Once we forsake these opportunities, it will be very hard to win them back**.** As Apollo astronauts Neil Armstrong, Jim Lovell and Gene Cernan noted on the eve of the president’s recent speech at Kennedy Space Center, Fla.: “For The United States, the leading space faring nation for nearly half a century, to be without carriage to low Earth orbit and with no human exploration capability to go beyond Earth orbit for an indeterminate time into the future, destines our nation to become one of second or even third rate stature.” In terms ofnational security and global leadership, the White House’s budget plan all but abdicates U.S. leadership in exploration and manned spaceflight at a time when other countries, such as China and Russia, are turning to space programs to drive innovation and promote economic growth. Last month, China Daily reported that China is accelerating itsmanned spaceflight development while the U.S. cuts back. According to Bao Weimin with the Chinese Academy of Sciences, “A moon landing program is very necessary, because it could drive the country’s scientific and technological development.” In a recent special advertising section in The Washington Post, the Russian government boasted of its renewed commitment to human spaceflight and exploration. Noting the White House’s recent budget proposal, the piece said, “NASA has long spent more money on more programs than Russia’s space agency. But President Barack Obama has slashed NASA’s dreams of going to the moon again. … At the same time, the Russian space industry is feeling the warm glow of state backing once again. There has been concerted investment in recent years, an investment that fits in well with the [Vladimir] Putin doctrine of trying to restore Russian pride through capacity.” Manned spaceflight and exploration are one of the last remaining fields in which the United States maintains an undeniable competitive advantage over other nations. To walk away is shortsighted and irresponsible. Our global competitors have no intention of scaling back their ambitions in space.James A. Lewis with the Center for Strategic and International Studies recently said that the Obama administration’s proposal is “a confirmation of America’s decline.” The 2011 budget proposal guarantees that the United States will be grounded for the next decadewhile gambling all of our exploration money on unproven research-and-development experiments.Although I am an ardent supporter of federal R&D investments, I believe it is unacceptable that the administration would gamble our entire space exploration program for the next five years on research. The dirty little secret of this budgetproposal is that it all but ensures that the United States will not have an exploration system for at least two decades. That is a fundamental abdication of U.S. leadership in space— no matter how much the administration tries to dress it up. Our international competitors are not slowing down, and neither should we.

# Space Leadership Advantage

**[\_\_\_\_] Abandoning Constellation means backing out of international space agreements. This shows that no longer willing to take leadership on space– restoring the program is vital to creating an international partnership.**

**Elizabeth Newton and Michael Griffin, director for Space Policy in the Center for System Studies at the University of Alabama in Huntsville and former strategist at NASA Marshall Space Flight Center, 2011 Space Policy, 7/9/2011 “United States space policy and international partnership”**

President Obama’s 2010 policy is notable for the shift over the 2006 version, which most agree to be more a stylistic change of tone, rather than one of substance. The messages conveying the need for multilateral action are likely to be welcome to external audiences’ ears and suggest a more consultative approach. That said, the cancellation of the Constellation program was done without prior notice or consultation with international partners, and much of the debate on the subject has centered on the domestic repercussions of the decision, not the impact on the partners. There is evidently a mismatch between intent and such unilateralist actions.

3.2. Perceptions of reliability as a partner The president’s request and congressional authorization for continued funding of the ISS’s operations delivers on commitments made to international partners beginning in the mid-1980s when the program was conceived. However, without a successor system to the Shuttle, the USA has abrogated intergovernmental agreements to provide crew and cargo transportation, and crew rescue, as partial compensation for partner investments in the ISS’s infrastructure and operations. Reliance on the Russian Soyuz for limited down-mass cargo transport seriously inhibits the value that can be realized from ISS utilization until a commercial solution is available. In addition, the USA’s unilateral abandonment of the Moon as a near-term destination shakes partners’ political support for their exploration plans, some of which were carefully premised on US intentions, and more than five years of collaborative development of lunar base plans.

3.3. Leadership

The USA is a majority funder for many space programs and is a technology leader, two features which have provided sufficient motivation for partners to accept US leadership, even when unfortunately high-handed. It is a stunning failure of political will to lack a successor system to the retiring Space Shuttle, and so the US cedes leadership in human spaceflight with its inability to access the ISS independently, for itself or for its partners, until a new commercial capability has been demonstrated. The USA further relinquishes leadership when abandoning years of work on strategic planning and guidance, the evaluation of alternatives, and orchestration of diverse but important contributions that were manifested in the Global Exploration Strategy. Sudden redirections without consultation are not hallmarks of leadership and will no doubt motivate partners to do more unilateral planning and execution, at least for a while. Finally, leadership in the future is at risk: how can the USA hope to influence outcomes and protect interests - strategic, commercial, and cultural e on the Moon if it is not present?

# Space Leadership Advantage

**[\_\_\_\_] Cancelling Constellation guarantees that the US will lose its position as the leader in space.**

**Walter** Cunningham, Former Astronaut, went to the Moon, 2/6/2010 **“Taking a bite out of NASA”** <http://www.chron.com/disp/story.mpl/editorial/outlook/6854790.html>

The cancellation of Constellation will guarantee several things. Most important, strategically, is the gap, the period during which we will be dependent on Russia to carry Americans to our own space station. With the cancellation of Constellation, that gap will grow longer, not shorter. American astronauts will not travel into space on American-developed and -built spacecraft until at least 2016 or 2017. We are not trying to fix any deficiencies in Constellation; our fate will be in the hands of commercial companies with COTS (Commercial Orbital Transportation Services) program awards. They will attempt to regain our lost greatness with new capsules and new rockets or military rockets, after man-rating them. Supposedly, they will do this faster and cheaper than NASA. Cheaper, maybe; faster is not going to happen. These will be companies that have never made a manned rocket and have little idea of the problems they face trying to man-rate a brand new launch vehicle and space capsule. Even under the best of circumstances, humans will not be flying to the space station on COTS-developed vehicles before 2017.

After 50 years and several hundred billion dollars, the accomplishments of NASA and the U.S. space program in science, technology and exploration are unchallenged. They are admired, respected and envied by people and countries around the world. Our space program has provided inspiration to the human spirit for young and old alike. It said proudly to the world that Americans could accomplish whatever they set their minds to. Look at the efforts of China and India in the past 30 years to emulate this success. Young people have always been inspired with talk of sending explorers to the planets. Do you think they will have the same reaction when we speak of the new plan for “transformative technology development”? NASA may have been backing away from the real challenge of human spaceflight for years, but in canceling Constellation and NASA manned vehicles we are, in effect, abdicating our role as the leading spacefaring nation of the world. America will lose its pre-eminence in space.

**[\_\_\_\_] Restoring Constellation will give NASA all the technology necessary to restore US space leadership.**

**Harrison Schmitt, Former U.S. Senator and Former Chair of the NASA Advisory Council, 8/10/2009 “Liberty and Space Leadership,” http://www.spacenews.com/commentaries/liberty-and-space-leadership.html**

The current Constellation Program contains most of the technical elements necessary to implement a policy of deep space leadership, particularly development of a heavy-lift launch vehicle, the Ares 5. In addition, Constellation includes a large upper stage for transfer to the Moon and other destinations, two well-conceived spacecraft for transport and landing of crews on the lunar surface, strong concepts for exploration and lunar surface systems, and enthusiastic engineers and managers to make it happen if adequately supported. The one major missing component of a coherent and sustaining architecture may be a well-developed concept for in-space refueling of spacecraft and upper rocket stages. The experience base for developing in-space refueling capabilities clearly exists based on a variety of past activities, including ISS construction. Again, if we abandon leadership in deep space to any other nation or group of nations, particularly a non-democratic regime, the ability for the United States and its allies to protect themselves and liberty for the world will be at great risk and potentially impossible. To others would accrue the benefits — psychological, political, economic and scientific — that the United States harvested as a consequence of Apollo’s success 40 years ago. This lesson has not been lost on our ideological and economic competitors. American leadership absent from space? Is this the future we wish for our progeny?

# Space Leadership Advantage

[\_\_\_\_] US space leadership is key to national security and overall cooperative US hegemony.

**Christopher Stone, Chief Executive Officer at Constellation Software Engineering, 3/15/2011, “American leadership in space: leadership through capability,” The Space Review, http://www.thespacereview.com/article/1797/1**

The world has recognized America as the leaders in space because it demonstrated technological advancement by the Apollo lunar landings, our deep space exploration probes to the outer planets, and deploying national security space missions. We did not become the recognized leaders in astronautics and space technology because we decided to fund billions into research programs with no firm budgetary commitment or attainable goals. We did it because we made a national level decision to do each of them, stuck with it, and achieved exceptional things in manned and unmanned spaceflight. We have allowed ourselves to drift from this traditional strategic definition of leadership in space exploration, rapidly becoming participants in spaceflight rather than the leader of the global space community. One example is shutting down the space shuttle program without a viable domestic spacecraft chosen and funded to commence operations upon retirement of the fleet. We are paying millions to rely on Russia to ferry our astronauts to an International Space Station that US taxpayers paid the lion’s share of the cost of construction. Why would we, as United States citizens and space advocates, settle for this? The current debate on commercial crew and cargo as the stopgap between shuttle and whatever comes next could and hopefully will provide some new and exciting solutions to this particular issue. However, we need to made a decision sooner rather than later. Finally, one other issue that concerns me is the view of the world “hegemony” or “superiority” as dirty words. Some seem to view these words used in policy statements or speeches as a direct threat. In my view, each nation (should they desire) should have freedom of access to space for the purpose of advancing their “security, prestige and wealth” through exploration like we do. However, to maintain leadership in the space environment, space superiority is a worthy and necessary byproduct of the traditional leadership model. If your nation is the leader in space, it would pursue and maintain superiority in their mission sets and capabilities. In my opinion, space superiority does not imply a wall of orbital weapons preventing other nations from access to space, nor does it preclude international cooperation among friendly nations. Rather, it indicates a desire as a country to achieve its goals for national security, prestige, and economic prosperity for its people, and to be known as the best in the world with regards to space technology and astronautics. I can assure you that many other nations with aggressive space programs, like ours traditionally has been, desire the same prestige of being the best at some, if not all, parts of the space pie. Space has been characterized recently as “congested, contested, and competitive”; the quest for excellence is just one part of international space competition that, in my view, is a good and healthy thing. As other nations pursue excellence in space, we should take our responsibilities seriously, both from a national capability standpoint, and as country who desires expanded international engagement in space. If America wants to retain its true leadership in space, it must approach its space programs as the advancement of its national “security, prestige and wealth” by maintaining its edge in spaceflight capabilities and use those demonstrated talents to advance international prestige and influence in the space community. These energies and influence can be channeled to create the international space coalitions of the future that many desire and benefit mankind as well as America. Leadership will require sound, long-range exploration strategies with national and international political will behind it. American leadership in space is not a choice. It is a requirement if we are to truly lead the world into space with programs and objectives “worthy of a great nation.”

# Space Leadership Advantage

**The end of American hegemony would cause conflict and war.**

**Niall Ferguson, Professor of History at the School of Business at New York University and Senior Fellow at the Hoover Institution at Stanford University, September-October, 2004 (A World Without Power. Foreign Policy. Lexis |**

So what is left? Waning empires. Religious revivals. Incipient anarchy. A coming retreat into fortified cities. These are the Dark Age experiences that a world without a hyperpower might quickly find itself reliving. The trouble is, of course, that this Dark Age would be an altogether more dangerous one than the Dark Age of the ninth century. For the world is much more populous--roughly 20 times more--so friction between the world's disparate "tribes" is bound to be more frequent. Technology has transformed production; now human societies depend not merely on freshwater and the harvest but also on supplies of fossil fuels that are known to be finite. Technology has upgraded destruction, too, so it is now possible not just to sack a city but to obliterate it. For more than two decades, globalization--the integration of world markets for commodities, labor, and capital--has raised living standards throughout the world, except where countries have shut themselves off from the process through tyranny or civil war. The reversal of globalization--which a new Dark Age would produce--would certainly lead to economic stagnation and even depression. As the United States sought to protect itself after a second September 11 devastates, say, Houston or Chicago, it would inevitably become a less open society, less hospitable for foreigners seeking to work, visit, or do business. Meanwhile, as Europe's Muslim enclaves grew, Islamist extremists' infiltration of the EU would become irreversible, increasing trans-Atlantic tensions over the Middle East to the breaking point. An economic meltdown in China would plunge the Communist system into crisis, unleashing the centrifugal forces that undermined previous Chinese empires. Western investors would lose out and conclude that lower returns at home are preferable to the risks of default abroad. The worst effects of the new Dark Age would be felt on the edges of the waning great powers. The wealthiest ports of the global economy--from New York to Rotterdam to Shanghai--would become the targets of plunderers and pirates. With ease, terrorists could disrupt the freedom of the seas, targeting oil tankers, aircraft carriers, and cruise liners, while Western nations frantically concentrated on making their airports secure. Meanwhile, limited nuclear wars could devastate numerous regions, beginning in the Korean peninsula and Kashmir, perhaps ending catastrophically in the Middle East. In Latin America, wretchedly poor citizens would seek solace in Evangelical Christianity imported by U.S. religious orders. In Africa, the great plagues of AIDS and malaria would continue their deadly work. The few remaining solvent airlines would simply suspend services to many cities in these continents; who would wish to leave their privately guarded safe havens to go there? For all these reasons, the prospect of an apolar world should frighten us today a great deal more than it frightened the heirs of Charlemagne. If the United States retreats from global hegemony--its fragile self-image dented by minor setbacks on the imperial frontier--its critics at home and abroad must not pretend that they are ushering in a new era of multipolar harmony, or even a return to the good old balance of power. Be careful what you wish for. The alternative to unipolarity would not be multipolarity at all. It would be apolarity--a global vacuum of power. And far more dangerous forces than rival great powers would benefit from such a not-so-new world disorder.

# Inherency Extensions

**[\_\_\_\_]**

**[\_\_\_\_] Constellation Program was officially canceled after being defunded.**

**Dan Leone, Space News International Staff Writer, 6/11/2011, “Memo Marks Formal End of Constellation Program,” http://www.spacenews.com/civil/110614-memo-marks-end-constellation.html**

WASHINGTON — A senior NASA official has signed the formal death warrant for the Constellation deep space exploration program even as work proceeds on one of Constellation’s legacy development efforts and agency officials continue to ponder the fate of another. “I have signed the letter to close out the Constellation Program,” Douglas Cooke, associate administrator for NASA’s Exploration Systems Mission Directorate, wrote in a June 10 memo. With Constellation’s demise now official, the Constellation project office, which “has already scaled back in size significantly,” will be charged “with transitioning contracts, etc. to the new [Space Launch System] and [Multi-Purpose Crew Vehicle] programs,” Cooke wrote in the memo.

**[\_\_\_\_] The Constellation program has been cancelled and the US has no means to send astronauts into space.**

**Jacqui Goddard, writer for the Telegraph Newspaper, 7/02/2011, “Final Lift-off,” http://m.gulfnews.com/news/world/usa/the-last-flight-of-the-atlantis-shuttle-1.831365**

For every crew that has trained for a shuttle mission since the fleet was launched in 1981, there has been another on its tail ready to fly the next. But this one, Mission STS-135, is the end of the line. Three decades of space flight history are about to end. Nearly 15,000 jobs will be lost at the Kennedy and Florida space centres. Nasa would prefer the final flight to be a celebration of the shuttle's considerable accomplishments — among them the construction of the $100 billion (Dh367.3 billion) International Space Station, completed last month, and the launch of the Hubble Space Telescope. But some space flight veterans cannot help thinking of it as more of a wake. George Mueller, a former Nasa manager considered the ‘Father of the Space Shuttle' for his role in championing the policies that led to its development, still travels at 92 years old, but cannot bring himself to attend Atlantis' farewell launch. "I'm never enthusiastic about going to funerals," he said. The shuttle has been scheduled for retirement since president George W. Bush set out his Vision for Space Exploration in 2004. After the shuttle would come a new spacecraft, Bush decreed, that would make its first manned mission by 2014, ferrying astronauts initially to the space station and later to "other worlds" including the Moon by 2020, to build a manned base, and Mars by 2030. The programme, which would build Ares rockets and a crew capsule called Orion, was known as Constellation. Seven years and $9 billion later, behind schedule and over budget, President Barack Obama cancelled it. Now, the private sector has instead been tasked with developing vehicles to ferry astronauts to the space station while NASA designs a rocket to haul crew and cargo further afield. But a decision on the design of the rocket will not come before 2015 at the earliest, with construction and a manned launch unlikely before 2020.

# Industrial Base – Plan Reinvigorates Industrial Base

**[\_\_\_\_]**

**[\_\_\_\_] The new space policy relies on private development that doesn’t exist – Constellation is key to stimulate demand for space transportation vehicles.**

Elizabeth Newton and Michael Griffin, director for Space Policy in the Center for System Studies at the University of Alabama in Huntsville and former strategist at NASA Marshall Space Flight Center, 2011 Space Policy, 7/9/2011 “United States space policy and international partnership”

The president’s new policy endeavors to jump-start a private sector-led space transportation market by canceling plans for a government transportation system to deliver cargo and crew to low-Earth orbit and redirecting the funds toward procuring a yetto-be developed commercial solution which proponents purport will be more cost-efﬁcient. This decision has its curious origins in a juncture of circumstances: ﬁrst, the Ofﬁce of Management and Budget’s drive to downsize the agency; second, ascendant special interests over-anxious for market conditions that do not yet exist and frustrated with a status quo manifested in a mature bureaucracy’s methodical execution. Commercial demand for cargo and crew transport to low-Earth orbit is currently non-existent, and will be so for the foreseeable future, so it is specious to characterize the government’s paying for system development to meet limited government demand as ‘market creation’. Historically, market creation has occurred when the government’s long-term needs guaranteed a predictable and relatively high-volume of purchases, or when the government served as an anchor tenant, establishing a long-term need for service, rather than serving as an ‘investor of last resort’ to underwrite the entirety of system development because private capital markets will not. Space will only truly be brought into the USA’s economic sphere when some commercially viable enterprise is invented that either serves a stable user-base in space or that uses the resources of low-Earth orbit, the lunar surface, or other destinations. It is worth noting that an international, government lunar base would have constituted one such stable market for logistics and supplies that could have spawned a commercial market. ISS utilization, in contrast, will not require a comparable magnitude or frequency of service.

# Industrial Base – Plan Reinvigorates Industrial Base

**[\_\_\_\_]**

### **[\_\_\_\_] US shuttles are key to the American economy because of direct employment and technological spillover from the program.**

**Scott Spencer and Christopher C. Kraft, Staff writers for the Houston Chronicle, 8/12/2010, “Our economy needs a robust space program”, http://www.chron.com/disp/story.mpl/editorial/outlook/7164226.html)**

As the end of the space shuttle program nears, where and how America next travels into space appears unclear. There are no defined missions, destinations or deadlines. With the upcoming 50th anniversary of the first U.S. manned spaceflight — Alan Shepard's Mercury Freedom 7 suborbital flight on May 5, 1961, - America's leadership in space exploration is at risk of being set adrift into an uncertain future, cluttered with program cancellations, budget cuts and conflicting directives for government and commercial spaceflight development. In addition to the need to retain the unique technical expertise of tens of thousands of workers, the future of the space program is vital to the economic future of our nation. No other government program can match the economic impact of space program spin-offs that include applications in medicine, computer technology, communications, public safety, food, power generation and transportation. Where our economy goes in the future depends on where we go in space now. MRI testing, flat screen TVs, cordless power tools and solar power are examples of the long-term economic benefits of space technology spin-offs. A robust manned space program, with well defined missions, destinations and deadlines, is essential for NASA and U.S. advancement in science, technology, engineering and medicine. Such advancements inspire continued academic achievement and employment opportunities in these areas for America's youth. In the midst of the current political debate about NASA and America's future in space, it is easily overlooked that the dangerous endeavor of traveling into space requires purpose and focus on two principles that have been essential to successful U.S. manned space flight for nearly 50 years - proficiency and redundancy. Keeping the space shuttles flying will be essential to preserve the continuity of 30,000 jobs and maintaining American technical proficiency with regular space missions. The space shuttles also provide the United States with vital space transportation redundancy

# Impact – Air Power

**[\_\_\_\_]**

**[\_\_\_\_] Air power is the most effective form of power in the 21st century. It won the Cold War and is the best way to project power without casualties.**

**Maj. Gen. Charles J. Dunlap Jr., deputy judge advocate general of the Air Force, September 2006, “America's asymmetric advantage,”**

So where does that leave us? If we are smart, we will have a well-equipped high-technology air power capability. Air power is America’s asymmetric advantage and is really the only military capability that can be readily applied across the spectrum of conflict, including, as is especially important these days, potential conflict. Consider the record. It was primarily air power, not land power, that kept the Soviets at bay while the U.S. won the Cold War. And it was not just the bomber force and the missileers; it was the airlifters, as well. There are few strategic victories in the annals of military history more complete and at so low a human cost as that won by American pilots during the Berlin airlift. Armageddon was avoided. And the flexibility and velocity of air power also provides good-news stories in friendly and low-threat areas. For example, huge U.S. transports dropping relief supplies or landing on dirt strips in some area of humanitarian crisis get help to people on a timeline that can make a real difference. Such operations also illustrate, under the glare of the global media, the true American character the world needs to see more often if our strategic goals are to be achieved. Air power also doesn’t have the multi-aspect vulnerabilities that boots on the ground do. It can apply combat power from afar and do so in a way that puts few of our forces at risk. True, occasionally there will be a Francis Gary Powers, and certainly the Vietnam-era POWs — mostly airmen — became pawns for enemy exploitation. Yet, if America maintains its aeronautical superiority, the enemy will not be able to kill 2,200 U.S. aviators and wound another 15,000, as the ragtag Iraqi terrorists have managed to do to our land forces.

# AT: Obama Plan Creates Jobs

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Obama’s plan directly causes thousands of layoffs.**

**Anne Wainescott-Sargent, staff writer for Satellite today, 1/1/2011, “Commercial Satellite Sector Sees Upside to New Space Policy Hopeful of ITAR Reform, Greater Stake in U.S. Roadmap for Space.”** [**http://www.satellitetoday.com/via/cover/35808.html**](http://www.satellitetoday.com/via/cover/35808.html)

While the bill privatizes manned launches, it also puts an end to the Constellation program, the successor to the space shuttle that has been plagued by cost and schedule overruns. As envisioned, Constellation was to return astronauts to the moon by 2020, however, an independent government panel estimated last year that the Ares rocket system would not be ready for manned missions before 2017. A return to the moon was estimated to occur sometime in the mid-2020s. The U.S. has spent $11.7 billion to date developing the Constellation program’s Ares rockets and Orion crew capsule, according to NASA officials. Blakey expressed concerns about job loss in the space sector as a result of that decision. “Moving away from the Constellation program has caused real concern, particularly along the Space Coast and some of our states that have had the biggest aspects of those programs, there have been very large layoffs. Our concern is that highly skilled people may very well have to gravitate to other industries because they simply do not have that volume of work currently coming from the new programs.” AIA, in a letter to Rep. Pete Olson (R-Texas), noted that short-term layoffs directly related to the shutdown of the Constellation program total around 2,300, with another 500 jobs possibly being affected before the end of the fiscal year.Even the Space Foundation was outspoken in noting that the U.S. Space Policy provision for developing and retaining space professionals “rings hollow so long as the administration’s plans for NASA continue to put thousands of American space professionals out of work.“

# AT: Brain drain

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**[\_\_\_\_] Lack of government funding of space programs is one of the main causes of brain drain.**

**Dominic Gates, reporter for the Seattle Times, 6/12/2011, “Boeing’s Albaugh worries about ‘intellectual disarmament of U.S.” http://seattletimes.nwsource.com/html/businesstechnology/2015304417\_albaughside13.html**

Jim Albaugh is worried about the future of American technological supremacy in the world. "The biggest fear I have is what I call the intellectual disarmament of this country," said the Boeing Commercial Airplanes chief, who is also this year's chairman of the Aerospace Industries Association, the trade group for U.S. defense, space and aviation companies. "We still are the leader in aerospace," he added. "Are we going to be the leader in aerospace in another 20 years?" Albaugh is troubled that the nation's lead in aerospace, the fruit of Cold War military and space-race projects, will be allowed to wither through lack of government funding of new challenges. In a wide-ranging interview in advance of the global aviation gathering at the Paris Air Show, he ticked off a list of broad national problems that transcend Boeing: • Brain drain of talented immigrants: "The best and brightest used to come to the United States and stay," Albaugh said. "Now, the best and brightest come to the United States, get trained, and leave, and go back and compete against us."

# AT: Space won’t inspire

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**[\_\_\_\_] A national commitment from the government to space exploration will encourage students to go into STEM fields.**

**Peter Olson, Republican Member of the US House of Representatives, member of the Science and Technology Committee, 3/1/2010, “Reversing space in space exploration” http://thehill.com/special-reports/science-a-math-march-2010/84349-reversing-decline-in-space-exploration**

There is another opportunity for our nation, through the government, to have a role in this solution. We must fully commit to our nation’s human space program. A robust national space program both maintains our global leadership in human space exploration, and inspires generations of young minds to create the next level of American superiority. China and India are demonstrating their commitment to human space exploration. As it stands now, President Barack Obama’s budget is putting the U.S., the global leader in space exploration, firmly into fourth place. Without a manned space program, we will be forced to pay Russia over $50 million a person to take our astronauts to the International Space Station and beyond**.** The United States has been a beacon of cutting-edge technology when it comes to pioneering the path in science and space exploration. We were the first to set foot on the moon because we made a national commitment to being first and being the best. That’s what America does. We must continue that investment so our next generation reaps the benefits of excellence in science, math and engineering. Human space exploration is an important part of that national plan. There is still time to correct our national decline in both education and space exploration. They go hand in hand. It requires a national commitment — both public and private**.** That’s America at it’s best and that’s what will keep us on top.

# AT: Alternate Causalities

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**[\_\_\_\_] NASA is the key customer to the aerospace industry. Its demand for products is what is directly keeping the industry afloat.**

**Air Force Association, 2010, “Cancellation of NASA’s Constellation Program,” http://www.afa.org/edop/2010/nasas\_constellation\_program.asp**

There is no question that the cancellation of the Constellation program will result in the elimination of tens of thousands of jobs around the country. Not only will major suppliers feel the impact, but so will second and third tier suppliers, not to mention other collateral business fallout. The magnitude of the job loss is catastrophic enough, particularly when the nation is experiencing an unemployment rate of nearly 10%, but compounding the effect is the fact that jobs being lost are exactly the types we would like to retain if we are serious about remaining in a position of world leadership…highly technical design, engineering, and manufacturing jobs, most of which are fairly high paying. There is also a significant negative impact on the United States aerospace industrial base. As an example, we currently have but one or two companies in this country that can reliably produce large scale solid rocket boosters. The elimination of Constellation eliminates the need to produce those boosters, and as a result, the capability to do so will likely wither away. There is money in the NASA budget for research on large rockets, but there is a huge difference between R&D capability and production capability. Let us also not forget that our Armed Forces depend on these same companies to produce large missiles and boosters for our national defense. The DOD is not currently procuring enough large missile or booster systems to keep these companies afloat, either. In fact, it was the combination of military and NASA business that enabled a booster production capability to be maintained in this country. Since the NASA aerospace industrial base and the DOD aerospace industrial base are inherently intertwined, a significant negative impact on one has the same impact on the other.

# AT: Alternate Causalities

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**[\_\_\_\_] Government funding of a clear space policy is necessary to sustained the industrial base.**

Jim Maser, **Chairman of the Corporate Membership Committee, American Institute of Aeronautics and Astronautics, 3/30/2011, at a Hearing on “A Review of NASA’s Exploration Program in Transition: Issues for Congress and Industry,” Committee on Science, Space and Technology, Subcommittee on Space and Aeronautics, US House of Representatives, http://www.prattwhitney.com/media\_center/executive\_speeches/jim\_maser\_03-30-2011.asp**

Unfortunately, we do not have the luxury of waiting until we have all the answers. We must not “let the best be the enemy of the good.” In other words, selecting a configuration that we are absolutely certain is the optimum configuration is not as important as expeditiously selecting one of the many workable configurations, so that we can move forward. This industry has smart people with excellent judgment, and we will figure the details out, but not if we don’t get moving soon. NASA must initiate SLS and MPCV efforts without gapping the program efforts already in place intended to support Constellation. The time for industry and government to work together to define future space policy is now. We must establish an overarching policy that recognizes the synergy among all government space launch customers to determine the right sustainable industry size, and plan on funding it accordingly. The need to move with clear velocity is imperative if we are to sustain our endangered U.S. space industrial base, to protect our national security, and to retain our position as the world leader in human spaceflight and space exploration. I believe that if we work together we can achieve these goals. We are ready to help in any way that we can. But the clock is ticking. Thank you again for the opportunity to address the committee today. I look forward to responding to any questions you may have.

# Constellation Key to Space Exploration

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**[\_\_\_\_] The constellation program is the first step to exploration and colonization of space.**

**Christian Chrisomoto, technical researcher, 11/12/2010, “NASA’s Constellation Program Planning to Take Initiative for Moon Colonization”**

The Constellation program started as a planned successor to the Apollo program. It is a multi-faceted project that concentrated on three primary factors: the need to apply improved technologies to current spacefaring technology, the need to go beyond the current achievements in space travel and the need to initiate research to eventually colonize other planets. The program was literally meant to be taken as a first step towards the future human exploration of the entire interplanetary neighborhood. Application of advanced 21st century technology would be crucial for the Constellation program’s success. On the navigation and safety part, the Orion crew module and the Altair lunar module will be installed with the most advanced computers to aid astronauts in their journey. Spacesuits will be redesigned and redeveloped to provide astronauts with highly improved mobility during extra-vehicular activity. Numerous fail-safe devices are to be installed to ensure the safety of the crew; even if the mission doesn’t turn out to be a success. Various systems are also slated for research and improvement to make the astronauts’ stay at the moon better and much more pleasant. The Apollo program previously used the gigantic Saturn V rocket to send both the Apollo Command/Service module and Lunar module into the moon. The Constellation program however, plans to launch both modules separately. This was a plan to cut costs of lifting heavier payloads off into space, and also because of the large difference in size of both modules. Upon reaching low-Earth orbit, both modules would be docked together, and would be guided on its trip to the moon by an Earth Departure Stage. The initial plan of the Constellation program was to send astronauts to the moon by the year 2020 and let them stay for about a week. The next stage involves the establishment of a base camp that would let more astronauts stay for about half a year. After that, NASA plans to create a permanent thriving colony that can live on the moon using the resources available there by the year 2030-2050.

# Space Exploration Impacts

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**[\_\_\_\_] Colonization will help solve energy and resource problems on Earth by giving us more resources.**

**NASA, 2010** “**Space Colonization”, NASA Headquarters Library, March, http://www.hq.nasa.gov/office/hqlibrary/pathfinders/colony.htm**

One of the major environmental concerns of our time is the increasing consumption of Earth's resources to sustain our way of life. As more and more nations make the climb up from agricultural to industrial nations, their standard of life will improve, which will mean that more and more people will be competing for the same resources. While NASA [spinoffs](http://www.hq.nasa.gov/office/hqlibrary/pathfinders/spinoff.htm) and other inventions can allow us to be more thrifty with Earth's treasures, once all is said and done, its raw materials are limited. Space colonies could be the answer to the limitations of using the resources of just one world out of the many that orbit the Sun. The colonists would mine the Moon and the minor planets and build beamed power satellites that would supplement or even replace power plants on the Earth. The colonists could also take advantage of the plentiful raw materials, unlimited solar power, vaccuum, and microgravity in other ways, to create products that we cannot while inside the cocoon of Earth's atmosphere and gravity. In addition to potentially replacing our current Earth-polluting industries, these colonies may also help our environment in other ways. Since the colonists would inhabit self-supporting environments, they would refine our knowledge of the Earth's ecology.

## [\_\_\_\_] Colonization will solve many diseases on Earth through low gravity research.

**W. H.** Siegfried, Integrated Defense Systems employee for Boeing, 2003, **Integrated Defense Systems “Space Colonization—Benefits for the World”**

Many current human problems are the result of failures of the body’s natural immune system. We can diagnose many of these problems and have made great strides in ameliorating the symptoms, but to date, understanding immune system function and enhancement is seminal. Both United States and Russian long-term space missions have induced similar red blood cell and immune system changes. Hematological and immunological changes observed during, or after, space missions have been quite consistent. Decreases in red cell mass were reported in Gemini, Apollo, Skylab and Soyuz, and Mir programs—probably due to diminished rates of erythrocyte production. Space flight at microgravity levels may produce changes in white blood cell morphology and a compromise of the immune system. Skylab studies indicated a decrease in the number of T lymphocytes and some impairment in their function. Certain United States and Russian findings suggest that space flight induces a transient impairment in immune system function at the cellular level. Space flight offers a clinical laboratory unlike any place on Earth that may lead to an improved understanding of the function of the human immune system. Perhaps cures of aging, HIV, and other immune function-related illnesses can result from a comprehensive approach to Space Colonization.

# Space Leadership on the Brink

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**[\_\_\_\_] US is losing leadership in space now and ceding it to China.**

**Alan Dowd, Senior Fellow of the Fraser Institute focus on Defense and Security, 8/17/2009, “Surrendering Outer Space,”** **http://www.fraseramerica.org/commerce.web/article\_details.aspx?pubID=6853**

“I am concerned that America’s real and perceived leadership in the standing of the world’s space-faring nations is slipping away,” Griffin warns. He worries that “we will face growing competition from the advancing Chinese space program.” The concerns are real. China conducted its first spacewalk in 2008. According to Griffin, Beijing plans to “launch about 100 satellites over the next five to eight years.” There is nothing untoward about this in and of itself. It is only natural for a state with a growing economy and global interests to gain a toehold in space. What is worrisome is how the Chinese are going about this and the prospect that the U.S. will be less able to keep a close eye on China’s celestial activities. The Pentagon estimated China’s military-related spending last year at $105 billion to $150 billion and has noted that “China has accorded space a high priority for investment.” For example: In 2007, China deployed its first lunar orbiter. That same year, Beijing also tested a direct-ascent anti-satellite (ASAT) missile against one of its own satellites, demonstrating its ability to attack satellites in low-earth orbit. In addition to the direct-ascent ASAT program, the Pentagon reported in its annual report to Congress on China’s military power, that Beijing is “developing other technologies and concepts for kinetic (hit-to-kill) weapons and directed-energy (e.g., lasers and radio frequency) weapons for ASAT missions.” China is building up its capacity to jam satellite communications and GPS receivers, which are crucial to U.S. commerce and security. A 2008 Pentagon report quotes Chinese military planners as openly envisioning a “space shock and awe strike . . . [to] shake the structure of the opponent’s operational system of organization and . . . create huge psychological impact on the opponent’s policymakers.”

**[\_\_\_\_] US space leadership is slipping now because of no plan for human spaceflight.**

**Neil Armstrong, Jim Lovell, and Gene Cernan, Astronauts, all of whom commanded missions to the moon, 5/25/2011: “Is Obama grounding JFK's space legacy?”**

But today, America's leadership in space is slipping. NASA's human spaceflight program is in substantial disarray with no clear-cut mission in the offing. We will have no rockets to carry humans to low-Earth orbit and beyond for an indeterminate number of years. Congress has mandated the development of rocket launchers and spacecraft to explore the near-solar system beyond Earth orbit. But NASA has not yet announced a convincing strategy for their use. After a half-century of remarkable progress, a coherent plan for maintaining America's leadership in space exploration is no longer apparent. "We have a long way to go in this space race**.** But this is the new ocean, and I believe that the United States must sail on it and be in a position second to none." President Kennedy Kennedy launched America on that new ocean. For 50 years we explored the waters to become the leader in space exploration. Today, under the announced objectives, the voyage is over. John F. Kennedy would have been sorely disappointed.

# Space Leadership on the Brink

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**[\_\_\_\_] The time it takes to develop a replacement to Constellation will mean that we will lose space leadership.**

**Alan Dowd, Senior Fellow of the Fraser Institute focus on Defense and Security, 8/17/2009, “Surrendering Outer Space,”** **http://www.fraseramerica.org/commerce.web/article\_details.aspx?pubID=6853**

What if, in the midst of the epic contest to explore and colonize the New World, Britain — the greatest seafaring power of its day — had to mothball its naval fleet and rely on other countries to transport British men and material across the oceans? This much we know: With British subjects, ideas, and goods tethered to a little island off the coast of Europe, Britain and the world would be very different today. Something not too dissimilar is about to happen in the heavens, as the United States prepares to retire its fleet of space shuttles. For almost 30 years, the venerable, if imperfect, space plane has been America’s workhorse in space, carrying astronauts, scientific experiments, and satellites into orbit, painstakingly building the International Space Station, and just as important, reviving America’s self-confidence and reinforcing America’s image as a pioneering nation. But by 2010, with the fleet grounded due to budget, age, and safety concerns, America will have no way of delivering its own astronauts into space. The hiatus could last almost five years. America and the world — and space — could be very different by then. NASA is retiring the remaining shuttles — Discovery, Endeavour, and Atlantis — in order to make way for the Constellation program, which includes the Orion Crew Exploration Vehicle (CEV) and Ares I and V rockets. The Constellation program will incorporate “the best aspects of the Apollo and Shuttle systems,” according to NASA. As the Government Accountability Office explains, “NASA is counting on the retirement of the Shuttle to free up resources to pursue a new generation of space flight vehicles.” The problem is this: Those next-generation vehicles won’t be ready until 2015. That leaves a significant gap between the last shuttle flight and first CEV flight — a gap that could strain or even undermine America’s international standing, national security, and independence. How will we bridge that gap? The alternatives are grim, so grim that the best option appears to be purchasing “crew and cargo transport services from Russia and our international partners,” in the worrisome words of one NASA official. As Michael Griffin, NASA administrator under President George W. Bush, observed in 2008, “It is dangerous for the United States to find itself dependent upon any external entity for a strategic capability, and space transportation is just that.”

# Constellation Key to Space Leadership

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**[\_\_\_\_] Ending Constellation will end US leadership, Constellation typifies American leadership in space.**

**J Paul Douglas, remote sensing engineer for NOAA Satellite Operations Facility and former NASA Spacecraft Analyst, 3/5/2010, “Constellation Plan-B a Good Idea” http://spacetalknow.org/wordpress/?p=1710**

When the Administration announced it’s *proposal* to scrap NASA’s Constellation project, it touched off an explosion of opposition including a bipartisan letter to NASA Administrator Charles Bolden asking him to cease and desist in his actions to begin dismantling the program before the issue can be addressed — and voted upon — by the Congress. The American people have invested billions already in the program, and any unilateral action to end it is not only improper but unlawful. And many believe that to end Constellation completely will effectively end US leadership in space. Now the rank and file within NASA are speaking up. In an effort lead by former astronaut and now Director of Johnson Space Center Michael Coats, NASA will be considering a Plan-B, and in his first show of independence since taking over as chief of the agency, Administrator Bolden is backing Coats’ play. He has instructed all NASA center directors to begin exploring “what a potential compromise might look like.” The plan will be a stunningly rational effort to realign the goals of Constellation so that commercial, human space flight can assume the long-overdue role of transporting cargo and people to low earth orbit while leaving US leadership on the frontier of space intact. No other program typifies American leadership in space better than Constellation, but to be sure, some change is necessary.

## [\_\_\_\_] The current US plan has no goals or timelines, which undermines US leadership in space.

Taylor Dinerman, **Consultant for the Department of Defense and columnist for the Space Review, 6/9/2010 “The Collapse of NASA?,” http://www.hudson-ny.org/1366/the-collapse-of-nasa**

The attempt to kill George W. Bush's Constellation Program has thrown NASA and the US space industry into chaos. If the next human to set foot on the Moon is not a US astronaut, that change will be seen by the rest of the world as a major humiliation for this country. Those who say, "Been there, done that" will be answered with, "Can't go there, can't do that." In his testimony at the May 12th hearing, former astronaut Neil Armstrong said, "If the leadership we have acquired through our investment is allowed to simply fade away, other nations will surely step in where we have faltered. I do not believe that this would be in our best interest." Although the Constellation Program may have been modestly underfunded, it was based on technological and political reality. The new "Obama Program," however, currently proposed as a substitute for the Constellation, recommend a "flexible path" to human space exploration, yet provides no solid goals or timelines, and only a few vague promises that, with "game changing technology," NASA will someday be able to visit an asteroid or, in the very long term, send people to the moons of Mars. It is, as Apollo Astronaut Gene Cernan before a US Senate Committee on May 12th put it, "a travesty which flows against the grain of over 200 years of our history." The proposal is also based on the idea that the US cannot be the world's leader in space technology. It must now seek to subordinate its space ambitions to the international community. Even to the extent of killing off large segments of the space industry.

# Space Leadership Key to Hegemony

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**[\_\_\_\_] Giving up leadership in space proves to other nations that America is in decline.**

**Alan Dowd, Senior Fellow of the Fraser Institute focus on Defense and Security, 8/17/2009, “Surrendering Outer Space,”** **http://www.fraseramerica.org/commerce.web/article\_details.aspx?pubID=6853**

Surrendering the ability to carry astronauts into space promises to be a blow to America’s international stature. And in this age of global connectivity and global competition, what may seem like a marginal matter could become a serious problem. We already live at a time America is perceived as a nation in decline. Pierre Hassner of the Paris-based National Foundation for Political Science recently concluded, “It will not be the New American Century.” A 2005 piece in the Guardian dismissed America as “the hollow superpower.” It’s no wonder that Obama addressed the “nagging fear” of America’s decline in his inauguration speech, and Bush dismissed “the belief that America is in decline” in his 2006 State of the Union address. What’s relevant here is how America’s self-imposed absence from space could fuel the declinist fire, weaken America’s standing, and enhance the position of America’s enemies. Again, history is instructive: When Sputnik rocketed into orbit and Moscow triumphed, Senator Henry Jackson called it “a national week of shame and danger.” America’s attempt to match Moscow only highlighted the gap between the two superpowers when, weeks after Sputnik, America’s answer, Vanguard, exploded on takeoff. Leebaert writes that Moscow’s initial space superiority was “alarming because it was far more visible than anything else in science and technology.” Combined with America’s futility, the situation negatively impacted the country’s prestige and security, “the two in those days being habitually linked.

# Space Leadership Key to Hegemony

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**[\_\_\_\_] A program to return humans to the moon like constellation is essential to maintain national security and secure resources in space that will be vital in the future.**

**Harrison Schmitt, Former U.S. Senator and Former Chair of the NASA Advisory Council, 8/10/2009 “Liberty and Space Leadership,” http://www.spacenews.com/commentaries/liberty-and-space-leadership.html**

In spite of these difficulties, history tells us that an aggressive program to return Americans to deep space, initially the Moon and then to Mars, must form an essential component of national policy. Americans would find it unacceptable, as well as devastating to human liberty, if we abandon leadership in deep space to the Chinese, Europe or any other nation or group of nations. Potentially equally devastating would be loss of access to the energy resources of the Moon as fossil fuels diminish on Earth. In the harsh light of history, it is frightening to contemplate the long-term, totally adverse consequences to the standing of the United States in modern civilization of a decision to abandon deep space. What, then, should be the focus of national space policy in order to maintain leadership in deep space? Some propose that we concentrate only on Mars. Without the experience of returning to the Moon, however, we will not have the engineering or physiological insight for many decades to either fly to Mars or land there. Others suggest going to an asteroid. As important as asteroid diversion from a collision with the Earth someday may be, just going there is hardly a stimulating policy initiative, and it is a capability that comes automatically with a return to the Moon. Returning to the Moon and to deep space constitutes the right course for the United States. Human exploration of space embodies basic instincts — the exercise of freedom, betterment of one’s conditions and curiosity about nature. These instincts have been manifested in desires for new homelands, trade and knowledge. For Americans particularly, such instincts lie at the very core of our unique and special society of immigrants. Over the last 150,000 years or more, human exploration of Earth has yielded new homes, livelihoods, know how and resources as well as improved standards of living and increased family security. In historical times, governments have directly and indirectly played a role in encouraging exploration efforts. Private groups and individuals often have taken additional initiatives to explore newly discovered or newly accessible lands and seas. Based on their specific historical experience, Americans can expect that the benefits sought and won in the past also will flow from their return to the Moon, future exploration of Mars and the long reach beyond. To realize such benefits, however, Americans must continue as the leader of human activities in space**.**

# AT: Constellation Design Was Flawed

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**[\_\_\_\_] The Constellation program was behind schedule because it never received adequate funding, forcing directors to make damaging cuts.**

**Space Travel Online, 9/28/2009, “Funding Shortfalls Have Hurt NASA’s Constellation Program,” http://www.space-travel.com/reports/Funding\_Shortfalls\_Have\_Hurt\_NASA\_Constellation\_Program\_999.html**

"Following on the heels of the Science and Technology Committee's September 15, 2009 hearing on the Review of U.S. Human Space Flight Plans Committee's Summary Report, during which it became crystal clear that NASA hasn't been given adequate resources to implement the Constellation Program, it should come as no surprise that funding is at the center of NASA's inability to complete the work necessary to build confidence in the cost and schedule estimates the agency develops for Constellation" Gordon said. At the September 15th hearing the chair of the review committee, Mr. Norman Augustine, provided the committee's assessment of the Constellation program, stating that: "We did review the program, its management. We believe it to be soundly managed...We believe that the existing program, given adequate funds, is executable and would carry out its objectives." "Constellation has been underway for four years, and we have invested almost $8 billion in it to date. I am heartened that the review committee found the program to be sound and one that can be successfully implemented if given adequate resources in a timely manner. GAO's report provides a sobering indication of the negative impact that funding shortfalls can have on complex and technically difficult space flight programs like Constellation, no matter how dedicated and skillful the program's workforce is," added Gordon.

# AT: Constellation Design Was Flawed

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[\_\_\_\_] The cancellation of Constellation was a political decision, not based on program performance.

**Scott J. Horowitz, former NASA Associate Administrator of Exploration Systems Missile Directorate, 5/8/2011, “A Trajectory to Nowhere,”** [**http://www.americaspace.org/?p=7621**](http://www.americaspace.org/?p=7621)

Myth 1: The current debate is about technical and programmatic issues with NASA’s Constellation Program. The current debate has nothing to do with technical/programmatic issues, it is completely politically motivated and being driven by a few people in the current administration (Lori Garver, NASA Deputy Administrator, Jim Kohlenberger, Office of Science and Technology Policy Chief of Staff, and Paul Shawcross, Chief of the Science and Space Branch at the Office of Management and Budget). Their objective is to cancel the “Bush” program and punish the states (Alabama, Texas) that “didn’t vote for us anyway”.

**[\_\_\_\_]**

**[\_\_\_\_] The study that found Constellation to be inefficient was done incorrectly.**

**Scott J. Horowitz, former NASA Associate Administrator of Exploration Systems Missile Directorate, 5/8/2011, “A Trajectory to Nowhere,”** [**http://www.americaspace.org/?p=7621**](http://www.americaspace.org/?p=7621)

Myth 2: The Constellation Program is on an “unsustainable trajectory”. This of course is the administration’s entire platform (excuse) for wanting to cancel the Constellation Program. They used a simple 3 step process to create this catch-phrase.

•Immediately reduce the Constellation Budget by 20% in the FY 2010 budget when the new administration took office.

•Gather a commission to study the program populated with as few people that know anything about real development programs as possible and have agendas aligned with the desired outcome.

•Produce a report with “options”, but insufficient data to support recommendations and pick the ones that cancel the current program even though there is no data supporting any “sustainable” alternatives.

So what the Augustine Commission found out was that the Constellation Program was underfunded (didn’t need a commission to tell us that), but more importantly, it was well managed and capable of dealing with technical issues expected in a program of this magnitude. In fact Norm Augustine testified before Congress that:

“We did review the program, its management. We believe it to be soundly managed… We saw no problems that appear to be unsolvable given the proper engineering talent, the attention, and the funds to solve them.”

# Constellation Effective / AT: Smaller Rockets Solve

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**[\_\_\_\_] Constellation’s ARES rocket opens up new ways of studying space that were previously impossible.**

**Tariq Malik, Senior Editor for SPACE.com, 1/21/2009, “New Moon Rocket Could Launch Giant Space Telescopes,” from** [**http://www.space.com/6337-moon-rocket-launch-giant-space-telescopes.html**](http://www.space.com/6337-moon-rocket-launch-giant-space-telescopes.html)

NASA’s plans for the mammoth Ares V rocket could do more than just launch new lunar landers and cargo to the moon. It could also haul massive telescopes that dwarf the Hubble Space Telescope or fling deep space probes on faster missions to the outer planets**.** Slated to make its first test flight in 2018, the Ares V rocket is designed to stand about 381 feet (116 meters) tall and be able to launch payloads weighing almost 180 metric tons into low-Earth orbit. ‘When it’s built, it’ll be the biggest rocket that’s ever been built,’ said Kathy Laurini, project manager for NASA’s Altair lunar lander designed to ride an Ares V to the moon by 2020, has said. ‘It’s quite big.’ But while the Ares V is designed under NASA’s Constellation program to return astronauts to the moon, the rocket behemoth presents a boon for astronomers and other scientists dreaming of bigger, better space-based observatories. ‘The science community is taking a hard look at Ares V and its capability,’ Laurini told SPACE.com. ‘It helps them enable a whole other class of mission.’

# Constellation Effective / AT: Smaller Rockets Solve

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**[\_\_\_\_] Ares 5 is key to many types of missions – including near Earth exploration, Moon, Mars, and the outer solar system – that includes probing for habitable places in the universe for space colonization.**

**Phil Sumrall, Advanced Planning Manager, ARES Projects Office, NASA, 10/21/2008,** **“Ares V: Application to Solar System Scientific Exploration”**

4. Summary and Conclusions In summary, there appears to be a wide range of science missions that could be launched by Ares V that would not be possible otherwise. Ares V capability is expected to open up lunar, Mars, near Earth and solar system missions for heavy payloads, and might even enable reasonable sample return missions from the far reaches of the Solar System**.** Furthermore, Ares V, configured with an upper stage, could enable vastly more capable missions that could bring the search for habitability at far reaches of the solar system much closer. It is an obvious conclusion that in order to make maximum use of this capability, design requirements specific to challenging solar system exploration missions must be identified for consideration during Ares V development. Follow-on studies should be considered to examine in detail the capability of the Ares V vehicle to enable large, complex solar system exploration missions, the results of which will be valuable to NASA’s programs for both human and robotic exploration.

# AT: Constellation Trade off With Deep Space

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Constellation allows the US to be a leader in deep space exploration.**

**Harrison Schmitt, Former U.S. Senator and Former Chair of the NASA Advisory Council, 8/10/2009 “Liberty and Space Leadership,” http://www.spacenews.com/commentaries/liberty-and-space-leadership.html**

The current Constellation Program contains most of the technical elements necessary to implement a policy of deep space leadership, particularly development of a heavy-lift launch vehicle, the Ares 5. In addition, Constellation includes a large upper stage for transfer to the Moon and other destinations, two well-conceived spacecraft for transport and landing of crews on the lunar surface, strong concepts for exploration and lunar surface systems, and enthusiastic engineers and managers to make it happen if adequately supported. The one major missing component of a coherent and sustaining architecture may be a well-developed concept for in-space refueling of spacecraft and upper rocket stages. The experience base for developing in-space refueling capabilities clearly exists based on a variety of past activities, including ISS construction. Again, if we abandon leadership in deep space to any other nation or group of nations, particularly a non-democratic regime, the ability for the United States and its allies to protect themselves and liberty for the world will be at great risk and potentially impossible. To others would accrue the benefits — psychological, political, economic and scientific — that the United States harvested as a consequence of Apollo’s success 40 years ago. This lesson has not been lost on our ideological and economic competitors. American leadership absent from space? Is this the future we wish for our progeny?

# Answers To: Privatization DA / CP

**[\_\_\_\_]**

**[\_\_\_\_] Privatization hurts STEM education and harms the space program.**

**Christian Science Monitor, 4/13/2010. Former astronauts pan Obama's proposal for NASA space program http://www.csmonitor.com/USA/2010/0413/Former-astronauts-pan-Obama-s-proposal-for-NASA-space-program**

But the letter’s signatories say this is not the right time for Obama’s proposals. The space shuttle program is slated is to end later this year, which raises the prospect of the United States relying on Russia to ferry its astronauts to the International Space Station.“We are very concerned about America ceding its hard earned global leadership in space technology to other nations,” the letter says. “We are stunned that, in a time of economic crisis, this move will force as many as 30,000 irreplaceable engineers and managers out of the space industry.” Thousands of space shuttle engineers and other agency workers staged a rally last weekend outside the space center to protest against the job cuts. Senators representing Florida and Texas, where most of NASA’s workers are employed, have promised to fight Obama’s proposals in Congress. Not all of NASA's noted alumni are critical of the Obama’s plans, however. In February, Buzz Aldrin, the second man to step on the moon, issued a statement applauding Obama's vision, saying: "A near-term focus on lowering the cost of access to space and on developing key, cutting-edge technologies to take us further, faster, is just what our Nation needs to maintain its position as the leader in space exploration for the rest of this century." Still, those who signed the letter worry that a vital opportunity to educate and inspire American youths is being lost. “We see our human exploration program, one of the most inspirational tools to promote science, technology, engineering and math to our young people, being reduced to mediocrity,” they wrote. “This is not the time to abandon the promise of the space frontier for a lack of will or an unwillingness to pay the price.”

**[\_\_\_\_] We need government leadership to maintain leadership in space.**

**Aerospace Industries Association, 2010, Maintain U.S. leadership in space, http://www.aia-aerospace.org/issues\_policies/space/maintain/**

U.S. space efforts — civil, commercial and national security — drive our nation’s competitiveness, economic growth and innovation. To maintain U.S. preeminence in this sector and to allow space to act as a technological driver for current and future industries, our leadership must recognize space as a national priority and robustly fund its programs. U.S. leadership in space cannot be taken for granted. Other nations are learning the value of space systems; the arena is increasingly contested, congested and competitive. Strong government leadership at the highest level is critical to maintaining our lead in space and must be supported by a healthy and innovative industrial sector.

# Article: Constellation and the Space Program’s Legacy

**Neil Armstrong, Jim Lovell and Gene Cernan: *Is Obama Grounding JFK’s Space Legacy?* May 24th, 2011.**

*"First, I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the Earth. No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish."*—President John F. Kennedy, Joint Session of Congress, May 25, 1961

Was President Kennedy a dreamer, a visionary, or simply politically astute? We may never know, but he had the courage to make that bold proposal 50 years ago Wednesday. The Soviet Union's Yuri Gagarin had completed an orbit of the Earth the previous month and electrified the world. The United States had taken only one human, Alan Shepard, above 100 miles altitude and none into orbit. Americans, embarrassed by the successes of our Cold War adversary, were eager to demonstrate that we too were capable of great achievements in space.

President Kennedy called in the leaders of the nascent National Aeronautics and Space Administration for their opinion on any space goal that Uncle Sam could win. They concluded that the only possibility was a manned lunar landing, and that would include all the principal elements of human space travel.

The president decided this was the right project, the right time, and the Americans were the right people.

*"Now it is time to take longer strides — time for a great new American enterprise — time for this nation to take a clearly leading role in space achievement, which in many ways may hold the key to our future on earth.… Let it be clear that I am asking the Congress and the country to accept a firm commitment to a new course of action, a course which will last for many years and carry very heavy costs."*

*— President Kennedy*

A half century has passed since Kennedy challenged our citizenry to do what most thought to be impossible. The subsequent American achievements in space were remarkable: Mercury, Gemini, Apollo and Skylab. Our efforts enhanced international cooperation with Apollo-Soyuz, the space shuttle and the International Space Station. The compelling fascination of our space achievements among young people spurred their interest in education.

By 2005, in keeping with President Kennedy's intent and America's resolve, NASA was developing the Constellation program, focusing on a return to the moon while simultaneously developing the plans and techniques to venture beyond, and eventually to Mars.

The program enjoyed near-unanimous support, being approved and endorsed by the Bush administration and by both Democratic and Republican Congresses. However, due to its congressionally authorized funding falling victim to Office of Management and Budget cuts, earmarks and other unexpected financial diversions, Constellation fell behind schedule. An administration-appointed review committee concluded the Constellation program was "not viable" due to inadequate funding.

President Obama's proposed 2011 budget did not include funds for Constellation, therefore essentially canceling the program. It sent shock waves throughout NASA, the Congress and the American people. Nearly $10 billion had been invested in design and development of the program.

Many respected experts and members of Congress voiced concern about the president's proposal. Some supported the president's plan,but most were critical. The supporters' biases were often evident, particularly when there was a vested or economic interest in the outcome.

Obama's advisers, in searching for a new and different NASA strategy with which the president could be favorably identified, ignored NASA's operational mandate and strayed widely from President Kennedy’s Vision and the will of the American people.

*"We intend to be first. In short, our leadership in science and in industry, our hopes for peace and security, our obligations to ourselves as well as others, all require us to make this effort, to solve these mysteries, to solve them for the good of all men, and to become the world's leading space-faring nation."*

*— President Kennedy*

Congress, realizing the devastating effects to the plans, program and morale of those trying to keep America in the forefront of exploring the universe and expanding the human frontier, worked diligently to steer NASA's program back toward Kennedy's goals.

Congress passed an authorization bill directing NASA to begin development of a large rocket capable of carrying humans toward the moon and beyond and to continue development of a multipurpose spacecraft based on the configuration that was being developed in the Constellation program. However, the president's 2012 budget reduced funding significantly below the authorized amount for both the big rocket and the multipurpose crew vehicle.

On the other hand, the president's budget had significantly increased funding over the congressional direction in the area of space technology research programs and the development of rockets and spacecraft by the commercial entrepreneurs.

Congress stated that rather than depending on NASA subsidies, the development of commercial sources to supply cargo and crew to the International Space Station should be a partnership between government and industry.

Entrepreneurs in the space transportation business assert that they can offer such service at a very attractive price — conveniently not factoring in the NASA-funded development costs. These expenditures, including funds to insure safety and reliability, can be expected to be substantially larger and more time consuming than the entrepreneurs predict.

The response to Kennedy's bold challenge a half-century ago has led to America's unchallenged leadership in space. We take enormous pride in all that has been accomplished in the past 50 years. And we have the people, the skills and the wherewithal to continue to excel and reach challenging goals in space exploration.

But today, America's leadership in space is slipping. NASA's human spaceflight program is in substantial disarray with no clear-cut mission in the offing. We will have no rockets to carry humans to low-Earth orbit and beyond for an indeterminate number of years. Congress has mandated the development of rocket launchers and spacecraft to explore the near-solar system beyond Earth orbit. But NASA has not yet announced a convincing strategy for their use. After a half-century of remarkable progress, a coherent plan for maintaining America's leadership in space exploration is no longer apparent.

*"We have a long way to go in this space race. But this is the new ocean, and I believe that the United States must sail on it and be in a position second to none."*

*— President Kennedy*

Kennedy launched America on that new ocean. For 50 years we explored the waters to become the leader in space exploration. Today, under the announced objectives, the voyage is over. John F. Kennedy would have been sorely disappointed.

# Article: America’s Need for Space Leadership

**Harrison Schmitt: *Liberty and Space Leadership*. August 10th, 2009.**

The Apollo 11 40th anniversary celebrations and the confirmation of Charles Bolton as the new NASA administrator has not removed the morale-bending cloud of uncertainty created by the inaction of the current administration relative to space policy. The lack of initiative by President Barack Obama indicates that he does not understand the role space plays in the future of the United States and of liberty.

Between 2005 and 2008, the NASA Advisory Council continuously reviewed all aspects of the Constellation Program under then-President George W. Bush. The Council’s conclusion can be summarized as follows: Constellation constitutes an extremely important, technically well-conceived, highly challenging, and grossly underfunded effort to return Americans to deep space, including eventual flights to Mars.

By lack of congressional and Bush administration action, however, Constellation not only never received the administration’s promised funding but was required:

1) to continue the construction of the international space station (ISS), which was badly underbudgeted by the NASA administrator, the Office of Management and Budget, and ultimately the Congress, prior to Mike Griffin’s tenure at NASA;

2) to accommodate numerous major overruns in the Science programs, which are largely protected from major revision or cancellation by congressional interests;

3) to manage the agency without hire and fire authority, which is particularly devastating to the essential hiring of young engineers; and

4) to eat the redirection and inflation-related costs of several Continuing Resolutions.

Whatever course is set by the new administration, these four fundamental restrictions to success must be eliminated or the risk of program failure and of loss of future missions and crews will reach unacceptable levels.

In spite of these difficulties, history tells us that an aggressive program to return Americans to deep space, initially the Moon and then to Mars, must form an essential component of national policy. Americans would find it unacceptable, as well as devastating to human liberty, if we abandon leadership in deep space to the Chinese, Europe or any other nation or group of nations. Potentially equally devastating would be loss of access to the energy resources of the Moon as fossil fuels diminish on Earth. In the harsh light of history, it is frightening to contemplate the long-term, totally adverse consequences to the standing of the United States in modern civilization of a decision to abandon deep space.

What, then, should be the focus of national space policy in order to maintain leadership in deep space? Some propose that we concentrate only on Mars. Without the experience of returning to the Moon, however, we will not have the engineering or physiological insight for many decades to either fly to Mars or land there. Others suggest going to an asteroid. As important as asteroid diversion from a

collision with the Earth someday may be, just going there is hardly a stimulating policy initiative, and it is a capability that comes automatically with a return to the Moon.

Returning to the Moon and to deep space constitutes the right course for the United States. Human exploration of space embodies basic instincts — the exercise of freedom, betterment of one’s conditions and curiosity about nature. These instincts have been manifested in desires for new homelands, trade and knowledge. For Americans particularly, such instincts lie at the very core of our unique and special society of immigrants.

Over the last 150,000 years or more, human exploration of Earth has yielded new homes, livelihoods, know how and resources as well as improved standards of living and increased family security. In historical times, governments have directly and indirectly played a role in encouraging exploration efforts. Private groups and individuals often have taken additional initiatives to explore newly discovered or newly accessible lands and seas. Based on their specific historical experience, Americans can expect that the benefits sought and won in the past also will flow from their return to the Moon, future exploration of Mars and the long reach beyond. To realize such benefits, however, Americans must continue as the leader of human activities in space.

With a permanent resumption of the exploration of deep space, one thing is certain: Our efforts will be comparable to those of our ancestors as they migrated out of Africa and into a global habitat. Further, a permanent human presence away from Earth provides another opportunity for the expansion of free institutions, with all their attendant rewards, as humans face new situations and new individual and societal challenges.

The competitve international venue remains at the Moon. Returning there now meets the requirements for a U.S. space policy that maintains deep space leadership, as well as providing major new scientific returns and opportunities. Properly conceived and implemented, however, returning to the Moon prepares the way for a new generation to go to Mars.

The current Constellation Program contains most of the technical elements necessary to implement a policy of deep space leadership, particularly development of a heavy-lift launch vehicle, the Ares 5. In addition, Constellation includes a large upper stage for transfer to the Moon and other destinations, two well-conceived spacecraft for transport and landing of crews on the lunar surface, strong concepts for exploration and lunar surface systems, and enthusiastic engineers and managers to make it happen if adequately supported. The one major missing component of a coherent and sustaining architecture may be a well-developed concept for in-space refueling of spacecraft and upper rocket stages. The experience base for developing in-space refueling capabilities clearly exists based on a variety of past activities, including ISS construction.

Again, if we abandon leadership in deep space to any other nation or group of nations, particularly a non-democratic regime, the ability for the United States and its allies to protect themselves and liberty for the world will be at great risk and potentially impossible. To others would accrue the benefits — psychological, political, economic and scientific — that the United States harvested as a consequence of Apollo’s success 40 years ago. This lesson has not been lost on our ideological and economic competitors.American leadership absent from space? Is this the future we wish for our progeny?

**Constellation Negative**

# Constellation Negative

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# Glossary

**Apollo** – The Apollo program ran from 1961 to 1972 and was the NASA program that was tasked with sending humans to the moon.

**“date by” goal –** A means of organization where a goal is expected to be done at a certain period of time. Kennedy’s proclamation that the U.S. should land a man on the moon by 1970 was a “date by” goal.

**capabilities-based approach** – a means of organization where instead of focusing on having a goal complete by a specific date emphasis is placed on being able to complete a variety of tasks. A capabilities-based approach in NASA would perhaps include being able to reach an asteroid or being able to send humans into space at a certain low cost.

**Heavy lift capacity –** A country that has heavy lift capacity has a fleet of functioning heavy lift vehicles. Heavy lift vehicles are a class of rocket that can lift the heaviest payloads into space. Human missions into space exclusively have used heavy-lift vehicles, while the launch of merely a satellite could be accomplished with a smaller rocket

**Terraform –** the idea of transforming another planet so that it more closely resembles Earth, perhaps by introducing Earth species or making a thicker atmosphere

**Hysterical –** uncontrolled or extreme emotion

**Cannibalize –** to use resources from one project to fund another. If the ISS is to be cannibalized to fund other programs, the ISS would cease to function and its funds and parts would be used for the other project

**Isolationism –** a policy of remaining removed from the affairs of other countries

**Prosperity –** flourishing, thriving, with success or good fortune -

**Demographic –** relating to the size or structure of a population

**Microelectronics –** the design and manufacture of microchips and circuits

**Satiety –** the condition of being full or gratified

**Maw –** the mouth of an animal, especially a carnivorous one

**NASA**

**STEM**

**ISS** – International Space Station

# Answers To: Inherency

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] NASA’s budget is increasing on net as a result of Obama’s new plan.**

**Phil Plait, writer for the Discovery Magazine, 2/1/2010, “President Obama’s NASA budget unveiled”. http://blogs.discovermagazine.com/badastronomy/2010/02/01/president-obamas-nasa-budget-unveiled/**

As promised, today President Obama released his planet NASA budget for the year. Not too surprisingly, it’s pretty much as the rumors indicated. There’s a lot to say here, and I have a lot on my mind, so please hear me out. The good news for sure is an increase of $6 billion over the next five years. It stresses new technology and innovation (to the tune of over $1.5 billion), which is also good. A lot of NASA’s successes have been from pushing the limits on what can be done. It also stresses Earth science, which isn’t surprising at all; Obama appears to understand the importance of our environmental impact, including global warming. So that’s still good news. The very *very* good news is that half that money — *half*, folks, 3.2 **billion** dollars — is going to science. Yeehaw! The release specifically notes telescopes and missions to the Moon and planets. That, my friends, sounds fantastic.

# Answers To: Space Leadership Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] The Apollo approach is outdated and threatens US leadership – a new space strategy is necessary.**

**Dr. John M. Logsdon, Professor Emeritus of Political Science and International Affairs at The George Washington University's Elliott School of International Affairs; founder and director of GW's Space Policy Institute in 1987, 6/30/2010 “The End of the Apollo Era – Finally?”, 6/30/10, http://www.spacenews.com/commentaries/100630-blog-end-apollo-era-finally.html**

There is a coherent explanation of what is being proposed, but NASA has given it little emphasis and it seems not to have registered with those trying to understand the new strategy. That strategy involves a restart — a five-year period of building the technological foundation for the future. That restart would be followed by another five to seven years of developing new systems based on that foundation, then a series of human missions to various destinations beyond Earth orbit. There is no commitment to a specific destination on a specific schedule; that avoids the narrowing effect that was a characteristic of Apollo. To me this is a quite sensible and easily understandable strategy, if the United States wants to be in the vanguard of 21st century space exploration. But it does not follow the Apollo model of setting a date to arrive at a specific destination that gave the United States unquestioned space leadership. It will be a challenge to maintain focus and technological discipline in implementing a strategy without a “date by” goal, but a capabilities-based approach can pave the way to U.S. leadership in reaching all the interesting destinations between the Earth and Mars. To me, the greatest threat to U.S. space leadership would come from our political system insisting on staying with the Apollo-era approach to the future, not from adopting this new strategy.

# Answers To: Space Leadership Advantage

**[\_\_\_\_]**

[\_\_\_\_] Space leadership is strong in the status quo, Constellation is only a minor setback.

**Anatoly Zak, Contributing Editor – Astronomy and Cosmonautics, 2/4/2010, “End of Constellation: It is Not All Doom and Gloom,” http://www.russianspaceweb.com/sei\_end.html**

Obviously, for every space enthusiast around the world, it would be sad to see any major space exploration effort to be axed in a budget crunch. The frustration of legislators representing congressional districts with heavy involvement into a discontinued federal project is also understandable. However there is a silver lining. Every failure presents a new opportunity and even more so does the inevitable demise of the Constellation program. NASA still can make it right, make it big, and remain a leader in space, if it chooses to do so. First of all, the Obama administration promised to increase overall NASA funding, which along with recovering economy, puts the US space agency in a very strong position for drawing up an aggressive future strategy in space. The goal of going to the Moon itself has not been abandoned but only postponed, likely for a historically insignificant period of time. In the meantime, NASA and all its international partners will be able to send their astronauts to the International Space Station, ISS, to conduct scientific research and built foundation for human ventures beyond the Earth orbit. The fact that US astronauts will temporarily fly to the ISS onboard Russian spacecraft, should bother no one but isolationists and nationalists. It is much more tragic that under funding restraints of the Constellation program, a brand-new space station -- the largest and most complex man-made structure in orbit -- would have to be dumped into the ocean as soon as 2015. Perhaps, it still would not be the most unprecedented waste of taxpayers’ money in the history of space program – just ask the developers of the Soviet N1 moon rocket and the Energia-Buran system. (Both were abandoned practically on the launch pad, after years of colossal efforts.) Beyond the station Before the end of this decade, NASA would have a new manned spacecraft, capable of reaching the ISS and, most likely, the same vehicle would be easily adaptable for lunar missions. Although the potential of the so-called “private sector” to build better, cheaper spacecraft is greatly over-hyped, there is little doubt that the US aerospace industry would be fully capable of building a state-of-the-art spacecraft for the federal government. Hysterical cries in the American press about the loss of US capability to launch astronauts into space are completely unfounded. Hysterical cries in the American press about the loss of US capability to launch astronauts into space are completely unfounded.

# Answers To: Space Leadership Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Increasing human spaceflight shortchanges existing cooperation in NASA in other areas which ultimately damages leadership.**

**Vincent G. Sabathier and Ryan Faith, senior fellow and director of the Human Space Exploration Initiative at the Center for Strategic and International Studies (CSIS) in and program manager for the Human Space Exploration Initiative at CSIS, 4/26/06 “U.S. Leadership, International Cooperation, and Space Exploration” csis.org/files/media/csis/pubs/060426\_us\_space\_leadership.pdf**

The future of international space exploration is at a turning point as is U.S. leadership.

Space exploration has always been very complex on many levels. On the national front, one has been confronted with the political, diplomatic, budgetary, and technical swings and compromises that govern any national space program. Activities in space also lie in the middle of strategic and foreign policy considerations. As NASA has already had to sacrifice its image as a technology innovator to pursue exploration, it is understandable that it does not want to be further constrained by foreign policy requirements. Exploration, however, demands leadership, which in turn is dependent on foreign policy considerations**.** But one could argue that exploration in a difficult budget environment would cannibalize both the International Space Station (ISS) and science programs, two areas in which most of the collaborative efforts today are taking place. Such an approach will result in a critical loss of U.S. leadership. Therefore, the current mindset, articulated by the expressions “If we build it, they will follow” and “Forget diplomacy, let’s go back to the moon,” is closer to isolationism than to leadership. In other words, a quarterback by himself isn’t an entire football team.

**[\_\_\_\_]**

**[\_\_\_\_] Studies show that the US is still the dominant power in space.**

**The Economist, 4/10/2008, “Space Competitiveness” http://www.economist.com/node/11019607?story\_id=E1\_TTDTJGDS**

Russia may have won the initial race into space with Sputnik but half a century on, America has forged a big lead. A report by Futron, a technology consultancy, confirms America's dominance of space. On its space-competitiveness index—which comprises 40 measures, including government spending, numbers of spacecraft built, numbers of spaceports and corporate revenue from space ventures—America is light years ahead of its closest rivals in Europe. Russia, which still dominates the orbital-launch industry, is ranked third. China is an emerging space power with ambitious goals backed by heavy government investment. Its launch industry is now challenging America's. India is ranked just behind China.

# Answers To: Space Leadership Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Astronauts conclude that the Obama’s space program would be effective at maintaining leadership.**

**Buzz Aldrin, second human being to walk on the moon, 2/1/2010, Interviewed by Phil Plait, writer for the Discovery Magazine 2/1/2010. “President Obama’s NASA budget unveiled”. http://blogs.discovermagazine.com/badastronomy/2010/02/01/president-obamas-nasa-budget-unveiled/**

Now the White House has released a letter from another NASA luminary, Buzz Aldrin, that supports the administration's approach:

As an Apollo astronaut, I know full well the importance of always exploring new frontiers and tackling new challenges as we explore space. The simple truth is that we have already been to the Moon - some 40 years ago. What this nation needs in order to maintain its position as the 21st century leader in space exploration is a near-term focus on lowering the cost of access to space and on developing key, cutting-edge technologies that will take us further and faster - while expanding our opportunities for exploration along the way. The President's program will help us be in this endeavor for the long haul and will allow us to again push our boundaries to achieve new and challenging things beyond Earth. I believe that this is the right program at the right time, and I hope that NASA and our dedicated space community will embrace this new direction as much as I do. By so doing we can together continue to use space exploration to help drive prosperity and innovation right here on Earth.

**[\_\_\_\_] The Constellation program would not have restored space leadership even if it had been completed.**

**Roger Handberg, Professor and Chair of the Department of Political Science at the University of Central Florida, 5/3/2010, “Post-Constellation blues”, “http://www.thespacereview.com/article/1620/**

Taking another pathway to the future is disturbing when you have a particular model of how to do human exploration in your head. What is happening now is that the United States is being forced to adapt to a situation where it no longer dominates events at least until the United States returns to routine human spaceflight. The reality, not always understood, is that this situation would have arisen even if the Constellation program continued on its projected, albeit delayed, path. Regardless of President Obama’s choices, the US confronted a new situation due to the Constellation program’s failure to keep on track and on budget. Advocates ignore the reality that the bulk of Congress is not terribly driven or excited about the space program because its linkages to their constituents are not concrete and immediate. As a general proposition, most would support an American space program, but the reality is that support is not strong enough to drive them to significantly increase NASA’s budget without some greater sense of where the program is going. Prematurely killing the ISS was a perplexing decision from their perspective since NASA seemed to be throwing away a generation of its work and saying, in effect, “Let’s start over.” The Vision for Space Exploration in one sense was a clean-sheet concept despite the obvious carry forward aspects of the Apollo program, but Congress and the American people seem reluctant to start over without first exploiting what has taken several decades to build.

# Answers To: Space Leadership Advantage

**[\_\_\_\_]**

**[\_\_\_\_] The Constellation program followed an outdated model based on the Apollo missions. It was doomed.**

**Dr. John M. Logsdon, Professor Emeritus of Political Science and International Affairs at The George Washington University's Elliott School of International Affairs; founder and director of GW's Space Policy Institute in 1987, 6/30/2010 “The End of the Apollo Era – Finally?”, 6/30/10, http://www.spacenews.com/commentaries/100630-blog-end-apollo-era-finally.html**

I interpret the new space strategy set out by the White House Feb. 1 to be at its foundation a proposal to move from the 20th century, Apollo-era approach to human spaceflight to a new approach consistent with 21st century national and international realities and future exploration and other strategic space objectives. It is not surprising that those with positive memories of Apollo and with vested interests in continuing the space status quo have been so strong in their opposition to the new approach; they are defending a space effort that to date has served them well. These critics have been met with a — literally — incoherent defense of the new strategy by its advocates inside and outside of the government. U.S. President Barack Obama confused the situation even further in his April 15 speech at the Kennedy Space Center. The result has been a polarized debate unprecedented in my more than four decades of close observation of space policymaking. I am an optimist by nature, and so I hope that we will see emerging over this summer an approach that accepts the main tenets of the new strategy and allows NASA to start implementing them. But that outcome is far from assured, and the alternative is distressing to contemplate. Apollo was aimed at beating the Russians to the Moon; it was not propelled by a long-term vision of space exploration. To meet Kennedy’s “before this decade is out” goal, NASA chose a set of hardware systems and an architecture optimized for getting to the Moon as soon as possible; these choices had unfortunate consequences. The Apollo spacecraft and the magnificent Saturn 5 launcher proved not to be relevant to any post-Apollo mission that could gain political support in the early 1970s, and were quickly discarded. But in developing, testing and operating the Apollo-Saturn system, NASA developed a large facility infrastructure, an extremely competent and dedicated work force, and a widespread space industrial base; those remain. One way of understanding the 40 years since Apollo is by viewing the space shuttle and the international space station as attempts to preserve and take advantage of that infrastructure, work force and industrial base. Pursuing an “Apollo on steroids” approach to the Constellation program was an understandable sequel to those programs, once again trying to employ the heritage left by Apollo. But this, like the hardware developed for Apollo and then abandoned, is ultimately a dead-end approach. Yale University organizational sociologist Gary Brewer more than 20 years ago observed that NASA during the Apollo program came close to being “a perfect place” — the best organization that human beings could create to accomplish a particular goal. But, suggested Brewer, “perfect places do not last for long.” NASA was “no longer a perfect place.” The organization needed “new ways of thinking, new people, and new means.” He added “The innocent clarity of purpose, the relatively easy and economically painless public consent, and the technical confidence [of Apollo] ... are gone and will probably never occur again. Trying to recreate those by-gone moments by sloganeering, frightening, or appealing to mankind’s mystical needs for exploration and conquest seems somehow futile considering all that has happened since Jack Kennedy set the nation on course to the Moon.”

# Answers To: Space Leadership Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Unilateral space leadership is self-defeating. Our allies resent us and it prevents cooperation on key issues.**

**Lou Friedman, Former Executive Director of The Planetary Society (30 years), 2/14/2011, “American leadership,” The Space Review, Monday, February 14, 2011, pg.** [**http://www.thespacereview.com/article/1778/1**](http://www.thespacereview.com/article/1778/1)**/**

American leadership in space is much more desired that resented—except when it gets used unilaterally, as in the past Administration’s call for “dominance in cislunar space.” Asian countries (China, Japan, India) are especially interested in lunar landings; Western countries, including the US, much less so. However, cooperating with Asian countries in lunar science and utilization would be both a sign of American leadership and of practical benefit to US national interests. Apollo 11 astronaut Buzz Aldrin has been a leader advocating such cooperation. At the same time American leadership can be extended by leading spacefaring nations into the solar system with robotic and human expeditions to other worlds. The US can’t do everything alone. Climate monitoring, Earth observation, space weather prediction, and ultimately asteroid deflection are huge and vital global undertakings that require international participation. That is also true with exploration projects sending robots and human to other worlds. American leadership in these areas is welcomed and used by other countries, even as they develop their own national programs. The US government should make more of this and not treat it as an afterthought—or even worse, prohibit American leadership as the House of Representatives is doing this week by banning any China collaboration or cooperation. (The proposed House continuing resolution for fiscal year 2011 prohibits OSTP or NASA funds to be used for anything to do with China.) On a bigger stage I was struck by the demands of the Egyptian protesters over the past few weeks for American leadership and engagement in reforming their country, while at the same time strongly resenting any American interference in their country. This demand for American leadership and opposition to American hegemony may seem inconsistent. It is not: it only emphasizes the need to recognize the difference and use leadership for cooperation and engagement. If we Americans do this in the space program, we will accomplish more in our many Earth, space science, and exploration projects, and we will raise higher the importance of the space program on the national and international political agenda.

# Answers To: Industrial Base Advantage

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**[\_\_\_\_] Obama’s space strategy includes more opportunities for job creation in the aerospace industry, which solves the impact.**

Ann Klamper**, staff writer at SpaceNews.com, 6/18/2010 “Obama Asks Congress to Shift $100M from NASA for Job Initiatives”, http://www.spacenews.com/civil/100618-obama-asks-congress-shift-100m-from-nasa-for-job-initiatives.html**

In April, Obama pledged $40 million to NASA’s largely Florida-based space shuttle workforce transition to new jobs. He appointed a task force led by NASA Administrator Charles Bolden and Commerce Secretary Gary Locke to decide how best to spend the money. Bolden told Congress in April that the $40 million would come from $1.9 billion NASA was requesting in 2011 to cover costs associated with terminating the agency’s Constellation program, a 5-year-old effort to replace the space shuttle with new rockets and spacecraft optimized for lunar missions. Under Obama’s newly revised spending proposal, $100 million of the $4.26 billion requested for NASA’s Exploration Systems Mission Directorate next year would go to the Commerce and Labor departments. Specifically, some $30 million would be moved to the Commerce Department for “economic development assistance programs” aimed at helping the area around NASA’s Kennedy Space Center in Florida, while another $45 million would be used for “other areas affected by job losses” expected to result from the proposed cancellation of the Constellation program. The Labor Department, meanwhile, would get $10 million for Florida-based workforce initiatives and $15 million to promote job growth in other parts of the country expected to suffer post-shuttle economic hardship. NASA spokesman Michael Cabbage said in a June 18 statement the space agency “is pleased the president has targeted additional support from his fiscal year 2011 budget request to help the communities and workers around the U.S. most deeply involved in our space program meet the challenges of tomorrow. “Our workforce is incredibly talented and dedicated, and we are committed to equipping them with the tools they need to contribute to new developments in our nation's space program and related industries. This $100 million investment in our people is essential to spurring regional economic growth and job creation.”

# Answers To: Industrial Base Advantage

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**[\_\_\_\_] Aging workers and a policy of outsourcing are dooming the aerospace industry.**

**Ray Goforth, Professor Emeritus of Mechanical Engineering at Texas A&M, 4/21/2008, “Outsourcing’s Hidden Costs”**

A convergence of demographic changes and short-term corporate policies is creating a crisis that threatens the very foundation of the U.S. aerospace industry. The average age of an aerospace engineer at the Boeing Co. is 46. Technical workers are an average of 50. Although U.S. colleges turn out engineering and science degrees at double the pace of 40 years ago, aerospace has lost its luster as a career path. The Baby Boom generation of engineers, technical workers and machinists who design, build and effectively manage the production of aerospace products is fast approaching retirement. Moreover, while one demographic group is planning to rapidly exit the aerospace workforce, the industry is ignoring the need to groom the next generation. Instead, U.S. corporations remain fixated on short-term cost-cutting and cost-shifting strategies to boost the prices of company stocks. One of the primary corporate strategies to paper over this crisis is to cut the domestic workforce and outsource projects to lower cost workers overseas, a strategy predicated upon a fundamental misunderstanding of the aerospace workforce. The idea that complex aerospace products can be outsourced as if they were cheap consumer electronics is profoundly flawed. For example, Boeing developed its business model for the 787 Dreamliner upon the idea that aerospace workers are easily replicated. The assumption was that an engineer is an engineer and that transferred jobs can be leveraged to gain foreign sales. Final assembly was left for the gutted domestic workforce. Although it may make sense to outsource common redundant pieces of mature products, cost savings from outsourcing during the design and initial manufacturing of complex aerospace products is illusory. Boeing discovered this when it had to perform costly rework on thousands of components outsourced for the 787. One particularly devastating example was the 787center wingbox. Companies obscure the true costs of outsourcing disasters by burying them in overhead. Boeing and other companies are now discovering what the Society of Professional Engineering Employees in Aerospace warned about in 2002: Complex, technical and manufacturing jobs cannot be outsourced. Aerospace is not built on discrete tasks of individual engineers, technicians and machinists. Rather, it is the integration of complex tasks evolved from decades of experience working on similar projects. This value-added synergistic workforce cannot be purchased in the world marketplace by cobbling together a network of global suppliers. Boeing’s answer to its disastrous 787 outsourcing model is to dip into its experienced workforce, and scatter its members around the world to fix the problems at global ‘partners.’ For today’s problems, it may work. But, without a new generation of aerospace workers training at their side, the company, and our industry, will not be able to solve the next problems. This doesn’t mean there aren’t extremely talented younger workers in the aerospace industry. Of course there are. However, there are not nearly enough of them, and even they are being deprived of the tribal skills-transfer that comes from working projects from development to final rollout. The outsourcing of the intermediate production steps is robbing the workforce of the opportunity to engage in the intergenerational skills-transfer that is vital to keeping the American aerospace industry innovative and competitive.

# Answers To: Industrial Base Advantage

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[\_\_\_\_] Promoting space exploration to maintain the aerospace industry is an inefficient and roundabout way to pursue success.

**Keith Cowing, founder and editor of NASAWatch.com and former NASA space biologist, 1/11/2008, http://www.freakonomics.com/2008/01/11/is-space-exploration-worth-the-cost-a-freakonomics-quorum/**

Right now, all of America’s human space flight programs cost around $7 billion a year. That’s pennies per person per day. In 2006, according to the USDA, Americans spent more than $154 billion on alcohol. We spend around $10 billion a month in Iraq. And so on. Are these things more important than human spaceflight because we spend more money on them? Is space exploration less important? Money alone is not a way to gauge the worthiness of the cost of exploring space. NASA is fond of promoting all of the spinoffs that are generated from its exploits, such as microelectronics. But are we exploring space to explore space, or are we doing all of this to make better consumer electronics? I once heard the late Carl Sagan respond to this question by saying, “you don’t need to go to Mars to cure cancer.” If you learn how to do that as a side benefit, well, that’s great, but there are probably more cost effective ways to get all of these spinoffs without leaving Earth.

**[\_\_\_\_]**

**[\_\_\_\_] Space policies won’t inspire students to go into STEM fields.**

**Laura Delgado, Space Policy Institute, George Washington University, 2011, “When inspiration fails to inspire: A change of strategy for the US space program,” Space Policy 27 (2011) 94e98,**

If only we could answer the “why space?” question. If only we could come up with a catchy phrase to light up people’s eyes and compel the masses. If only we could inspire the young generations just as the Apollo generation was inspired. Then the space program would see a bigger budget and a more vocal and populous following, the aerospace sector would be fed to satiety with a skilled and passionate workforce for decades to come and US leadership in space, even in the context of a growing number of space actors, would be a sure thing. If only.

So the logic goes for those who see the most pressing issues of the US space program as a result of endemic emotional detachment. For these stakeholders, the compelling reasons that drove the country to glory in the most visible “battle” of the Cold War have been either forgotten or ignored. In their wake, the country has implemented space policies that have failed to attach themselves to the minds and hearts of the younger generations, threatening the very survival of the program they were meant to support. To solve this situation, the inspiration argument has been highlighted often in the past couple of years, to the point of predictability. Yet despite its widespread defense, inspiration alone has not reinvigorated support for the space program as proponents argue it would. At the root of the problem is that this logic, constructed out of a memory of the Cold War era, is sharply at odds with the interests and sensibilities of the generations it is supposed to reel in. The unpopular but potentially fruitful alternative is to draw attention to the pragmatic aspects of space, and to move away from concepts that made sense decades ago but which may prove counterproductive in the years to come.

# Answers To: Industrial Base Advantage

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**[\_\_\_\_] An increase in the quality of the STEM workforce is impossible without more qualified teachers .**

**Jeffrey J. Kuenzi, Christine M. Matthews, Bonnie F. Mangan, Researchers at the GAO, 5/22/06, http://media.umassp.edu/massedu/stem/CRS%20Report%20to%20Congress.pdf**

University officials told us and researchers reported that the quality of teachers in kindergarten through 12th grades and the levels of mathematics and science courses completed during high school affected students’ success in and decisions about pursuing STEM fields. University officials said that some teachers were unqualified and unable to impart the subject matter, causing students to lose interest in mathematics and science. In 2002, Education reported that, in the 1999–2000 school year, 45 percent of the high school students enrolled in biology/life science classes and approximately 30 percent of those enrolled in mathematics, English, and social science classes were instructed by teachers without a major, minor, or certification in these subjects—commonly referred to as “out-of-field” teachers.7 Also, states reported that the problem of underprepared teachers was worse on average in districts that serve large proportions of high-poverty children.

**[\_\_\_\_] The aerospace industry is already in decline due to cuts in military spending, oil prices, and the economic recession .**

**Investment Weekly News 6/25/2011**, **“Aerospace and Defense; Aerospace Industry to Be 'Squeezed' by Steep Ramp-up in Commercial and Continued Cuts in Defense, According to AlixPartners Study”, p.15,**

"The aerospace supply chain was basically decimated by the economic downturn, as even sold orders were put on hold or otherwise put in a lumpy, stop-and-go mode," said David Wireman, director in AlixPartners' Aerospace and Defense Practice. "From all indications, that supply chain is not at all prepared for steep commercial ramp-up curve that lies ahead, and production constraints are a very real possibility." Defense Sector But while demand on the commercial-aircraft side looks strong, defense, globally, looks to be weakening. According to the study, U.S. defense spending is expected to decrease by at least 12.2% by 2013 and by 6.5% by 2016, while defense spending in Europe, already down 2.8% in 2010, is expected to continue to drop sharply in the coming years, led by the U.K.'s recent announcement of an 8% cut by 2015 and promised drops of up to 25% in smaller European nations.

As a result of these expected widespread cuts, says the study, defense priorities will shift toward extending the life of existing equipment, improving communication networks and investing more in weapons systems targeted at supporting today's more asymmetric warfare. However, says the study, the scale of these new investments will not be enough to make up for cutbacks in major-platform investments such as the F-35 fighter aircraft series built jointly by Lockheed Martin Corp., BAE Systems PLC and Northrop Grumman Corp., which has already experienced significant cuts in planned production numbers. In response to these kinds of cutbacks, the larger defense companies will need to pursue a more diverse business mix that will lead to partnerships, M&A and consolidation among smaller players as larger companies pursue new markets, the study says.

In sum, the study shows that both the commercial-aviation and defense industries face critical challenges that they will need to address. Key economic challenges will come from federal budget uncertainties, volatile fuel prices and new entrants into the few growing sectors of the industry. In particular, the recent volatility of oil prices, coupled with continued sluggish economies in the West, has made it hard to predict future industry trends. These factors are leading many aerospace and defense manufacturers, especially lower-tier suppliers, to delay investments, says the study.

# Answers To: Industrial Base Advantage

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**[\_\_\_\_] The aerospace industry will fare poorly even with the plan because of foreign competition and an aging workforce.**

**Robert Walker, Chair of the Commission on the Future of the U.S. Aerospace Industry, November 2002, “Final Report”,**

**http://www.trade.gov/td/aerospace/aerospacecommission/AeroCommissionFinalReport.pdf**

The U.S. aerospace sector, most notably the commercial air sector, is seen increasingly as a mature industry lacking in capital investment, innovation, and capacity for growth. Aerospace sector market capitalization, research and development investments and return on investments/assets are down and consolidations are up. The U.S. is losing global market share and its positive balance of trade in aerospace manufacturing is eroding. Jobs are going overseas. The U.S. economic downturn, coupled with the additional security costs resulting from the September 11 terrorist attacks, is crippling the airlines and causing massive layoffs. Meanwhile, today’s air transportation system—based on 1960s technology and operational concepts—is reaching capacity, resulting in increasing delays and costs for both passengers and shippers. At the same time, government investments in longterm civil aerospace research are static, if not declining in real terms. The lack of sustained, long-term investment is stifling innovation and preventing the establishment of new economic growth curves for air transportation and space. While the military has recently received significant increases, both in research and development and in procurement accounts, those increases focus on near-term counter-terrorism and homeland security problems and may be short-lived. The aerospace workforce and infrastructure are aging, and there is a lack of compelling vision or robust financial outlook to draw our youth into this important business sector.

# Answers To: Industrial Base Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Air power fails to deter conflict in practice.**

**Conrad Crane, Director of the U. S. Army Military History Institute at Carlisle Barracks, and fellow at the Strategic Studies Institute , Fall 2001, “Sky High: Illusions of Air Power.” The National Interest,**

Unfortunately, practice has let theory down. Though technology has continued to advance, public expectations and U.S. Air Force o promises about airpower's decisiveness and accuracy have advanced faster. As a result, key decisions about the application of military force in most American wars in the air age have been shaped by an overestimation of airpower's effectiveness against military and industrial targets, and disappointing results have led repeatedly to the escalation of aerial operations against civilians --confirming Douhet's theories and confounding America's precision bombing enthusiasts. Such escalations have long-lasting implications. It may be, for example, that current North Korean programs to develop ballistic missiles are motivated by memories of the destruction of most of their cities and towns by American bombing between 1950 and 1953.(n4) Recent air operations over Yugoslavia repeated the pattern of the Korean War: anticipatory claims of decisiveness, followed by disappointment, followed by escalation against civilian targets. Frustrated by seemingly interminable peace talks and the failure of aerial interdiction, American airmen adopted a strategy they called "Air Pressure": coercion through the destruction of key dual-use civilian-military targets. These targets eventually included hydroelectric power facilities, almost every city and town in North Korea, and irrigation dams for rice fields. Again in Kosovo there were high expectations for what airpower, along with the newest precision-guided munitions and information warfare, could accomplish. While airpower was in the end the primary offensive arm that produced a settlement without risking U.S. and allied ground casualties, the results were not at all those envisioned when the campaign started. When the bombing commenced, Pentagon planners and State Department spokesmen admitted that they did not expect airpower alone to force President Slobodan Milosevic to surrender Kosovo. Consequently, President Clinton announced that the operation had three primary objectives: to stop the ethnic cleansing in Kosovo, to prevent an even bloodier Serb offensive against civilians there; and to "seriously damage" the Serb military capacity to do such harm.(n5) Bombing did not achieve any of those goals; indeed, it exacerbated the assault against Albanian Kosovar civilians as Serb ground forces responded to the high-tech aerial assault with a low-tech ravaging of the province. As to seriously damaging the Serb military capacity, NATO peacekeepers subsequently discovered that initial estimates of the degradation of Serbian forces from air attacks were vastly exaggerated, primarily due to extensive Serbian use of decoys and deception. NATO officials quickly reduced initial claims of tanks destroyed from 122 to 93, and were then forced to admit uncovering only 26 "kills" when all was said and done. Yugoslav vehicle commanders, it seems, proved quite adept at hiding in villages, using the surrounding community and inhabitants as human shields.(n6)

# Answers To: Space Exploration Advantage

**[\_\_\_\_]**

## [\_\_\_\_] Space exploration would take thousands of years to reach tangible benefits.

**Donald F.** Robertson**, freelance space journalist, 3/6/**2006**, “Space Exploration,” Space News, http://www.space.com/spacenews/archive06/RobertsonOpEd\_030606.html**

Dangerous it will be. Detailed exploration, let alone settlement, of nearby worlds will be the single most difficult task humanity has ever tackled. Most likely, it will take many hundreds, or even thousands, of years. Our first attempts to establish a base on Earth's Moon or Mars may well fail. As on the oceans, many people will die: we cannot insist on levels of safety that make the exercise technically impractical or unaffordable.

**[\_\_\_\_] Space makes us more vulnerable to diseases by impairing the immune system.**

**Dolores Beasley and William Jeffs, Director, Strategic Communications and Education at NASA Ames Research Center; NASA spokesman, 9/29/2004 “Study Suggests Spaceflight May Decrease Human Immunity”**

A NASA-funded study has found the human body's ability to fight off disease may be decreased by spaceflight. The effect may even linger after an astronaut's return to Earth following long flights. In addition to the conditions experienced by astronauts in flight, the stresses experienced before launch and after landing also may contribute to a decrease in immunity. Results of the study were recently published in "Brain, Behavior, and Immunity." The results may help researchers better understand the affects of spaceflight on the human immune response. They may also provide new insights to ensure the health, safety and performance of International Space Station crewmembers and future spacefarers on extended missions. "Astronauts live and work in a relatively crowded and stressful environment," said Duane Pierson, the study's principal investigator and NASA Senior Microbiologist at Johnson Space Center, Houston. "Stresses integral to spaceflight can adversely affect astronaut health by impairing the human immune response. Our study suggests these effects may increase as mission duration and mission activity demands increase," he added.

# Answers To: Space Exploration Advantage

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## [\_\_\_\_] Colonization yields no real resource benefits since planets are uninhabitable and resources are almost impossible to mine.

**Lynda Williams, M.S. in Physics and a physics faculty member at Santa Rose Junior College, 2010 “Irrational Dreams of Space Colonization”, Peace Review: A Journal of Social Justice, 22.1, Spring, pg 5-6**

What do the prospects of colonies or bases on the moon and Mars offer? Both the moon and Mars host extreme environments that are uninhabitable to humans without very sophisticated technological life- support systems beyond any that are feasible now or will be available in the near future. Both bodies are subjected to deadly levels of solar radiation and are void of atmospheres that could sustain oxygen-based life forms such as humans. Terra-forming either body is not feasible with current technologies and within any reasonable time frames (and may, in any case, be questioned from an ethical and fiscal point of view). Thus, any colony or base would be restricted to living in space capsules or trailer park–like structures that could not support a sufficient number of humans to perpetuate and sustain the species in any long-term manner. Although evidence of water has been discovered on both bodies, it exists in a form that is trapped in minerals, which would require huge amounts of energy to access. Water can be converted into fuel either as hydrogen or oxygen, which would eliminate the need to transport vast amounts of fuel from Earth. According to Britain’s leading spaceflight expert, Professor Colin Pillinger, however, ‘‘You would need to heat up a lot of lunar soil to 200C to get yourself a glass of water.’’ The promises of helium as an energy source on the moon is also mostly hype. Helium-3 could be used in the production of nuclear fusion energy, a process we have yet to prove viable or efficient on Earth. Mining helium would require digging dozens of meters into the lunar surface and processing hundreds of thousands of tons of soil to produce one ton of helium-3. (25 tons of helium-3 would be required to power the United States for one year.) Fusion also requires the very rare element tritium, which does not exist naturally on the moon, Mars, or Earth in the abundances needed to facilitate nuclear fusion energy production. Currently, there are no means for generating the energy on the moon needed to extract the helium-3 to produce the promised endless source of energy. Similar energy problems exist for the proposed use of solar power on the moon, which has the additional problem of being sunlit two weeks a month and dark for the other two weeks.

# Answers To: Solvency

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**[\_\_\_\_]**

**[\_\_\_\_] Constellation was a design failure. It could barely have made it to the moon.**

**Harry Spencer, founder of the Canadian Space Society and conducted mission analysis for the Canadian Space Program, 2/11/2010, “NASA moon plan was an illusion, wrapped in denial,”**

[**http://www.newscientist.com/article/dn18515-nasa-moon-plan-was-an-illusion-wrapped-in-denial.html**](http://www.newscientist.com/article/dn18515-nasa-moon-plan-was-an-illusion-wrapped-in-denial.html)

Exploring with robots looks cheaper only because we set our expectations so much lower. Bolder goals need humans on the scene. Nevertheless, I'm not shedding tears for Constellation. Why not? *Because it wasn't going to get us there.* First, it probably wasn't going to work. Even so early in its life, the programme was already deep into a death spiral of "solving" every problem by reducing expectations of what the system would do. Actually reaching the moon would probably have required a major redesign, which wasn't going to be funded.

Second, even if all went as planned, there was a money problem. As the Augustine committee noted, Constellation was already underfunded, and couldn't *ever* get beyond Earth orbit without a big budget increase. Which didn't seem too likely. Finally, and most important, even if Constellation was funded and worked ... so what? The programme was far too tightly focused on repeating Apollo, which was pointless: we already *did* Apollo! Early ideas of quickly establishing a permanent lunar base had already been forgotten. Constellation was going to deliver exactly what Apollo did: expensive, brief, infrequent visits to the moon. That was all it was good for.

# Answers To: Solvency

**[\_\_\_\_]**

[\_\_\_\_] The Constellation Program overemphasizes human missions at the expense of robotic exploration of the solar system which is net worse for scientific knowledge.

**Spencer Rinkus, Staff Writer for the Medill Report, 4/20/2010, “Moonwalkers disappointed with NASA budget but scientists side with Obama,” http://news.medill.northwestern.edu/chicago/news.aspx?id=163282**

Butscientists are siding with Obama, citing the efficiency and safety of robotic exploration of the solar systemand pointing to the success of the Pioneer, Voyager, Cassini and Mars rover missions, among many others. **“**The opinions of astronauts should not be the bulk of the story,” said Dan Hooper, an astrophysicist at the Fermi National Accelerator Laboratory. **“**It is like asking Navy pilots whether the new jet fighter program should be canceled. The scientists who are making use of the data collected by NASA missions are in a much better position to compare the merits of manned and unmanned space programs**,”** said Hooper.

**[\_\_\_\_]**

**[\_\_\_\_] The Ares I rocket that was part of the Constitution program was faulty and extremely unsafe.**

**Robert Block, Sentinel Space Editor, 10/26/2008,“ Sentinel exclusive: Is NASA's Ares doomed?”, The Orlando Sentinel, October 26th, http://articles.orlandosentinel.com/2008-10-26/news/ares26\_1\_rocket-ares-program-cape-canaveral**

Bit by bit, the new rocket ship that is supposed to blast America into the second Space Age and return astronauts to the moon appears to be coming undone. First was the discovery that it lacked sufficient power to lift astronauts in a state-of-the-art capsule into orbit. Then engineers found out that it might vibrate like a giant tuning fork, shaking its crew to death. Now, in the latest setback to the Ares I, computer models show the ship could crash into its launch tower during liftoff. The issue is known as "liftoff drift." Ignition of the rocket's solid-fuel motor makes it "jump" sideways on the pad, and a southeast breeze stronger than 12.7 mph would be enough to push the 309-foot-tall ship into its launch tower. Worst case, the impact would destroy the rocket. But even if that doesn't happen, flames from the rocket would scorch the tower, leading to huge repair costs. "We were told by a person directly involved [in looking at the problem] that as they incorporate more variables into the liftoff-drift-curve model, the worse the curve becomes," said one NASA contractor, who asked not to be named because he wasn't authorized to discuss Ares. "I get the impression that things are quickly going from bad to worse to unrecoverable." NASA says it can solve -- or limit -- the problem by repositioning and redesigning the launchpad. Engineers say that would take as much as a year and cost tens of millions of unbudgeted dollars. What happens with Ares I is crucial to the future of the U.S. manned space program -- and of Kennedy Space Center. KSC is looking at thousands of layoffs after the space shuttle is retired in 2010. Its work force won't grow again until a new rocket launches. In addition, huge expenditures on the rocket could bankrupt the agency's moon plans and prompt a new president to halt the program, delaying America's return to space.

# Answers To: Solvency

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**[\_\_\_\_] We don’t need a “heavy lift” launcher like Constellation. Our current, smaller rockets can fulfill our needs.**

**Grant Bonin, aerospace engineer and co-founder of Consortium Technologies, LLC, 6/6/2011, The Space Review, “Human spaceflight for less: the case for smaller launch vehicles, revisited,” http://www.thespacereview.com/article/1861/1**

Heavy-lift is not necessary, and even if we had it, we could reasonably choose not to use it, in favor of diverse portfolio of cheaper, smaller, simpler vehicles. A program that requires what only a single rocket can provide puts all its eggs in one basket, and is correspondingly fragile: the program will be delayed if the rocket is delayed; grounded if the rocket is grounded; and perhaps lost entirely if the rocket fails. Are existing launchers sufficient? Having argued that HLVs aren’t necessary, the complementary question is whether or not smaller launch vehicles are sufficient. This author contends that the answer is unequivocally yes. Programs of both human spaceflight and human space exploration can readily be accomplished with existing or near-term launch vehicles, including (but not limited to) the United Launch Alliance Atlas 5 and Delta 4, SpaceX Falcon 9, as well as other launchers on the horizon such as the Taurus 2 and Falcon Heavy. While different vehicles are better for different types of missions (crew or cargo delivery, for example), the key advantage of using rockets that already exist (or are currently being developed by the private sector) is that the initial costs of any particular program can be substantially reduced. As well, the demand for a large number of flights can only be expected to increase competition and drive prices down, if competitively procured in the first place.

**[\_\_\_\_]**

**[\_\_\_\_] Lack of funding was not the problem – Constellation was built around flawed architecture.**

Rand Simberg, **former aerospace engineer and a consultant in space commercialization,** 5/26/2011**, “Space heroes stuck in the past,” Washington Examiner, http://washingtonexaminer.com/people/rand-simberg#ixzz1PTFAoZBs**

The second paragraph lacks ingenuity. The notion that Constellation was underfunded is a myth to which program defenders continue to cling, but it's simply untrue, as I note at my blog today. The exploration budget went up every year except for one, and beyond that, former NASA administrator Mike Griffin raided other budgets to feed the insatiable maw of the Ares rocket program. Constellation's problem was not underfunding -- its problem was that Griffin selected a flawed architecture that couldn't be delivered within the planned budgets, which is why it not only was continually overrunning, but losing more than a year per year in schedule.

# Answers To: Solvency

**[\_\_\_\_]**

[\_\_\_\_] A. Cutting the Constellation program allows NASA to focus on deep space exploration outside the solar system.

**Clay Dillow, Staff Writer at Popular Science, 2/1/2010, “NASA Budget: Constellation Officially Canned, But The Deep-Space Future Is Bright,” http://www.popsci.com/technology/article/2010-02/nasa-budget-constellation-officially-canned-deep-space-future-bright**

In a teleconference today, NASA Administrator Charles Bolden outlined the budget’s goals, emphasizing thatwhile Constellation is getting the axe, NASA’s deep space exploration ambitions have not been curtailed, nor are they being fiscally undercut. Rather, NASA is reprioritizing, seeking more or less a five-year period of intense study on possible means toward future manned missions to deep spacebefore embarking on a mission to the moon or beyond.Between now and fiscal 2015, the agency plans to fully utilize the R&D capabilities of the ISS, demonstrate better deep space flight technologies and fly some unmanned missions around the near solar system to scout out the most scientifically interesting targets for future manned exploration**.**

B. Deep space exploration is the only way to ensure humanity’s survival.

**Joe Falconer, Australian editor of TheNextWeb news service, 6/26/2011, “What Would Colonization of the Final Frontier Look Like?” http://thenextweb.com/industry/2011/06/26/what-would-colonization-of-the-final-frontier-look-like/**

The question of which local bodies we could colonize, terraform and otherwise adopt is an interesting one, butto truly preserve humanity as Hawking mandates we need to move beyond our own solar system**.** But we’re a long, long way from figuring this problem out.Trying to find a habitable planet isn’t even the biggest concern. Getting there is**.** Interstellar travel is a tricky topic even when it comes to small craft.Moving the equipment, resources and humans needed for a colony over interstellar distances, let alone in our own solar system, is a tricky problemindeed**.** Propulsion is the biggest**,** though not the only,setback. At the speed of Voyager 1, the fastest craft we’ve sent into space, it would take over 70,000 years to get to the Alpha Centauri system – the closest star system to ours. Modern technology could do somewhat better, though not significantly enough to make it close to feasible.

# Article: Is the Apollo Approach Best?

**John M. Logsdon: *The End of the Apollo Era – Finally?* June 30th, 2010**

I recently finished the manuscript for a new book, “John F. Kennedy and the Race to the Moon,” and sent it off to the publisher. (Look for it early next year!) In my final chapter, I reflect on the impact of Apollo on the evolution of the U.S. space program in the half century since JFK declared, “We should go to the Moon.” Sending 12 astronauts to the lunar surface was a great achievement and will forever be a proud part of American history. But in my judgment, while Apollo’s impacts on subsequent U.S. human spaceflight activities have been lasting, they have been on balance negative. The reasons why are relevant to the current heated space debate.

I interpret the new space strategy set out by the White House Feb. 1 to be at its foundation a proposal to move from the 20th century, Apollo-era approach to human spaceflight to a new approach consistent with 21st century national and international realities and future exploration and other strategic space objectives. It is not surprising that those with positive memories of Apollo and with vested interests in continuing the space status quo have been so strong in their opposition to the new approach; they are defending a space effort that to date has served them well. These critics have been met with a — literally — incoherent defense of the new strategy by its advocates inside and outside of the government. U.S. President Barack Obama confused the situation even further in his April 15 speech at the Kennedy Space Center. The result has been a polarized debate unprecedented in my more than four decades of close observation of space policymaking. I am an optimist by nature, and so I hope that we will see emerging over this summer an approach that accepts the main tenets of the new strategy and allows NASA to start implementing them. But that outcome is far from assured, and the alternative is distressing to contemplate.

Apollo was aimed at beating the Russians to the Moon; it was not propelled by a long-term vision of space exploration. To meet Kennedy’s “before this decade is out” goal, NASA chose a set of hardware systems and an architecture optimized for getting to the Moon as soon as possible; these choices had unfortunate consequences. The Apollo spacecraft and the magnificent Saturn 5 launcher proved not to be relevant to any post-Apollo mission that could gain political support in the early 1970s, and were quickly discarded. But in developing, testing and operating the Apollo-Saturn system, NASA developed a large facility infrastructure, an extremely competent and dedicated work force, and a widespread space industrial base; those remain. One way of understanding the 40 years since Apollo is by viewing the space shuttle and the international space station as attempts to preserve and take advantage of that infrastructure, work force and industrial base. Pursuing an “Apollo on steroids” approach to the Constellation program was an understandable sequel to those programs, once again trying to employ the heritage left by Apollo.

But this, like the hardware developed for Apollo and then abandoned, is ultimately a dead-end approach. Yale University organizational sociologist Gary Brewer more than 20 years ago observed that NASA during the Apollo program came close to being “a perfect place” — the best organization that human beings could create to accomplish a particular goal. But, suggested Brewer, “perfect places do not last for long.” NASA was “no longer a perfect place.” The organization needed “new ways of thinking, new people, and new means.” He added “The innocent clarity of purpose, the relatively easy and economically painless public consent, and the technical confidence [of Apollo] ... are gone and will probably never occur again. Trying to recreate those by-gone moments by sloganeering, frightening, or

appealing to mankind’s mystical needs for exploration and conquest seems somehow futile considering all that has happened since Jack Kennedy set the nation on course to the Moon.”

Introducing “new ways of thinking, new people, and new means” into the NASA approach to human spaceflight has not happened in the two decades since Brewer made his observations. That was the conclusion of the Columbia Accident Investigation Board in 2003, and despite the positive steps taken since then to operate the shuttle as safely as possible, much of the Apollo-era human spaceflight culture remains intact. Trying to change that culture and thereby close out the half century of Apollo-style human spaceflight seems to me the essence of the new space strategy. There is no way of achieving that objective without wrenching dislocations; change is indeed hard. Gaining acceptance of that change will require more White House and congressional leadership and honesty about the consequences of the new strategy than has been evident to date.

There is a coherent explanation of what is being proposed, but NASA has given it little emphasis and it seems not to have registered with those trying to understand the new strategy. That strategy involves a restart — a five-year period of building the technological foundation for the future. That restart would be followed by another five to seven years of developing new systems based on that foundation, then a series of human missions to various destinations beyond Earth orbit. There is no commitment to a specific destination on a specific schedule; that avoids the narrowing effect that was a characteristic of Apollo. To me this is a quite sensible and easily understandable strategy, if the United States wants to be in the vanguard of 21st century space exploration. But it does not follow the Apollo model of setting a date to arrive at a specific destination that gave the United States unquestioned space leadership. It will be a challenge to maintain focus and technological discipline in implementing a strategy without a “date by” goal, but a capabilities-based approach can pave the way to U.S. leadership in reaching all the interesting destinations between the Earth and Mars. To me, the greatest threat to U.S. space leadership would come from our political system insisting on staying with the Apollo-era approach to the future, not from adopting this new strategy.

One element of the new strategy that is serving as a lightning rod for opponents is the proposal that the private sector take on a larger role in providing transportation services for people travelling to low Earth orbit. This fundamentally is a side issue to the main thrust of the strategy — developing capabilities for going beyond Earth orbit. The report of the Columbia Accident Investigation Board is being cited in the current debate as if it were scripture, particularly in support of the contention that only NASA can operate systems for carrying people to orbit with adequate provision for their safety. In fact, much of the board’s report was a strong indictment of NASA’s safety culture, not an endorsement of NASA’s uniqueness or its performance with respect to ensuring crew safety aboard the shuttle. While it will be a long time, if ever, before launching people into orbit can be “routine,” and while NASA must play an important role in overseeing the safety of government-funded spaceflights, the notion that only NASA can assure adequate safety seems to me to be a product of the obsolete thinking identified by Professor Brewer.

It is really too bad that the announcement, and since then the defense, of a fundamental paradigm shift in the way the United States carries out human space exploration, and human spaceflight overall, have been so poorly articulated. The White House and NASA dug a rather deep hole in mismanaging the rollout of the new strategy, and the president really did not improve matters much by announcing a quickly conceived resuscitation of Orion, blowing off the Moon as a valuable destination, and setting an ambiguous target for a heavy-lift vehicle. NASA seems unable to provide clear or convincing answers to the congressional critics of the new strategy, and those of us who support it are having difficulty in

getting our views heard. Going back to the drawing board and starting over on a modified strategy as the next budget is announced does not seem to me to be an option. Forcing NASA to continue to move grudgingly forward on Constellation while it is planning its replacement is untenable. There is a pressing need for a sensible outcome.

The time is now for ending the era of Apollo. When it began, John Kennedy was clear in purpose and consistent in explaining his reasons for going to the Moon. Now we need JFK-like leadership to be equally clear in purpose and equally convincing in arguing for moving to a new era in U.S. human spaceflight.

# Article: Constellation Design Was Flawed

**Harry Spencer: *NASA moon plan was an illusion, wrapped in denial*. February 11th, 2010.**

NASA's Constellation programme, which was going to fly manned capsules to the International Space Station in (maybe) 2015, to the moon in (maybe) 2020, and to Mars someday, is dead. Some people are mourning it. I'm not.

Is manned space exploration important? Yes – not least because it simply works much better than sending robots. When you look past the rhetoric and superstitions and compare the results, today's robots (and tomorrow's too) are pitifully limited, painfully slow, and not really all that cheap. (Case in point – NASA recently gave up trying to free the Mars rover Spirit from a sand pit it had been stuck in for nine months. But when the Apollo 15 crew's lunar rover got bogged down in loose soil, the astronauts got off, picked it up, moved it, got back on, and drove away – all in maybe two minutes. Robots do fine when everything goes as planned, but that's rarely true on complex, poorly-known planetary surfaces.)

Exploring with robots looks cheaper only because we set our expectations so much lower. Bolder goals need humans on the scene. Nevertheless, I'm not shedding tears for Constellation. Why not? *Because it wasn't going to get us there.*

First, it probably wasn't going to work. Even so early in its life, the programme was already deep into a death spiral of "solving" every problem by reducing expectations of what the system would do. Actually reaching the moon would probably have required a major redesign, which wasn't going to be funded.

Second, even if all went as planned, there was a money problem. As the Augustine Committee noted, Constellation was already underfunded, and couldn't *ever* get beyond Earth orbit without a big budget increase. Which didn't seem too likely.

Finally, and most important, even if Constellation was funded and worked ... so what? The programme was far too tightly focused on repeating Apollo, which was pointless: we already *did* Apollo! Early ideas of quickly establishing a permanent lunar base had already been forgotten. Constellation was going to deliver exactly what Apollo did: expensive, brief, infrequent visits to the moon. That was all it was good for.

Sure, there were hopes that Constellation's systems could later be adapted to support more ambitious goals. But Apollo had those hopes too. It didn't work in 1970, and it wasn't going to work in 2020.

The demise of Constellation is not the death of a dream. It's just the end of an illusion.

The proposed replacements are a mixed bag, with reason for optimism but some reason for concern.

More R&D is good. Space flight technology has stagnated badly in recent decades; for example, we badly need a robust, fully-reusable, low-maintenance heat shield system for atmospheric re-entry,

and promising concepts from 50 years ago are still awaiting flight tests. My one concern is that when money gets tight, it's easy to cut R&D funding that isn't tied to a specific project – look at what's happened to NASA's aviation research.

Switching to commercial space transportation, for both cargo and crews, is long overdue. For over 20 years, NASA has been legally required to use commercial space transportation whenever possible – and has used every possible excuse not to. It's high time to end this.

Opponents' main argument is that NASA will have trouble assuring astronaut safety if it uses commercial launch services. Hogwash. To be blunt, NASA has no financial incentive to build safe spaceships – the shuttle, on average, has killed its entire crew about every 50 to 60 flights, and yet it has kept going. (Indeed, after the Challenger disaster, NASA's shuttle budget *increased*; compare that to what happened after Boeing's first two launches of its Delta III rocket failed – no one bought more launches and the rocket programme folded.) Spaceship builders who have a direct financial interest in safety should do better, not worse.

At the very least, safety assessments should be done by an independent authority, with no vested interest in the answer. When NASA was considering launching its Orion capsule on Atlas or Delta rockets five years ago, its safety standards were very strict indeed – and the commercial rockets ended up losing out. But when NASA started applying those standards to its *own* rocket when development of the Ares rocket and Orion crew capsule got well underway a few years later, suddenly the standards were in need of revision, and the revised ones were much less demanding. It's time to give commercial space flight a fair trial.

The one aspect of the announcement that is worrisome is the vagueness of the long-term plans. "We'll do neat stuff someday" is a recipe for going back into the holding pattern NASA has been stuck in for many years, driving endlessly around the parking lot without ever getting out onto the road. Even if the transportation is going to come from commercial providers and the details will depend on them, they need some rough idea of what NASA wants to do and when. A clearer explanation of NASA's new exploration goals is urgently needed.

**NASA Tradeoff Disadvantage**

# NASA Tradeoff Disadvantage

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# Explanation

This disadvantage forces the affirmative to consider the potential costs of their plan. As you have no doubt realized, there are many ways to improve the world, but almost all of them are costly. Humanity, and especially the United States government, has a very limited amount of resources that it can use in order to solve problems. Every year, NASA is assigned as set budget by Congress to conduct all of its operations. This year, NASA received 18.7 billion dollars that it could choose to spend how it liked. Predictably, NASA had many more possible projects than it had money for, so it was forced to choose some over others.

The uniqueness evidence indicates that a shift is occurring in NASA right now. At the request of President Obama, the agency is beginning to focus less on exploring space, especially with human astronauts, and beginning to allocate more money towards studying the Earth itself. Specifically, it is planning to fund experiments and satellites that would allow it to more effectively track carbon dioxide and climate change, which many scientists think is important to eventually solving the problem.

The plan forces a tradeoff. NASA’s budget doesn’t get any bigger as a result of the plan, so in order to do the plan, NASA has to choose something to cut. The evidence indicates that NASA sees a choice between space-focused programs and ones that focus on Earth. Because the plan is focused on space exploration, money will likely come from the budget for Earth sciences.

The impact to this is that NASA will not be able to effectively monitor climate change, which may mean that we feel more of the negative effects of global warming in the future.

# Glossary

**CO2** – Carbon Dioxide. Carbon Dioxide is the result of many human activities, such as driving a car or burning oil to heat a house. Carbon dioxide is frequently mentioned as one of the gasses that is contributing to the global warming problem.

**Greenhouse gasses** – Gasses believed to be responsible for climate change. While C02 is the most well known, water vapor, methane, nitrus oxide, and ozone, also function as greenhouse gasses. They get their name because they prevent energy from the Sun from escaping back into space once it reaches the Earth, much the same way that a glass greenhouse traps energy inside it to keep plants warm.

**Fossil fuel** – Fuels created by the slow decomposition of dead organisms. They are mostly made of carbon. Examples of fossil fuels include coal, oil, and natural gas.

**Emissions** – the product or discharge of something. When someone refers to emissions, they refer to greenhouse gasses entering the atmosphere.

**Climate change** – Refers to the phenomenon that the Earth’s climate and mean temperature are changing over time. It has been well documented that in the last half century that the average temperature of the Earth has increased. Many believe this increase is a result of human activity and releasing many greenhouse gasses into the atmosphere.

**Heliophysics** – A branch of space science that explores the interactions between radiation given off by the sun and the atmospheres of planets. The study of solar flares is done under heliophysics.

**Monies** – money set aside for a specific purpose

**Global Precipitation Mission** – An attempt by NASA to continually measure the Earth’s atmospheric moisture.

**Toil -** Work extremely hard or incessantly.

**Robust** - Strong and healthy; vigorous

**Passé** - No longer fashionable; out of date

**Flora and fauna** – Plants and Wildlife

**Correlated** – Two things are correlated if they have a mutual relationship or connection.

**Post facto** – After the fact

**Budget –** An allocation of money for a specific goal.

**R&D** – Research and Development

**OCO –** Orbiting Carbon Observatory, a NASA satellite mission intended to provide global space-based observations of atmospheric carbon dioxide.

**NASA –** National Aeronautics and Space Administration

**NOAA –** National Oceanic and Atmospheric Administration

**GRACE –** Gravity Recovery and Climate Experiment, a satellite system run by NASA that makes detailed measurements of the Earth’s gravity field.

# Budget Tradeoff 1NC [1/2]

**A. Uniqueness. NASA is shifting its priorities. While its budget will not increase, it will spend more money focusing on the observation of Earth and not the exploration of space.**

Spaceref.com, 6/8/2011, “**NASA Spending Shift to Benefit Centers Focused on Science & Technology”, 6/8/11, http://www.spaceref.com/news/viewpr.html?pid=33782**

Euroconsult, the leading international consulting and analyst firm specializing in the space sector, along with the consulting firm Omnis, today announced the findings of a study today foreseeing a significant shift in NASA spending toward [Earth](http://www.spaceref.com/news/viewpr.html?pid=33782) science and R&D programs and away from legacy spaceflight activities. According to the report "NASA Spending Outlook: Trends to 2016," [NASA's](http://www.spaceref.com/news/viewpr.html?pid=33782) budget, which will remain flat at around $18.7 billion for the next five years, will also be characterized by significant shifts from space operations to technology development and science. With the shift in [budget](http://www.spaceref.com/news/viewpr.html?pid=33782) authority, NASA Centers focused on Earth observation, space [technology](http://www.spaceref.com/news/viewpr.html?pid=33782), and aeronautics will see increases in funding, while those involved in human spaceflight will see major funding reductions. Indeed, the termination of the Space Shuttle program will lead to a budget cut over $1 billion for Space Operations, resulting in a 21% budget cut for the Johnson Space Center. Overall, the agency's budget for R&D will account for about 50% of all NASA spending.

**B. Link. A push for space exploration as a result of the plan causes cuts in the budgets of Earth science programs.**

**Brian Stempeck, Environment and Energy Daily Senior Reporter, 4/29/2005, “Climate Change:****NASA space missions may undermine climate studies,” April 29, Environment and Energy Daily,**

A member of the National Academy of Sciences' National Research Council told a House panel yesterday that the White House's push for further space exploration missions is coming at the expense of earth research programs, including a key effort on climate change science. Berrien Moore, a professor at the University of New Hampshire and a co-chair with the National Research Council, told assembled House Science Committee members yesterday about the findings NRC has uncovered so far as it prepares a final report on federal earth science research due out in late 2006. "Recent changes in federal support for Earth observation programs are alarming," NRC scientists concluded in their interim report . "Opportunities to discover new knowledge about Earth are diminished as mission after mission is cancelled, descoped or delayed because of budget cutbacks." NASA's decision to shift its priorities toward space exploration is putting current earth research programs "at risk of collapse," Moore said. And presidential initiatives such as the Climate Change Research Initiative and the subsequent Climate Change Science Program are some of the most at-risk programs, he said.

# Budget Tradeoff 1NC [2/2]

**C. Impact. NASA’s new focus on Earth science is key to monitoring and solving global warming.**

**James A. Lewis et. al, , senior fellow and director of the Technology and Public Policy Program at CSIS Sarah O. Ladislaw, senior fellow in the Energy and National Security Program at CSIS, June 2010, “ Earth Observation for Climate Change,”** [**http://csis.org/files/publication/100608\_Lewis\_EarthObservation\_WEB.pdf**](http://csis.org/files/publication/100608_Lewis_EarthObservation_WEB.pdf)

For most of the last decade, NASA was unable to replace its climate-monitoring satellites. Replacing these satellites is crucial to avoid a drastic decline in collecting the most valuable information for monitoring climate change. The Obama administration has proposed a budget for NASA’s Earth science programs of $2.4 billion in new funding over the next five years, an increase of more than 60 percent. The new funding, which requires congressional approval, will help replace OCO and allow NASAto replace the twin GRACE satellites that make detailed measurements of Earth’s gravity field that can provide important climate data. The request for NOAA’s budget for climate-related activities has been increased as well. NOAA will be spending $2.2 billion to maintain and further develop satellites and to support climate research; $435 million has been requested to support the U.S. Global Change Research Program, with $77 million in new increases for core climate services and observations. Spending on space has always been a question of priorities. Until recently, those priorities were frozen in time, reflecting political needs that were decades out of date. Our national priorities have changed. A new priority, reflecting the new challenges to our security and national interest, involves monitoring and understanding climate change. Debate over climate change is fierce and there are many skeptics, but the signs of major changes are undeniable. Warnings of catastrophe are likely overblown, but we do not fully understand the implications of climate change or the utility of various measures to mitigate it. Climate change is occurring, and it creates new risks. In this context, the recent decision to scale back spending on human space flight and increase spending on Earth observation is a better match for national priorities and interests. It updates a space policy that has been badly out of date for years. Observation of climate change began more than a century ago with simple measurements of the Earth’s average temperature. These were interesting, but inadequate. The breakthrough in understanding climate change came with Earth observation satellites. Satellites provide global awareness in ways that other technologies cannot match. The monitoring needed for a serious effort requires observations that can only be done from space.

**D. Unchecked, global warming will cause extinction.**

**Oliver Tickell, environmental researcher, 8/11/2008,** [**http://www.guardian.co.uk/commentisfree/2008/aug/11/climatechange**](http://www.guardian.co.uk/commentisfree/2008/aug/11/climatechange)

We need to get prepared for four degrees of global warming, Bob Watson told the Guardian last week. At first sight this looks like wise counsel from the climate science adviser to Defra. But the idea that we could adapt to a 4c rise is absurd and dangerous. Global warming on this scale would be a catastrophe that would mean, in the immortal words that Chief Seattle probably never spoke, "the end of living and the beginning of survival" for humankind. Or perhaps the beginning of our extinction. The collapse of the polar ice caps would become inevitable, bringing long-term sea level rises of 70-80 metres. All the world's coastal plains would be lost, complete with ports, cities, transport and industrial infrastructure, and much of the world's most productive farmland. The world's geography would be transformed much as it was at the end of the last ice age, when sea levels rose by about 120 metres to create the Channel, the North Sea and Cardigan Bay out of dry land. Weather would become extreme and unpredictable, with more frequent and severe droughts, floods and hurricanes. The Earth's carrying capacity would be hugely reduced. Billions would undoubtedly die.

# Overview

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# Uniqueness – NASA Focusing on Earth Science

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**[\_\_\_\_] NASA’s most recent budget substantially increased funds allocated for Earth Science.**

**Keith Cowing, writer at astrobiology.com, 2/1/2011, “The Obama Space Vision for NASA: Massive Paradigm Shifts Ahead,” http://www.astrobiology.com/news/viewnews.html?id=1372**

Over the past decade, NASA's focus on Earth Science has faltered as it has across the Federal government. This will be rectified with a hefty budget that will increase the enacted FY 2010 budget by $382 million and then go on to add an additional $1.8 billion between FY 2011 and 2014. In addition to re-flying the Orbiting Carbon Observatory, NASA will seek to accelerate the development of new satellites to observe Earth as well as support the existing flotilla of Earth observation spacecraft. Planetary science will see much less of an increase than other parts of NASA. Its budget will ramp up from $1.486 billion in FY 2001 to $1.650 billion in FY 2015. Astrophysics will go from $1.076 billion in FY 2011 to $1.132 billion in FY 2015, and Heliophysics will go from $542 million in FY 2011 to $751 million in FY 2015. Some of the notable increases in space and planetary science, albeit small, include adding $16 million per year for the next 5 years to Near Earth Object (NEO) detection, restarting Plutonium-238 production with the Department of Energy for radioisotope thermoelectric generator (RTG) construction, plans for a 2011 launch of Mars Science Laboratory, bringing the Mars 2016 mission into formulation, funding of James Webb Space Telescope at a 70% confidence level for a 2014 launch, and initiation of Solar Probe "Plus" mission.

[\_\_\_\_] Obama cut the Constellation program in order to orient NASA towards climate science

Chloe Albanesius, **editor at PCMagazine online, “Obama Budget Cuts Moon Program, Boosts R&D”, 2/1/10, http://www.pcmag.com/article2/0,2817,2358658,00.asp**

Among the programs on the chopping block are NASA's Constellation Systems Program, an effort to put astronauts back on the Moon by 2020. The $3.466 billion program, which started in 2005, is woefully behind schedule, and a review conducted in May 2009 found that the program probably won't put anyone on the Moon until well into the 2030's. Instead, the White House would increase NASA's overall budget in order to focus on climate science, green aviation, science education, and other priorities. It would also encourage NASA to leverage advanced technology, international partnerships, and commercial capabilities in its quest to return to the Moon. Also getting the proposed axe is the $12 million EP-X manned surveillance program and a $9 million revamped command and control center, both within the Department of Defense, as well as a $73 million infrared missile warning satellite program.

# Uniqueness – NASA Focusing on Earth Science

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**[\_\_\_\_] Obama’s new budget strongly stresses Earth science and global warming research.**

**Phil Plait, writer for the Discovery Magazine, 2/1/2010, “President Obama’s NASA budget unveiled”. http://blogs.discovermagazine.com/badastronomy/2010/02/01/president-obamas-nasa-budget-unveiled/**

As promised, today President Obama released his planet NASA budget for the year. Not too surprisingly, it’s pretty much as the rumors indicated. There’s a lot to say here, and I have a lot on my mind, so please hear me out. The good news for sure is an increase of $6 billion over the next five years. It stresses new technology and innovation (to the tune of over $1.5 billion), which is also good. A lot of NASA’s successes have been from pushing the limits on what can be done. It also stresses Earth science, which isn’t surprising at all; Obama appears to understand the importance of our environmental impact, including global warming. So that’s still good news. The very *very* good news is that half that money — *half*, folks, 3.2 billion dollars — is going to science. Yeehaw! The release specifically notes telescopes and missions to the Moon and planets. That, my friends, sounds fantastic.

**[\_\_\_\_] NASA is shifting priorities away from the shuttle towards Earth science.**

**Space Travel.com, 6/8/2011 “NASA Spending Shift to Benefit Centers Focused on Science and Technology,” http://www.space-travel.com/reports/NASA\_Spending\_Shift\_to\_Benefit\_Centers\_Focused\_on\_Science\_and\_Technology\_999.html**

"Budget allocation across Centers will vary greatly," said Steve Bochinger, President of Euroconsult North America. "As NASA shifts priorities for human spaceflight from Shuttle operations to Human Exploration Capabilities and commercial spaceflight, the budget will be redirected to a range of technology development programs. Likewise, as NASA shifts its science mission focus away from space science to Earth science, the science budget will be redistributed among centers." This shift in NASA's priorities will also affect the agency's contract spending. As large legacy programs end, new research and development programs will be initiated. This turnover of programs should provide many new contracting opportunities over the next five years, especially at Research Centers. The Euroconsult/Omnis report details these changes. "The uniqueness of this report is that it brings together in one picture NASA's budget, spending and contracting, providing insights into opportunities created by the new NASA direction," said Bretton Alexander, Senior Consultant for Omnis. Some of the findings include: Following an 11% increase in 2011, the Science Mission Directorate budget will remain at the $5 billion level through 2016. This increase, however, is entirely within the Earth science theme, reflecting the Administration's priority on climate change research. Goddard Space Flight Center and Langley Research Center, which manage and implement Earth science projects, will thus benefit from this increase as will contractors who develop Earth observation spacecraft and instruments.

# Link - Space Exploration Trades off With Earth Science

### **[\_\_\_\_]**

### **[\_\_\_\_] Experiences from the Bush administration prove that space exploration directly trades off with NASA’s focus on Earth.**

**Andrew Lawler, senior writer with Science Magazine, and freelance writer for Smithsonian, National Geographic, Discover, March 2004 “ Scientists Fear Collateral Damage From NASA's Revised Vision,” Science 26 March 2004: Vol. 303**

NASA currently spends nearly $4 billion on space science, with another $1.5 billion for earth science and $965 million for biological and physical research. Bush's January call forrobotic and humanexploration of the moon and Mars would mean new monies fortheMarsrobotic effort,a new line of lunar orbiters and landers costing $1.3 billion through 2009, and more biological research on the space station tailored to the needs of future astronauts (see table). Under the new plan, space science budgets would grow from $3.9 billion this year to $5.5 billion by 2009. A host of projects not directly related to such exploration, however**,** face significant changes. The Laser Interferometer Space Antenna, for example, would be launched in 2012, a year later than planned, and Constellation-X, also slated for launch after 2010, would face a 2-year delay. NASA is halting preliminary work on a series of probes named after Einstein and designed to examine mysteries such as dark energy. In earth science, the Global Precipitation Mission would be delayed 2 years, a probe to measure ocean winds would be postponed indefinitely, and a series of small earth science platforms would be put on hold for a year. “This is a massive shift in direction,” said Yale University astronomer Meg Urry. “It is a little disorienting.” She and several board members called these and other changes “collateral damage” from the new exploration plan. “We're ending up with a very narrowly focused science program,” complained James Burch, vice president of the Southwest Research Institute in San Antonio, Texas, and a former NASA space physicist.

# Link - Space Exploration Trades off With Earth Science

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### **[\_\_\_\_] Earth science and space missions will tradeoff**, **they are seen as zero-sum in the budget**

**Jeff Foust, editor and publisher of The Space Review and has written for Astronomy Now and The New Atlantis, 2/9/2011 “Human spaceflight versus Earth sciences?”**

**http://www.spacepolitics.com/2011/02/09/human-spaceflight-versus-earth-sciences/]**

A letter signed by several members of Congress is the latest evidence that a new battle line is forming over NASA funding**:** humanspaceflight versus Earth sciences. In a letter to House Appropriations committee chairman Rep. Hal Rogers and CJS subcommittee chairman Frank Wolf, six Republican members of Congress asked the appropriators to prioritize NASA funding on what they consider to be the agency’s primary mission, human spaceflight. To do that, they argue that funding for NASA’s climate change research be redirected to human spaceflight accounts. “With your help, we can reorient NASA’s mission back toward human spaceflight by reducing funding for climate change research and reallocating those funds to NASA’s human spaceflight accounts, all while moving overall discretionary spending towards FY2008 levels,” the letter’s authors—Reps. Bill Posey (R-FL), Pete Olson (R-TX), Rob Bishop (R-UT), Jason Chaffetz (R-UT), Sandy Adams (R-FL), and Mo Brooks (R-AL)—argue.

### **[\_\_\_\_] A shift towards space exploration will cause budget cuts in Earth science.**

**Brian Berger, Space.com Staff Writer, 5/02/2005, “ NASA's Exploration Focus Blamed for Earth Science Cuts,”** [**http://www.space.com/1028-nasa-exploration-focus-blamed-earth-science-cuts.html**](http://www.space.com/1028-nasa-exploration-focus-blamed-earth-science-cuts.html)

WASHINGTON -- House Science Committee Chairman Sherwood Boehlert (R-N.Y.) expressed alarm over recent budget cuts and delays in NASA's Earth science program that a recent National Research Council report attributed to the U.S. space agency's shift in focus toward lunar and Mars exploration. "This report has to be a red flag for all of us," Boehlert said during an April 26 hearing examining how Earth science programs fare in NASA's 2006 budget request. "We need to stop, examine what's happening, and make sure that the fiscal 2006 budget for NASA - whatever its top-level number - includes adequate funding to keep Earth science moving forward for the foreseeable future." NASA merged its Earth science and space science programs into a single organization, the Science Mission Directorate, in 2004 and no longer maintains separate budgets for the two activities. But according to a House Science Committee analysis of NASA's budget request, of the $5.47 billion included for the Science Mission Directorate, only $1.36 billion would be spent on Earth science activities, a drop of 8 percent below the 2005 level and 12 percent less than the 2004 level. Earth science spending would continue to decline in 2007, NASA projections show, even as overall science funding would grow by $500 million. The National Research Council report, written by an expert panel and released the day of the hearing, says the budget trend for Earth science already is translating into program delays and cancellations. The report, "Earth Science Applications from Space: Urgent Needs and Opportunities to Serve the Nation," points out that NASA has "canceled, descoped, or delayed at least six planned missions" and has nothing in the pipeline to replace the fleet of Earth Observing System satellites the agency has spent more than a decade putting on orbit. "At NASA, the vitality of Earth science and application programs has been placed at substantial risk by a rapidly shrinking budget that no longer supports already-approved missions and programs of high scientific and societal relevance," the report states. "Opportunities to discover new knowledge about Earth are diminished as mission after mission is canceled, descoped, or delayed because of budget cutbacks, which appear to be largely the result of new obligations to support flight programs that are part of the Administration's vision for space exploration."

# Specific Link – Colonization Affirmative

**[\_\_\_\_]**

[\_\_\_\_] A Mars mission would deplete intellectual resources for a decade and hurt studying climate change on Earth.

J. Scott Christianson, writer at the Columbia Daily Tribune, 3/11/2011**, “We can’t afford manned mission to Mars”, http://thefreerangetechnologist.com/2011/03/manned-mission-to-mars/**

A manned mission to Mars will tie up most of NASA’s intellectual resources for a decade or more as they toil on an incredibly expensive project whose success and scientific value is uncertain. The American public should have a better chance of receiving a decent return on its investment in NASA. Perhaps the most compelling argument for not proceeding with a manned mission to Mars is NASA’s great success with unmanned missions to Mars and other planets. These “smaller, cheaper, faster” space probes have been extremely useful and cost-effective and have proved themselves capable of performing real science or, at the very least, capable of being the on-the-ground technicians for scientists safely located on Earth. A better use of NASA’s budget for exploration and planetary science would be to fund several smaller unmanned missions to explore Mars and other planets, thus spreading out both the risks and the rewards. While some of these are bound to fail, most of these little probes would be successful, and several would be successful beyond their original design. The Spirit and Opportunity probes continue to operate on Mars some five years past their original mission of 90 days. Even Voyager 1, launched in 1977, is still operating some 30 years later. Investing in several smaller missions with clear scientific goals offers much more reward for the risk. If NASA is to receive more appropriations, it should be for investigating problems here on Earth. Studying climate change is an unprecedented opportunity to learn about a sophisticated planetary processes happening right here, right now. Moreover, we need NASA to not just document the effects of global warming and other environmental problems but provide us with possible solutions and new technologies addressing these challenges. Solving the problem of global warming would be a greater step for mankind than any trip to space and is much more deserving of public investments. Landing humans on Mars and bringing them back safely would be a great technological feat and no doubt resplendent with numerous spinoff technologies, but it is not one of the major technical problems currently facing the human race. A manned mission to Mars will happen someday, but we should concentrate our scientific resources on figuring out how to leave future generations with a habitable Earth and leave it to them to discover how to make it to Mars.

**[\_\_\_\_] Missions to Mars drain funding allocated to answer science questions.**

Frank Gaglioti, high school science teacher and contributing journalist, 5/20/2006, **“Cuts to NASA Budget Gut Space Research http://www.wsws.org/articles/2006/may2006/nasa-m20.shtml**

In a far-reaching reorientation of its programs, the US National Aeronautic and Space Administration (NASA) budget has effectively capped science spending for the five-year period from 2007 to 2011. Programs designed to investigate more fundamental scientific questions about the character of the solar system and the universe are being sacrificed to enable NASA to carry out President George Bush’s grandiose scheme to establish a permanent settlement on the moon in preparation for a manned mission to Mars. NASA’s announcement in February was part of Bush’s budget cuts to federal science spending by 1 percent to $59.8 billion. The changes to NASA’s program are mirrored in the overall science budget, which is focussed more narrowly on projects with commercial payoffs or to strengthen the US military. Bush’s “American Competitive Initiative,” which is aimed at bolstering US corporate interests at the expense of their rivals, will consume $5.9 billion. Presidential science adviser John Marburger bluntly declared: “The point is, we’re prioritising.”

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# Specific Link – Constellation Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] Climate science would be cut to build the replacement to the space shuttle.**

Agence France-Presse, French news agency 3/6/2011, “**NASA reels from climate science setbacks”, http://www.spacemart.com/reports/NASA\_reels\_from\_climate\_science\_setbacks\_999.html**

But some Republicans, who hold a majority in the House of Representatives, want to see NASA give up climate science so it can focus on returning astronauts to space once the 30-year-old shuttle program ends later this year. "NASA's primary purpose is human space exploration and directing NASA funds to study [global warming](http://www.spacemart.com/reports/NASA_reels_from_climate_science_setbacks_999.html) undermines our ability to maintain our competitive edge in human space flight," said Republican Congressman Bill Posey last month. Earth science has been a distinct mission of NASA ever since Congress formed the agency with the 1958 Space Act, setting its first objective as "the expansion of human knowledge of the earth and of phenomena in the atmosphere and space." Further revisions of the Space Act in 1976 gave NASA "authority to carry out stratospheric ozone research," and a 1984 change broadened NASA's earth science authority from the stratosphere to "the expansion of human knowledge of the Earth." But budget squeezes have crippled NASA's efforts since the 1990s, when NASA first set out to create a global Earth observing system and budget deficits forced engineers to scale back to one third of their original plan, according to Wielicki. "What we have now are pieces of that system that have lived well beyond their design life," he said. "Space missions are expensive by nature, risky by nature, and our nation has decided not to spend the kind of resources it would take for a more robust set of climate research observations."

**[\_\_\_\_] Returning to the moon will cause funds to be taken from science.**

Stefanie Olsen, staff writer at CNET, 2/6/2006, **“NASA budget emphasizes space exploration”, 2/6/6,** [**http://news.cnet.com/NASA-budget-emphasizes-space-exploration/2100-11397\_3-6035753.html#ixzz1PsWvN4gW**](http://news.cnet.com/NASA-budget-emphasizes-space-exploration/2100-11397_3-6035753.html#ixzz1PsWvN4gW)

Science will play a diminishing role at NASA as the space agency emphasizes lunar exploration in the next five years, according to a new governmental budget. NASA Administrator Michael Griffin, who was appointed to the office by the Bush administration only 10 months ago, announced a $16.8 billion budget request for NASA on Monday, per recommendations from President Bush. The budget, outlined in a press briefing here at NASA Ames Research Center, is a 3.2 percent rise over expected 2006 spending. It comprised about 0.7 percent of the federal budget. "This is a modest investment to extend the frontiers of space exploration, scientific discovery and aeronautics research," Griffin said. NASA's spending, Griffin said, will concentrate on implementing Bush's Vision for Space Exploration, a plan the president announced roughly two years ago to launch human missions to the moon. Science, such as studying the solar system or the origin of the universe, will [play a lesser role at NASA organizations](http://news.cnet.com/Research-money-crunch-in-the-U.S./2100-1008_3-5938451.html), resulting in cutbacks to divisions like astrobiology studies and life sciences at Ames Research Center. Ames' life sciences budget was cut by roughly 80 percent in November 2005, resulting in the loss of 100 contractor jobs.

# Specific Link – SETI Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] SETI is extremely expensive and would strain NASA’s budget.**

**D. Vogt, writer and historical researcher, and manager of the Canadian History channel on Helium, 6/14/2010,** [**http://www.helium.com/items/1861053-stephen-hawking-opposes-seti**](http://www.helium.com/items/1861053-stephen-hawking-opposes-seti)

Most critics of the Search for Extraterrestrial Intelligence (SETI) suggest merely that it is a well-intentioned but foolish waste of money, chasing after radio signals sent by "little green men" while substantive research projects with tangible results go unfunded. However, some, like well-known Cambridge physicist [Stephen Hawking](http://astronomy.helium.com/topic/6956-stephen-hawking), go further: not only is SETI expensive, if done right, but it's also a bad idea because we really don't know who (if anyone) is listening. Usually, it is assumed that the worst-case scenario for SETI is that the money and time invested simply goes to waste. Not so, says Hawking: how are we sure that the aliens are really people we'd want to meet?

# Specific Link – Asteroids Affirmative

### **[\_\_\_\_] Surveys to find asteroids are funded by taking money from other programs.**

**National Academies, independent research organizations comprised of some of the premier scientists of the US, 2009, “Near-Earth Object Surveys and Hazard Mitigation Strategies:**

**Interim Report” http://www.nap.edu/catalog.php?record\_id=12738**

Currently, the U.S. government spends a relatively small amount of money funding a search and survey program to discover and track near-Earth objects, and virtually no money on studying methods of mitigating the hazards posed by such objects.3 Although Congress has mandated that NASA conduct this survey program and has established goals for the program, neither Congress nor the administration has sought to fund it with new appropriations**.** As a result, NASA has supported this activity by taking funds from other programs, while still leaving a substantial gap between the goals established by Congress and the funds needed to achieve them.

### **[\_\_\_\_] Because Congress is unwilling to allocate new funding to asteroid detection, NASA has been forced to fund the program by cutting other areas.**

**Cary Johnston, associate writer for Ars Technica, 08/2009, “ NASA asteroid-tracking program stalled due to lack of funds,” 8/2009,** [**http://arstechnica.com/science/news/2009/08/nasa-asteroid-tracking-program-stalled-due-to-lack-of-funds.ars**](http://arstechnica.com/science/news/2009/08/nasa-asteroid-tracking-program-stalled-due-to-lack-of-funds.ars)

The risk of an asteroid rending civilization into bits is a favorite scenario in disaster movies, but it has been none too popular with the United States government. Eleven years ago**,** Congress tasked NASA with detecting, tracking, and classifying large asteroids and comets **t**hat pose a threat to Earth; these are generically termed near earth objects, or NEOs. Since then, save for a small grant, NASA has funded the project on its own. Now Congress has created new goals for the program and requested that they be achieved by 2020. The National Research Committee has put out an interim report on the NEO project, and it indicates that very little progress has been made since 2005, primarily due to a lack of funding. Congress kicked off the NEO-tracking project in 1998, requiring that NASA's equipment be able to locate and identify at least 90 percent of all NEOs one kilometer in diameter or larger. Congress selected this size as the lower bound because it is the smallest size that might be globally catastrophic if it ran into Earth. To guarantee a catastrophe, an asteroid would have to be even larger, perhaps 1.5 to 2 kilometers. On impact, an asteroid of this size would create a fireball the size of a continent and a crater fifteen times the asteroid's diameter; if it hits the ocean, there would be an enormous tsunami. Congress awarded NASA a $1.6 million grant in 1999 toput towards the NEO discovery program. Unfortunately, this was the only funding Congress gave to NASA to pursue this goal; nonetheless, NASA continued the project on its own, and has since successfully achieved the objective of a 90 percent track rate for 1km NEOs. The problem now, the NRC report asserts, is that we shouldn't be satisfied with this. What NASA has accomplished so far will largely enable us to at least attempt to prevent any impacts that would ultimately cause the majority of humans that survive the initial blow to die of starvation. However, asteroids smaller than 1km in diameter are not sufficiently less disastrous than their larger counterparts that we can happily ignore them. For example, the NRC report states that the body that caused the 1908 Tunguska explosion and destroyed 2,000 square kilometers of Siberian forest was only 30-40 meters in diameter. This realization is what led Congress to change its mind and decide that NASA should track even smaller asteroids. The new goal: track 90 percent of NEOs 140 meters or larger in diameter by 2020. The NRC report primarily takes issue with the lack of action on this goal from anyone involved: Congress has not volunteered funding for their mandate, and NASA has not allotted any of their budget toit**,** either. The equipment currently in use to track NEOs can easily see the 1km monsters, but it's not sensitive enough to track the 140m asteroids. As a result, if a Tunguska-sized body were headed for Earth today, its arrival would probably be a complete surprise.

# Impact – Earth Science Solves Global Warming

**[\_\_\_\_]**

**[\_\_\_\_] Satellite data from NASA is essential to measuring emissions to stop global warming.**

**James Lewis et. al, senior fellow and director of the Technology and Public Policy Program at CSIS Sarah O. Ladislaw, senior fellow in the Energy and National Security Program at CSIS, June 2010, “ Earth Observation for Climate Change,”** [**http://csis.org/files/publication/100608\_Lewis\_EarthObservation\_WEB.pdf**](http://csis.org/files/publication/100608_Lewis_EarthObservation_WEB.pdf)

This is a question of priorities. Manned flight should remain a priority, but not the first priority. Earth observation data is critical to understanding the causes and effects of climate change and quantifying changing conditions in the environment. The paucity of satellites actually designed and in orbit to measure climate change is disturbing. The United States does not have a robust climate-monitoring infrastructure. In fact, the current infrastructure is in decline. Until that decline is reversed and an adequate space infrastructure put in place, building and launching satellites specifically designed for monitoring climate change should be the first priority for civil space spending. Manned spaceflight provides prestige, but Earth observation is crucial for security and economic well-being. The United States should continue to fund as a priority a more robust and adequate space infrastructure to measure climate change, building and orbiting satellites specifically designed to carry advanced sensors for such monitoring. Satellites provide globally consistent observations and the means to make simultaneous observations of diverse measurements that are essential for climate studies. They supply high-accuracy global observations of the atmosphere, ocean, and land surface that cannot be acquired by any other method. Satellite instruments supply accurate measurements on a near-daily basis for long periods and across broad geographic regions. They can reveal global patterns that ground or air sensors would be unable to detect—as in the case of data from NASA satellites that showed us the amount of pollution arriving in North America from Asia as equal to 15 percent of local emissions of the United States and Canada. This sort of data is crucial to effective management of emissions—the United States, for example, could put in place regulations to decrease emissions and find them neutralized by pollution from other regions. 15 Satellites allow us to monitor the pattern of ice-sheet thickening and thinning. While Arctic ice once increased a few centimeters every year, it now melts at a rate of more than one meter annually. This knowledge would not exist without satellite laser altimetry from NASA’s ICESat satellite.

# Impacts – Earth Science Solves Global Warming

**[\_\_\_\_]**

**[\_\_\_\_] NASA satellites focused on global warming are key to help predict global warming and natural disasters.**

**Larry West, Environmental journalist, finalist for the Pulitzer prize, 3/5/2006,** “**Budget Cuts and Mismanagement Place Environmental Satellites at Risk”**

Budget cuts and cost overruns are threatening the current integrity and future existence of a network of U.S. environmental satellites that help scientists forecast hurricanes, droughts and floods, and predict global warming, according to a news story by the Associated Press. "The system of environmental satellites is at risk of collapse," said Richard A. Anthes, president of the University Corporation for Atmospheric Research and chairman of a National Academy of Sciences committee that advises the federal government on developing and operating environmental satellites, in an interview with the Associated Press. "Every year that goes by without the system being addressed is a problem." Satellites Give Warning Before Disasters Strike Scientists say that neglecting the environmental satellites orbiting the Earth could have severe human consequences. If the environmental satellites aren’t there to provide up-to-date information about approaching natural disasters and threats from other severe climate and weather conditions, then scientists will be unable to warn the people most likely to be harmed and the public safety officials who must try to protect them. Yet, at a time when the United States is still recovering from the worst hurricane season on record, when Africa and South America are experiencing devastating droughts, and when regions worldwide are feeling the first effects of global warming, NASA is managing its budget as though extreme weather and natural disasters were passé.

**[\_\_\_\_] Environmental satellites provide critical data on global warming.**

**Larry West, Environmental journalist, finalist for the Pulitzer prize, 3/5/2006,** “**Budget Cuts and Mismanagement Place Environmental Satellites at Risk”**

In an effort to save money, NASA has canceled plans for at least three earth-observing satellites, and cost overruns have delayed a new generation of weather satellites until 2010 or 2012. The Government Accounting Office has called the entire U.S. environmental satellite effort “a program in crisis.” Balancing Budgets and Priorities NASA Administrator Michael Griffin has the difficult job of trying to stretch his shrinking budget to cover the cost of operating the space shuttle and the space station as well as space exploration and programs such as the environmental satellites. NASA’s proposed budget for 2007 includes $6.2 billion for space shuttle and space station operations, and $4 billion for planning future missions to the moon and Mars, but only $2.2 billion for satellites that help scientists observe the Earth and the sun. "We simply cannot afford all of the missions that our scientific constituencies would like us to sponsor," Griffin told members of Congress when he testified before the House Science Committee on Feb. 16, 2006. Perhaps not, but it seems as though humanity’s critical need for the information that environmental satellites provide should place them higher on NASA’s list of priorities.

# Impact – Warming Causes Extinction

**[\_\_\_\_]**

**[\_\_\_\_] Global warming causes extinction.**

**Bill Henderson, district environmental administrator for the Florida DOT, 8/19/2006, “Runaway Global Warming Denial.” Countercurrents.org August 19,.** [**http://www.countercurrents.org/cc-henderson190806.htm**](https://webmail.whitman.edu/horde/services/go.php?url=http%3A%2F%2Fwww.countercurrents.org%2Fcc-henderson190806.htm)

The scientific debate about human induced global warming is over but policy makers - let alone the happily shopping general public - still seem to not understand the scope of the impending tragedy. Global warming isn't just warmer temperatures, heat waves, melting ice and threatened polar bears. Scientific understanding increasingly points to runaway global warming leading to human extinction. If impossibly Draconian security measures are not immediately put in place to keep further emissions of greenhouse gases out of the atmosphere we are looking at the death of billions, the end of civilization as we know it and in all probability the end of man's several million year old existence, along with the extinction of most flora and fauna beloved to man in the world we share.

**[\_\_\_\_]**

**[\_\_\_\_] Global warming will cause civilization to collapse**

**Lester R. Brown, founder of the Worldwatch Institute and the Earth Policy Institute, 2008 “Plan B 3.0: Mobilizing to Save Civilization,”**

Beyond what is already happening, the world faces a risk that some of the feedback mechanisms will begin to kick in, further accelerating the warming process. Scientists who once thought that the Arctic Ocean could be free of ice during the summer by 2100 now see it occurring by 2030. Even this could turn out to be a conservative estimate.78 This is of particular concern to scientists because of the albedo effect, where the replacement of highly reflective sea ice with darker open water greatly increases heat absorbed from sunlight. This, of course, has the potential to further accelerate the melting of the Greenland ice sheet. A second feedback loop of concern is the melting of permafrost. This would release billions of tons of carbon, some as methane, a potent greenhouse gas with a global warming effect per ton 25 times that of carbon dioxide.79 The risk facing humanity is that climate change could spiral out of control and it will no longer be possible to arrest trends such as ice melting and rising sea level. At this point, the future of civilization would be at risk. This combination of melting glaciers, rising seas, and their effects on food security and low-lying coastal cities could overwhelm the capacity of governments to cope. Today it is largely weak states that begin to deteriorate under the pressures of mounting environmental stresses. But the changes just described could overwhelm even the strongest of states. Civilization itself could begin to unravel under these extreme stresses.

# Impact – Warming is Man Made

## [\_\_\_\_]

**[\_\_\_\_] Warming is caused by humans – the variation of temperature increase is much higher than normal.**

## Stephanie B. Oshita, Assistant Professor of Environmental Science and Management at the University of San Francisco, 2007, “The Scientific and International Context for Climate Change Initiatives” 42 U.S.F.L. Rev. 1 Summer

Even if we recognize that the globe is warming, how do we know that humans are causing the phenomenon? Through a combination of measurements and models, we can discern the human "fingerprint" on the climate system in a number of ways. n27 First, the observed warming goes well beyond natural variation. Paleoclimatology - the sleuthing for indicators of past temperatures in ice cores and coral reefs - indicates that current levels of CO2 in the atmosphere far exceeded the natural range of the last 650,000 years. n28 We know that the atmospheric concentrations of CO2 and temperature are strongly correlated, explaining why temperatures levels are higher than ever before. n29 Second, the rapid increase in levels of CO2 in the atmosphere coincides with the onslaught of the industrial revolution and the release of CO2 from fossil fuels, along with dramatic changes in land use by humans. n30 Third, models of the climate system with and without human emissions show that natural variation alone cannot obtain observed [\*7] changes. n31 Natural fluctuations in the Earth's orbit, natural variation in solar activity, and other non-human phenomena cannot account for the rapid rise in atmospheric greenhouse gases and average temperature over the past century. Human activity does explain the observed changes

**[\_\_\_\_] The increase of carbon dioxide in the atmosphere is very predictable, and it has increased dramatically in the last 50 years due to human activity.**

## Lester E. Brown, Director and Founder of the Global Institute of Environment in the U.S. and President and Senior Researcher at the Earth Policy Institute, 2008 [Lester E., “Plan B 3.0: Mobilizing to Save Civilzation”

Scientists at the Goddard Institute for Space Studies of the National Aeronautics and Space Administration (NASA) gath­er data from a global network of some 800 climate-monitoring stations to measure changes in the earth's average temperature. Their direct measurements go back to 1880.6 Since 1970, the earth's average temperature has risen by 0.6 degrees Celsius, or 1 degree Fahrenheit. Meteorologists note that the 23 warmest years on record have come since 1980. And the seven warmest years since recordkeeping began in 1880 have come in the last nine years. Four of these-2002, 2003, 2005, and 2006-were years in which major food-producing regions saw their crops wither in the face of record temperatures. The amount of carbon dioxide (C02) in the atmosphere has risen substantially since the start of the Industrial Revolution, growing from 277 parts per million (ppm) to 384 ppm in 2007. The annual rise in the atmospheric *C02* level, one of the world's most predictable environmental trends, is the result of the annu­al discharge into the atmosphere of 7.5 billion tons of carbon from burning fossil fuels and 1.5 billion tons from deforesta­tion. The current annual rise is nearly four times what it was in the 1950s, largely because of increased emissions from burning fossil fuels. As more C02 accumulates in the atmosphere, tem­peratures go up.

# Impact – Warming Not Inevitable

**[\_\_\_\_]**

**[\_\_\_\_] Warming is not inevitable. Many of the predicted consequences can still be avoided.**

## James E Hansen, NASA Goddard Institute for Space Studies and Adjunct Professor in the Department of Earth and Environmental Sciences at Columbia University, 6/25/2007, “How Can We Avert Dangerous Climate Change?” Delivered to the Select Committee on Energy Independence and Global Warming, United States House of Representatives, http://arxiv.org/pdf/0706.3720

We have solved or are solving those pollution problems, at least in developed countries. But we did not address them until they hit us with full force. That approach, to wait and see and fix the problems post facto, unfortunately, will not work in the case of global climate change. On the contrary, the inertia of the climate system, the fact that much of the climate change due to gases already in the air is still ‘in the pipeline’, and the time required for economically-sensible phase-out of existing technologies together have a profound implication. They imply that ignoring the climate problem at this time, for even another decade, would serve to lock infuture catastrophic climatic change and impacts that will unfold during the remainder of this century and beyond (references A and B). Yet this is not a reason for gloom and doom. On the contrary, there are many bright sides to the conclusion that the ‘dangerous’ level of CO2 is no more than 450 ppm, and likely much less than that. It means that we, humanity, are forced to find a way to limit atmospheric CO2 more stringently than has generally been assumed. In so doing, many consequences of high CO2 that were considered inevitable can be avoided. We will be able to avoid acidification of the ocean with its destruction of coral reefs and other ocean life, retain Arctic ice, limit species extinctions, prevent the U.S. West from become intolerably hot, and avoid other undesirable consequences of large global warming. It is becoming clear that we must make a choice. We can resolve to move rapidly to the next phase of the industrial revolution, and in so doing help restore wonders of the natural world, of creation, while maintaining and expanding benefits of advanced technology. Or we can continue to ignore the problem, creating a different planet, with eventual chaos for much of humanity as well as the other creatures on the planet.

# Article: The State of NASA’s Budget

**Space Reference: *NASA Spending Shift to Benefit Centers Focused on Science & Technology*. June 8th, 2011.**

Washington DC, June 7, 2011 - Euroconsult, the leading international consulting and analyst firm specializing in the space sector, along with the consulting firm Omnis, today announced the findings of a study today foreseeing a significant shift in NASA spending toward Earth science and R&D programs and away from legacy spaceflight activities.

According to the report "NASA Spending Outlook: Trends to 2016," NASA's budget, which will remain flat at around $18.7 billion for the next five years, will also be characterized by significant shifts from space operations to technology development and science.

With the shift in budget authority, NASA Centers focused on Earth observation, space technology, and aeronautics will see increases in funding, while those involved in human spaceflight will see major funding reductions. Indeed, the termination of the Space Shuttle program will lead to a budget cut over $1 billion for Space Operations, resulting in a 21% budget cut for the Johnson Space Center. Overall, the agency's budget for R&D will account for about 50% of all NASA spending.

"Budget allocation across Centers will vary greatly," said Steve Bochinger, President of Euroconsult North America. "As NASA shifts priorities for human spaceflight from Shuttle operations to Human Exploration Capabilities and commercial spaceflight, the budget will be redirected to a range of technology development programs. Likewise, as NASA shifts its science mission focus away from space science to Earth science, the science budget will be redistributed among centers."

This shift in NASA's priorities will also affect the agency's contract spending. As large legacy programs end, new research and development programs will be initiated. This turnover of programs should provide many new contracting opportunities over the next five years, especially at Research Centers. The Euroconsult/Omnis report details these changes.

"The uniqueness of this report is that it brings together in one picture NASA's budget, spending and contracting, providing insights into opportunities created by the new NASA direction," said Bretton Alexander, Senior Consultant for Omnis.

Some of the findings include: Following an 11% increase in 2011, the Science Mission Directorate budget will remain at the $5 billion level through 2016. This increase, however, is entirely within the Earth science theme, reflecting the Administration's priority on climate change research. Goddard Space Flight Center and Langley Research Center, which manage and Implement Earth science projects, will thus benefit from this increase as will contractors who develop Earth observation spacecraft and instruments.

- Spending in the Exploration Systems Mission Directorate has been impacted by the cancellation of Constellation and repositioning of exploration policy. But it will hold steady at around $3.9 billion between 2011 and 2016, funds will shift away from human exploration activities at the Johnson Space Center in Texas and the Marshall Space Flight Center in Alabama. The Kennedy Space Center in Florida will escape some of the pain of reduced funding with the development of the new Commercial

Crew Development program. However, much of the work will be done by companies spread around the United States, rather than those based at Kennedy, creating an opportunity for new contractors.

- The newly created Space Technology Directorate, is set to receive an average of $1 billion annually between 2012 and 2016. The programs here are designed to revitalize the agency's ability to develop revolutionary technologies and innovations for exploration and robotic spaceflight This substantial budget will benefit Langley, Glenn and Ames Research Centers, which in the past supported research and test programs in aeronautics, science and human spaceflight missions.

- NASA's restructuring of the Aeronautics Research Mission Directorate (ARMD) will be focused on long-term investment in fundamental aeronautics and development of technologies required for the Next Generation Air Transportation System (NextGen). Funding for the 2011-2016 period is expected to increase to a total of $570 million per year. With these shifts in funding and priorities, NASA's business practices will also adapt. The Euroconsult/Omnis report analyzes how NASA's shift from cost-plus contracting, currently used in many legacy programs, to fixed-price contracts will impact various programs throughout the agency. The new Commercial Crew Development program undertaken as a public-privatepartnership with the industry typifies the agency's new contract practices.

# Article: Space Science, Earth Science and Politics

**Space politics: *Human Spaceflight versus Earth Sciences?* February 9th, 2011.**

A letter signed by several members of Congress is the latest evidence that a new battle line is forming over NASA funding: human spaceflight versus Earth sciences. In [a letter to House Appropriations committee chairman Rep. Hal Rogers and CJS subcommittee chairman Frank Wolf](http://posey.house.gov/UploadedFiles/NASAAppropsLetter-Feb2011.pdf), six Republican members of Congress asked the appropriators to prioritize NASA funding on what they consider to be the agency’s primary mission, human spaceflight. To do that, they argue that funding for NASA’s climate change research be redirected to human spaceflight accounts. “With your help, we can reorient NASA’s mission back toward human spaceflight by reducing funding for climate change research and reallocating those funds to NASA’s human spaceflight accounts, all while moving overall discretionary spending towards FY2008 levels,” the letter’s authors—Reps. Bill Posey (R-FL), Pete Olson (R-TX), Rob Bishop (R-UT), Jason Chaffetz (R-UT), Sandy Adams (R-FL), and Mo Brooks (R-AL)—argue.

There are a number of issues with the letter. They claim that NASA spent “over a billion dollars” on “studying global warming/climate change” in FY2010. The agency got about $1.4 billion for all Earth sciences research in FY10, [according to agency budget documents](http://www.nasa.gov/pdf/432577main_Earth_Science_R1.pdf). There’s no breakout for how much of that went specifically to climate change research, though. The letter also claims that the “lion share” of NASA’s share of stimulus funding went to climate change studies. In fact, only about a third of the agency’s stimulus funding, $325 million, [went to Earth sciences programs](http://www.recovery.gov/Transparency/agency/reporting/agency_reporting5program.aspx?agency_code=80&progplanid=7540), to accelerate development of Earth science spacecraft. Human spaceflight got even more: [$400 million](http://www.recovery.gov/Transparency/agency/reporting/agency_reporting5program.aspx?agency_code=80&progplanid=7541), including $50 million for the CCDev program. And their claim that NASA’s core mission is human spaceflight is not supported by other documents, ranging from the [National Aeronautics and Space Act](http://www.nasa.gov/offices/ogc/about/space_act1.html) from 1958 to the latest [NASA authorization act](http://legislative.nasa.gov/PL%20111-267.pdf), which declared that NASA “is and should remain a multi-mission agency with a balanced and robust set of core missions in science, aeronautics, and human space flight and exploration” and that “NASA plays a critical role through its ability to provide data on solar output, sea level rise, atmospheric and ocean temperature, ozone depletion, air pollution, and observation of human and environment relationships”.

A bigger issue, though, is that this letter may be indicative of a bigger battle some in Congress want to wage between human spaceflight and Earth science. Some members have openly expressed their skepticism about the validity of climate change research, questioning either the existence of global warming or the role of human activities in causing climate change. The letter to appropriators makes no judgment on the quality of validity of such research, only NASA’s role in supporting it, but some might see that unspoken argument there. For example, one of the letter’s signers, Rep. Brooks, said last week in regards to NASA funding that [there would be “hearings soon on global warming” by the House science committee](http://blog.al.com/breaking/2011/02/congress_will_cut_defense_cong.html) without going into more details. An attack on Earth sciences funding to support human spaceflight could create or reinvigorate opponents of human spaceflight programs, reminiscent of previous debates between human spaceflight and robotic space exploration advocates—a battle that the agency presumably would want to avoid.

**NASA Tradeoff Disadvantage Affirmative**

# NASA Tradeoff DA Affirmative

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# Glossary

**Mars Science Laboratory** – A NASA mission to land a rover named curiosity of the Martian surface. The object of the mission is to determine whether Mars could have once supported microbial life, and determine its habitability for humans.

**Cape Canaveral** – An area of Florida east of Orlando that is home to the Kennedy Space Center and the location of the launches of many spacecraft.

**Irradience** – describing an object that is shining brightly

**Imperative** - An essential or urgent thing

**Inception** - The establishment or starting point of something; the beginning

**Pension** - A regular payment made by the government to people of or above the official retirement age

**Animosity** – strong hostility

**Decadal** – With respect to decades.

**Appropriator** – Someone who allocates resources among difference causes.

**ISS** – International Space Station

**NASA** – National Aeronautics and Space Administration

**NOAA** – National Oceanic and Atmospheric Administration

**GISS** – Goddard Institute for Space Studies

**FY** – Fiscal Year. A fiscal year is a year for tax or accounting purposes. It is still 365 days long, but it often does not start and end on January 1st.

**JPL** – Jet Propulsion Laboratory

**OCO** – Orbiting Carbon Observatory

**IPCC** – United Nations Intergovernmental Panel on Climate Change

# Uniqueness – NASA overbudget now

**[\_\_\_\_] The Mars Science Laboratory is already overbudget, which makes a trade off with Earth science inevitable.**

**Amy Svitak, senior writer for space.com, 1/28/2011, “NASA’s Overbudget Mars Rover in Need of Another Cash Infusion,”** [**http://www.spacenews.com/civil/110128-mars-rover-need-cash.html**](http://www.spacenews.com/civil/110128-mars-rover-need-cash.html)**,**

NASA’s Mars Science Laboratory (MSL) mission needs an $82 million cash infusion to maintain its late November launch date after development of the $2.47 billion rover exhausted program funding reserves last year, according to agency officials. Jim Green, director of NASA’s Planetary Sciences Division in the U.S. space agency’s Science Mission Directorate here, attributed the 3 percent cost increase to problems developing the truck-sized rover’s mobility systems, avionics, radar and drill, as well as delays in completing the rover’s Sample Analysis at Mars instrument suite, which is designed to sniff the surrounding air for carbon-containing compounds. “Our problem right now is MSL,” Green told members of the NASA Advisory Council’s planetary sciences subcommittee during a public meeting here Jan. 26. “It has virtually no unencumbered reserves left.” With MSL slated for delivery to Florida’s Cape Canaveral Air Force Station in June, Green said it is imperative that the program’s funding reserves be restored in order to gird against any further development or test problems that could cause the rover to miss an unforgiving three-week launch window that opens Nov. 25. MSL’s price tag has grown by more than $660 million since 2008, according to a February 2010 audit by the U.S. Government Accountability Office, which attributed much of the increase to a 68 percent rise in hardware development costs since the program’s 2003 inception. Although NASA had planned to launch MSL in 2009, technical setbacks forced the agency to postpone the mission two years, the minimal delay for any Mars-bound craft missing its launch window.

[\_\_\_\_] NASA’s pension obligations to shuttle workers mean that it will have to take funds from other areas.

**New York Times, 6/15/2011, “Shuttle’s End Leaves NASA a Pension Bill” http://www.nytimes.com/2011/06/15/business/15nasa.html?\_r=2**

The pension fund now has about half the amount needed. The president’s budget proposal for the 2012 fiscal year requests $547.9 million for NASA to provide the rest. That is nearly 3 percent of the agency’s total budget and just about what the Science Mission Directorate at NASA spent last year on all grants and subsidies to study climate change, planetary systems and the origins of life in the universe. “We know that it’s NASA’s obligation to fund this, and NASA will do so,” said a spokesman for the space agency, Michael Curie. Other federal agencies have made promises to pay contractors’ annual pension costs — the Energy Department, for example, for companies that run nuclear sites — and some government auditors have been warning for years that investment oversight was lacking and that the potential costs had been underestimated. This appears to be the first time, though, that a company’s main contract has expired and an agency has had to bear the cost of terminating its plans. Although NASA was reimbursing the contractor for the annual pension contributions, it had no say over how the money was invested. United Space Alliance put most of the money into stocks. The backstop will be unusually costly because of market conditions. While United Space Alliance has made its required contributions every year, the fund lost nearly $200 million in the market turmoil of 2008 and 2009. When interest rates are very low, as they have been, the cost of the promises rises rapidly as well, creating a bigger shortfall. The cash infusion is also being readied at a time when some members of Congress are demanding cuts in spending and threatening to block anything that could be construed as a taxpayer bailout. “It’s unfortunate that it’s coming in this fiscal environment,” said Bill Hill, NASA assistant associate administrator for the space shuttle. He said that he hoped Congress would appropriate the money before the fiscal year ended on Sept. 30. If not, he said, NASA will have to divert funds from space-related activities.

# Uniqueness – Earth Science Not Funded Now

**[\_\_\_\_]**

**[\_\_\_\_] Despite increasing funds for Earth science Obama is cutting research for global warming.**

**Turner Brinton, Space News Writer, 3/7/2011, “NASA Cuts 2 Earth Science Missions on White House Order”, March 7th 2011 http://www.space.com/11050-white-house-nasa-earth-science-cuts.html**

Even though NASA’s Earth science budget is slated to rise next year, the U.S. space agency has been ordered by the White House to shelve a pair of big-ticket climate change missions that just last year were planned for launch by 2017. With U.S. President Barack Obama under pressure to rein in federal spending, the White House eliminated funding for the Climate Absolute Radiance and Refractivity Observatory (CLARREO) and Deformation, Ecosystem Structure and Dynamics of Ice (DESDynI) missions, Steve Volz, associate director for flight programs at NASA’s Earth Science Division, said in a Feb. 24 interview. The cuts came before the failed launch of the Glory satellite Friday (March 4), NASA's latest Earth-observing mission to study Earth's atmosphere, due to a rocket malfunctions. So the White House orders are unrelated to NASA's loss of the Glory satellite. The multiyear budget plan NASA sent Congress a year ago called for spending $1.2 billion between 2012 and 2015 to develop CLARREO and DESDynI, two of the four top-tier missions recommended by the National Research Council’s 2007 Earth Science decadal survey. But the White House Office of Management and Budget specifically removed these funds from the agency’s 2012 budget request, Volz said in an interview. “Removal of these missions was not what we desired and not what the administration desired, but it was a clear recognition and acknowledgement of the budget issues we face as a nation,” Volz said. “It’s cleaner to be allowed to delete the scope that goes along with the dollars than to have to figure out how to do more with less.” The other two top-tier Earth science missions — Soil Moisture Active-Passive and ICESat-2 — remain budgeted for launch in 2014 and 2016, respectively.

[\_\_\_\_] Current budget levels are just projections that mean nothing. Hostility to global warming by Republicans means that Earth science will be cut.

**Eli Kintisch, writer at Science Insider, 3/8/2011 http://news.sciencemag.org/scienceinsider/2011/03/nasa-satellite-crash-complicates.html**

The desired launch dates presume that Congress will approve the president's request to grow the agency's budget for Earth science in the next 4 years—from $1.8 billion to $2.3 billion by 2015. That may be wrong. Given the budget pressure, the $1.9 billion that President Barack Obama requested for the 2012 fiscal year "is the high point," speculates NASA earth science budget expert Art Charo of the National Academies' National Research Council. In particular, the House of Representatives has already approved cutting NASA's budget for the rest of 2011 by $600 million. Senate Democrats have said they want to cut it by $200 million. Neither has yet specified how the cut should be distributed across the agency's $18.7 billion budget. But in recent years, the earth science budget has gotten its lunch eaten by the manned spaceflight program. Given the animosity in the House toward anything that has the word "climate" in its name, it's hard to see any change in that dynamic. The crash of OCO in 2009 has already led to some brutal triage. To set up OCO-II, NASA was forced to cut other missions. In the 2012 budget rollout last month, for example, NASA announced it wished to curtail plans to launch CLARREO—a four-satellite constellation to measure tiny fluctuations in reflected energy from Earth, and DESDynI, a $1.6 billion mission to scan ice.

# Uniqueness – Earth Science Not Funded Now

**[\_\_\_\_] NASA’s Earth science budget is slated to lose 1.7 billion dollars this year.**

**Turner Brinton, Space News Writer, 3/7/2011, “NASA Cuts 2 Earth Science Missions on White House Order”, March 7th 2011 http://www.space.com/11050-white-house-nasa-earth-science-cuts.html**

While NASA’s Earth Science Division fared better in the president’s 2012 budget proposal than other parts of the agency, the division stands to receive some $1.7 billion less between 2010 and 2015 than forecast just last year**.** That spending plan, which called for giving Earth science a growing share of a NASA budget expected to surpass $20 billion within four years, included enough funding to build and launch all four top-tier decadal survey missions by the end of 2017. The NASA budget plan unveiled Feb. 14 puts last year’s growth plans on hold. The agency’s overall spending would be frozen at $18.7 billion, and Earth science, after receiving a $400 million boost for 2012, would remain flat at $1.8 billion through at least 2016. Adding to NASA’s budget woes, the president’s 2011 budget was never enacted, leaving the agency and the rest of the federal government funded at typically lower 2010 levels under stopgap spending measures, the latest of which expires March 4.

[\_\_\_\_] Obama recently cancelled two climate change satellites to save money, leaving NASA’s Earth science program crippled.

**Seth Borenstein, National Science writer for The Associated Press, 3/4/2011, “Lost satellite deals heavy blow to climate research”, http://www.msnbc.msn.com/id/41895904/ns/technology\_and\_science-space/t/lost-satellite-deals-heavy-blow-climate-research/**

NASA's environmental division is getting used to failure, cuts and criticism. In 2007, a National Academy of Sciences panel said that research and purchasing for NASA Earth sciences had decreased 30 percent in six years and that the climate-monitoring system was at "risk of collapse." Just last month, the Obama administration canceled two major satellite proposals to save money. Also, the Republican-controlled House has sliced $600 million from NASA in its continuing spending bill, and some GOP members do not believe the evidence of manmade global warming. Thirteen NASA Earth-observing satellites remain up there, and nearly all of them are in their sunset years. "Many of the key observations for climate studies are simply not being made," Harvard Earth sciences professor James Anderson said. "This is the nadir of climate studies since I've been working in this area for 40 years." Scientists are trying to move climate change forecasts from ones that are heavily based on computer models to those that rely on more detailed, real-time satellite-based observations like those that Glory was supposed to make. The satellite's failure makes that harder. Ruth DeFries, the Columbia University professor who co-chaired the 2007 National Academy of Sciences panel, said in an e-mail that this matters for everyone on Earth. "The nation's weakening Earth-observing system is dimming the headlights needed to guide society in managing our planet in light of climate change and other myriad ways that humans are affecting the land, atmosphere and oceans," DeFries wrote. NASA Earth Sciences chief Michael Freilich said it is not that bad. "We must not lose sight of the fact that we in NASA are flying 13 research missions right now, which are providing the fuel for advancing a lot of our Earth science," Freilich told The Associated Press. He said airplane missions, current satellites and future ones can pick up much of the slack for what Glory was going to do. However, Freilich, at a budget briefing a year ago, described the Earth-watching satellites as "all old," adding that 12 of the 13 "are well beyond their design lifetimes." "We're losing the ability to monitor really key aspects of the climate problem from space," said Jonathan Overpeck, a climate scientist at the University of Arizona. "Just about every climate scientist in the worldhas got to be sad right now."

# No Link – Tradeoff Happens Between Agencies

**[\_\_\_\_]**

[\_\_\_\_] New NASA projects take funding from other agencies. Funding will not be taken from within NASA’s budget itself.

**Jeffrey Mervis, deputy news editor, Science Magazine, 2/5/2010, http://www.wbur.org/npr/123410020/president-obamas-science-spending**

But more broadly, Congress isn't going to go for all of these things. Congress, as you'll talk about later with NASA, is not going to be happy with that reallocation and savings. And the reason that's important to the rest of the science budget is because NASA is funded by the same committee that funds the National Science Foundation, the Environmental Protection Agency, the Department of Commerce, which has NOAA and NIST. And so if they have a fixed amount of money, the more they give to one agency, the less there is for everybody else. So sometimes Congress makes decisions not because they're opposed to research, but because they have other higher priorities.

**[\_\_\_\_] Congress is considering taking funds from other agencies to fund NASA, which proves there would be no tradeoff.**

**Amy Svitak, Senior writer for space.com, 3/29/2011, “NASA’s Budget Could Get Infusion From Other U.S. Departments,” http://www.space.com/11247-nasa-budget-funding-commerce-justice-departments.html**

Congressional appropriators could tap the funding accounts of the U.S. departments of Commerce and Justice to help cover what some see as a $1 billion shortfall in NASA’s $18.7 billion spending plan for 2012, which allocates less money for a heavy-lift rocket and crew capsule than Congress directed last year. “There’s over a billion-dollar difference between the budget request and the authorized levels in [20]12 for the launch system and the crew vehicle, and now that falls squarely back on the shoulders of [the appropriations committees] to try and figure out where to come up with that money,” said a panelist at a March 23 breakfast on Capitol Hill. Sponsored by Women in Aerospace (WIA), the breakfast was held under the Chatham House Rule, an 84-year-old protocol fashioned by the London-based nonprofit think-tank to promote frank discussion through anonymity. [What Obama and Congress Should Do for Spaceflight] The panelist, one of six whose names and job titles were circulated by WIA prior to the meeting, said funding requested in NASA’s 2012 spending plan does not square with levels Congress set in the NASA Authorization Act of 2010 that U.S. President Barack Obama signed into law in October. Specifically, the request called for spending $1.2 billion less than the $4 billion Congress authorized for the heavy-lift launch vehicle and crew capsule in 2012. At the same time, the request includes $350 million more than the $500 million Congress authorized to nurture development of commercial vehicles to deliver cargo and crews to the International Space Station after the space shuttle retires later this year. Consequently, the panelist said, it is now up to congressional appropriators “to find a billion dollars in other places in NASA to pay for those activities or to decide to make those tradeoffs and take that money out of the departments of Commerce or Justice or the other agencies that are funded in the same bill as NASA.” NASA’s annual appropriation is part of a broader spending package totaling nearly $65 billion that funds the U.S. Commerce and Justice departments, the National Science Foundation, the National Institute of Standards and Technology and related agencies.

# No Link – Budget Flexibility now

**[\_\_\_\_]**

### **[\_\_\_\_] The retirement of the shuttle means there is a lot of extra money in NASA’s budget to be spent**.

**Clara Moskowitz, Senior Writer for Space.com, 4/15/2011 “NASA's 2011 Budget Should Allow Flexibility Despite Cuts,” Space.com, http://www.space.com/11411-nasa-2011-budget-cuts-constellation-funding.html**

The new budget at least frees NASA from a stifling provision under its 2010 budget that prevented it from cutting funding to the moon-bound Constellation program. Yet that program was canceled by President Barack Obama in early 2010, and NASA has been targeting new goals ever since. Now the space agency will finally be free to stop spending money on canceled Constellation projects. "The elimination of the Constellation provision will free up resources otherwise committed," Handberg said, saving NASA some of the money that it loses in the reduction of its annual budget. NASA leaders expressed gratitude that the agency can now move forward fully toward its new direction. "This bill lifts funding restrictions that limited our flexibility to carry out our shared vision for the future," NASA administrator Charles Bolden said in a statement. "With this funding, we will continue to aggressively develop a new heavy lift rocket, multipurpose crew vehicle and commercial capability to transport our astronauts and their supplies on American-made and launched spacecraft."

### **[\_\_\_\_] The end of Constellation frees up money and creates new budget flexibility.**

**The Economist 6/30/2011 “The space shuttle Into the sunset”** [**http://www.economist.com/node/18895018**](http://www.economist.com/node/18895018)

So, although the shuttle—which has been the icon of America’s space effort for a generation—will be missed, harder heads will be glad to see the decks cleared. Last year Barack Obama outlined his plans for the future of America’s space programme. Its most striking feature is to delegate the humdrum task of ferrying people and equipment to low-Earth orbit to the private sector. Rocketry is a mature technology, and NASA has always relied on using contractors to build its rockets and spacecraft. In future, private firms will run the missions as well. Later this year two spacecraft, one which has been designed by Orbital Sciences, a Virginia-based firm, and another by SpaceX, a Californian company run by Elon Musk, an internet entrepreneur, will make cargo runs to the ISS. The hope is that such craft will soon be able to carry humans too, and at a far lower cost than NASA’s efforts. Liberated from the burden of having to service the ISS (which Mr Obama wants to keep until 2020, six years longer than originally planned), NASA will be free to concentrate on loftier goals. In 2010, when Mr Obama outlined his ideas, he spoke, somewhat vaguely, of a manned trip to a near-Earth asteroid, to be followed at some unspecified date in the 2030s by the ultimate space-cadet dream—a manned mission to Mars. To that end, NASA will spend billions of dollars developing new engines, propellants, life-support systems and the like. Even the shuttle will live on, in some sense, since the Space Launch System—the unromantic name of the beefy rocket needed to loft astronauts and cargoes into high orbits or farther into the solar system—will be built partly from recycled shuttle parts in an effort to save money and use familiar technology. And spending will be managed through fixed-price contracts instead of the “cost-plus” deals that helped to inflate the price of the shuttle.

# Link Turn – Spending Increases the Budget

**[\_\_\_\_]**

**[\_\_\_\_] Allocating funds for one part of NASA has a snowball effect and results in Congress increasing the agency’s budget overall.**

**Geoffrey Landis, NASA scientist in planetary exploration and interstellar propulsion, 1995, “ Footsteps to Mars: An incremental approach to Mars exploration,” Journal of the British Interplanetary Society, Vol. 48, pp. 367-342 (1995); http://www.geoffreylandis.com/Footsteps.pdf**

Recently there has been an alarming tendency in the scientific and space advocacy communities for advocates to attack one project, in the belief that if that project could be canceled, the money saved would be used for their own, more desirable projects. This is false. Quoting from senate staffer Steve Palmer [17]: “What space station and ASRM [advanced solid rocket motor] add up to is a drop in the bucket. If Congress cuts out both space station and ASRM, will the money be used for other programs of interest to the space industry? The short answer is no**”.** Arguments to cancel space projects are eagerly picked up in Congress, by people who have agendas and pet projects that have nothing to do with space. Further, attacking space projects has the result of making enemies out of allies. When we attack someone else’s project, we can count on having them attack ours**.** The result is that the arguments against both projects will be remembered by a money-starved Congress**.** It is not true that manned missions eclipse funds for unmanned sciencemissions. In fact**,** there is an excellent case to be made for precisely the opposite correlation**:** the presence of large mannedmissions increases the funding and opportunities for unmanned science missions. Historically, the science budget of NASA has been a roughly constant fraction of the total budget**;** any major new initiative which increases the overall space budget is likely to increase the funding for science. If Mars advocates adopt the approach of pushing our initiatives by tearing down other space programs, the likely result is that nothing, neither Mars nor other programs, will be accomplished.

# No Impact – NASA Program Unnecessary

**[\_\_\_\_]**

**[\_\_\_\_] NASA research on global warming is only a small part of total federal spending on climate change. Even if it were lost NASA was doing redundant research.**

**Anthony Watts, meteorologist with the seal of approval from the American Meteorological Society, 2/9/2011, “NASA Climate Programs Being Eyed for Budget Axe”** [**http://wattsupwiththat.com/2011/02/09/nasa-climate-programs-being-eyed-for-the-budget-axe/**](http://wattsupwiththat.com/2011/02/09/nasa-climate-programs-being-eyed-for-the-budget-axe/)

NASA spent over a billion dollars last year on climate change studies…which would you rather have? Pronouncements about death trains, expert testimony for climate vandals, failed predictions, failed models, and a questionable GISTEMP dataset, or a continued manned spaceflight program? From my perspective, NASA GISS is a duplication of climate services already covered by NOAA/NCDC, and all we seem to get from it is climate activism of the chief scientist, a coffee table book by his assistant, and a snarky condescending blog called RealClimate that one private citizen and some volunteers are currently beating the pants off of in public outreach. Further, the government spent over $8.7 billion across 16 Agencies and Departments throughout the federal government on these efforts in FY 2010 alone. Inside NASA, we have duplication of climate services not only at GISS in NYC, Goddard Spaceflight in Greenbelt, MD, but also at JPL Pasadena. There’s been all sorts of domestic military base closures in the recent years to save money, and NASA Goddard and GISS re-purposed itself after the Apollo program ended and their mission did too. It’s time to close this duplication of services dinosaur, it will be missed far less than a TV comedy series by the American public.  If you feel the same way, tell your representatives.

**[\_\_\_\_] Other countries are filling in by gathering climate change data.**

**Tariq Malik, Senior Editor for space.com, 2/21/2009, “NASA Climate Satellite Crashes in Ocean After Launch Failure”, http://www.space.com/3355-nasa-climate-satellite-crashes-ocean-launch-failure.html**

The loss of NASA’s OCO spacecraft is a blow to global climate research after eight years of development to ready the satellite for launch. Researchers hoped the spacecraft would provide definitive answers to questions surrounding Earth’s natural carbon dioxide cycle, as well as how the planet processes the 8 billion tons of greenhouse gas produced by the burning of fossil fuels and other human endeavors each year. “OCO was to make some important measurements of the carbon cycle,” said Michael Freilich, director of NASA’s Earth Science Division. “What we’re going to do is take a good, solid and thoughtful look at how best to advance earth system science in general, and with a focus on the carbon cycle, given all the assets that we have available now and into the near future.” Climate scientists expected OCO to take the lead in an international collection of weather-monitoring spacecraft known as the A-Train, which fly in a train-like progression over Earth with the goal of building a three-dimensional picture of the planet’s weather and climate change, as well as understanding human contributions to the greenhouse effect and global warming. Japan’s recently launched Ibuki climate-studying spacecraft, as well as other satellites already in orbit, may be able to compensate for the lack of OCO. While there is hope to be able to pick up where the OCO’s loss left off, much work lies ahead before NASA officials can, “decide how it is best scientifically, and for the nation, to move forward,” Freilich said.

# No Impact – Warming Not Caused by Humans

**[\_\_\_\_]**

[\_\_\_\_]Warming is natural – studies of Mars prove this.

**Kate Ravilious, writer for National Geographic 2/28/2007, “ Mars Melt Hints at Solar, Not Human, Cause for Warming, Scientist Says,”** [**http://news.nationalgeographic.com/news/2007/02/070228-mars-warming.html**](http://news.nationalgeographic.com/news/2007/02/070228-mars-warming.html)**,**

Simultaneous warming on Earth and Mars suggests that our planet's recent climate changes have a natural—and not a human-induced—cause, according to one scientist's controversial theory. Earth is currently experiencing rapid warming, which the vast majority of climate scientists says is due to humans pumping huge amounts of greenhouse gases into the atmosphere. Mars, too, appears to be enjoying more mild and balmy temperatures. In 2005 data from NASA's Mars Global Surveyor and Odyssey missions revealed that the carbon dioxide "ice caps" near Mars's south pole had been diminishing for three summers in a row. Habibullo Abdussamatov, head of space research at St. Petersburg's Pulkovo Astronomical Observatory in Russia, says the Mars data is evidence that the current global warming on Earth is being caused by changes in the sun. "The long-term increase in solar irradiance is heating both Earth and Mars," he said. Solar Cycles Abdussamatov believes that changes in the sun's heat output can account for almost all the climate changes we see on both planets. Mars and Earth, for instance, have experienced periodic ice ages throughout their histories. "Man-made greenhouse warming has made a small contribution to the warming seen on Earth in recent years, but it cannot compete with the increase in solar irradiance," Abdussamatov said. By studying fluctuations in the warmth of the sun, Abdussamatov believes he can see a pattern that fits with the ups and downs in climate we see on Earth and Mars.

**[\_\_\_\_]**

[\_\_\_\_] Warming is natural- satellites prove.

**Roy Spencer, U.S. Science Team Leader for the National Aeronautic and Space Administration’s collection of satellite temperature data, 10/9/2008, “ NASA’s Spencer Tells Congress Global Warming Is Not a Crisis”**

Despite decades of persistent uncertainty over how sensitive the climate system is to increasing concentrations of carbon dioxide from the burning of fossil fuels, we now have new satellite evidence which strongly suggests that the climate system is much less sensitive than is claimed by the U.N.’s Intergovernmental Panel on Climate Change (IPCC). Another way of saying this is that the real climate system appears to be dominated by “negative feedbacks”—instead of the “positive feedbacks” which are displayed by all 20 computerized climate models utilized by the IPCC. (Feedback parameters larger than 3.3 Watts per square meter per degree Kelvin (Wm-2K-1) indicate negative feedback, while feedback parameters smaller than 3.3 indicate positive feedback.) If true, an insensitive climate system would mean that we have little to worry about in the way of manmade global warming and associated climate change. And, as we will see, it would also mean that the warming we have experienced in the last 100 years is mostly natural. Of course, if climate change is mostly natural then it is largely out of our control, and is likely to end—if it has not ended already, since satellite-measured global temperatures have not warmed for at least seven years now.

# No Impact – Warming Inevitable

**[\_\_\_\_]**

**[\_\_\_\_] Even if we stop greenhouse gas emissions, warming is inevitable.**

**Robert Longley, government official that has worked with the EPA, 2008, “ Global Warming Inevitable This Century, NSF Study Finds” http://usgovinfo.about.com/od/technologyandresearch/a/climatetochange.htm**

Despite efforts to reduce greenhouse gas emissions, global warming and a greater increase in sea level are inevitable during this century, according to a new study performed by a team of climate modelers at the National Center for Atmospheric Research (NCAR) in Boulder, Colo. Indeed, say the researchers, whose work was funded by the National Science Foundation (NSF), globally averaged surface air temperatures would still rise one degree Fahrenheit (about a half degree Celsius) by the year 2100, even if no more greenhouse gases were added to the atmosphere. And the resulting transfer of heat into the oceans would cause global sea levels to rise another 4 inches (11 centimeters) from thermal expansion alone. The team's findings are published in this week's issue of the journal "Science." “This study is another in a series that employs increasingly sophisticated simulation techniques to understand the complex interactions of the Earth,” says Cliff Jacobs of NSF’s atmospheric sciences division. “These studies often yield results that are not revealed by simpler approaches and highlight unintended consequences of external factors interacting with Earth’s natural systems.”

**[\_\_\_\_]**

**[\_\_\_\_] Even if we stopped emitting completely we couldn’t reverse current levels.**

**The Times News, Gary Yohe, Wesleyan University, Richard Richels, Electric Power Research Institute and Richard Tol, Economic and Social Research Institute, 5/23/2008, “ Copenhagen Consensus: global warming,”**

There is unequivocal evidence that humans are changing the planet’s climate. We are already committed to average temperature increases of about 0.6°C, even without further rises in atmospheric carbon dioxide concentration. The world has focused on mitigation — reducing carbon emissions — a close look at the costs and benefits suggests that relying on this alone is a poor approach. Option One: Continuing focus on mitigation Even if mitigation — economic measures like taxes or trading systems — succeeded in capping emissions at 2010 levels, then the world would pump out 55 billion tonnes of carbon emissions in 2100, instead of 67 billion tonnes. It is a difference of 18 per cent: the benefits would remain smaller than 0.5 per cent of the world’s GDP for more than 200 years. These benefits simply are not large enough to make the investment worthwhile.

**Privatization Disadvantage**

# Privatization Disadvantage

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# Explanation

This disadvantage explores the domestic consequences of a new initiative by the government to explore space. Since President Kennedy issued his infamous challenge to America in 1961 to place a man on the moon by the end of the decade, space exploration has largely been accomplished by the public sector, that is, conducted by the government. The Apollo program, the Space Shuttle, and all NASA operations are completely funded by Congress and are ultimately accountable to the President.

Recently however, there has been a movement towards the privatization of space exploration. What this means is that private companies independent of the government would begin to take over the business of going to space, and the government and NASA would rely on them for their needs. Many of these companies have existed for many years, like Boeing, while others like SpaceX have come into being recently. During the Apollo program, NASA engineers would design rockets and space probes and then pay one of these companies to build them.

Recently, Obama’s vision for space exploration cancelled the Constellation program and allocated funds to incentivize the private sector to fill in the lost capabilities. Obama’s plan pushes a vision of space exploration whereby NASA would no longer be designing the rockets going into space – they would instead be more like passengers. The government would function as a customer to a business just like you or me do (if you had the money, likely millions of dollars, you too could ride to space if these companies are successful).

The disadvantage argues that new NASA programs hinder the development of these private space companies. If NASA takes over a function, then investors perceive that that service is already being provided and will not set up their own companies to provide it. Ultimately, private companies will be more effective than the government at space exploration, so NASA should allow them to continue to develop.

# Glossary

**Private sector** – the private sector collectively refers to companies that are owned by individuals, as opposed to the government. In the context of space exploration, NASA would be a “public” organization since it is a part of the government, whereas someone like Boeing or Lockheed Martin would be considered a part of the private sector.

**SpaceX** – a private company attempting space exploration. It created the Falcon 1 and Falcon 9 rockets and the Dragon spacecraft. In 2010, SpaceX became the first privately funded company to successfully launch, orbit, and recover a spacecraft.

**Outsourcing** – to outsource is to contract out a practice an organization used to perform itself to another organization. You may have heard some electronics companies have outsourced tech support to foreign countries. In the context of the disadvantage, outsourcing is similar to privatization, and refers to NASA allowing the private sector to take over functions it traditionally performed itself.

**Low earth orbit** – the area from 100 miles to 1240 miles above the Earth’s surface. With the exception of the Apollo missions, every spacecraft has been launched into low earth orbit.

**Ansari X Prize** - A Competition launched by private donors and supported by NASA that awarded 10 million dollars to the first company that could send a reusable manned rocket into space twice within two weeks. The object of the prize was to promote commercial development of space.

**Crowding Out –** When a government prevents private business activity because it already provides the service.

**Entrepreneur** - A person who organizes and operates a business or businesses, taking on financial risk to do so

**Investor** - someone who lends money to a company on the promise of repayment with interest later on.

**Behest** - A person's orders or command

**Frenetic** - Fast and energetic in a rather wild and uncontrolled way

**Hypersonic** – Faster than 5 times the speed of sound

# Privatization DA 1NC [1/2]

**A. Uniqueness. Space exploration is being taken over by the private sector in the status quo due to policies of the Obama administration.**

**Jeffrey Kluger, senior time write for TIME magazine, 12/17/2010, “Astronatus Inc.: The Private Sector Muscles Out NASA,” http://www.time.com/time/health/article/0,8599,2037089,00.html**

If old NASA hands winced at this kind of giddy talk, they kept it to themselves — and wisely so. In the face of contracting federal budgets and an expanding private sector, the space agency of the golden years is being blown up and rethought — transformed from a government operation into a public-private partnership that, so its advocates say, will replace the politics, stodginess and glacial pace of Washington with the speed, nimbleness and accountability of the marketplace. That door had been creaking open for a while, but the Obama Administration — facing towering debts and a nation in no mood to spend big on an indulgence like space — has kicked it wide, and Musk is not the only one rushing through. The Orbital Sciences Corporation of Dulles, Va., is vying with SpaceX for government recognition and government contracts. So too are traditional aerospace giants like Lockheed and Boeing, whose rockets are not currently intended to carry astronauts but, they insist, could be redesigned to be safe for humans in short order and at a reasonable price.

**B. Government space programs prevent solutions by the commercial sector and hurt privatization more broadly.**

David Matsen, CEO of Masten Space Systems, Inc, and named person of the year by Aviation Week in 2010, 6/29/2004, “Public Goods, Bads and NASA,” http://distributedrepublic.net/archives/2004/06/29/public-goods-bads-and-nasa

Over the past 30 years or so NASA, the Air Force, and both of their prime contractors have been the only organizations doing any serious space work. But the idea that government must do this and is more capable is not a correct understanding of how it really is. The existence and inefficiencies of government space programs has hindered the market development of private space industry. NASA is to the entrepreneurial space community a public bad. Until very recently, when I or any of my friends or associates talked to investors about funding a space program we would get laughed at, nevermind that there is lots of solid market research indicating far better returns than most other technologies. We called it the giggle factor. We had to carefully hone our presentations to minimize this. And even then we would more often hear "what - you intend to compete against NASA?" or "Only governments can do space it's too difficult and too expensive." Followed by laughing. At us. If they were in a good mood. Government programs to provide some good do it badly, and in addition discourage private solutions from coming to market.

# Privatization DA 1NC [2/2]

## C. Impact—Privatization of space is key to the US economy. **A strong private space industry is key to the economy and innovation.**

**E.C. Aldridge, Chairman of the President’s Commission on Implementation of United States Space Exploration Policy, 2004 “A Journey to Inspire, Innovate, and Discover”, pg. 32, http://www.nasa.gov/pdf/60736main\_M2M\_report\_small.pdf**

Although many companies exist and more are emerging in the field of space, an increase in both the number and variety of such businesses would vastly increase the processes and materials available for space exploration. The private sector will continue to push the envelope to succeed competitively in the space field. It is the stated policy of the act creating and enabling NASA that it encourage and nurture private sector space. The Commission heard testimony on both positive incentives and potential bottlenecks encountered by the private sector as they attempt to exploit these commercial opportunities. A space industry capable of contributing to economic growth, producing new products through the creation of new knowledge and leading the world in invention and innovation, will be a national treasure. Such an industry will rely upon proven players with aerospace capabilities, but increasingly should encourage entrepreneurial activity.

## D. US economic leadership solves great power wars.

**Zalmay Khalilzad, former US ambassador to the United Nations, 2/8/2011 National Review, “The Economy and National Security.” February 8, 2011. Online. Accessed May 4, 2011 at http://www.nationalreview.com /articles/259024/economy-and-national-security-zalmay-khalilzad?page=1**

Today, economic and fiscal trends pose the most severe long-term threat to the United States’ position as global leader. While the United States suffers from fiscal imbalances and low economic growth, the economies of rival powers are developing rapidly. The continuation of these two trends could lead to a shift from American primacy toward a multi-polar global system, leading in turn to increased geopolitical rivalry and even war among the great powers.

# Overview

1.

2.

3.

# Uniqueness – Privatization Occuring Now

**[\_\_\_\_]**

**[\_\_\_\_] Private industry will eclipse NASA as the leader in space in the next 10 years**

**Evan Ackerman, staff writer for DVICE, 4/25/2011, "Will humans make it to the moon and Mars in 10 years? ", http://dvice.com/archives/2011/04/will-humans-mak.php**

Private industry is rapidly catching up to NASA. In the next ten years especially, the space agency seems likely to get eclipsed after the impending retirement of the space shuttle. SpaceX might have the credentials to back up its space exploration plans, which would put humans on Mars in a decade if everything goes well. That's a big if, though, since SpaceX still has a lot of work to do to get its Falcon heavy-lift rocket operational by 2012. Is a 10 year timetable — especially one that includes Mars —; reasonable? SpaceX founder Elon Musk even puts the worst case at "15 to 20 years." When considering investing in an outpost on the moon at all, there are so many variables: whether we want it to be manned by humans (as opposed to robots and the like) or whether NASA is even the best fit for the job. Don't get me wrong, I'm a big supporter of NASA and I think there's a lot of important lunar research that still needs to be done. At the same time, however, I think that the amount of additional infrastructure required to support humans would be hard to justify considering the capabilities of autonomous or teleoperated systems. And it seems that NASA itself is starting to focus more on outsourcing spaceflight (and space exploration) to private industry, which often exhibits the same levels of creativity and technical expertise without the bureaucratic baggage and budget constraints.

**[\_\_\_\_]**

**[\_\_\_\_] NASA is in transition to allow the private sector to lead space exploration**

**Jeffrey Kluger, senior time write for TIME magazine, 12/17/2010, “Astronatus Inc.: The Private Sector Muscles Out NASA,” http://www.time.com/time/health/article/0,8599,2037089,00.html**

The Obama Administration turbo-charged things this year when it officially directed NASA to scrap its part of that work and concentrate exclusively on space science and eventual manned flights to asteroids or beyond. The private sector alone will tend to near-Earth orbit. SpaceX and Orbital Sciences had already made enough progress to secure conditional contracts with NASA to service the space station, but SpaceX was clearly the greater of those two equals, with successful orbital missions in 2008 and June 2010. Last week's mission blew those other two away because it included a working prototype and successful return of the *Dragon* space capsule, making SpaceX the first private company to achieve such a feat.[(See pictures of five nations' space programs.)](http://www.time.com/time/photogallery/0,29307,1737868_1584492,00.html) "It's a historical truth that government goes into those areas in which there is no private-sector profit motive, and the private sector follows behind," says Phil McAlister, acting director of NASA's Commercial Space Flight Development team. "We think the time is right to transition that part to the private sector."

# Uniqueness – Privatization Occuring Now

**[\_\_\_\_] Private companies are leading the way with new innovations in space.**

**The Economist, 9/10/2009, “Flying High,” http://www.economist.com/node/14401165**

At the behest of the president, NASA has been undergoing an independent review of its human-spaceflight plans. On September 8th the review committee delivered a summary report. That the agency does not have enough money to return to the moon is no surprise. What is more surprising is that the Augustine report (named after the committee’s chairman, Norman Augustine) argues that NASA should stop travelling to the International Space Station in particular and to “low Earth orbit” in general. It should let the private sector do that instead, and focus its own efforts on more distant and difficult tasks. Five years ago the idea that the private sector might have been capable of transporting cargo and people reliably into low Earth orbit was viewed as crazy. Much has happened since, and two things in particular. One was that Virgin Galactic, an upstart British firm, said it would develop a space-tourism business based around a craft that had cost only $25m to build. The other was that an equally upstart American entrepreneur called Elon Musk, flush from his sale of PayPal, created a company called SpaceX (whose Falcon rocket is pictured above, dropping its first stage on its way into orbit). He said he wanted to make it cheaper to launch people into space and wanted, ultimately, to send a mission to Mars—but that he would start by launching satellites. It would be an understatement to say that both ventures were treated with scepticism. But they have now come far enough to be able to thumb their noses at the cynics. On September 3rd SpaceX signed a contract worth $50m with ORBCOMM, a satellite-communications firm. The deal is to launch 18 satellites for ORBCOMM’s network. Meanwhile, at the end of July, Aabar Investments, a sovereign-wealth fund based in Abu Dhabi, bought a 32% stake in Virgin Galactic for $280m. Aabar was not just interested in space tourism. It was also keen on a proposal to use Virgin’s White Knight launch system to put satellites into low Earth orbit. Will Whitehorn, Virgin Galactic’s president, said that one of the things which attracted Aabar was the fact that White Knight (an aircraft which lifts to high altitude a rocket that can then take either passengers or satellites onwards into space) could be flown from Abu Dhabi.

**[\_\_\_\_]**

**[\_\_\_\_] Space exploration will be led by businesses soon.**

**Patrice Sarath, staff writer for bizmology, a subsidiary of Hoover’s business research company, , 2/25/ 2011. “Space, Inc: as the shuttle program lands for good, private companies step in.”** <http://www.bizmology.com/2011/02/25/space-inc-as-the-shuttle-program-lands-for-good-private-companies-step-in/>

It’s not just the plot of a science fiction novel, either. Humans are a resource-hungry species. With the right infrastructure, from rockets to shuttles to space stations, to automated mining equipment to space elevators (my personal favorite in the pie-in-the-sky space exploration Olympics), it is possible that the exploration of space will become the business of space in a fairly short time. It’s interesting to compare the development of space flight with the development of manned flight. It’s only now that the private sector has stepped in, after the government has stepped back, whereas the Wright Brothers and their intrepid ilk led the way in their rickety airplanes. At a recent discussion of space flight at ConDFW, a science fiction convention, several experts in the space industry said that is exactly what space flight needs now to carry it forward: the barnstormers and the space tourists to put it within reach.

# Links – NASA Crowds Out Private Sector

**[\_\_\_\_]**

**[\_\_\_\_] NASA’s presence in an activity in space hinders private companies from going into the same area because of NASA’s regulations.**

**Blake Powers, Director of Outreach for NASA’s Space Product Development Program, 8/24/2003 “A Time for Everything,”** [**http://laughingwolf.net/archives/000400.html**](http://laughingwolf.net/archives/000400.html)

At the same time, NASA has not exactly been a friend to commercial space enterprises. This is particularly true for efforts to develop alternative manned space access. NASA has a great deal invested in being the only way to get people into space, from hardware and infrastructure to an internal culture that claims that only career NASA civil servants can be called astronauts. All those others who fly, or meet the international guidelines for being called such, cannot be called such in any NASA publication. NASA has for years tried to block the development of manned commercial access. Just take a look at the regulatory environment for such and NASA’s role in it. NASA has bitterly resisted any suggestion that any other launch service be used, unless it was completely under their control. There are many other examples, for those who care to go do the homework and look them up. It’s official support of commercial activities has been limited. Despite various actions by Congress and its own charter, the agency has not been supportive of commercial research and development. Just go take a look at the history of the Space Product Development Program, which has managed to do some very important and good things with industry, for a good example. Take a good look at the so-called commercialization efforts of Dan Tam, or the idea that Headquarters had that companies would pay for large portions of the ISS without being able to display logos or use their sponsorship in advertising. Those ideas were patently ridiculous, obvious to anyone who had any real-world experience, and beloved by top NASA management who should have known better.

**[\_\_\_\_]**

# Links – NASA Crowds Out Private Sector

**[\_\_\_\_] NASA space programs discourage innovation by drawing talented engineers away from the private sector.**

**Declan McCullagh, chief political correspondent for CNET, 10/3/2007, “Do we need NASA?” CNET News, http://news.cnet.com/Do-we-need-NASA/2009-11397\_3-6211308.html**

The difference? Critics say it's the National Aeronautics and Space Administration. Aviation's youth and adolescence were marked by entrepreneurs and frenetic commercial activity: Lindbergh's trans-Atlantic prize money was put up by a New York hotel owner, and revenue from the airlines funded the development of the famous DC-3. The federal government aided aviation by paying private pilots to deliver air mail. Space, by contrast, until recently has remained the domain of NASA. Burt Rutan, the aerospace engineer famous for building a suborbital rocket plane that won the Ansari X Prize, believes NASA is crowding out private efforts. "Taxpayer-funded NASA should only fund research and not development," Rutan said during a recent panel discussion at the California Institute of Technology. "When you spend hundreds of billions of dollars to build a manned spacecraft, you're...dumbing down a generation of new, young engineers (by saying), 'No, you can't take new approaches, you have to use this old technology.'"

**[\_\_\_\_]**

[\_\_\_\_] NASA’s bureaucracy and regulations have a crowd out effect with the private sector, making commercial investment impossible.

Joe Pappalardo, writer for Popular Mechanics, 6/04/2009, “Private Space to the Government”

The future of space could soon belong to private companies—the soon-to-be retired space shuttle is being replaced by private launchers, space tourists are snapping pictures from the International Space Station, global positioning systems are ubiquitous, and entrepreneurs are building suborbital craft destined for use by paying customers. But the mood at the Space Business Forum, an annual gathering of investors and space geeks held in New York City, was impatience to get the feds out of the way so the private sector can attract investments and grow quicker. "I'd say the role of government [in the space industry] is too high," says Heidi Wood, the senior equity analyst for aerospace for Morgan Stanley. "There are far too many hands on it." Complaints start with a familiar mantra of the stifling nature of bureaucracy and regulation. High on the list of irritants is the Federal Communications Commission, which must license the use of bandwidth and approve the orbital slot of any satellite being launched. This oversight prevents satellite collisions and overlapping signal interruptions, but the auction and approval process can be slow, and firms loathe delaying the construction of satellites until the government hoops are cleared. These add to financial risks, in turn driving away much-needed investor cash; companies with long startup times and no guaranteed return are not appealing to investors. "The markets don't want to hear about negative cash flow right now," says Andrew Africk, senior partner with the private equity firm Apollo Management LP.

# Links – NASA Crowds Out Private Sector

**[\_\_\_\_] As long as NASA is the leader in human space efforts we will not make advances towards commercial uses of space.**

**Edward L. Hudgins, director of The Objectivist Center, is the editor of the Cato Institute book, Space: The Free-Market Frontier, 1998 “Time to Privatize NASA”** [**http://www.cato.org/pub\_display.php?pub\_id=5960**](http://www.cato.org/pub_display.php?pub_id=5960)

The government has had many opportunities to turn over civilian space activities to the private sector. In the 1970s, American Rocket Co. was one of the private enterprises that wanted to sell launch services to NASA and private businesses. But NASA was moving from science to freight hauling, and planned to monopolize government payloads on the shuttle and subsidize launches of private cargo as well. The agency thus turned down American Rocket. In the late 1980s, Space Industries of Houston offered, for no more than $750 million, to launch a ministation that could carry government and other payloads at least a decade before NASA's station went into operation. (NASA's station currently comes with a price tag of nearly $100 billion for development, construction and operations.) NASA, not wishing to create its own competition, declined Space Industries' offer. In 1987 and 1988, a Commerce Department-led interagency working group considered the feasibility of offering a one-time prize and a promise of rent to any firm or consortium that could deliver a permanent manned moon base. When asked whether such a base were realistic, private-sector representatives answered yes -- but only if NASA wasn't involved. That plan was quickly scuttled. Each shuttle carries a 17-story external fuel tank 98 percent of the distance into orbit before dropping it into the ocean; NASA could easily -- and with little additional cost -- have promoted private space enterprise by putting those fuel tanks into orbit. With nearly 90 shuttle flights to date, platforms -- with a total of 27 acres of interior space -- could be in orbit today. These could be homesteaded by the private sector for hospitals to study a weightless Mr. Glenn or for any other use one could dream of. But then a $100 billion government station would be unnecessary. As long as NASA dominates civilian space efforts, little progress will be made toward inexpensive manned space travel. The lesson of Mr. Glenn's second flight is that space enthusiasts ignore economics at their peril.

# Impact – Economic Growth

**[\_\_\_\_]**

**[\_\_\_\_] Privatization of space will spur an economic renaissance in the US.**

**Steve Nelson, Daily Caller staff writer, 2/8/2011. “Fiscal Conservatives call for increased privatization of space” http://dailycaller.com/2011/02/08/fiscal-conservatives-call-for-increased-privatization-of-space/**

Tuesday morning the Competitive Space Task Force, a self-described group of fiscal conservatives and free-market leaders, hosted a press conference to encourage increased privatization of the space industry. Members of the task force issued several recommendations to Congress, including finding an American replacement to the Space Shuttle (so to minimize the costly expenditures on use of Russian spacecraft) and encouraging more private investment in the development of manned spacecraft. Former Republican Rep. Robert S. Walker of Pennsylvania said, “If we really want to ‘win the future’, we cannot abandon our commitment to space exploration and human spaceflight. The fastest path to space is not through Moscow, but through the American entrepreneur.” Task Force chairman Rand Simberg, of the Competitive Enterprise Institute, said, “By opening space up to the American people and their enterprises, NASA can ignite an economic, technological, and innovation renaissance, and the United States will regain its rightful place as the world leader in space.”

**[\_\_\_\_]**

**[\_\_\_\_] Allowing for commercialization of space will create jobs and add to the economy.**

**Environment News Service, 6/28/2010, “Obama's New Space Policy Peaceful But Guarded,” http://www.ens-newswire.com/ens/jun2010/2010-06-28-02.html**

"In addition," he said, "we will expand our partnerships with private industry, allowing commercial companies to take a larger role in the exploration of space while NASA pursues those activities the agency is uniquely qualified to do." "This policy will enable a vibrant, job-creating, transportation system for taking humans to and from low-Earth orbit, which should significantly contribute to the national economy, benefit all of our nation's citizens, and enable exploration beyond low-Earth orbit," Bolden said. "This policy promises to transform human spaceflight for future generations. "If there's one really broad theme it is international cooperation, which is woven throughout the new policy and it's our sort of foundational emphasis for achieving all of our goals in space," Barry Pavel, senior director for defense policy and strategy for the National Security Council, told reporters.

# Impact – Leadership

**[\_\_\_\_] Privatization of space is absolutely necessary to maintain space leadership.**

**Douglas Messier, founder of Earth and Space Foundation, International Space University graduate, masters in public policy and science and technology from George Washington University29, 11/29/2011. “Witt: Privatization “Absolutely Required” to Progress in Space” http://www.parabolicarc.com/2010/11/29/witt-privatization-absolutely-required-progress-space/**

The Obama administration, Congress, NASA and the private sector are finally voyaging toward a market-based space industry. Admittedly, the new policy’s vision is not bold enough nor its exploration schedule aggressive enough, but it does – as the Great One advised – “skate to where the puck is going, not to where it’s been.” It dismantles a cost-plus quagmire that has left Americans traveling in space far less often, far less safely, at far greater expense and, most ironically, not so very far at all. Much must be done to maintain U.S. space leadership, but privatization is absolutely required. In a world of declining revenues and budget-crushing entitlements, NASA as a sleepy jobs program for aging engineers is unsustainable. We understand that putting all our eggs into a newly woven basket of private space firms is taking a risk. However, risk-taking has defined America’s space accomplishments. President Obama took a risk when he chose to fight the vested interests for this private-sector solution, and it would be mad to imagine a Republican-led House opposing it. Yet, in a “through the looking glass” moment, some GOP members are resuscitating socialized space as a high-tech pork delivery vehicle for loyal Southern states.

[\_\_\_\_]

[\_\_\_\_] Privatization is key to overall space leadership because it will allow us to outperform other governments.

**David Gomez, writer for TG daily, 7/5/2011, ” Russia has the edge in the space race now”** [**http://www.tgdaily.com/opinion-features/57034-russia-has-the-edge-in-the-space-race-now**](http://www.tgdaily.com/opinion-features/57034-russia-has-the-edge-in-the-space-race-now)

I think that the space race is extremely important for all of mankind, but when the wealthiest country in the world is cutting most of its budget for their space program I’d say that’s a very telling event. Economic problems and budget problems are causing our status in the world to fall, and they need to be taken seriously. If the U.S. ever wants to be a world leader in the space race, which I hope we do, then it will need to come from a different system. If we are ever going to get serious about a space program again, then this time it needs to be directed by the private sector. The huge budget that NASA used to have is unjustifiable with the economic problems we are facing, but that doesn’t mean we have to give up on getting to colonize the stars. We can still have the best space program in the world; we just shouldn’t expect the taxpayers to fund it. We also shouldn’t let politicians be the ones who control it anymore. They’re the reason why the program lost its edge in the first place. A private sector directed space program needs to happen in some way, shape, or form. It’s too important to humanity’s future to not pursue. Our private sector space program could easily beat any other country’s government controlled space program. The only problem is getting it started. Does anyone want to put in a call to Richard Branson or some other eccentric billionaire?

# Impact – Turns Case

**[\_\_\_\_]**

**[\_\_\_\_] Privatization frees NASA from menial functions which allows it to focus its funding on crucial science including asteroids and global warming.**

**Joseph N. Pelton, Research Professor with the Institute for Applied Space Research -- George Washington University, 05/2010 “A new space vision for NASA - And for space entrepreneurs too?” Space Policy 26 (2010) p. 78-80**

With much less invested in a questionable Project Constellation enterprise we can do much more in space astronomy. We can invest more wisely in space science to learn more about the Sun, the Earth and threats from Near Earth Objects. David Thompson, Chairman and CEO of Orbital Sciences said the following in a speech that endorsed the new commercial thrust of the NASA space policies on Nine February 2010: “Let us, the commercial space industry, develop the space taxis we need to get our Astronauts into orbit and to ferry those wanting to go into space to get to where they want to go. We are in danger of falling behind in many critical areas of space unless we shift our priorities”[10]. With a change in priorities we can deploy far more spacecraft needed to address the problems of climate change via betterEarth observation systems. We can fund competitions and challenges to spur space entrepreneurs to find cheaper and better ways to send people into space. We can also spur the development of solar power satellites to get clean energy from the sun with greater efficiency. We can deal more effectively with finding and coping with “killer” asteroids and near earth objects. We may even find truly new and visionary ways to get people into space with a minimum of pollution and promote the development of cleaner and faster hypersonic transport to cope with future transportation needs. The real key is to unlock the potential of commercial space initiatives while giving a very middle-aged NASA a new lease on life. Here are just some of the possibilities that are on the horizon of a revitalized commercial space industry.

## [\_\_\_\_] The disadvantage turns the case: increased privatization of space allows NASA to be freed up to do deep space operations and better research.

**Seth Borenstein and Alicia Chang, staff writers for the Huffington Post, 1/31/2010, “NASA To Outsource Space Travel To Private Companies As Part Of Obama's Budget Proposal,” http://www.huffingtonpost.com/2010/01/31/nasa-to-outsource-space-t\_n\_443549.html**

Getting to space is about to be outsourced. The Obama administration on Monday will propose in its new budget spending billions of dollars to encourage private companies to build, launch and operate spacecraft for NASA and others. Uncle Sam would buy its astronauts a ride into space just like hopping in a taxi. The idea is that getting astronauts into orbit, which NASA has been doing for 49 years, is getting to be so old hat that someone other than the government can do it. It's no longer really the Right Stuff. Going private would free the space agency to do other things, such as explore beyond Earth's orbit, do more research and study the Earth with better satellites. And it would spur a new generation of private companies – even some with Internet roots – to innovate.

# Impact – Turns Case

**[\_\_\_\_]**

**[\_\_\_\_] Privatization of space allows for a substantial reduction in launch costs and more space exploration overall.**

**Jessica Berman, Writer for Voice of America News, 4/27/2011, “US Space Program Goes Commercial,” http://www.voanews.com/english/news/science-technology/US-Space-Program-Goes-Commercial-120822324.html**

President Barack Obama is asking Congress to approve $850 million to aid the development of private rockets to service the orbiting scientific outpost. NASA administrator Charles Bolden says the budget will support a public-private partnership in space. "We must have safe, reliable and affordable access to it for our astronauts and their supporting equipment. That's why this budget boosts funding for our partnership with the commercial space industry," Bolden said. The private sector's role in unmanned space operations - such as the manufacture of satellites and robotic spacecraft -- is nothing new. So says former NASA executive Alan Stern, now with the Southwest Research Institute, which offers technical assistance to the aerospace industry. Stern says the private sector is promising to conduct space missions for a fraction of what they have traditionally cost NASA. For example, SpaceX says it can reduce the cost of a launch, depending upon the rocket, to between $50 million and $100 million compared to the $1.5 billion price tag for each space shuttle mission. Stern says this savings of dimes on the dollar benefits the private sector as well as the public. "That's a huge reduction in cost that's going to allow us to have multiple space lines, and to be able to afford that and to be able to do more things in space than we could in the past," Stern said. Last year, SpaceX became the first commercial aerospace company to successfully launch, place into orbit and retrieve a spacecraft -- the Falcon 9, carrying an unmanned capsule called the Dragon. The Dragon is being built as part of NASA's $1.6 billion deal with SpaceX. Company founder and CEO Elon Musk says the space agency has been pressing it to complete testing of the capsule, so it can go to the space station on a resupply mission at the end of this year. However, news reports have quoted a top official in Russia's manned space program as saying Russia will not allow the SpaceX rocket to dock with the space station until more extensive safety testing has been completed. Safety is a big concern for the private rocket builders, too. Alan Stern says the companies are not cutting corners to keep costs down or to meet tight deadlines. He says they have a lot to lose if there are accidents. "If the rockets fail or the capsules have problems, that's going to affect their future business pretty strongly; in fact it could put them out of business. And that's a very strong motivation for any private concern," Stern said.

# Article: NASA and the Privatization of Space

**Time Magazine: *Astronauts Inc.: The Private Sector Muscles Out NASA.* December 17th, 2010.**

NASA has never been an exclamation-point outfit. The folks who work there may do extraordinary things, but they tend to talk about them in the dry and uninflected tones of the engineers they are.

So it was something of a departure last week when, after an unmanned version of what may well be the next spacecraft that will carry American astronauts into orbit took off from Cape Canaveral and returned home safely, the first official dispatch read simply: "SPLASHDOWN!!!" Unfamiliar too was how the announcement was made: it was a tweet.

That tonal change was by no means the most important thing that made the launch of the fancifully named *Falcon 9* booster and *Dragon* space capsule different from all the granddaddy Saturns and Titans that have gone before it. Far more significant was that this ship was privately designed and privately built, the brainchild of the California-based rocketry start-up SpaceX, owned and operated by engineer Elon Musk, who also created PayPal.

"It's actually almost too good," the never reticent Musk said of his accomplishment at his postflight press conference. "There's a natural reaction that sort of blows my mind, and it's hard to be articulate with a blown mind."

If old NASA hands winced at this kind of giddy talk, they kept it to themselves — and wisely so. In the face of contracting federal budgets and an expanding private sector, the space agency of the golden years is being blown up and rethought — transformed from a government operation into a public-private partnership that, so its advocates say, will replace the politics, stodginess and glacial pace of Washington with the speed, nimbleness and accountability of the marketplace.

That door had been creaking open for a while, but the Obama Administration — facing towering debts and a nation in no mood to spend big on an indulgence like space — has kicked it wide, and Musk is not the only one rushing through. The Orbital Sciences Corporation of Dulles, Va., is vying with SpaceX for government recognition and government contracts. So too are traditional aerospace giants like Lockheed and Boeing, whose rockets are not currently intended to carry astronauts but, they insist, could be redesigned to be safe for humans in short order and at a reasonable price.

Such competitive churn is exactly what the private sector likes to see. But detractors worry that it's exactly the wrong way to take people into orbit, much less to the moon and beyond. Manned spaceflight is a uniquely risky, uniquely pricey, uniquely time-consuming enterprise that does not respond well to the pressures of the business cycle. Go too fast and people die (think the Apollo 1 fire), but go too slow and investors gripe. Best to take your time, keep the investors out of the loop and avoid the periodic tableaus of the flag-draped coffins and grieving families.

"Every time we f\_\_\_ up," says Mike Griffin, NASA administrator from 2005 to 2009, "it's because something that we didn't think mattered turns out to matter. Who knew that a briefcase-size piece of foam could bring down an orbiter? The stuff that kills us isn't going to be the thing we think will hurt us."

But even old-school rocketeers — including Griffin himself — recognize the current reality, which is that without the private sector, America may simply not have the wallet to put human beings into space for a very long time. Giving private companies skin in the game may be an inevitable step if we don't want to become an earthbound nation, but what worries detractors is whether it's a prudent one.

The privatization of at least some of the manned space program has been inevitable for a while — particularly since 2003, when the loss of the shuttle *Columbia* made it clear that the entire aging shuttle fleet was becoming too risky to fly. NASA had made only the sketchiest plans for a shuttle replacement, so in 2006, Griffin created an office called Commercial Orbital Transportation Services (COTS) within the agency to draw private companies into the business of helping to deliver cargo and crew to the International Space Station, even as NASA developed its own Earth-orbital rockets too.

The Obama Administration turbo-charged things this year when it officially directed NASA to scrap its part of that work and concentrate exclusively on space science and eventual manned flights to asteroids or beyond. The private sector alone will tend to near-Earth orbit. SpaceX and Orbital Sciences had already made enough progress to secure conditional contracts with NASA to service the space station, but SpaceX was clearly the greater of those two equals, with successful orbital missions in 2008 and June 2010. Last week's mission blew those other two away because it included a working prototype and successful return of the *Dragon* space capsule, making SpaceX the first private company to achieve such a feat.

"It's a historical truth that government goes into those areas in which there is no private-sector profit motive, and the private sector follows behind," says Phil McAlister, acting director of NASA's Commercial Space Flight Development team. "We think the time is right to transition that part to the private sector."

Such transitions are usually slow, but Musk, a space newbie, sees no reason to wait. His press conference was equal parts Q&A and touchdown dance — and that raised eyebrows. "People sometimes assume that to take a cargo spacecraft and put a crew into it requires this enormous amount of magical pixie dust or something," he said. "This is not the case. If there had been people sitting in the *Dragon* capsule today, they would have had a very nice ride."

Well, no. For one thing, there are no seats. For another thing, the life-support system is not remotely human-rated yet. Those are more than details. Every bit of additional hardware adds weight and complexity and the possibility of a breakdown — and if that breakdown occurs in the network of tubes and tanks and fuel cells that feed air and power and water to the crew, the mortal consequences can be immediate (think Apollo 13).

Musk is right that it's not pixie dust that makes a spacecraft suitable for what the space community sometimes calls "payloads with a pulse"; it's rigorous testing and retesting of multiply redundant systems, until you've reduced the risk of failure to a statistical rounding error. When Musk spoke equally glibly about scrapping the *Dragon*'s parachute-based re-entry system and instead using a motor and legs as the lunar landers did — something no manned craft has ever achieved on Earth — he caused more murmuring still.

The established space companies are being no less flip in their belief that they can leap quickly into the manned-space pool. There is a lot that goes into human-rating a rocket that was built to launch only

satellites, not the least being redesigning it so it can fly on a shallower trajectory that reduces the g-forces to a level a human body can tolerate and retrofitting the booster with both hardware and software to make an abort possible. Astronauts speak of so-called black zones during a powered ascent — points at which speed or angle of flight rule out any safe abort, regardless of what onboard equipment you have. Unmanned ships have plenty of black zones since there's nothing on board that can die if the vehicle blows up. Astronauts want no black zones at all, and recent years have witnessed an unseemly tableau of manufacturers and astronauts sitting at conference tables haggling over just how long a black zone would be considered acceptable. Would you tolerate 10 seconds in which there'd be no saving you if something were to break down? How about a minute? How about two?

"What you get is an alternative discussion led by people who stand to make a profit," says Griffin. "Lockheed and Boeing say NASA's goals are too strict. Well, that's fine — up until the first accident, when people say, 'Where were NASA's standards?' "

Among the leading companies, it's Orbital Sciences that, at the moment at least, seems to be threading the needle most carefully — if least showily. With former shuttle astronaut Frank Culbertson heading up its human-spaceflight-activities group, it is concentrating on developing a cargo vehicle for the space station as well as a new launch site at NASA's Wallops Island facility in Virginia, with no talk at present of trying to fly crew.

NASA, while ceding some of its turf to the private sector, is both immovable and believable when it says it won't let safety suffer. Any private craft approved to approach anywhere near the space station — much less carry crew — will be subjected to the same rigorous flight-readiness requirements the agency's own spacecraft are. In the meantime, U.S. cargo and astronauts can always get to and from orbit if seats are bought aboard Russian Soyuz ships. The Soyuz already makes regular runs to the space station and will become America's sole means of transport after the last space-shuttle mission is flown next year.

The hope both inside and outside NASA is that we won't be thumbing rides for too long — but that we'll suffer that indignity for as long as we have to and vet any new ship fully and well before we commit lives to it. Musk may have been right last week when he was asked about people who resist the inevitable move to privatization. "They'll be fighting on the wrong side of yesterday's war," he said.

But as Musk himself knows, wars have casualties. There were 14 of them in the shuttle program and three in Apollo, and that was with some of the best safety protocols imaginable. NASA does things the old way, but until a new way proves itself — which it eventually will — it's still the best way we have.

**Privatization Disadvantage Affirmative**

# Privatization DA Affirmative

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# Glossary

**Private sector** – the private sector collectively refers to companies that are owned by individuals, as opposed to the government. In the context of space exploration, NASA would be a “public” organization since it is a part of the government, whereas someone like Boeing or Lockheed Martin would be considered a part of the private sector.

**Free Enterprise** – Synonym for Private sector

**Commercial Sector** – Synonym for Private Sector

**Commercialization** – Synonym for Privatization

**Space Junk** – Also known as space debris, it is the collection of objects in orbit around Earth that were created by humans but no longer serve any useful purpose. Many worry that accumulation of Space Junk will pose a hazard to future space flight. Because there is no friction or air resistance in space, the debris moves very fast and functions like a small bullet, potentially ripping holes

**Demand Pull –** The process of creating a market by creating a demand for it. You are creating demand pull for a company if you consistently demand something that you cannot buy in the status quo. Government operations in space create a demand pull for private companies if the government is unwilling to use its own means of space transportation

**Chapter 11** – A company in Chapter 11 is bankrupt.

**Assumption** – a foundation of an argument accepted to be true without proof

# Uniqueness – Private Sector Doesn’t Exist

**[\_\_\_\_]**

**[\_\_\_\_] A commercial space sector does not exist yet.**

**William Harwood, writer for cnet news, 2/1/2010, “Obama ends moon program, endorses private spaceflight,” http://news.cnet.com/8301-19514\_3-10445227-239.html**

As for commercial flights to and from the International Space Station, NASA Deputy Administrator Lori Garver said she hoped a new private-sector launch system, possibly including modified versions of technology developed for the canceled moon program, could be available by around 2016 if not earlier. "We will try to accelerate and use the great minds of industry to get a competition going, and I'm sure they'll want to beat that," she said. Former NASA Administrator Mike Griffin, chief architect of the now-canceled moon program, told CBS News the shift to commercial space operations was a profound mistake. "I'm one of the biggest proponents of commercial spaceflight that there is, but it doesn't yet exist," he said. "I would like an enlightened government policy to help bring it about, but I don't believe you get there by destroying all your government capability so there's no option but for the government to do whatever necessary to get the 'commercial operators' to succeed. That's not the way to do it.

**[\_\_\_\_]**

**[\_\_\_\_] The private sector is not ready to take over from NASA.**

David Freedman, science and tech journalist for 30 years, December 2010, Scientific American December 2010, Vol 303, Issue 6

What, then, could the Obama administration have been thinking when it announced this past February that NASA should essentially get out of the manned-spaceship business and turn it over to private industry? Under the plan, NASA will write off most of the $9 billion invested so far in Constellation, the program to develop a replacement vehicle for the **space** shuttle capable of ferrying astronauts and supplies to the **space** station and, eventually, to the moon. Instead the agency will provide seed money to start-ups such as SpaceX, then agree to buy tickets to the **space** station on their rockets. It is a naive and reckless plan, a chorus of voices charged. Among the loudest was that of former astronaut and **space** icon Neil Armstrong, who was quick to scoff at the notion that the private sector is ready to take over from NASA. "It will require many years and substantial investment to reach the necessary level of safety and reliability," he stated. Leaving orbital ferrying in the hands of private companies, Armstrong and others insisted, would at best be setting the clock back on manned **space** exploration. And were private enterprise to drop the ball, perhaps even catastrophically, as many believe it would, the entire grand enterprise of sending people into **space** might come to a long-term or even permanent halt. Once NASA's massive manned-spaceflight machine is dismantled, rebuilding it might take far more time and money than anyone would want to spend. Yet despite these concerns, Congress reluctantly agreed to the plan this fall.

# Uniqueness – Private Sector Doesn’t Exist

**[\_\_\_\_]**

**[\_\_\_\_] The private sector is not ready now because it has not received enough government incentives.**

**Gregg Easterbrook, senior editor of the New Republic, 4/15/2010, “Get over the moon. We need NASA to save the Earth”**

Obama’s plan to encourage free-enterprise rocketry sounds great, but is extremely unrealistic. Only one company, Sea Launch, has ever succeeded in placing a large, privately funded rocket into orbit, and right now Sea Launch is in Chapter 11. The capital requirement for reaching space is very high, the customer base modest. (Here are details about Sea Launch and private rocketry The White House would provide $6 billion over five years to encourage development of private rockets, but this is a drop in the bucket. The new Boeing 787 and its engines cost about $13 billion to develop, and the 787, while beautiful, is just an airplane. A new “human-rated” — multiple redundant systems — rocket capable of carrying significant payloads to orbit could easily require $25 billion or more for development. No private company will be able to raise such a sum without a long-term guaranteed NASA contract, at which point you might as well just have NASA develop the next rocket. (Private flight to orbit will happen someday, but absent a major breakthrough, perhaps not for decades. The winged “spaceship” being developed by Richard Branson is not a spaceship; it will fly higher than conventional aircraft, but not reach orbit.)

# Link Turn – Government Action Spurs the Private Sector

**[\_\_\_\_]**

**[\_\_\_\_] Government action is needed for a private sector. The government must create a demand for companies to fulfill.**

**Christopher Chyba, Professor of Astrophysics and International Affairs at Princeton, 5/18/2011, Senate Committee on Commerce, Science and Transportation, Subcommittee on Science and Space. “Sen. Bill Nelson Holds a Hearing on Contributions of Space to National Imperatives”**

What we have to do instead I think is twofold. We have to develop a kind of infrastructure or even you might even call it an ecosystem in low Earth orbit that has a variety of ways of encouraging the advance of human space flight and cost cutting in human space flight. And that includes this robust - encouraging this robust commercial sector. But in order to do that the government is going to have to provide demand pull; all right? It's going to have to provide the station as a destination. Not for make-work, but for important experiments and developments that will further enable human space flight. And also, let's hope - let's hope - this remains to be demonstrated, but let's hope there will turn out to be a commercial market, both with respect to suborbital flights and perhaps also with an additional private station-like inflatable entity that people want to go to. That remains to be seen. But I think that the government demand-pull alone is probably sufficient to get that ball rolling. But simultaneously, because the commercial sector independently is not there yet, we have to have the heavy launch vehicle capability that's going to allow us to move out beyond low Earth orbit**.** So I favor, I absolutely support, the authorization bill's approach to this. This is not - flexible path is not a mission to nowhere. It's a mission to expand human civilization into our solar system, the most ambitious possible space objective. But it tries to do it in a way that I think has the hope of being sustainable, of actually providing us with that future.

**[\_\_\_\_] The government must lead the way and demonstrate necessary technologies in order to promote true privatization.**

**Mike Wall, SPACE.com Senior Writer, 10/30/2010, “Want to Mine the Solar System? Start With the Moon”, http://www.space.com/9430-solar-system-start-moon.html**

However, government leadership and [investment](http://www.space.com/9430-solar-system-start-moon.html) will likely be needed to get these businesses off the ground, several panelists said. Some people in the aerospace industry are skeptical about the feasibility of extraterrestrial mining operations, Spudis said. To get them onboard, government should demonstrate the necessary technologies and know-how. "Let the government lead the way, and let the private sector follow," Spudis said. Government could also prime the pump for private industry, some panelists said, spurring demand for rocket fuel sold from orbiting filling stations. "An appropriate government investment can catalyze it," Greason said. "Government shows the initial demand and the private sector figures out how to provide the supply." The panel agreed about the transformative potential of extraterrestrial resource extraction.

# Link Turn – Government Action Spurs the Private Sector

**[\_\_\_\_]**

**[\_\_\_\_] Private industry can’t go it alone; it needs support from the government.**

**Vinita Singla, Reporter for the new York Post, 7/8/2011, “NASA Takes a New Route in Space Leadership”, CNBC.com, 8 Jul 2011, http://www.cnbc.com/id/43470129, CGW**

Again, critics disagree. "In order to retain our capabilities we need both commercial and federally-led efforts," says Dr. Mark Lewis, a professor at the University of Maryland and former chief scientist of the U.S. Air Force. “Private industry can't go it alone. It would be like expecting private industry to develop a private fighter jet on its own. It's too expensive and would require too much speculative investment.” Space is certainly a modern growth industry, but it is a very broad one, which complicates the discussion of the space race. The global space sector grew for the fifth straight year in 2010, up 7.7 percent to $276.52 billion, based on the Space Foundation's annual study. The industry is expected to grow 5 percent annually until 2020, according to the UK Space Agency. The bulk of that money is from the private sector and for commercial purposes. For every orbital launch in 2010, there were 13 active satellites, a growing number of them dedicated to serving the broadband internet connectivity — hardly a great technological leap into the unknown. Total government spending is only a quarter of the money involved.

**[\_\_\_\_]**

**[\_\_\_\_] The funding needed to develop space exploration technology means that the government must be involved.**

**Jeff Foust, Program Manager at the Futron Corporation and the editor and publisher of The Space Review, 7/26/2010, “Recasting the Debate about commercial crew”, The Space Review, July 26 2010. http://www.thespacereview.com/article/1671/1,**

However, the magnitude of the funding needed to develop commercial orbital crewed spacecraft—hundreds of millions to perhaps billions of dollars—suggests that the government may be the only source of funding to support near-term development of such systems. Mcalister, who last year supported the Augustine Committee, noted that at the time a number of companies pitched commercial crew systems to the committee. “Consistently, everyone said that without any government support, there was really no viable way for them to get a return on their investment,” he said. That conclusion was echoed last week by Boeing officials in Farnborough in discussions of funding development of the CST-100. “The money that NASA has proposed being invested allows us to close the business case,” said John Elbon, manager of Boeing’s commercial crew program. “It would be very difficult for us to make a decision to move out if there is no decision in Congress to support commercial crew.”

# No Impact – Privatization Won’t Achieve Goals

### **[\_\_\_\_]**

**[\_\_\_\_] The private sector looks to the government for direction. Alone, it will not innovate.**

**David M. Livingston, business consultant, financial advisor, and strategic planner, 8/10/2000, “From Earth to Mars: A Cooperative Plan,”** [**http://www.spacefuture.com/archive/from\_earth\_to\_mars\_a\_cooperative\_plan.shtml**](http://www.spacefuture.com/archive/from_earth_to_mars_a_cooperative_plan.shtml)

Regarding the private sector, some of the same components are missing, such as leadership, education, commitment, and acceptance. Unfortunately, the private sector has been conditioned to believe that our space program is the proper function of government. This is to be expected since the commercial space industry of today, while highly profitable and successful, was initiated by government policy and acts of Congress. In addition, space commercialization developed on a dual track with the military's usage of space and communication satellites, even to the extent of using military rockets for all commercial satellite launches. The private sector simply is not prepared to lead the way with something as unique, costly, risky, and new as putting humans on Mars. It still looks to the public sector for leadership, support, and encouragement. Thus, there is no private-sector leadership that can do what public sector leadership has the opportunity to do. While the opportunity does exist for developing private-sector leadership in this field, it is not within the culture of the private sector at this time to do so. This fact needs to change before the private sector can help lead the way to putting people on Mars.

**[\_\_\_\_]**

[\_\_\_\_] Private companies will only look to make money, they will not create useful technologies.

Lane Wallace, **author who has written several books for NASA,** 7/8/2011 **“*As the Shuttle Mission Ends, Analyzing the Cost of Exploration*”, The Atlantic, http://www.theatlantic.com/technology/archive/2011/07/as-the-shuttle-mission-ends-analyzing-the-cost-of-exploration/241586/,**

But exploration of the cosmos -- even through robotic eyes -- still takes an enormous amount of commitment and investment. Which is to say ... money. Federal, government money. Why government money? For the very same reason national laboratories, NASA, and its predecessor, the National Advisory Committee on Aeronautics, were formed in the first place. Private industry has no incentive to invest in endeavors where either: a) the result is greater scientific knowledge or understanding, but nothing that has any hope of a fiscal return on investment, or b) cutting-edge technology whose development is so nascent that its incorporation into commercial products is simply too risky to attempt.

# No Impact – Privatization Won’t Work

**[\_\_\_\_]**

**[\_\_\_\_] The private sector will be unable to comply with NASA safety standards and not develop.**

**Alan Boyle, Science editor for MSNBC, 1/28/2011, “New spaceships should be safer than the space shuttle”,** [**http://www.msnbc.msn.com/id/41279893/ns/technology\_and\_science-space/t/new-spaceships-should-be-safer-space-shuttle/**](http://www.msnbc.msn.com/id/41279893/ns/technology_and_science-space/t/new-spaceships-should-be-safer-space-shuttle/)

NASA eventually hopes to use commercial craft to ferry astronauts back and forth to the space station as well. But the job won't be easy. In a set of draft requirements issued last month, NASA said it expected commercial companies to measure up to the same risk standards the space agency expected for itself: a 1-in-1,000 chance that the crew would be lost during a journey to and from the space station. "These are quite demanding and rigorous standards," Logsdon said. Some space veterans think the commercial companies can't do it. Apollo 17 commander Gene Cernan — who was the last man to walk on the moon back in 1972 — complained to Congress last year that the new players in spaceflight "do not yet know what they don't know, and that can lead to dangerous and costly consequences." In addition to the dollars-and-cents issue, the commercial companies are wary of being too hamstrung by hundreds of pages of written requirements. Former space shuttle program director Wayne Hale, who retired from NASA last year, warned that excessive red tape could lead to a "train wreck" for the space agency's commercialization effort.

**[\_\_\_\_]**

**[\_\_\_\_] Space research is too expensive to be successful and will not attract business.**

**John McGowan, contractor at NASA Ames Research Center, 6/8/2009**

**Space Review, “Can the private sector make a breakthrough in space access?”, 6/8/09, http://www.thespacereview.com/article/1388/1**

Modern “professional” research has not overcome the need for large amounts of trial and error to achieve major breakthroughs or significant inventions and discoveries. Indeed, the number of actual breakthroughs may have declined with increased funding and professionalization, at least in part because the per-trial cost has risen relative to funding. (See “Cheap access to space: lessons from past breakthroughs”, The Space Review, May 11, 2009) In space, a full launch attempt costs on the order of $50–100 million, depending on the vehicle, meaning that $1 billion can fund only 10–20 trials, a small number relative to the hundreds or thousands usually involved in a major breakthrough. There has been minimal progress in power and propulsion in aviation and rocketry since about 1970. Even five years is an extremely long time by the standards of modern business, especially the high technology companies often looked to as examples of how to achieve cheap access to space. Venture capitalists, for example, typically invest in projects with an expected return (an initial public offering, merger, or other so-called “exit strategy”) within three to five years. During the Internet bubble, some venture capitalists appeared to have invested in a large number of dot-coms with very short turnarounds, little more than put up a web site and go public in a few months or years.

# Impact Turn – Leadership

**[\_\_\_\_]**

**[\_\_\_\_] Privatization will undermine leadership because it will have no clear goal to implement.**

**David Wu, Democratic Member of the U.S. House of Representatives from Oregon, 4/15/2010**, “**Debate: Obama's Space Privatization Plan Is a Costly Mistake,” http://www.aolnews.com/2010/04/15/debate-obamas-space-privatization-plan-is-a-costly-mistake/**

President Barack Obama is in Florida today to argue his case for privatizing the human spaceflight program. It will be a tough sell. The president's vision for privatizing American space exploration may sound appealing initially, but it rests on flawed assumptions and could result in the United States surrendering our lead in space exploration to our international competitors, including China and Russia. The president has proposed a radical restructuring of U.S. space policy, which includes the termination of the next phase of the human spaceflight program, known as the Constellation program. The Constellation program is the architecture developed to deliver American astronauts to the International Space Station -- and later to the moon and other destinations in our solar system -- following the retirement of the space shuttle program, which is on pace to fly its last mission late this year or early next year. In place of Constellation, the Obama administration supports the development of commercial capabilities for delivering Americans to the space station and beyond. This may sound good rhetorically, but it fails to meet the standards of sound space policy. The president's plan to privatize space exploration rests on ill-defined objectives and unsubstantiated assumptions. For instance, the administration has not adequately explained where the space program's shifted trajectory will lead our nation and cannot explain how its plan affects our nation's previously established goals of returning humans to the moon by 2020 and some day sending astronauts to Mars and beyond. Without clearly defined goals, including specific destinations and timelines for reaching them, how can we ensure that taxpayers are receiving an adequate return on their investments in space exploration? It is simply unwise to carry out such a dramatic shift in how our nation conducts space exploration without a clear objective in mind

**[\_\_\_\_] Privatization will mean that space ceases to inspire leadership by the US.**

**David Wu, Democratic Member of the U.S. House of Representatives from Oregon, 4/15/2010**, “**Debate: Obama's Space Privatization Plan Is a Costly Mistake,” http://www.aolnews.com/2010/04/15/debate-obamas-space-privatization-plan-is-a-costly-mistake/**

The Constellation program is not perfect. But putting all of our eggs in a private-sector basket is simply too risky a gamble. If the president's plan is implemented, we would be jeopardizing our nation's lead in space exploration, and we would be jeopardizing our children's future. The space program encourages us to reach for the stars in both our dreams and our actions. It helps drive innovation, and it challenges us to find creative solutions to technological challenges. Moreover, it inspires America's next generation of scientists and engineers to pursue their passions -- something we must have if our nation is to compete in the 21st century global economy. The president's plan to privatize our spaceflight program will hinder our nation's ability to remain at the forefront of human achievement for generations to come. We must reconsider.

# Impact Turn – Leadership

**[\_\_\_\_]**

**[\_\_\_\_] US leadership prevents nuclear war.**

**Zalmay Khalilzad, Defense Analyst at RAND, 1995 “Losing the Moment? The United States and the World After the Cold War” The Washington Quarterly, RETHINKING GRAND STRATEGY; Vol. 18, No. 2; Pg. 84**

Under the third option, the United States would seek to retain global leadership and to preclude the rise of a global rival or a return to multipolarity for the indefinite future. On balance, this is the best long-term guiding principle and vision. Such a vision is desirable not as an end in itself, but because a world in which the United States exercises leadership would have tremendous advantages. First, the global environment would be more open and more receptive to American values -- democracy, free markets, and the rule of law. Second, such a world would have a better chance of dealing cooperatively with the world's major problems, such as nuclear proliferation, threats of regional hegemony by renegade states, and low-level conflicts. Finally, U.S. leadership would help preclude the rise of another hostile global rival, enabling the United States and the world to avoid another global cold or hot war and all the attendant dangers, including a global nuclear exchange. U.S. leadership would therefore be more conducive to global stability than a bipolar or a multipolar balance of power system.

# Impact Turn – Space Debris

**[\_\_\_\_]**

**[\_\_\_\_] The privatization of space will cause increased space debris to the point where space can no longer be used.**

**Bruce Gagnon, coordinator of the Global Network Against Weapons & Nuclear Power in Space, 6/23/2003, “Space Privatization: A road to conflict?” http://www.space4peace.org/articles/road\_to\_conflict.htm**

The news brings us the story of "space pioneers" launching privately funded craft into the heavens.  A special prize is offered to the first private aerospace corporation who can successfully take a pilot and a "space tourist" into orbit. Is this "privatization" of space a good thing?  Is there any reason to be concerned about the trend?  Are there any serious questions that should be raised at this historic moment? Three major issues come immediately to mind concerning space privatization.  Space as an environment, space law, and profit in space. We've all probably heard about the growing problem of space junk where over 100,000 bits of debris are now tracked on the radar screens at NORAD in Colorado as they orbit the earth at 18,000 m.p.h.  Several space shuttles have been nicked by bits of debris in the past resulting in cracked windshields.  The International Space Station (ISS) recently was moved to a higher orbit because space junk was coming dangerously close.  Some space writers have predicted that the ISS will one day be destroyed by debris. As we see a flurry of launches by private space corporations the chances of accidents, and thus more debris, becomes a serious reality to consider.  Very soon we will reach the point of no return, where space pollution will be so great that an orbiting minefield will have been created that hinders all access to space.  The time as certainly come for a global discussion about how we treat the sensitive environment called space before it is too late.

**[\_\_\_\_] Space junk threatens satellites that perform many crucial economic functions.**

**Megan Ansdell, Consultant at Booz Allen Hamilton for Space Policy, Former Graduate Student Intern at NASA, 2010 “Active Space Debris Removal: Needs, Implications, and Recommendations for Today’s Geopolitical Environment,”** [**www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf**](http://www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf)

There are currently hundreds of millions of space debris fragments orbiting the Earth at speeds of up to several kilometers per second. Although the majority of these fragments result from the space activities of only three countries—China, Russia, and the United States—the indiscriminate nature of orbital mechanics means that they pose a continuous threat to all assets in Earth’s orbit. There are now roughly 300,000 pieces of space debris large enough to completely destroy operating satellites upon impact (Wright 2007, 36; Johnson 2009a, 1). It is likely that space debris will become a significant problem within the next several decades. Predictive studies show that if humans do not take action to control the space debris population, an increasing number of unintentional collisions between orbiting objects will lead to the runaway growth of space debris in Earth’s orbit (Liou and Johnson 2006). This uncontrolled growth of space debris threatens the ability of satellites to deliver the services humanity has come to rely on in its day-to-day activities. For example, Global Positioning System (GPS) precision timing and navigation signals are a significant component of the modern global economy; a GPS failure could disrupt emergency response services, cripple global banking systems, and interrupt electric power grids (Logsdon 2001).

**Space Weaponization Disadvantage**

# Space Weaponization DA

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# Explanation

This disadvantage explores a potential underside of the exploration of space. Currently, there is a debate about what the uses of space should be in the future. Many believe that space should be treated and thought of essentially as another large ocean – meaning that it should be free for all to use as they please for trade and growth. Another key component of this view is that space should remain free of weapons that could disrupt peaceful activities and trade. Another view of space resembles modern day colonialism – that space represents property for the taking, and that countries that reach it have the right to place weapons in space to defend their new resources. Space is seen as “the ultimate high ground,” and control of it will make a country safer.

President George W. Bush held the latter view of space. His statements warned other countries that the U.S. had the right to place weapons in space and would do so when they became sufficiently advanced. This concerned many countries who wanted to use space for their own purposes and who were uneasy with the idea of America dominating space, a position they could easily use to harm other countries. Many felt that before President Bush, a custom had been established to use space peacefully. President Obama reversed America’s policy towards space: he has recently endorsed a peaceful vision for cooperation in space, claiming that it should be free of weapons. As a result, the uniqueness evidence claims that space will remain free of weapons for the future.

The problem is that new attempts at space exploration have the potential to upset this agreement. Developing new technology for space is almost always “dual use,” which means it can be used for both peaceful and militaristic objectives. The disadvantage claims that the technology that would come about as a result of the plan would eventually be used to develop better space weapons, which could ultimately upset the fragile international balance and result in conflict in space.

# 

# Glossary

**Militarization** – the act of assembling and putting into readiness for war or other emergencies. Space is currently militarized because there are many things in space that aid the U.S.’s ability to win wars, such as GPS and communications satellites.

**Weaponization** – the act of placing offensive weapons into space. Space is currently not weaponized because these do not exist. Even though there are satellites in space that aid the U.S. military, they cannot themselves function easily as weapons. Instead, they support other weapons.

**Arms control** – international agreements that limits the number or types of weapons that countries may possess. Bans on biological weapons are examples of arms control.

**Isolationist** – a policy of remaining apart from the affairs or interest of other countries, receding from international relations.

**Dual use** – Technology that is dual use can be used for more than one purpose. In this context, dual use technologies can be used for both peaceful and military means.

**Interceptor** – a fast aircraft for repelling hostile aircraft.

**Challenger disaster** – Refers to the Space Shuttle Challenger, which crashed in 1986, killing every crew member aboard.

**Military industrial complex** – A country’s military and the companies that supply it with arms and technology.

**Transparency** – refers to behavior characterized by openness, communication, and accountability with other countries

**Hair trigger** – a firearm set to go off at the slightest disturbance or signal

**Insidious** - Proceeding in a gradual, subtle way, but with harmful effects

**Moratorium** – a ban.

**Nexus** – the intersection

**Hegemony** – Leadership or dominance in a particular area by a country.

**Unilateral** – an action taken unilaterally is taken on one’s own, without asking others permission beforehand.

**HLV** – heavy lift vehicle. The largest class of space ship.

**ICBM** – Intercontinental Ballistic missiles. ICBMs are large missiles that hold several nuclear weapons that can travel thousands of miles across the globe to reach their target.

**NASA** – National Aeronautics and Space Administration

**ASAT** – Anti Satellite weapons

**TCBM** – transparency and confidence building measures

# Space Weaponization 1NC Shell [1/3]

**A. Uniqueness. Obama’s new space policy is moving away from space weaponization – putting weapons into space. However, the future of weapons in space will depend on future U.S. policies.**

**Jeff Foust, editor and publisher of the Space Review, editor and publisher of The Space Review, 6/27/11, “The national space policy, one year later,” http://www.thespacereview.com/article/1873/1**

One major difference widely cited between the current administration’s space policy and the one released by the George W. Bush Administration in 2006 has been its tone. The Obama Administration’s policy has been more open to international cooperation on various issues, although it retains language from previous policies that puts strict guidance on when the US should sign onto space arms control measures. Previous US views on space issues, including space arms control, “was not received well by the international community,” said Ben Baseley-Walker, advisor on security policy and international law for the Secure World Foundation. “It was seen as inconsistent, it was seen as antagonistic, and it was seen as isolationist.” That view can’t be immediately changed, he said, but the new space policy takes steps in that direction. “What the national space policy has done is to start to rebuild trust, start to rebuild consistency, and start to rebuild the reliability of the US as an internationally-engaged partner.” Just how willing the US is to be a better international partner will depend on not just the words in the policy, but other forces, notably funding, that force the US to engage more with other nations. “The US has not been put into a situation financially, or on specific limitations on the goals it wants to achieve, to have to deal with international partners,” he said. That could change down the road, he noted, such as when—at some time after 2020—the International Space Station is retired, at which time it’s possible the only space station in orbit is Chinese.

**B. Space exploration paves the way for increased weaponization. All technology developed for exploration is “dual use” and can be used to develop weapons to put in space.**

**Raymond D. Duvall, and Jonathan Havercroft , Professor at the University of Minnesota & Professor at the University of Victoria, March 22-25,2006, “Taking Sovereignty Out of This World: Space Weaponization and the Production of Late-Modern Political Subjects,”** [**http://www.allacademic.com//meta/p\_mla\_apa\_research\_citation/0/9/8/6/8/pages98680/p98680-1.php**](http://www.allacademic.com//meta/p_mla_apa_research_citation/0/9/8/6/8/pages98680/p98680-1.php)

The weaponization of space—the act of placing weapons in outer space—has an intimate relationship to space exploration, in that the history of the former is embedded in the latter, while the impetus for space exploration, in turn, is embedded in histories of military development. Since the launch of Sputnik, states that have ability to access— and hence to explore—outer space have sought ways in which that access could improve their military capabilities. Consequently, militaries in general and the U.S. military in particular have had a strong interest in the military uses of space for the last half century. Early on, the military interest in space had two direct expressions: enhancing surveillance; and developing rocketry technologies that could be put to use for earth based weapons, such as missiles. Militaries also have a vested interest in the “dual-use” technologies that are often developed in space exploration missions. While NASA goes to great lengths in its public relations to stress the benefits to science and the (American) public of its space explorations, it is noteworthy that many of the technologies developed for those missions also have potential military use**.**

# Space Weaponization 1NC Shell [2/3]

**C. Impact. Weaponization by the United States would cause other nations to follow suit, creating a destabilizing environment in space.**

**Nina Tannenwald, Joukowsky Family Research Assistant Professor and Director of the International Relations Program, Watson Institute for International Studies, Brown University, Summer 2004, 29 Yale J. Int'l L. 363**

The choice between a competition for national superiority and a strengthened legal regime that preserves and balances the interests of all in space will have profound consequences. If the United States aggressively moved weaponry into space, it would likely provoke other nations to pursue countermeasures, with destabilizing consequences for global and national security. In addition, by encouraging nations who do not currently have an interest in placing weapons in space to compete directly and immediately with U.S. space-based assets, the United States would almost certainly guarantee the loss of the advantages it seeks to protect. Although an arms race in ASAT weapons is one of the dangers, the threat currently of greatest concern to states such as China and Russia is the U.S. use of space systems to augment its nuclear and conventional strategic strike capabilities. From the perspective of these nations, the U.S. decision to expand strategic capabilities into space represents the collapse of the Cold War bargain of strategic stability based on mutual vulnerability. A military competition in space could thus invigorate a high-tech arms race and renew emphasis on doctrines of nuclear warfare. n25

# Space Weaponization 1NC Shell [3/3]

**D. Space weaponization, even if initially peaceful, will result in devastating war.**

**Gordon Mitchell, Associate Professor of Communication and Director of Debate at the University of Pittsburgh. 07/2001, “Missile Defence: Trans-Atlantic Diplomacy at a Crossroads”, ,** [**http://www.isisuk.demon.co.uk/0811/isis/uk/bmd/no6.html**](http://www.isisuk.demon.co.uk/0811/isis/uk/bmd/no6.html)

A buildup of space weapons might begin with noble intentions of 'peace through strength' deterrence, but this rationale glosses over the tendency that '… the presence of space weapons…will result in the increased likelihood of their use'.33 This drift toward usage is strengthened by a strategic fact elucidated by Frank Barnaby: when it comes to arming the heavens, 'anti-ballistic missiles and anti-satellite warfare technologies go hand-in-hand'.34 The interlocking nature of offense and defense in military space technology stems from the inherent 'dual capability' of spaceborne weapon components. As Marc Vidricaire, Delegation of Canada to the UN Conference on Disarmament, explains: 'If you want to intercept something in space, you could use the same capability to target something on land'. 35 To the extent that ballistic missile interceptors based in space can knock out enemy missiles in mid-flight, such interceptors can also be used as orbiting 'Death Stars', capable of sending munitions hurtling through the Earth's atmosphere. The dizzying speed of space warfare would introduce intense 'use or lose' pressure into strategic calculations, with the spectre of split-second attacks creating incentives to rig orbiting Death Stars with automated 'hair trigger' devices. In theory, this automation would enhance survivability of vulnerable space weapon platforms. However, by taking the decision to commit violence out of human hands and endowing computers with authority to make war, military planners could sow insidious seeds of accidental conflict. Yale sociologist Charles Perrow has analyzed 'complexly interactive, tightly coupled' industrial systems such as space weapons, which have many sophisticated components that all depend on each other's flawless performance. According to Perrow, this interlocking complexity makes it impossible to foresee all the different ways such systems could fail. As Perrow explains, '[t]he odd term "normal accident" is meant to signal that, given the system characteristics, multiple and unexpected interactions of failures are inevitable'.36 Deployment of space weapons with pre-delegated authority to fire death rays or unleash killer projectiles would likely make war itself inevitable, given the susceptibility of such systems to 'normal accidents'. It is chilling to contemplate the possible effects of a space war. According to retired Lt. Col. Robert M. Bowman, 'even a tiny projectile reentering from space strikes the earth with such high velocity that it can do enormous damage — even more than would be done by a nuclear weapon of the same size!'. 37 In the same Star Wars technology touted as a quintessential tool of peace, defence analyst David Langford sees one of the most destabilizing offensive weapons ever conceived: 'One imagines dead cities of microwave-grilled people'.38 Given this unique potential for destruction, it is not hard to imagine that any nation subjected to space weapon attack would retaliate with maximum force, including use of nuclear, biological, and/or chemical weapons. An accidental war sparked by a computer glitch in space could plunge the world into the most destructive military conflict ever seen.

# Overview

1.

2.

3.

# Uniqueness – No Space Weaponization Now

**[\_\_\_\_]**

**[\_\_\_\_] Space is not weaponized right now, but the decision of the U.S. will determine whether that remains true.**

**Michael Krepon, co-Founder and President of Emeritus of the Henry L. Stimson Center, a non-profit institution that seeks to promote pragmatic steps to enhance international security, 2005, “Space Security or Space Weapons?”** [**http://www.gsinstitute.org/docs/Stimson\_Space\_brief.pdf**](http://www.gsinstitute.org/docs/Stimson_Space_brief.pdf)

The United States has a very important choice to make between space security and space weapons. Space security means that the satellites we depend on every day to save lives, grow our economy, and support national security will remain available when needed. No nation benefits more from space or has more to lose if space becomes a shooting gallery than the United States. Space is now mercifully free of weapons. The last Cold War test of a satellite-killing weapon occurred twenty years ago. This moratorium is now being challenged. The US Air Force has published and seeks to implement a new doctrine calling for space weapons. If the US tests and deploys these weapons, other nations will surely follow suit, and then everyone’s satellites will be endangered. Satellites are expensive and extremely hard to defend. Space weapons don’t cost very much and are easy to build. Debris in space kills indiscriminately. Space warfare would risk the loss of live-saving satellites. We can also expect far greater casualties in war. US leadership, global commerce, and US alliances will suffer. Space weapons undercut national and international security.

**[\_\_\_\_]**

**[\_\_\_\_] The U.S. is currently pursuing cooperation with Europe and other nations in space.**

**Eli Lake, writer for the Washington times, 1/27/2011, “ U.S., EU eye anti-satellite weapons pact”, http://www.washingtontimes.com/news/2011/jan/27/us-eu-eye-anti-satellite-weapons-pact/**

The Obama administration is negotiating with the European Union on an agreement limiting the use of anti-satellite weapons, a move that some critics say could curb U.S. development of space weapons in general. Three congressional staffers told The Washington Times that Pentagon and intelligence analysts said in a briefing Monday that the administration is looking to sign on to the European Union’s Code of Conduct for Outer Space Activities. The briefing followed the completion of an interagency review that recommends the United States sign on to the document with only a few minor changes to its language, according to two administration officials familiar with the review. That recommendation is awaiting final approval from the National Security Council. “The United States is continuing to consult with the European Union on its initiative to develop a comprehensive set of multilateral TCBMs, also known as the Code of Conduct for Outer Space Activities,” Rose Gottemoeller, assistant secretary of state for arms control, verification and compliance, said Thursday at the U.N. Conference on Disarmament. TCBM stands for “transparency and confidence-building measures.”

# Uniqueness – No Space Weaponization Now

**[\_\_\_\_]**

**[\_\_\_\_] Obama’s new space policy stresses cooperation and renounces space weapons.**

**William Broad and Kenneth Chang, Writer for the New York Times, 6/29/2010, “ Obama Reverses Bush’s Space Policy”, http://www.nytimes.com/2010/06/29/science/space/29orbit.html**

The Obama administration on Monday unveiled a space policy that renounces the unilateral stance of the Bush administration and instead emphasizes international cooperation, including the possibility of an arms control treaty that would limit the development of space weapons. In recent years, both China and the United States have destroyed satellites in orbit, raising fears about the start of a costly arms race that might ultimately hurt the United States because it dominates the military use of space. China smashed a satellite in January 2007, and the United States did so in February 2008. The new space policy explicitly says that Washington will “consider proposals and concepts for arms control measures if they are equitable, effectively verifiable and enhance the national security of the United States and its allies.” The Bush administration, in the space policy it released in August 2006, said it “rejects any limitations on the fundamental right of the United States to operate in and acquire data from space,” a phrase that was interpreted as giving a green light to the development and use of antisatellite weapons. The policy also stated that Washington would “oppose the development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access or use of space,” a phrase that effectively ruled out arms control. In secret, the Bush administration engaged in research that critics said could produce a powerful ground-based laser, among other potential weapons meant to shatter enemy satellites in orbit. By contrast, the Obama policy underlines the need for international cooperation. “It is the shared interest of all nations to act responsibly in space to help prevent mishaps, misperceptions and mistrust,” the new policy says in its opening lines. “Space operations should be conducted in ways that emphasize openness and transparency.”

**[\_\_\_\_] Space has not been overtly weaponized yet.**

**M. V. Smith, USAL Colonel and PhD student of strategic studies in the Politics and International Relations Department at the University of Reading in the United Kingdom, 2011, “Spacepower and Warfare,” 2011, http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA536586**

A discussion of the nexus of spacepower and warfare is controversial because space has yet to be overtly weaponized or generally recognized as an arena of open combat. Many, if not most, nations want to keep space a weapons-free peaceful sanctuary, particularly the suprastate actors. Just because all other media are weaponized and used as arenas of combat does not mean that space will automatically follow suit. Perhaps this generation will figure out how to keep the beast of war in chains short enough to prevent it from going to space. But the next (and each succeeding) generation must also keep the chains short. Unfortunately, the constant march of technology is making space more important to states at the same time it is making it easier to build space weapons. In anticipating the future of spacepower for theoretical discussion, we can do little more than extract a roadmap from the history of human activity and extrapolate forward.

# AT: Space Weaponization Inevitable

**[\_\_\_\_]**

**[\_\_\_\_] Countries are more interested in economic exploitation of space. This proves that space militarization is not inevitable.**

**Nina Tannenwald, Joukowsky Family Research Assistant Professor and Director of the International Relations Program, Watson Institute for International Studies, Brown University, Summer 2004, 29 Yale J. Int'l L. 363**

[\*385] Added to this are the large majority of the world's nations that are primarily interested in the economic benefits of space. Access to communications and other benefits of space are of special interest to developing nations, which want to bridge the "information gap" between the industrial nations and emerging economies. Most nations would like guarantees that space will not be used against them, and have supported strengthening the legal regime in space to constrain weaponization. This group includes key spacefaring nations. China's views have been noted, and Russia has also called strongly for an international treaty prohibiting weapons in space. In September 2001, Russian Foreign Minister Igor Ivanov outlined several key provisions for any new treaty on space security: no placing of weapons in orbit; no use or threat to use weapons against targets in space; and the establishment of adequate verification mechanisms. n117 The Russian delegate to the CD reiterated this position in January 2002, calling for a moratorium on placing weapons in space until a treaty could be achieved. n118

In late June 2002, Russia and China submitted a first-ever joint proposal to the CD for an international treaty to ban space weapons - clearly a response to the U.S. withdrawal from the ABM Treaty several weeks earlier. n119 Although there was little new in the substance of the proposal, the fact that it dropped many self-serving provisions and focused on a few simple points that would have broad international appeal suggests that it was a serious effort. Additionally, the fact that it was a joint proposal suggests that, as critics of missile defenses have predicted, U.S. pursuit of missile defenses is driving Russia and China together, an adverse outcome for the United States. Canada, Egypt, France, Sri Lanka, and other members of the CD have also offered proposals to begin negotiations on the nonweaponization of space. n120 As David Ziegler notes, "any assertion that the United States should aggressively pursue weaponization in order to beat adversaries already rushing in that direction is highly questionable."

# Link – Exploration Causes Weaponization

**[\_\_\_\_]**

### **[\_\_\_\_] Almost any space activity can be used to military advantage. Even peaceful deployments in space well be seen as our rivals as an attempt to weaponize.**

**Jeremy Hsu, writer for Space.com. 5/05/2010, “Is a New Space Weapon Race Heating Up?”, SPACE.com, http://www.space.com/8342-space-weapon-race-heating.html**

“Space has been militarized since before NASA was even created," said Joan Johnson-Freese, a space policy analyst at the Naval War College in Newport, RI. Yet she sees weaponization as a different issue from militarization because "so much space technology is dual use" in terms of having both civilian and military purposes, as well as offensive or defensive use. Such uncertainty regarding space technology can make it tricky for nations to gauge the purpose or intentions behind new prototypes, including the X-37B space plane or the HTV-2 hypersonic glider. The U.S. military could even be using the cloak of mystery to deliberately bamboozle and confuse rival militaries, according to John Pike, a military and security analyst who runs GlobalSecurity.org. He suggested that the X-37B and HTV-2 projects could represent the tip of a space weapons program hidden within the Pentagon's secret "black budget," or they might be nothing more than smoke and mirrors. The devil is in the details Many existing space technologies play dual roles in both military and civilian life. The Global Positioning Satellite (GPS) system which started out as military-only has since become common in consumer smartphones and car navigation systems. Modern rocketry grew in part from the technology and scientific minds behind Nazi Germany's V-2 rockets of World War II, and continued to evolve alongside ballistic missile technology. Even something as basic as a satellite image can be used for either military weapons targeting or civilian crop rotation, Johnson-Freese said. Space plane technology can seem equally ambiguous ? the Air Force deputy undersecretary of space programs scoffed at the notion of X-37B paving the way for future space weapons. "The whole issue is further complicated because beyond technologies like lasers, Rods from God, explosives, etc.... virtually any object traveling in space can be a weapon if it can be maneuvered to run into another object," Johnson-Freese told SPACE.com. Uncertainty matters a great deal for how other nations view the recent U.S. space plane and hypersonic glider tests, regardless of whether or not the technologies lead to future weapons. "They are testing capabilities that could certainly be useful to the military if it chose to use them in an offensive manner," Johnson-Freese said. "And the military has been silent on intent." Intrigue and deception Pike said the current work under way by the U.S. military leaves plenty of room for misinterpretations or even outright deception, which could be a ploy to distract other nations with military space projects.

# Link – Exploration Causes Weaponization

**[\_\_\_\_]**

**[\_\_\_\_] Because the U.S. acts alone, it is seen as going back on Obama’s strategy of international cooperation and his commitment to peace in space.**

**Marcia A. Smith, Space and Technology Policy Group, 02/2011 Space Policy, Vol. 27, Issue 1, p. 22-23,**

Reality is that we don’t fight alone, we don’t deter alone, we don’t assure alone. Everything is done in partnerships. Everything is in coalitions. We [think we] have to have the only capability; we have to fill every rung on the ladder with the best capability in the world. We can’t afford it, nor can we do it. There are other very capable nations out there very willing to partner up. We’ve got to make sure that our strategy is inclusive. You cannot afford to do everything yourself. We are not an island [4]. Thus, a major thrust of the new US policy is working together with like-minded countries in using space and treating space as a global commons for which all are responsible. 2. Implementing the new policy A policy, of course, is just words on paper the real point is how it is implemented. But perception is key and the Obama policy clearly wants to convey that the USA is willing not only to talk, but to listen, and to find mechanisms for ensuring space sustainability. In a real sense implementation will have to happen on an international basis. If other countries do not agree that space sustainability is a critical need, the USA cannot do it alone. “Sustainability” has become the keyword and while it is not defined in the policy, that means all the stakeholders will have the opportunity to discuss what it is and what is needed to achieve it. Non-US policy makers may have as much influence on the implementation of these aspects of the policy as their American colleagues. Europe already deserves a lot of credit for its draft Code of Conduct for Outer Space Activities. A revised version was released at a meeting at the UN in October 2010 [5].

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### **[\_\_\_\_] A new Exploration program will be used to weaponize space – the money will benefit defense contractors.**

**Richard C. Cook, former NASA analyst and frequent contributor to Global Research, 1/22/2007, “Militarization and The Moon-Mars Program: Another Wrong Turn in Space?” Global Research, http://www.globalresearch.ca/index.php?context=va&aid=4554**

The way NASA has started its new moon-to-Mars exploration program, the October 2006 White House announcement of a new national space policy, and subsequent statements by the State Department raise grave concerns about whether a new push to militarize space has begun. Events are pointing to an aggressive extension of U.S. supremacy beyond the stratosphere reminiscent of Reagan administration actions in the 1980s. Then it was the militarization of the space shuttle and the start-up of the Strategic Defense Initiative—"Star Wars"—which were gaining momentum until space weapons technology testing halted with the space shuttle Challenger disaster. To date, the principal beneficiary of the moon-Mars program is Lockheed Martin, to which NASA awarded a prime contract with a potential value stated at $8.15 billion. Already the world’s largest defense contractor, Lockheed Martin’s stock yielded an instant bonanza, rising more than seven percent in the five weeks following NASA’s August 2006 announcement. NASA is not paying the giant of the military-industrial complex $8.15 billion to have people hop around and hit golf balls on the moon. The aim of the moon-Mars program is U.S. dominance, as suggested by NASA Administrator Michael Griffin’s statements that "my language"—i.e., English—and not those of "another, bolder or more persistent culture" will be "passed down over the generations to future lunar colonies."

# Link – Exploration Causes Weaponization

**[\_\_\_\_]**

**[\_\_\_\_] Advances in civilian space technology also further attempts at weaponization.**

**Trevor Brown, MSc, S. Rajaratnam School of International Studies, Nanyang Technological University, Spring 2009, “Soft Power and Space Weaponization,” Air and Space Power Journal, http://www.airpower.au.af.mil/airchronicles/apj/apj09/spr09/brown.html**

But the United States does not necessarily have to choose between civilian and military space programs since much of the technology developed for space is dual use. The space industry provides a tremendous opportunity for militaries that desire more affordable access and space assets that can significantly augment terrestrial forces. As Alfred Thayer Mahan pointed out, “Building up a great merchant shipping lays the broad base for the military shipping.” The US military can maximize its resources, not only financially but also politically, by packaging as much military space activity as possible into commercial space activity. One example involves satellite communications. The arrangement the Pentagon has with Iridium Satellite LLC gives the military unlimited access to its network and allows users to place both secure and nonsecure calls or send and receive text messages almost anywhere in the world. Another example involves space imagery. Even though the government must maintain sophisticated imaging capabilities for special situations, it could easily meet the vast majority of its routine requirements at lower cost by obtaining commercially available imagery. The Air Force could also use space transportation, another emerging industry, to maximize its resources. Private ventures now under way are reducing the costs of space access considerably. It is possible that one enterprise could become an alternative to Russian Soyuz spacecraft for NASA’s missions to the International Space Station. Such enterprises could prove attractive, cost-effective options for delivering the Air Force’s less-sensitive payloads to Earth orbit. Space tourism, a growing industry, could enable the Air Force to procure affordable capabilities to routinely operate 60 to 90 miles above Earth. Advances that entrepreneurs are making in suborbital space flight could eventually evolve to a point where the Air Force would find it far easier, politically as well as financially, to acquire platforms capable of delivering munitions from space.

# Specific Link – Colonization

**[\_\_\_\_]**

**[\_\_\_\_] Space colonization leads to competition over the resources in space, which results in weaponization.**

**Bruce Gagnon, Coordinator of the Global Network Against Weapons & Nuclear Power in Space, 1/30/2010 “Statement of Concern,” http://www.space4peace.org/statement/concern.htm, Accessed January 2, 2010**

This same space law also declares that all interplanetary bodies belong to the common good. As NASA lands on the moon and Mars and explores other planets they are finding gold, cobalt, magnesium, helium 3 and other rich resources. Plans are now underway to place mining colonies on these bodies. The U.S. is now exploring ways to circumvent international space law in order to "exploit" these planetary bodies so that corporate interests may secure the enormous financial benefits expected from this Mining the Sky as is described by NASA scientist John Lewis in his book by the same title. The Columbus mythology is often invoked to describe our "manifest destiny" as it relates to space exploration and colonization. The noble explorer theme is used to cover the more practical notion of profits to be made in regards to space. There is big money to be made building and launching rockets. There is money to be made building and launching satellites. There is money and power to be derived by "controlling" space. And there is money to be made mining the sky. Another obstacle exists though. If the U.S. can "control" space, so might another nation. Thus we have the early stages of an arms race in space. How will France, Russia, China or any other nation respond as the U.S. consolidates its "control" of space? In order to ensure that the Pentagon maintains its current space military superiority the U.S. Space Command is now developing new war fighting technologies like the Ballistic Missile Defense (BMD) and Anti-satellite weapons (ASATS) as well as space based laser weapons. Star Wars is alive and well. Recent efforts to move toward early deployment of the BMD system, which could easily be used for offensive purposes, is expected to break the 1972 ABM Treaty as well as the Outer Space Treaty.

# Specific Link – Constellation

**[\_\_\_\_]**

**[\_\_\_\_] Attempts to maintain space hegemony are seen as threatening by China and Russia.**

**William C. Martel and Toshi Yoshihara , professor of national security affairs at the Naval War College in Rhode Island, Toshi, doctoral candidate at the Fletcher School of Law and Diplomacy, Tufts University, 2003 “Averting a Sino-U.S. Space Race,” http://muse.jhu.edu/journals/washington\_quarterly/v026/26.4martel.html#authbio1**

Some Chinese observers point to U.S. efforts to militarize space as evidence of the U.S. ambition to establish unilateral hegemony. For example, in 2001, Ye Zhenzhen, a correspondent for a major daily newspaper of the Chinese Communist Party, stated that, "[a]fter the Cold War, even though the United States already possessed the sole strategic advantage over the entire planet, and held most advanced space technology and the most satellites, they still want to bring outer space totally under their own armed control to facilitate their smooth ascension as the world hegemon of the 21st century." 11 Diplomatically, China has urged the use of multilateral and bilateral legal instruments to regulate space activities, and Beijing and Moscow jointly oppose the development of space weapons or the militarization of space. 12 The Chinese leadership's opposition to weaponizing space provides evidence of China's growing concern that the United States will dominate space. The United States' avowed intention to ensure unrivaled superiority in space, as exemplified by the Rumsfeld Commission report, increasingly defines China's interests in space. Chinese anxieties about U.S. space power began with the 1991 Gulf War, when the PRC leadership watched with awe [End Page 22] and dismay as the United States defeated Iraq with astonishing speed. Beijing recognized that the lopsided U.S. victory was based on superior command and control, intelligence, and communications systems, which relied heavily on satellite networks. Demonstrations of the United States' undisputed conventional military power in Bosnia; Kosovo; Afghanistan; and, most recently, Iraq further highlighted for Chinese officials the value of information superiority and space dominance in modern warfare.

**[\_\_\_\_] Heavy launch vehicles can easily disguise space-based nuclear weapons.**

**Kendall K. Brown, liquid rocket engine system engineer for NASA and researcher at College of Aerospace Doctrine, Research, and Education, Summer 2006, Air and Space Power Journal “Is Operationally Responsive Space the Future of Access to Space for the US Air Force,”** [**http://www.airpower.maxwell.af.mil/airchronicles/apj/apj06/sum06/brown.html**](http://www.airpower.maxwell.af.mil/airchronicles/apj/apj06/sum06/brown.html)

Inclusion of a global strike capability might have a destabilizing effect on world affairs in times of heightened geopolitical tensions. Given an HLV that can deliver either a satellite payload to orbit or a common aero vehicle with a strike weapon to a terrestrial target, a third-party nation might detect the launch and fear a nuclear attack by the United States. Regardless of whether such fears have any foundation, the Cold War forged a paradigm that ICBMs deliver nuclear weapons, and a US adversary or a nation not friendly to the United States could have difficulty distinguishing the launch of an HLV from that of an ICBM with strategic weapons, despite the fact that the trajectories might differ. The world community would have to accept the uncertainty that a reentry vehicle could deliver a conventional precision-guided munition-in essence, we would be asking the world to trust us in a time of hostilities.

# Impact – Plan Causes Weaponization

**[\_\_\_\_]**

**[\_\_\_\_] The US has agenda setting power in space, if it pursues weaponization than an aggressive response is inevitable.**

**Michael Krepon, founding president of the Henry L. Stimson Center, a nonprofit, nonpartisan institution, previously worked at at Carnegie Endowment for International Peace, U.S. Arms Control and Disarmament Agency, 2003, http://www.stimson.org/pubs.cfm?ID=81**

Put another way, the dominant position of the United States provides agenda-setting powers in space. The flight-testing and deployment of space warfare capabilities is surely inevitable if the United States takes the lead in this pursuit, but not if Washington maintains prudent hedges against unwelcome developments in the form of a readiness to respond in kind to any flight tests or deployments of space weapons by weaker states. These hedges, as discussed in Chapter 3, should be sufficiently persuasive to foreclose such a competition, unless weaker space-faring nations make very unwise choices. While a hedging strategy is necessary, it is also insufficient. Hedges against the flight-testing and deployment of space warfare capabilities need to be accompanied by initiatives that underscore the positive and affirming uses of space for the benefit of humankind. Space assurance, broadly defined, also requires the reaffirmation of existing norms against the weaponization of space.

# Impact – Weaponization Causes War

**[\_\_\_\_]**

**[\_\_\_\_] A war in space would pollute space for decades to come and cause an accidental nuclear war.**

**Steven Lee Myers, reporter for The New York Times, 3/9/2008, “Look Out Below. The Arms Race in Space May Be On,” http://www.nytimes.com/2008/03/09/weekinreview/09myers.html**

IT doesn’t take much imagination to realize how badly war in space could unfold. An enemy — say, China in a confrontation over Taiwan, or Iran staring down America over the Iranian nuclear program — could knock out the American satellite system in a barrage of antisatellite weapons, instantly paralyzing American troops, planes and ships around the world. Space itself could be polluted for decades to come, rendered unusable. The global economic system would probably collapse, along with air travel and communications. Your cellphone wouldn’t work. Nor would your A.T.M. and that dashboard navigational gizmo you got for Christmas. And preventing an accidental nuclear exchange could become much more difficult. “The fallout, if you will, could be tremendous,” said Daryl G. Kimball, executive director of the Arms Control Association in Washington. The consequences of war in space are in fact so cataclysmic that arms control advocates like Mr. Kimball would like simply to prohibit the use of weapons beyond the earth’s atmosphere. But it may already be too late for that. In the weeks since an American rocket slammed into an out-of-control satellite over the Pacific Ocean, officials and experts have made it clear that the United States, for better or worse, is already committed to having the capacity to wage war in space. And that, it seems likely, will prompt others to keep pace.

**[\_\_\_\_] Placing weapons in space will be destabilizing for the entire world.**

**Nina Tannenwald, Joukowsky Family Research Assistant Professor and Director of the International Relations Program, Watson Institute for International Studies, Brown University, Summer 2004, 29 Yale J. Int'l L. 363**

The future of peace and security in outer space is at a critical juncture. The legal regime that guides commercial, military, and scientific activities in  [**[\*364]**](http://www.lexis.com/research/retrieve?_m=56d919ecc6092491bcb81a9594a0fbbe&docnum=7&_fmtstr=FULL&_startdoc=1&wchp=dGLbVlb-zSkAA&_md5=a249bab5ab6e99dd8394ea3eea8ab231&focBudTerms=%22Technology%2C%20Security%20and%20Privacy%3A%20The%20Fear%20Of%20Frankenstein%2C%20The%20Mythology%20Of%20Privacy%20and%20The%20Lessons%20Of%20King%20Ludd%22%20or%20%22When%20Wishing%20on%20a%20Star%20Just%20Won%27t%20Do%3A%20The%20Legal%20Basis%20for%20International%20Cooperation%20in%20the%20Mitigation%20of%20Asteroid%20Impacts%22%20or%20%22The%20Duty%20to%20Expect%20the%20Unexpected%3A%20Mitigating%20Extreme%20Natural%20Threats%20to%20the%20Global%20Commons%20Such%20as%20Asteroid%20and%20Comet%20Impacts%20with%20the%20Earth%22%20or%20%22Law%20Versus%20Power%20on%20the%20High%20Frontier%3A%20The%20Case%20for%20a%20Rule-Based%20Regime%20for%20Outer%20Space%22%20or%20%22NOTES%20AND%20COMMENTS%3A%20THE%20COMMON%20HERITAGE%20OF%20MANKIND%20PRINCIPLE%20AND%20THE%20DEEP%20SEABED%2C%20OUTER%20SPACE%2C%20AND%20ANTARCTICA%3A%20WILL%20DEVELOPED%20AND%20DEVELOPING%20NATIONS%20REACH%20A%20COMPROMISE%22%20or%20%22Space%20Law%3A%20Its%20Cold%20War%20Origins%20and%20Challenges%20in%20the%20Era%20of%20Globalization%20or%20U.S.%20National%20Security%20And%20Government%20Regulation%20Of%20Commercial%20Remote%20Sensing%20From%20Outer%20Space%22&focBudSel=all)  space is fragmented and increasingly inadequate to meet the challenges posed by the growing number of actors seeking to exploit space. The most serious challenge to the space regime is posed by the stated intent of the George W. Bush administration to pursue national dominance in space, which may eventually include stationing weapons there. Although space is already militarized to some degree - that is, used for military support purposes - no nation has yet placed weapons in space. Such a move would cross an important and longstanding threshold, likely provoking a battle for national superiority in space dominated by the United States. It would seriously undermine the current legal order in space that is widely supported by the rest of the world. The deployment of ground-based antisatellite (ASAT) weapons would also constitute a serious departure from the current regime. Without a concerted effort to develop a more comprehensive legal regime for space that will limit unconstrained weaponization, the international community will likely face a new military competition in space, with destabilizing consequences for national and global security. Such a competition will place at risk existing military, commercial, and scientific activities.

# Impact – Weaponziation Causes War

**[\_\_\_\_]**

**[\_\_\_\_] Any weaponization of space or attacks triggers broader conflict and makes space uninhabitable.**

**Michael Krepon et al, co-founder of the Henry L. Stimson Center, former Senior Associate at the Carnegie Endowment for International Peace, 6/21/2007, Theresa Hitchens, Michael Katz-Hyman, Preserving Freedom of Action in Space: Realizing the Potential and Limits of U.S. Spacepower,”**

While some have compared space to another "global commons," the high seas, we believe this analogy to be deeply flawed. Warships provide backup for sea-based commerce, but they are essentially instruments of warfighting. Satellites, on the other hand, usually serve multiple purposes in both military and nonmilitary domains. A ship damaged in combat can seek safety and repairs at a friendly port. The debris from combat at sea sinks and rarely constitutes a lingering hazard. Defensive measures are easier to undertake at sea than in space. If space weapons are deployed and used, no nation can expect there to be safe havens in space. And if the most indiscriminate means of space warfare are employed, debris will become a long-lasting hazard to military and nonmilitary satellite operations. All countries would be victimized if a new precedent is set and satellites are attacked in a crisis or in warfare. As the preeminent space power, the United States has the most to lose if space were to become a shooting gallery. The best offense can serve as an effective defense in combat at sea, but this nostrum does not apply in space, since essential satellites remain extremely vulnerable to rudimentary forms of attack. The introduction of dedicated and deployed weapons in space by one nation would be followed by others that feel threatened by such actions. The first attack against a satellite in crisis or warfare is therefore unlikely to be a stand-alone event, and **n**ations may choose different rules of engagement for space warfare and different means of attack once this threshold has been crossed. Our analysis thus leads to the conclusion that the introduction and repeated flight-testing of dedicated ASAT weapons would greatly subtract from U.S. spacepower, placing at greater risk the military, commercial, civil, and lifesaving benefits that satellites provide. Instead, we propose that the United States seek to avoid further flight testing of ASATs while hedging against hostile acts by other spacefaring nations.

# Impact – Weaponization Kills Relations

**[\_\_\_\_] Attempts at space weaponization will severely impact relations with Russia and China.**

**Michael Krepon, founding president of the Henry L. Stimson Center, a nonprofit, nonpartisan institution, previously worked at Carnegie Endowment for International Peace, U.S. Arms Control and Disarmament Agency, 2003, http://www.stimson.org/pubs.cfm?ID=81**

The likely consequences of a dynamic, but uneven, space warfare competition are not hard to envision. Potential adversaries are likely to perceive American initiatives to weaponize space as adjuncts to a U.S. military doctrine of preemption and preventive war. Depending on the scope and nature of U.S. space warfare preparations, they could also add to Chinese and Russian concerns over the viability of their nuclear deterrents. U.S. initiatives to extend military dominance into space are therefore likely to raise tensions and impact negatively on U.S.-China and U.S.-Russia relations at a time when bilateral relations have some promising, but tenuous, elements. Cooperative relations with both countries will be needed to successfully combat proliferation, but Moscow and Beijing are unlikely to tender such cooperation if they perceive that U.S. strategic objectives include the negation of their deterrents. Under these circumstances, proliferation of weapons in space would be accompanied by terrestrial proliferation.

**[\_\_\_\_] Attempts to dominate space will alienate our allies and other powers, like Russia and China.**

**Michael Krepon, founding president of the Henry L. Stimson Center, a nonprofit, nonpartisan institution, previously worked at at Carnegie Endowment for International Peace, U.S. Arms Control and Disarmament Agency, 2003, http://www.stimson.org/pubs.cfm?ID=81**

U.S. initiatives to “seize” the high ground of space are likely to be countered by asymmetric and unconventional warfare strategies carried out by far weaker states—in space and to a greater extent on Earth. In addition, U.S. initiatives associated with space dominance would likely alienate longstanding allies, as well as China and Russia, whose assistance is required to effectively counter terrorism and proliferation, the two most pressing national security concerns of this decade. No U.S. ally has expressed support for space warfare initiatives. To the contrary, U.S. initiatives to weaponize space would likely corrode bilateral relations and coalition-building efforts. Instead, the initiation of preemptive or preventive warfare in space by the United States based on assertions of an imminent threat—or a threat that cannot be ameliorated in other ways—is likely to be met with deep and widespread skepticism abroad.

**[\_\_\_\_] Relations with Russia and China solve war.**

**Ted Galen Capenter, Senior Fellow at the Cato Institute, 11/14/2002, Asia Times, http://www.atimes.com/atimes/China/DK14Ad01.html**

The triangular relationship involving Russia, China and the United States is critically important. If the strategic triangle is managed properly, the danger of a great-power war in the coming decades will be virtually eliminated. If managed improperly, the 21st century could proceed down the same violent path as the 20th century. Much will depend on the wisdom of US policy.

# Impact – Turns the Case

**[\_\_\_\_]**

**[\_\_\_\_] weaponization of space undermines attempts at space exploration.**

**George Abbey Baker, Botts Senior Fellow in Space Policy at the James A. Baker III Institute for Public Policy at, former Director of the Johnson Space Center, And, Neal Lane is the Malcolm Gillis University Professor at Rice University and Senior Fellow of the James A. Baker III Institute for Public Policy, 2005, “United States Space Policy: Challenges and Opportunities”, http://www.amacad.org/publications/spacePolicy.pdf**

International cooperation in space will be crucial if we are to reap the benefits of scientific research and human exploration. It is equally important to both U.S. national security and international security. International cooperation necessitates a U.S. foreign policy that is enlightened and multilateral, and that encourages shared values. It also requires credibility and confidence within the world community, as well as a realistic and credible plan to meet international commitments. The intentions of the United States with regard to future international cooperation in space, the future of the U.S. human space flight program, and the support of the International Space Station should not be in question. For many of the reasons addressed in this paper, the United States has lost its credibility as a reliable partner in space and created the impression that it believes there is only one way—the American way. Either this is the message the Administration wishes to send or the United States has a serious communication problem. International cooperation in space continues today but, unfortunately, without U.S. leadership. Europe and Russia are partnering on major activities. Russia and China are working together and have signed agreements to cooperate on exploration studies. The United States made a great investment over the last forty years to become a leader in space. Such a role should not be given up lightly.

# Article: Obama’s Objectives in Space

**Jeff Foust, *The national space policy, one year later*. 6/27/2011.**

The space community often treats the release of new policies as major milestones, the end of a long process largely conducted behind closed doors. A prime example was the release of the Obama Administration’s national space policy, one year ago this week. Immediately after its release, industry, media, and other observers closely examined both the language and tone of the policy, looking for what had changed and what had remained the same, congratulating the administration for its insights or lamenting the policy’s oversights (see “A change in tone in national space policy”, The Space Review, July 6, 2010).

However, the release of a policy, while the end of one, largely private process, is more importantly the beginning of a much more public process: its implementation. Like the reports of countless blue-ribbon committees over the years that provided recommendations on the future of the nation’s space efforts, only to collect dust on bookshelves, policy documents run the risk of being little more than words on paper unless those words are backed by government actions. A year after the release of its overarching national space policy, what has the administration done to carry out this policy?

**International reaction and codes of conduct**

One major difference widely cited between the current administration’s space policy and the one released by the George W. Bush Administration in 2006 has been its tone. The Obama Administration’s policy has been more open to international cooperation on various issues, although it retains language from previous policies that puts strict guidance on when the US should sign onto space arms control measures.

Previous US views on space issues, including space arms control, “was not received well by the international community,” said Ben Baseley-Walker, advisor on security policy and international law for the Secure World Foundation. “It was seen as inconsistent, it was seen as antagonistic, and it was seen as isolationist.” That view can’t be immediately changed, he said, but the new space policy takes steps in that direction. “What the national space policy has done is to start to rebuild trust, start to rebuild consistency, and start to rebuild the reliability of the US as an internationally-engaged partner.”

Just how willing the US is to be a better international partner will depend on not just the words in the policy, but other forces, notably funding, that force the US to engage more with other nations. “The US has not been put into a situation financially, or on specific limitations on the goals it wants to achieve, to have to deal with international partners,” he said. That could change down the road, he noted, such as when—at some time after 2020—the International Space Station is retired, at which time it’s possible the only space station in orbit is Chinese.

More recently, the national space policy has been wrapped up in debates about a proposed “Code of Conduct” for outer space activities promulgated by the European Union (see “Debating a code of conduct for space”, The Space Review, March 7, 2011). The document seeks to provide a set of best practices dealing with space activities, including avoiding the creation of orbital debris and minimizing the risk of collisions.

Many of the elements of the EU Code are closely aligned with themes of the new US national space policy, which puts a new emphasis on space sustainability and ensuring access to space for all who wish

to use it peacefully. This has raised speculation that the US might soon sign on to the EU Code: although so far there has been no formal move by the US to do so, there have been discussions between American and European officials about aspects of the proposed code of conduct.

Baseley-Walker noted that proposals like the EU Code can be “an asset to national security in the long-term”, and that the national space policy does endorse the use of such “transparency and confidence-building measures” to, in its words, “encourage responsible actions in, and the peaceful use of, space.” However, he said the US should proceed with caution when it comes to the EU Code in order to encourage wider adoption of the code, or something like it, by other nations. “Being very careful with our diplomatic strategy and working out our timing and how best we can build the foundations for long-term success for this issue” is preferable than expending political capital on signing onto this particular document, he said.

Andrew Palowitch, the director of the Space Protection Program, a joint effort of the US Air Force and the National Reconnaissance Office, said his personal view was that any such code of conduct needs to be a truly international document, not an EU one, with involvement from Russia, China, and “space wannabe” nations. Such an approach makes any code more difficult to do, “but harder is not necessarily ‘wronger’; you want to do this because it’s the right thing to do.”

Marquez said that while the national space policy is aligned to some degree to the EU Code, that doesn’t mean that the US should sign onto it. “You can say that the intent of the EU code of conduct is in line with the US national space policy, and that I would wholeheartedly agree with,” he said. But interpretation of that language can differ even within the US, let alone with an international audience, raising the risk of “the law of unintended consequences.”

“I don’t think the US signing up to an EU code of conduct shows a form a leadership,” he said. “We’re already doing these things, we’ve signed up to doing them on our own. Leadership is gained through experience and knowledge, not through following.”

**How much does the new policy matter?**

While panelists discussed details about implementation, and its affect on initiatives like the EU Code of Conduct, they also weighed in on a bigger question: just how influential has the new policy been? Some questioned how big of an impact it’s had, at least so far.

“Everything that happened in this last year, and everything that’s going to happen in the next year, is completely independent of that national space policy,” said Palowitch. His rationale is that it takes years to plan and carry out major space programs, and thus a new policy has little effect on programs already in some phase of development and operations. “Changes do not happen rapidly in space.”

Government activities in the last year, from the surge in national security satellite launches to the impending retirement of the Space Shuttle, had their roots in decisions made long before the policy’s release, he noted, while commercial activities are largely independent of national space policy and are based on economic rationales. Even discussion about the EU Code, he argued, had their basis outside of the policy.

Palowitch also offered a corollary to his argument about the independence of actions from the national space policy: “our actions, our reactions, and our inaction has been the actual policy that we have shown

for the past year and will do for the next year.” That’s particularly true regarding international perceptions of US policy, he said. “What we did action-wise over the year was 1,000 times more important than what we actually wrote down on a piece of paper.”

However, despite questioning its near-term impact, Palowitch called the new national space policy “fantastic” and expects to see results from it in the next 18 to 24 months. He said a number of government agencies are moving forward with implementing aspects of the policy, but those efforts take time. “We’re not going to see those in the next 12 months,” he said, citing the constraints of coordinating changes among government agencies.

Marquez disagreed with the claim that the policy hasn’t changed anything in the last year. “It is somewhat false if you look at political initiatives and international relations initiatives,” he said. “What we’ve been doing on the international front has dramatically changed in the past year.”

It’s clear that the space policy’s impact, whatever it turns out to be, will be measured over the long haul and not based on what’s been accomplished in its first 12 months. The policy, said Baseley-Walker, has created “intellectual foundations” that agencies within the government are still grappling with. “Which is,” he added, “what the space policy should do: it should lay down long-term direction for building sound, extensive national and international policy.”

**Space Weaponization Disadvantage Affirmative**

# Space Weaponization DA Affirmative

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# Glossary

**National Security Space Strategy** – Document released by the department of defense indicating that space was “congested, contested, and competitive,” and outlined America’s strategy to maintain leadership in this new environment while still being cooperative with other countries.

**Countermeasures** – an action taken to counteract a threat

**Beijing** – Capital of China

**Heavy lift vehicle** – A class of rocket that can move the heaviest payloads into space. Human missions into space exclusively have used heavy-lift vehicles, while the launch of merely a satellite could be accomplished with a smaller rocket

**Terrestrial** – relating to the earth

**Capricious** - Given to sudden and unaccountable changes of mood or behavior

**Unilateral** - an action taken unilaterally is taken on one’s own, without asking others permission

**Bane** - A cause of great distress or annoyance

**Jeopardizing** – endangering, putting into a situation of risk

**Deterrence** – Attempting to prevent a country from taking an action by threatening consequences that make the action not worth it. For example, the United States attempts to deter China from invading Taiwan by stationing its navy in between the two countries, meaning that the invasion would also force a war with the United States, something that China is not willing to do.

**Battery** - A fortified emplacement for heavy guns

**X37**-**B** – A new and classified military spacecraft

**PLA** – People’s Liberation Army, the army of China

**ISS** – International Space Station

**NASA** – National Aeronautics and Space Administration

**DMZ** – De-Militarized Zone. A thin stretch of land that separates North and South Korea.

# Uniqueness – Weaponization Now

**[\_\_\_\_]**

**[\_\_\_\_] Weaponization happening now - the Air Force has launched its own space weapons.**

**Charles Cooper, CBS editor, 4/22/2010 “ Unmanned Space Plane Opening Door to Space Weaponization?” http://www.cbsnews.com/8301-501465\_162-20003159-501465.html**

After a decade of development work, the Air Force is finally ready to launch its secret space plane, the unmanned X-37B Orbital Test Vehicle from Cape Canaveral. The craft is expected to spend up to nine months in orbit and will re-enter Earth on autopilot. It will land like an airplane at the Vandenberg Air Force Base, Calif. That much is publicly available. Much of the rest has become fodder for speculation. The only thing the government is saying officially is that the 29-foot-long delta-wing craft will conduct classified experiments while in orbit. Speaking earlier in the week, Gary Payton, the Air Force's deputy under secretary for the space program, said the Air Force's main interest is to test the craft's automated flight control system and learn about the cost of turning it around for launch again. Piecing together the available clues, Popular Mechanics suggests that the X-37B might resemble "a miniature version of the space shuttle. The publication notes that the launch "will mark the fulfillment of a dream the Department of Defense has been pursuing for nearly 50 years: the orbital flight of a military vehicle that combines an airplane's agility with a spacecraft's capacity to travel in orbit at 5 miles per second." NASA began the X-37B project in 1999, but the program was later moved under the Defense Department's auspices. It eventually found a home in the Air Force. The ensuing shroud of secrecy fed speculation that the U.S. military was interested in weaponizing space. So, what is the likely end game? The Christian Science Monitor raises the obvious question of whether this is a precursor to war in orbit. The fact that the US may have an aircraft that can remain airborne for such extended periods "provides you with all kinds of capability, both military and civilian," Chris Hellman, a policy analyst with the National Priorities Project told the Monitor.

### **[\_\_\_\_] The US and China are already engaged in a secret space war.**

**Tim Ross, Social and Religious Affairs Editor, and Holly Watt, 2/2/2011, “WikiLeaks: US vs China in battle of the anti-satellite space weapons,” The Daily Telegraph,**

It was a conference call from the Air Force General, Kevin Chilton, the head of US Strategic Command, and Marine General James Cartwright, the vice-chairman of the Joint Chiefs of Staff. They told him the conditions were “ripe” to launch what can now be disclosed was a secret test of America’s anti-satellite weapons, Washington’s first such strike in space for 23 years. That night, the US navy’s Ticonderoga-class cruiser, USS Lake Erie, scored a direct hit on an American spy satellite, known as USA 193. The missile used, a highly sophisticated SM-3, took about three minutes to climb 150 miles above the Earth, where it flew past the satellite before turning back and destroying the target at an impact speed of 22,000mph. The strike came about a year after the Chinese government had launched its own satellite attack, which started a secret “space war”, The Daily Telegraph can disclose. For months the two super powers had been engaged in a private and increasingly acrimonious row over China’s use of weapons in space – an international taboo since President Ronald Reagan abandoned the “star wars” programme in the 1980s.

# Uniqueness – Weaponization Now

**[\_\_\_\_]**

**[\_\_\_\_] Weaponization of space is occurring in the status quo.**

**Stratfor, Global Intelligence company, “United States: The Weaponization of Space,” 4/10/2008, http://www.stratfor.com/analysis/united\_states\_weaponization\_space**

Summary STRATFOR’s position on the so-called “weaponization” of space is that it is inevitable and, indeed, is already occurring. Space is an integral part of U.S. military capability and therefore, in all practical terms, has been weaponized. In the 1950s, the United States began pushing for an international treaty on outer space — even before the 1957 launch of Sputnik atop a modified version of the world’s first intercontinental ballistic missile. Fortunes have changed somewhat in the last 50 years, and the Pentagon has little interest in taking on further legally binding constraints these days. This is especially true in space, where “weaponization” is not only inevitable, but already well under way.

**[\_\_\_\_]**

**[\_\_\_\_] Chinese space weapon tests prove that weaponization is occurring.**

**Joshua Philipp, writer for the Epoch Times, 2/8/2011, “US Strategy Bringing Governance to Outer Space,”**

The world was caught off guard in 2007 when the Chinese regime blasted its Fengyun-1C spacecraft out of orbit, sending thousands of shards pummeling in all directions. The act was a wake-up call for the international community—a handful of such incidents could render entire orbits unusable, since each destroyed satellite could have a butterfly effect of destruction, sending even more scrap pieces hurling through orbit. Space is a fragile place, not ruled by any nation, yet vital to modern military operations and modern lifestyles. To help protect this domain, the U.S. government unveiled its National Security Space Strategy (NSSS) on Feb. 4, bringing with it a set of standards for space. The report raises concern around three main areas, namely that “space is becoming increasingly congested, contested, and competitive.

# Uniqueness – Weaponization Inevitable

**[\_\_\_\_]**

### **[\_\_\_\_] Countries will inevitably seek weapons in space, they are motivated by more than just US policies.**

**Steven Lambakis, senior analyst at the National Institute for Public Policy, February 2001, “Space Weapons: Refuting the Critics,” Policy Review, pp.48-49**

One may ask, just because the United States unilaterally refrains from developing antisatellite weapons or space-based lasers, why do we assume that other countries will pause right alongside Washington? After all, not all innovations in war stem from provocation. While weapons developed and deployed by rival states surely influence decision making, it is unlikely that states procure weapons systems primarily to achieve a balance in arsenals. Some states certainly may strive to have what we have, but they also will strive to acquire and master those weapons that meet their unique security requirements. Washington's very reliance on satellites for security, moreover, would appear to be a more plausible motivation behind any hostile state's desire to acquire satellite countermeasures. While China might wish to integrate ASATS into its arsenal to offset Washington's deployment of ASATS as part of a deterrence strategy ("you hit one of mine, I'll hit one of yours"), Beijing is likely to be more inclined to acquire satellite countermeasures independently of what Washington does in order to degrade U.S. space advantages, which may be used to support Taiwan.

**[\_\_\_\_]**

**[\_\_\_\_] Military experts believe that weaponization of space is inevitable.**

**Agence France Presse, 11/3/2009, “China commander says space weapons inevitable, http://www.defencetalk.com/china-commander-says-space-weapons-inevitable-22844/**

Beijing: A top China air force commander has called the militarization of space an "historical inevitability", state media said Monday, marking an apparent shift in Beijing's opposition to weaponizing outer space. In a wide-ranging interview in the People's Liberation Army (PLA) Daily, air force commander Xu Qiliang said it was imperative for the PLA air force to develop offensive and defensive operations in outer space. "As far as the revolution in military affairs is concerned, the competition between military forces is moving towards outer space... this is a historical inevitability and a development that cannot be turned back," Xu told the paper. "The PLA air force must establish in a timely manner the concepts of space security, space interests and space development. "We must build an outer space force that conforms with the needs of our nation's development (and) the demands of the development of the space age."

# Link Turn – Plan Trades off with Weaponization

**[\_\_\_\_]**

### **[\_\_\_\_] A major new exploration project would trade off with weaponization, not support it.**

**David M. Livingston, business consultant, financial advisor, and strategic planner, 8/10/2000, “From Earth to Mars: A Cooperative Plan,” http://www.spacefuture.com/archive/from\_earth\_to\_mars\_a\_cooperative\_plan.shtml**

Despite the problems associated with putting humans on Mars, there are also benefits to be realized from such a mission. Both the public sector and the private sector have unique ways of benefiting from a manned voyage to Mars. Public-sector benefits include increased employment, the allocation of resources away from weapons to a space project, new technologies, scientific discoveries, and higher tax revenues. Some of the private-sector benefits include goodwill and a favorable public image as well as increased revenues and opportunities for corporate growth. High-paying jobs and employment opportunities will result from a Mars project. For example, maintaining and flying the Space Shuttle involves five NASA centers and approximately 25,000 high-paying jobs. A manned Mars mission has equal or greater potential for similar employment opportunities within both the public and private sectors. Another important benefit would be the probable allocation of resources away from military and weapons projects to the Mars project. Resources and talent will be dedicated to designing and developing the Mars mission.

**[\_\_\_\_]**

**[\_\_\_\_] NASA’s budget is finite. A new project would force a cancellation of other programs. The negative’s uniqueness evidence proves it would be a weaponization program.**

**Norman R. Augustine et al, chairman of the Aeronautics Committee of the NASA Advisory Council and served on the Air Force Scientific Advisory Board, 2009, “Seeking a Human Spaceflight Program Worthy of a Great Nation,” http://legislative.nasa.gov/396093main\_HSF\_Cmte\_FinalReport.pdf**

In the case of NASA, one result of this dilemma is that in order to pursue major new programs, existing programs have had to be terminated, sometimes prematurely. Thus, the demise of the Space Shuttle and the birth of “the gap.” Unless recognized and dealt with, this pattern will continue. When the ISS is eventually retired, will NASA have the capability to pursue exploration beyond low-Earth orbit, or will there be still another gap? When a human-rated heavy-lift vehicle is ready, will lunar systems be available? This is the fundamental conundrum of the NASA budget. Continuation of the prevailing program execution practices (i.e., high fixed cost and high overhead), together with flat budgets, virtually guarantees the creation of additional new gaps in the years ahead. Programs need to be planned, budgeted and executed so that development and operations can proceed in a phased, somewhat overlapping manner.

# Impact Turn – Space Weaponization Solves Conflict

### **[\_\_\_\_]**

### **[\_\_\_\_] Space weapons mean the end of conventional war.**

**Everett Carl Dolman, Associate Professor at the U.S. Air Force’s School of Advanced Airpower Studies, October 2003, “Space Weapons: Are They Needed?” http://www.gwu.edu/~spi/assets/docs/Security\_Space\_Volume.Final.pdf**

And so it would. Complete domination of space would give the United States such an advantage on the terrestrial battlefield that no state could openly challenge it. Traditional war would be effectively over. An idealist vision would be secured by realist means. Strategic dominance of space would further force the United States to maintain the industrial and technical capacity to keep it at the forefront of hegemony for the foreseeable future. Nontraditional war, especially terrorism, would not be over, but it could very well be mitigated.42 The current dominant use of space for military matters is in the areas of observation and monitoring. These are the tools of effective police organizations, and have already been adapted in counter-terrorism plans. The details would be worked out in time, but the strategy clearly has benefits for the United States and the world.

**[\_\_\_\_]**

### **[\_\_\_\_] Space weapons deter conflict and promote peace and freedom.**

**Steven Lambakis, senior analyst at the National Institute for Public Policy, February 2001, “Space Weapons: Refuting the Critics,” Policy Review, p.51**

Finally, strength at home and assertiveness abroad have ensured stability for the United States and much of the world during the past century. Capricious misfortune and aggression, after all, are the bane of the republic -- and of international security. Military strength can help the United States and its allies direct chance more favorably and, in the worst of times, deter and turn aside aggression. Vast practical consequences will fall out of policy choices concerning the nature of American space power, especially as they affect the composition of U.S. forces, military organization, and security strategy. The new administration and Congress must help the American people overcome a habit of viewing space weapons in isolation from America's purpose. Should military requirements warrant and cost permit, space weapons could be invited to join the rest of the arsenal to secure American interests and contribute to global strategic stability. The United States and its allies should resist enchantment with slogans that divert attention from new security possibilities, especially ballistic missile defense, which ought to be viewed in the broader context of space power. Far from jeopardizing stability and peaceful uses of space, American military power exercised on the edge of earth would contribute to world peace and freedom.

# Impact Turn – Space Weaponization Solves Conflict

**[\_\_\_\_]**

**[\_\_\_\_] Space weaponization could prevent a nuclear war from starting.**

**Dennis P. Tucker, Lieutenant Colonel, commander of the 336th Recruiting Squadron at Moody Air Force Base, June 2008, “PRESERVING UNITED STATES DOMINANCE: THE BENEFITS OF WEAPONIZING THE HIGH GROUND,” School of Advanced Air and Space Studies,** [**https://www.afresearch.org/skins/rims/q\_mod.../display.aspx**](https://www.afresearch.org/skins/rims/q_mod.../display.aspx)**?...**

Finally, the most radical of the US pro-space weaponization advocates are the space hegemonists. This school of thought has roots in Lupton’s high-ground school, whose believers were focused on dominating space with space-based ballistic missile defenses so that a nuclear war could be deterred and or won by winning the war in space*.* Today the United States places less emphasis on deterring and winning a nuclear war than it did in the bipolar Cold War era, and the space hegemonists have branched out to cover the rest of the spectrum with their beliefs. They assert that space hegemony should be the goal—and that space is the critical battlefield where wars must be fought and won. In the words of Dr. Everett Dolman, “An optimum deployment of space assets is essential for victory on the current terrestrial and future space-based battlefields….In accordance with the examples set by Sir Halford Mackinder and Nicholas Spykman, the formulation of a neoclassical astropolitical dictum is established: Who controls low-Earth orbit controls near-space. Who controls near-Earth space dominates Terra. Who dominates Terra determines the destiny of humankind.”16 In 1999, then-Senator Bob Smith, the most prominent spokesman for this perspective, clearly articulated the value of space weapons: American development of space weapons will buy generations of security that all the ships, tanks, and airplanes in the world will not provide…With credible offensive and defensive space control, we will deter and dissuade our adversaries, reassure our allies, and guard our nation’s growing reliance on global commerce. Without it, we will become vulnerable beyond our wildest dreams.17 Unlike space controllers who believe space weapons should be deployed as soon as they are militarily useful, the hegemonists are much more aggressive. They consider space weapons essential, and advocate their deployment as soon as possible. They believe these weapons will one day dominate terrestrial as well as outer space battlefields, and eventually will replace the need for most terrestrial weapons. Hegemonists believe that controlling space will truly lead to controlling the world.18

# Impact Turn – Weaponziation Solves India-Pakistan War

**[\_\_\_\_\_] Effective militarization deters Indo-Pak war and aggression against the U.S.**

**John J. Miller, national political reporter for the National Review and a Bradley fellow at the Heritage Foundation, 2002 “Our 'Next Manifest Destiny': America should move to control space -- now, and decisively”**

With the right mix of intellectual firepower and political muscle, the United States could achieve what Dolman calls "hegemonic control" of space. The goal would be to make the heavens safe for capitalism and science while also protecting the national security of the United States. "Only those spacecraft that provide advance notice of their mission and flight plan would be permitted in space," writes Dolman. Anything else would be shot down. That may sound like 21st-century imperialism, which, in essence, it would be. But is that so bad? Imagine that the United States currently maintained a battery of space-based lasers. India and Pakistan could inch toward nuclear war over Kashmir, only to be told that any attempt by either side to launch a missile would result in a boost-phase blast from outer space. Without taking sides, the United States would immediately defuse a tense situation and keep the skies above Bombay and Karachi free of mushroom clouds. Moreover, Israel would receive protection from Iran and Iraq, Taiwan from China, and Japan and South Korea from the mad dictator north of the DMZ. The United States would be covered as well, able not merely to deter aggression, but also to defend against it.

**Another open war between India and Pakistan would cause global nuclear war.**

**Ghulam Nabi Fai, Executive Director, Kashmiri American Council, WASHINGTON TIMES, September 8, 2001, p. 1**

The foreign policy of the United States in South Asia should move from the lackadaisical and distant (with India crowned with a unilateral veto power) to aggressive involvement at the vortex. The most dangerous place on the planet is Kashmir, a disputed territory convulsed and illegally occupied for more than 53 years and sandwiched between nuclear-capable India and Pakistan. It has ignited two wars between the estranged South Asian rivals in 1948 and 1965, and a third could trigger nuclear volleys and a nuclear winter threatening the entire globe. The United States would enjoy no sanctuary.

# AT: Space Weapons Cause Miscalculation

**[\_\_\_\_]**

**[\_\_\_\_]Multiple historical examples prove that miscalculation or single strikes won’t escalate.**

**Steven Lambakis, senior defense analyst at the National Institute for Public Policy, 2001. Policy Review 105, “Space Weapons: Refuting the Critics,” http://www.hoover.org/publications/policy-review/article/6612**

Those who believe we run extraordinary risks stemming from clouded perceptions and misunderstandings in an age of computerized space warfare might want to take a look at some real-world situations of high volatility in which potentially provocative actions took place. Take, for example, the tragedies involving the USS Stark and USS Vincennes. In May 1987, an Iraqi F-1 Mirage jet fighter attacked the Stark on patrol to protect neutral shipping in the Persian Gulf, killing 37 sailors. Iraq, a "near-ally" of the United States at the time, had never before attacked a U.S. ship. Analysts concluded that misperception and faulty assumptions led to Iraq’s errant attack. The memory of the USS Stark no doubt preoccupied the crew of the USS Vincennes, which little over a year later, in July 1988, was also on patrol in hostile Persian Gulf waters. The Vincennes crew was involved in a "half war" against Iran, and at the time was fending off surface attacks from small Iranian gunboats. Operating sophisticated technical systems under high stress and rules of engagement that allowed for anticipatory self-defense, the advanced Aegis cruiser fired anti-aircraft missiles at what it believed to be an Iranian military aircraft set on an attack course. The aircraft turned out to be a commercial Iran Air flight, and 290 people perished owing to mistakes in identification and communications. To these examples we may add a long list of tactical blunders growing out of ambiguous circumstances and faulty intelligence, including the U.S. bombing in 1999 of the Chinese Embassy in Belgrade during Kosovo operations. Yet though these tragic actions occurred in near-war or tinderbox situations, they did not escalate or exacerbate local instability. The world also survived U.S.-Soviet "near encounters" during the 1948 Berlin crisis, the 1961 Cuban missile crisis, and the 1967 and 1973 Arab-Israeli wars. Guarded diplomacy won the day in all cases. Why would disputes affecting space be any different?

# AT: Weaponization Causes Space Arms Race

**[\_\_\_\_]**

**[\_\_\_\_] Other countries would not have the funds to match U.S. dominance in space.**

**Everett C. Dolman, Associate Professor of Comparative Military Studies, US Air Force School of Advanced Air and Space Studies, 9/14/2005, “US Military Transformation and Weapons in Space,”**

And America would respond … finally. But would another state? If America were to weaponize space today, it is unlikely that any other state or group of states would find it rational to counter in kind. The entry cost to provide the infrastructure necessary is too high; hundreds of billions of dollars, at minimum. The years of investment it would take to achieve a minimal counter-force capability—essentially from scratch—would provide more than ample time for the US to entrench itself in space, and readily counter preliminary efforts to displace it. The tremendous effort in time and resources would be worse than wasted. Most states, if not all, would opt not to counter US deployments in kind. They might oppose US interests with asymmetric balancing, depending on how aggressively America uses its new power, but the likelihood of a hemorrhaging arms race in space should the US deploy weapons there—at least for the next few years—is extremely remote.

# AT: Weaponization is Infeasible

**[\_\_\_\_]**

**[\_\_\_\_] Space weapons are feasible, given increased funding.**

**Everett C. Dolman, Associate Professor of Comparative Military Studies, US Air Force School of Advanced Air and Space Studies, 9/14/2005, “US Military Transformation and Weapons in Space,”**

We have learned much, it would seem, or else bluntly negative scientific opinion on space weapons has been weeded out over time. Less encompassing arguments are now the rule. As the debate moved completely away from the impossibility of weapons and wars in space to more subtle and scientifically sustainable arguments that a particular space weapon is not feasible, mountains of mathematical formulae are piled high in an effort, one by one, simply to bury the concept. But these limitations on specific systems are less due to theoretical analysis than to assumptions about future funding and available technology. The real objection, too often hidden from view, is that a particular weapons system or capability cannot be developed and deployed within the planned budget, or within narrowly specified means. When one relaxes those assumptions, opposition on technical grounds falls away.

**Privatization Counterplan**

# Privatization Counterplan

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# Explanation

The privatization counterplan asks the question “is the government the best actor to solve the problem the affirmative identifies?” Privatization refers to the process of a private company taking over a function that the government has traditionally provided. A relevant example to this topic is the airline industry. When airplanes were first invented, they were largely owned by the government, and were developed in order to fit the government’s needs and preferences. However, in the decades that followed World War II, the government began to let airline companies govern themselves much more independently, which led to the creation of the airline system that we have today.

Some people believe that the same process can happen with space. The counterplan would create a tax incentive for private companies to solve the problems of the affirmative plan. Maybe a private company would develop a spaceship that could explore the Moon like Constellation, while another might seek to create a colony on Mars. A tax incentive is an opportunity for a company to pay less in taxes if it completes a specific task.

The privatization counterplan does not link to the NASA tradeoff disadvantage because it does not interfere with NASA’s budget. Because the action would be taken by a company, it does not require any of NASA’s current funds, and would not trade off with global warming observation

# Glossary

**Tax incentive** – An opportunity to pay fewer taxes to the government if a specific action is undertaken. If the government taxes companies that use renewable energy than companies that do not, the government has created a tax incentive to use renewable energy.

**Bureaucracy –** A bureaucracy is a system of government where policy decisions are made by appointed experts in the area instead of elected officials. Many people use bureaucracy as a negative term because they believe it is inefficient because bureaucracies lack a profit motive. Profit motive refers to the fact that companies have an incentive to take actions as efficiently as possible because in doing so they can make more money. Governments are not organized to make a profit, so they have far less of an incentive to act in the most efficient manner possible

**Private enterprise / commercial enterprise/ free enterprise** – refers to the private sector’s capability for innovation and solving problems with ingenuity.

**Privatization** – The process of taking an activity that was one

**Public sector** – Refers to the government and government agencies. NASA is in the public sector.

**GDP** – Gross Domestic Product, a measure of the size of a country’s economy.

Solar Power Satellites – a proposed system of satellites that would circle the Earth with large solar panels to collect energy, which would then be beamed down to Earth as a means of providing electricity.

**Private sector** – the private sector collectively refers to companies that are owned by individuals, as opposed to the government. In the context of space exploration, NASA would be a “public” organization since it is a part of the government, whereas someone like Boeing or Lockheed Martin would be considered a part of the private sector.

**SpaceX** – a private company attempting space exploration. It created the Falcon 1 and Falcon 9 rockets and the Dragon spacecraft. In 2010, SpaceX became the first privately funded company to successfully launch, orbit, and recover a spacecraft.

**Low earth orbit** – the area from 100 miles to 1240 miles above the Earth’s surface. With the exception of the Apollo missions, every spacecraft has been launched into low earth orbit.

**Ansari X Prize** - A Competition launched by private donors and supported by NASA that awarded 10 million dollars to the first company that could send a reusable manned rocket into space twice within two weeks. The object of the prize was to promote commercial development of space.

**Entrepreneur** - A person who organizes and operates a business or businesses, taking on financial risk to do so

**Investor** - someone who lends money to a company on the promise of repayment with interest later on.

# Privatization Counterplan 1NC [1/1]

**My partner and I offer the following counterplan:**

**The United States federal government should establish tax incentives for private companies pursuing the goals of space exploration of the affirmative’s plan.**

**Observation 1: The counterplan is competitive: The plan and the counterplan take different action. The plan has the government and NASA act directly, while we advocate that the U.S. rely on private companies to take action.**

**Observation 2: Net benefits**

1. **Allowing businesses to take over tasks in space – known as privatization – will result in them being run more efficiently and encouraging more innovation.**

**Joseph N. Pelton, Research Professor with the Institute for Applied Space Research -- George Washington University, chairs a NASA and the National Science Foundation Panel of Experts that is conducting a global review of satellite telecommunications, 05/2010 “A new space vision for NASA - And for space entrepreneurs too?,” Space Policy 26 (2010) p. 78-80**

NASA - now past 50 - is well into middle age and seemingly experiencing a mid-life crisis. Any honest assessment of its performance over the past two decades leads to the inexorable conclusion that it is time for some serious review and even more serious reform. National U.S. Space Study Commissions have been recommending major reform for some years and finally someone has listened. President Obama has had the political and programmatic courage to make some serious shifts in how NASA does its business. It is no longer sufficient to move some boxes around and declare this is the new and improved NASA. One of the key messages from the 2004 Aldridge Commission report, which was quickly buried by NASA, was words to this effect: “Let enterprising space entrepreneurs do what they can do better than NASA and leave a more focused NASA do what it does best namely space science and truly long range innovation” [1]. If one goes back almost 25 years to the Rogers Commission [2] and the Paine Commission [3] one can find deep dissatisfaction with NASA productivity, with its handling of its various space transportation systems, and with its ability to adapt to current circumstances as well as its ability to embark on truly visionary space goals for the future. Anyone who rereads the Paine Commission report today almost aches for the vision set forth as a roadmap to the future in this amazing document. True there have been outstanding scientific success stories, such as the Hubble Telescope, but these have been the exception and not the rule. The first step, of course, would be to retool and restructure NASA from top to bottom and not just tweak it a little around the edges. The first step would be to explore what space activities can truly be commercialized and see where NASA could be most effective by stimulating innovation in the private sector rather than undertaking the full mission itself. XPrize Founder Peter Diamandis has noted that we don't have governments operating taxi companies, building computers, or running airlines - and this is for a very good reason. Commercial organizations are, on balance, better managed, more agile, more innovative, and more market responsive than government agencies. People as diverse as movie maker James Cameron and Peter Diamand is feel that the best way forward is to let space entrepreneurs play a greater role in space development and innovation. Cameron strongly endorsed a greater role for commercial creativity in U.S. space programs in a February 2010 Washington Post article and explained why he felt this was the best way forward in humanity's greatest adventure: “I applaud President Obama's bold decision for NASA to focus on building a space exploration program that can drive innovation and provide inspiration to the world. This is the path that can make our dreams in space a reality.”

1. Counterplan doesn’t link to the disadvantages because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Solvency – General

**[\_\_\_\_]**

**[\_\_\_\_] The private sector is much more efficient and effective at exploring space than NASA.**

**Newt Gingrich, senior fellow at the American Enterprise Institute, and former speaker of the House of Presentatives, 6/14 2011, “Newt Gingrich on Space Exploration: 'NASA Is Standing in the Way'”, Fox News, http://www.foxnews.com/scitech/2011/06/14/newt-gingrich-on-space-exploration-nasa-is-standing-in-way/**

Well, sadly — and I say this sadly, because I'm a big fan of going into space and I actually worked to get the shuttle program to survive at one point — NASA has become an absolute case study in why bureaucracy can't innovate. If you take all the money we've spent at NASA since we landed on the moon and you had applied that money for incentives to the private sector, we would today probably have a permanent station on the moon, three or four permanent stations in space, a new generation of lift vehicles. And instead what we've had is bureaucracy after bureaucracy after bureaucracy, and failure after failure. I think it's a tragedy, because younger Americans ought to have the excitement of thinking that they, too, could be part of reaching out to a new frontier. You know, you'd asked earlier, John, about this idea of limits because we're a developed country. We're not a developed country. The scientific future is going to open up, and we're at the beginning of a whole new cycle of extraordinary opportunities. And, unfortunately, NASA is standing in the way of it, when NASA ought to be getting out of the way and encouraging the private sector.

**[\_\_\_\_] In order to best explore space we must take advantage of America’s entrepreneurs in the private sector.**

**National Space Society, 2005, Chapter of an ongoing series by the NSS on Space Transportation, “Chapter 5 Space Transportation,”**

"The president is recognizing the fact that the best of our system is the private investment and private development of commercial capabilities of all types," the official said. "That is hopefully going to grow and bloom out here." 47 “To exploit space to the fullest extent requires a fundamental transformation in U.S. space transportation capabilities and infrastructure. In that regard, the United States Government must capitalize on the entrepreneurial spirit of the U.S. private sector, which offers new approaches and technology innovation in U.S. space transportation, options for enhancing space exploration activities, and opportunities to open new commercial markets, including public space travel. “Further, dramatic improvements in the reliability, responsiveness, and cost of space transportation would have a profound impact on the ability to protect the Nation, explore the solar system, improve lives, and use space for commercial purposes. While there are both technical and budgetary obstacles to achieving such capabilities in the near term, a sustained national commitment to developing the necessary technologies can enable a decision in the future to develop such capabilities.”

# Solvency - General

**[\_\_\_\_]**

**[\_\_\_\_] Privatization solves better and accesses multiple sectors and technologies.**

**Phillip R. Harris, Research Associate at the California Space Institute, 07/2008, “Overcoming obstacles to private enterprise in space” Space Policy Vol 24 Issue 3 pg 124-127**

As the Space Age matures and develops, it is my belief that it will be private enterprise that truly opens up the space frontier for commerce. The history of exploration confirms a pattern—a small number of explorers and traders move first into the new frontier; then governments take an interest in the territorial acquisition prospects, so military outposts are established, often with the help of missionaries, and a basic infrastructure emerges. But it is large commercial trading companies that bring settlement—as opposed to occasional visits—in the form of colonists seeking to improve their life prospects. The opening and development of the American frontier by Europeans demonstrates this pattern. Similarly with regard to outer space, it was the explorers in science fiction and the rocket enthusiasts who opened our minds to the possibilities beyond Earth. Then it was governments, like those of the USA and the USSR, which got into a competitive political race to use the opportunities in outer space. In the former country, space leadership came from two government agencies, the Department of Defense and NASA, both of whom employed civilian contractors. Pioneering astronauts and cosmonauts were usually from a military background, while the actual unmanned exploration resulted from civilian teams of scientists, engineers and academics. Growing from the birth and maturity of world-wide aviation, the big aerospace industry arose. And these big corporations innovated and succeeded in ventures to build rockets and spacecraft that could take humans to the Moon, or the far corners of the universe. Today, as NASA moves away from the Space Shuttle and towards development of a Crew Exploration Vehicle (CEV), there is still a general consensus that, when CEV operations begin, government will be responsible for the more difficult missions, such as spaceflights to the Moon and Mars, while giant aerospace contractors and entrepreneurs will most likely build a commercial presence.

# Solvency – Colonization Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] Earth proves that we need private companies in order to achieve true colonization of Mars.**

**Sam Dinkin, columnist for the Space Review, 7/26/2004, “Space Privatization: Road to Freedom,”** [**http://www.thespacereview.com/article/193/1**](http://www.thespacereview.com/article/193/1)

With no privatization and no military protection, there will not be much colonization. Antarctica may be free of the intellectual pollution brought by property rights, but there are also no citizens, no development and very little in the way of commercial exports. Alaska, in contrast, hands out checks to its citizens rather than charging them taxes. Antarctica is also more inaccessible, so there may be another explanation for the disparity.

Texarkana offers a starker side-by-side comparison of different law leading to different levels of commerce. The city has a street running down the center of town where one side is governed by Arkansas law and the other is governed by Texas law. The main difference between the two jurisdictions is the ability to collect a high rate of interest (Arkansas caps their interest rate at 5% above the federal funds rate). This minor limitation on commerce means that there are many more stores on the Texas side of the street. But suppose for a moment that we do have the opportunity to create a viable space economy. Gagnon continues, “Thus, after the taxpayers have paid all the R&D, private industry now intends to gorge itself on profits. Taxpayers won’t see any return on our ‘collective investment.’” They are seeing little return now on their collective investment. Public returns will be great indeed if space development is successful. If privatization results in profits, those profits can be taxed. If private suborbital, orbital, point-to-point, lunar and planetary development lowers the price of access for public science, exploration and commerce, then that is a benefit. If colonization is successful, the public will have an insurance policy against extinction. Successful colonization will also energize the spirit of humanity. Colonizing Mars will double the amount of land available to the species and potentially more than double solar system GDP as a commerce of ideas and builds up between the growing Mars population and Earth.

**[\_\_\_\_] NASA is too bureaucratic to plan a mission to Mars, the private sector is needed.**

**C.A. Carberry et al, Executive Director of Explore Mars, Inc., November 2010, along with Artemis Westenberg, President, Explore Mars, Inc., and Blake Ortner, Project Leader, ISRU Challenge, Explore Mars, Inc., October-November 2010, “The Mars Prize and Private Missions to the Red Planet”, http://journalofcosmology.com/Mars139.html, AD: 6/27/11**

Despite the fact that Virgle was just an extremely well executed hoax, it stimulated some very intriguing questions – most notably – would a corporate partnership or consortium like Virgle really be able to launch a private mission to Mars? There are many people who believe that a private mission to Mars is not only possible, but perhaps the only way that the United States will be able to get there (Joseph 2010). They feel that NASA has become too bureaucratic to develop an affordable human Mars mission; that a human mission would fall victim to a lack of long-term political will in Congress and cannot be carried through multiple Administrations. Despite his doubts concerning a mega Mars X-Prize, Peter Diamandis is a strong advocate of a private mission to Mars. "I think privately funded missions are the only way to go to Mars with humans because I think the best way to go is on "one-way" colonization flights and no government will likely sanction such a risk. The timing for this could well be within the next 20 years. It will fall within the hands of a small group of tech billionaires who view such missions as the way to leave their mark on humanity" (Diamandis 2010).

# Solvency – Colonization Affiramtive

**[\_\_\_\_] Private sector planning of a mission to mars would save the government money and be more likely to excite the public imagination.**

**John Tierney, science journalist for the NYT, 5/26/1996, “How To Get To Mars (And Make Millions!” http://www.nytimes.com/1996/05/26/magazine/how-to-get-to-mars-and-make-millions.html?pagewanted=print&src=pm,**

A manned mission to Mars, the fantasy that had paid the mortgage for generations of science-fiction writers, lost its appeal as soon as NASA plotted the itinerary. The $400 billion price tag seemed absurdly high to a nation bored with the sight of astronauts lumbering around craters. We already had enough extraterrestrial rocks, thank you. Recently, though, an intriguing modification to NASA's Mars plan has been suggested: ditch NASA. Let private explorers, modern Vikings inspired by the Norsemen's third desire, seek wealth on Mars. The basics of the expedition have been worked out by Robert M. Zubrin, who has his own research and development company, Pioneer Astronautics, in Denver. Since devising the technology for a simple and cheap mission to Mars, Zubrin has been traveling the globe giving passionate lectures about "our generation's New World." He tells audiences of the prizes offered by 15th-century Portuguese and Spanish rulers to entrepreneurs for venturing down the African coast and across the Atlantic. (Columbus's expedition was financed not only by Queen Isabella but also by private merchants who stood to gain trading concessions.) Zubrin thinks that if the United States Government were to offer a Mars Prize of $20 billion -- four times what he estimates a private mission would cost -- entrepreneurs would take the bait. If they made it to Mars and back, pocketing the prize, they could turn a nice profit; if they failed, taxpayers wouldn't be stuck with the bill. The Mars Prize would be a bargain for the public, and not merely because it would cost so much less than a NASA mission. It would also have the wonderful consequence of making exploration interesting again. Unlike NASA's conservative officials, entrepreneurs couldn't afford to bore everyone with meticulously plotted test missions executed by bland technicians. They would have to take chances, risking their lives (or at least their employees' lives) with one bold venture, as explorers used to do. And because they would finance their mission by selling media rights and marketing tie-ins, they would have to appeal to the public's imagination. They couldn't go to Mars just to perform arcane scientific experiments and drop off a plaque with politicians' names. They would have to turn Mars, once again, into a dangerous and romantic destination.

**[\_\_\_\_] Private initiatives can provide the research necessary to reach mars.**

**Patrice Sarath, a staff writer for Bizmology.com, 2/25/2011, “Space Inc.: as the shuttle program lands for good, private companies step in”,** [**http://www.bizmology.com/2011/02/25/space-inc-as-the-shuttle-program-lands-for-good-private-companies-step-in/**](http://www.bizmology.com/2011/02/25/space-inc-as-the-shuttle-program-lands-for-good-private-companies-step-in/)

The space shuttle *Discovery*made its last flight into space yesterday. When*Endeavor*follows in May, it will be the end of the 30-year-old space shuttle program. (There may be a June flight, but it has not been confirmed.) The shuttles will be mothballed, and possibly cannibalized for other missions, perhaps to the moon, to establish an outpost, and perhaps straight to Mars, to build a base, then eventually a colony. This is where private companies and private initiatives step in. The X Prize, Burt Rutan,Richard Branson’s Virgin Galactic, all of these initiatives will drive the commercialization of space flight. Private funding along with space tourism may be able to fill the void left behind by the end of the shuttle program, and provide the research and development necessary to put humans on Mars.

# Solvency – Constellation Affirmative

[\_\_\_] Constellation is a “brute force” approach to space that will not be successful long term. We need to encourage commercial attempts at space access.

Dennis Wingo, **22-year veteran of the computer, academic, and space communities, Founder & President of SkyCorp Inc., 6/8/2011 “An Open Letter to Neil Armstrong, Gene Cernan, and James Lovell,” http://www.spaceref.com/news/viewnews.html?id=1538**

In 1969, the United States was at the height of its economic and political power and we turned away from space; today we are broke and the challenges that face our nation are daunting in the extreme. Without a powerful economic incentive, space is simply not worth the expenditure. It is within our financial and technical power to do this as a nation, but not through the brute force method of an "Apollo on steroids" architecture (as cited by Mike Griffin) and certainly not with further flags and footprints. The day that Werner von Braun, sitting at his desk in Huntsville, caved to the inevitability of the Lunar Orbit Rendezvous method of getting to the Moon. he warned his Huntsville staff that his greatest fear was that Apollo would lead to a "Kilroy Was Here" mentality that would allow our political leaders to kill the program after the first success was had. The ESAS/Constellation architecture of an "Apollo on steroids" program, even if somehow successful, is molded in the same vein, and with our economic difficulties today, would be similarly shut down after the initial goal reached. There are architectures out there - many of them - that will enable the economic development of the solar system and the harvesting of the resources that are out there, wealth that will transform our world for the better, for the good of all humankind, in keeping with the Kennedy vision and legacy. NASA is making moves in that direction today with a focus on the use of commercial space solutions for cargo and human spaceflight, contracts for fuel depots, and other innovative systems. However, the rump ESAS/Constellation program in the form of the SLS vehicle is not one of them. Indeed, as we are seeing what the James Webb Telescope threatens to do to the science budget, the SLS sucks the needed oxygen of technology development and innovation needed to make Kennedy's vision come to pass. To be worthy inheritors of the Kennedy space legacy we must be willing to depart from its 1960s form and adopt an approach that works now - half a century later - one that is as relevant to our times as Apollo was to its own time.

**[\_\_\_\_] Privatization is economic necessity. There’s no solvency deficit, all spacecraft are built by private companies in the status quo.**

**Paul** Taylor, **The Boston Globe and Mail’s health editor, has won two awards sponsored by the Canadian Science Writers’ Association; 4/9/2011, “Can Capitalism Save Space Travel?”**

It's not simply faith in free-enterprise economics that is driving the Obama administration's space policy. It's also a matter of necessity. U.S. taxpayers and lawmakers are unwilling to finance NASA to the same extent that made it possible for America to land the first men on the moon in 1969. As Mr. Mango explains it, if NASA spends its limited funds building a new rocket system just to get a few hundred miles above the Earth, "there won't be enough resources to do the exploration part." In many respects, Mr. Obama's plan is an extension of an existing program to fund the private development of unmanned supply vessels to the space station once the shuttles retire. Some of the same companies with cargo contracts also want to carry passengers. It's important to keep in mind that every single U.S. manned spaceship - from Mercury to the shuttles - has been essentially designed and built by private industry under contract for NASA. What is changing is the ownership. Rather than NASA having its own fleet, it will rent seats on commercial spacecraft. But for that to happen, the companies will have to make a profit on transporting people to space, rather than on building the vehicles. So Washington is essentially padding the bottom line of the companies by helping to pay the up-front development costs of the new rocket systems.

# Solvency – Constellation Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] A move to commercial launch services will create thousands of new jobs and high tech innovation.**

**Newt Gingrich and Robert S. Walker, senior fellow at AEI and chairman of the Commission on the Future of the United States Aerospace Industry, 2/12/2010, AEI Online “Obama's Brave Reboot for NASA,”** [**http://www.aei.org/article/101651**](http://www.aei.org/article/101651)

The use of commercial launch companies to carry cargo and crews into low earth orbit will be controversial, but it should not be. The launch-vehicle portion of the Constellation program was so far behind schedule that the United States was not going to have independent access for humans into space for at least five years after the shutdown of the shuttle. We were going to rely upon the Russians to deliver our astronaut personnel to orbit. We have long had a cooperative arrangement with the Russians for space transportation but always have possessed our own capability. The use of commercial carriers in the years ahead will preserve that kind of independent American access. Reliance on commercial launch services will provide many other benefits. It will open the doors to more people having the opportunity to go to space. It has the potential of creating thousands of new jobs, largely the kind of high-tech work to which our nation should aspire. In the same way the railroads opened the American West, commercial access can open vast new opportunities in space. All of this new activity will expand the space enterprise, and in doing so, will improve the economic competitiveness of our country.

**[\_\_\_\_]**

**[\_\_\_\_] A privatized space sector will allow NASA to focus on other priorities.**

**N. David, freelance writer for helium, 2/7/2010 “The NASA 2011 Budget and the Future of America’s Program”,** [**http://www.helium.com/items/1734055-nasa-2011-budget**](http://www.helium.com/items/1734055-nasa-2011-budget)

One encouraging sign is that the commercialization of low Earth orbit is part of the plan. The [Space Shuttle](http://astronomy.helium.com/topic/3995-space-shuttle) fleet will be retired at the end of 2010. Rather than use NASA resources to develop a replacement for the Shuttle, the goal is to have the commercial sector develop the means to reach low Earth orbit. The commercialization of space is long overdue. Private enterprise will do it more efficiently and cost-effectively, and leaving low Earth orbit to the private sector frees up NASA resources to explore deep space. Billions of dollars are allocated to NASA in the 2011 budget and beyond for research and development of new technologies and approaches to space flight. Hopefully, breakthrough technologies will make space flight easier, faster, and more affordable.

# Solvency – Asteroids Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] Obama’s privatization strategy would work just as well for asteroid tracking as it will for launch vehicles.**

**Dana Blankenhorn, contributing editor for SmartPlanet, 2010, “Maybe Obama just wants to save the Earth,” http://www.smartplanet.com/search?q=dana+blankenhorn&tag=mantle\_skin;content**

You’ve already seen the movie,. It was the biggest hit of 1998. Armegeddon, starring Bruce Willis, involved a mission to deflect an asteroid from striking Earth and destroying civilization. It even had a black astronaut, Michael Clarke Duncan as Bear. The plot was not so far-fetched. In 2004 NASA announced the discovery of Apophis, an asteroid 1,050 feet across that could possibly strike Earth in 2029, or maybe 2036, with an impact similar to what wiped out the dinosaurs. Astronomers have since backed off that prediction. But it’s still going to come close, and asteroids do strike planets, big asteroids. Ask a dinosaur the next time you fill up. Or look at the Moon. That crater called Tycho was an asteroid strike 95 million years ago. Russia was so concerned it made moves last year to launch its own mission aimed at shifting Apophis’ orbit. American astronomers fear such a mission may do more harm than good. After the President’s Florida announcement, which calls for relying on private space lift over the near term while boosting our deep space capability for the longer term, the political risk was made evident. Florida would be losing jobs. They have a Senate election coming up. Then, in a panel discussion following the announcement, former NASA chief scientist John Grunfeld, newly appointed deputy director of the Space Telescope Science Institute, started talking about moving asteroids. New asteroids are being discovered every day, dozens of them, he said, by the Wide-field Infrared Survey Explorer (WISE), launched by NASA last year. Who knows when we might plot one’s orbit and find it intersects with ours? Bill Nye the Science Guy, who is also vice president of the Planetary Society, quickly picked up the theme. It’s tough and risky and dangerous, yes. Then Space.com got its money quote. “You’re saving all of humankind. That’s worthy, isn’t it?” Well, isn’t it? The same technical strategy Obama announced for Mars, bypassing a generation of low Earth orbit launchers that might get us to the Moon in 10 years in favor of systems that might reach deep space in 20, using the savings to create a private space industry, also works for asteroids, and the budget could be accelerated if WISE finds something really dangerous.

# Solvency – Asteroids Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] Privatization allows for innovation that makes the private sector better at finding destructive asteroids.**

**Jospeh N. Pelton, director of the Space and Advanced Communications Research Institute at George Washington University, 05/2010, “A new space vision for NASA—And for space entrepreneurs too?”, http://www.sciencedirect.com/science/article/pii/S0265964610000251**

With much less invested in a questionable Project Constellation enterprise we can do much more in space astronomy. We can invest more wisely in space science to learn more about the Sun, the Earth and threats from Near Earth Objects. David Thompson, Chairman and CEO of Orbital Sciences said the following in a speech that endorsed the new commercial thrust of the NASA space policies on Nine February 2010: “Let us, the commercial space industry, develop the space taxis we need to get our Astronauts into orbit and to ferry those wanting to go into space to get to where they want to go. We are in danger of falling behind in many critical areas of space unless we shift our priorities” [10]. With a change in priorities we can deploy far more spacecraft needed to address the problems of climate change via better Earth observation systems. We can fund competitions and challenges to spur space entrepreneurs to find cheaper and better ways to send people into space. We can also spur the development of solar power satellites to get clean energy from the sun with greater efficiency. We can deal more effectively with finding and coping with “killer” asteroids and near earth objects. We may even find truly new and visionary ways to get people into space with a minimum of pollution and promote the development of cleaner and faster hypersonic transport to cope with future transportation needs.

**[\_\_\_\_] A flexible path as a result of private sector leadership will be better at protecting Earth from NEOs.**

**Norman Augustine, Chairman of the Review of U.S. Human Spaceflight Plans Committee (Augustine Commission), October 2009, “Seeking A Human Spaceflight Program Worthy Of A Great Nation”, October 2009, p. 95**

Because the Flexible Path option contained a commercially developed lunar lander descent stage, it was evaluated more highly in Economic Expansion as well. The use of a commercial lander is not fundamental to the execution of the Flexible Path, but is more likely in this strategy. The lunar landing would be later, involve a simpler lander, and follow the development by NASA of the in-space re-startable engine, all of which would make a commercial system more viable in the Flexible Path than in the Moon First strategy. Of the evaluation criteria on which the two strategies score equally, there are some distinctions. Under Human Civilization, both lead to better understanding of human adaptation to space, but the Flexible Path aids in the protection of Earth from near-Earth objects**.** From the viewpoint of Mission Safety Challenges, the two strategies are also about equal. Operations at the Moon are closer and allow return to the Earth more rapidly, but landing on and launching from a surface is a dynamic environment. In contrast, the Flexible Path missions are less dynamic, but occur farther from Earth. There is no reason to believe that the remaining evaluation criteria favor one or the other strategy for exploration. They have more to do with how the strategy is implemented. For example, either the Moon First or Flexible Path could be the basis for a new or extended international partnerships in space.

# Solvency – SETI Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] SETI functions better when it is not involved with the federal government.**

**Chris Edwards, director of tax policy studies at Cato Institute, senior economist on congressional Joint Economic Committee, 2005, “Downsizing The Federal Government”, http://www.cato.org/downsizing-government/Downsizing-the-Federal-Government.pdf**

In recent decades, private businesses, such as communications satellite firms, have gained a foothold in space. In 2004 Burt Rutan put the world’s first privately financed astronaut into space with an innovative spaceship design and a small $20 million budget. Entrepreneurs such as Virgin Group founder Richard Branson are planning for space tourism flights to begin later in the decade.In the 1990s the government cut off funding for NASA’s Search for Extraterrestrial Intelligence project, which uses radio telescopes to search for life on other planets. Private funders have stepped in to create a SETI Institute, and the project is now thriving. The Washington Post recently observed that Silicon Valley techies have infused the project with money and unconventional technical ideas, bringing a new respect and energy to the organization. Some argue that being cast away by the federal government was the best thing that could have happened to SETI, thatit has become stronger and more innovative in the private sector than it ever could have as part of a public bureaucracy. The rest of NASA ought to be terminated or privatized as well. Unfortunately, NASA funding is sustained by politics. As President Bush was beginning his reelection effort in 2004, the White House cast about for an uplifting initiative. They came up with a nutty scheme to send a manned space mission to Mars called ‘‘Vision for Space Exploration.’’ The public has not asked for a Mars mission, NASA would probably bungle it, and the costs of such a mission would be astronomical over the next couple of decades—just as the costs of programs for the elderly are exploding. Unfortunately, politics won the day because House Majority Leader Tom Delay (RTX) pushed the funding through Congress because his district—home of the Johnson Space Center—would be a big winner.

[\_\_\_\_] SETI is an easy target for budget cuts and its best hope is in the private sector. Private donors funded previous attempts at SETI.

**Christopher Cokinos, professor of English at the University of Arizona researching SETI, 6/20/2011, “Funding cut to the Search for Extraterrestrial Intelligence and the death of curiosity,” The Republic,**

For now, the phone is off the hook — as it was in 1994 when Sen. Richard Bryan, D-Nev., derided NASA's "Martian chase" and successfully shut down its SETI — "Search for Extraterrestrial Intelligence" — program. It would cost each U.S. taxpayer just 3 cents a year to fund the Allen array, according to SETI Institute Senior Astronomer Seth Shostak. But in this political environment, direct taxpayer support is unlikely, so the SETI Institute is trying to raise $5 million to reboot the array. Donors such as Microsoft's Paul Allen stepped up after NASA's project died; it's for him that the array is named. In fact, SETI's best hope may be the private sector. Privately financed astronomy is nothing new. In the 18th and 19th centuries — the heyday of private observatory building — such work was in part spurred by interest in alien life.

# Solvency – SETI Affirmative

**[\_\_\_\_]**

[\_\_\_\_] SETI has been funded by private sources before and has been empirically successful.

Brian Berger, Staff Writer for Space.com, 10/23/2006**, “With NASA Budget Cuts Looming: SETI Eyes Private Funding”** [**http://www.space.com/3031-nasa-budget-cuts-looming-seti-eyes-private-funding.html**](http://www.space.com/3031-nasa-budget-cuts-looming-seti-eyes-private-funding.html)

Hubbard said in an interview that if NASA goes through with the proposed cut, SETI would expect to see its NASA grant funding reduced by about 20 percent--making it impossible to sustain without outside help from the nearly 50 astrobiology researchers it has on staff. Astrobiology, a discipline NASA has been funding for about 10 years, is the hardest hit in NASA's proposal to reduce its overall scientific research and analysis spending by about 15 percent in the year ahead. NASA is under pressure from the hundreds of research scientists it funds and their allies in Congress to reverse course on the proposed reductions, and the SETI Institute is part of that fight. But Hubbard said SETI's intent in establishing the Carl Sagan Center for the Study of Life in the Universe is to introduce a measure of long-term stability to the astrobiology community, not protest the current proposed cuts. "Cleary [SETI Chief Executive Officer] Tom Pierson and [SETI trustee] Barry Blumberg and the entire science community are working the political process to try to get the funds restored," Hubbard said. "But federal funding for anything can go up and down, so let's try to broaden our portfolio and be here for the long haul and not just wring our hands about it." SETI is no stranger to seeking private funding to sustain its activities. The institute's well-known radio searches for signals from other intelligent life in the universe has been entirely funded by about $6 million a year in private donations since Congress cut off federal funding for the efforts in 1993.

# AT: Counterplan Links to Spending

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**The counterplan avoids the spending disadvantage. Tax incentives do not require the government to spend money.**

**Edward Aldridge Jr. et al, Under Secretary for Acquisition, Technology, and Logistics, at the Department of Defense, June 2004, “A Journey to Inspire, Innovate, and Discover,” Report of the President’s Commission on Implementation of United States Space Exploration Policy, http://www.nasa.gov/pdf/60736main\_M2M\_report\_small.pdf**

Tax Incentives. A time-honored way for government to encourage desired behavior is through the creation of incentives in the tax laws. In this case, an increase in private sector involvement in space can be stimulated through the provision of tax incentives to companies that desire to invest in space or space technology. As an example, the tax law could be changed to make profits from space investment tax free until they reach some pre-determined multiple (e.g., five times) of the original amount of the investment. A historical precedent to such an effort was the use of federal airmail subsidies to help create a private airline industry before World War II. In a like manner, corporate taxes could be credited or expenses deducted for the creation of a private space transportation system, each tax incentive keyed to a specific technical milestone. Creation of tax incentives can potentially create large amounts of investment and hence, technical progress, all at very little expense or risk to the government.

# AT: Counterplan Links to Spending

**[\_\_\_\_]**

**[\_\_\_\_] Privatizing parts of space exploration would allow the government to cut spending to NASA.**

**Buzzle Online, 6/8/2010,“Will Nasa Space Flights Be Privatized?”, http://www.buzzle.com/articles/will-nasa-space-flights-be-privatized.html**

Given that the contract was awarded in 2006 – during the Bush administration – it’s interesting that SpaceX is now being used as an example of how President Obama’s proposal of scaling back NASA could work. By privatizing aspects of space flight and exploration, the U.S. government could conceivably cut spending that is currently devoted to NASA and its sub-agencies. Of course, the far more likely outcome is that the U.S. government will fall into the same spending traps that always seem to occur when it begins outsourcing its most important functions to private sector corporate behemoths. Spending will likely spiral out of control while lobbyists and lawmakers become career puppets for the companies that are ultimately controlling decisions at the highest levels of government. From a technological standpoint, however, it’s difficult to argue with the advantages that the private sector could offer in terms of improving space flight. SpaceX recently completed a successful launch of a 154-foot, 735,000 pound rocket from Cape Canaveral, which ended with a payload capsule reaching its target orbit approximately 150 miles above the earth. This test flight was the culmination of nearly four years of testing and development and was highly successful by all accounts.

**[\_\_\_\_] privatization is the only sustainable solution from a cost standpoint.**

**Kevin Fong, co-director of the Centre for Aviation Space and Extreme Environment Medicine, University College London, 4/16/2010, “To boldly go to a commercial space age,” http://www.guardian.co.uk/commentisfree/cifamerica/2010/apr/16/nasa-apollo-private-industry-commercial**

Armstrong's message is that if you have a vision you've got to stick with it, believe in it and resource it properly. True; but it's the resource that is the forcing issue here. In embracing the commercial sector Nasa looks to solve the problem of sustainability, hoping that private contractors can drive down the cost of access to space. If it works this will be a game changer, leaving private industry to do the donkey work of hauling people and payload into low Earth orbit while NASA gets on with the business of developing new, advanced exploration technologies. If the US wishes to continue its human space exploration endeavours in this century it must find a new, more sustainable strategy and commercial providers hold the key to this. The question is not "if" but "when" they should start to rely upon private industry to do some of the things that their national space agency used to. Getting the timing wrong would decimate NASA army of aerospace engineers, leave their astronauts without a ride and irreversibly damage their space exploration capabilities. The direction in which Obama is taking NASA is new, bold and necessary in the long run. The plans lack nothing in the way of vision but risk a great deal in their potential pre-maturity. It is this that Armstrong fears and with good reason. But if Obama can negotiate this risk, and find a rational way to smooth the transition from old to new, then what we will witness is not the end of an era but the birth of a new space age.

# AT: Counterplan Links to Spending

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**[\_\_\_\_] The airline industry proves that incentives to encourage private development of space technology will reduce the cost to the government substantially.**

**Norman Augustine, Chairman of the Review of U.S. Human Spaceflight Plans Committee (Augustine Commission), October 2009, “Seeking A Human Spaceflight Program Worthy Of A Great Nation”, October 2009, p. 20**

In addition, there is now a burgeoning commercial space industry. Given the appropriate incentives, this industry might help overcome a long-standing problem. The cost of admission to a variety of space activities strongly depends on the cost of reaching low-Earth orbit. These costs become even greater when, as is the circumstance today, large sums are paid to develop new launch systems but those systems are used only infrequently. It seems improbable that order-of magnitude reductions in launch costs will be realized until launch rates increase substantially. But this is a “chicken and egg” problem. The early airlines faced a similar barrier, which was finally resolved when the federal government awarded a series of guaranteed contracts for carrying the mail. A corresponding action may be required if space is ever to become broadly accessible. If we craft a space architecture to provide opportunities to industry, creating an assured initial market, there is the potential—not without risk—that the eventual costs to the government could be reduced substantially. Significantly, we are more experienced than we were in 1961, and we are able to build on that experience as we design an exploration program. If, after designing cleverly, building alliances with partners, and engaging commercial providers, the nation cannot afford to fund the effort to pursue the goals it would like to embrace, it should accept the disappointment of setting lesser goals. Whatever space program is ultimately selected, it must be matched with the resources needed for its execution. Here lies NASA’s greatest peril of the past, present, and—absent decisive action—future. These challenging initiatives must be adequately funded, including reserves to account for the unforeseen and unforeseeable. (See Figure 1-3.)

# AT: Permutation

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**[\_\_\_\_] Including government programs trades off with the private investment the counterplan is supposed to promote.**

**Declan McCullagh, chief political correspondent for CNET, 10/3/2007, “Do we need NASA?” CNET News, http://news.cnet.com/Do-we-need-NASA/2009-11397\_3-6211308.html**

The difference? Critics say it's the National Aeronautics and Space Administration. Aviation's youth and adolescence were marked by entrepreneurs and frenetic commercial activity: Lindbergh's trans-Atlantic prize money was put up by a New York hotel owner, and revenue from the airlines funded the development of the famous DC-3. The federal government aided aviation by paying private pilots to deliver air mail. Space, by contrast, until recently has remained the domain of NASA. Burt Rutan, the aerospace engineer famous for building a suborbital rocket plane that won the Ansari X Prize, believes NASA is crowding out private efforts. "Taxpayer-funded NASA should only fund research and not development," Rutan said during a recent panel discussion at the California Institute of Technology. "When you spend hundreds of billions of dollars to build a manned spacecraft, you're...dumbing down a generation of new, young engineers (by saying), 'No, you can't take new approaches, you have to use this old technology.'"

# AT: Permutation

**[\_\_\_\_]**

**[\_\_\_\_] As long as NASA is the leader in human space efforts we will not make advances towards making the use of space cheaper.**

**Edward L. Hudgins, director of The Objectivist Center, is the editor of the Cato Institute book, Space: The Free-Market Frontier, 1998 “Time to Privatize NASA”** [**http://www.cato.org/pub\_display.php?pub\_id=5960**](http://www.cato.org/pub_display.php?pub_id=5960)

The government has had many opportunities to turn over civilian space activities to the private sector. In the 1970s, American Rocket Co. was one of the private enterprises that wanted to sell launch services to NASA and private businesses. But NASA was moving from science to freight hauling, and planned to monopolize government payloads on the shuttle and subsidize launches of private cargo as well. The agency thus turned down American Rocket. In the late 1980s, Space Industries of Houston offered, for no more than $750 million, to launch a ministation that could carry government and other payloads at least a decade before NASA's station went into operation. (NASA's station currently comes with a price tag of nearly $100 billion for development, construction and operations.) NASA, not wishing to create its own competition, declined Space Industries' offer. In 1987 and 1988, a Commerce Department-led interagency working group considered the feasibility of offering a one-time prize and a promise of rent to any firm or consortium that could deliver a permanent manned moon base. When asked whether such a base were realistic, private-sector representatives answered yes -- but only if NASA wasn't involved. That plan was quickly scuttled. Each shuttle carries a 17-story external fuel tank 98 percent of the distance into orbit before dropping it into the ocean; NASA could easily -- and with little additional cost -- have promoted private space enterprise by putting those fuel tanks into orbit. With nearly 90 shuttle flights to date, platforms -- with a total of 27 acres of interior space -- could be in orbit today. These could be homesteaded by the private sector for hospitals to study a weightless Mr. Glenn or for any other use one could dream of. But then a $100 billion government station would be unnecessary. As long as NASA dominates civilian space efforts, little progress will be made toward inexpensive manned space travel. The lesson of Mr. Glenn's second flight is that space enthusiasts ignore economics at their peril.

# AT: Permutation

**[\_\_\_\_]**

**[\_\_\_\_] NASA works against private involvement in space and discourages their progress.**

**David Boaz, senior fellow at the Cato Institute, 9/15/2008. “Space Privatization – from Cato to the BBC,” http://www.cato-at-liberty.org/space-privatization-from-cato-to-the-bbc/]**

Those ideas may sound radical, but not if you’ve been following the work of the Cato Institute. As long ago as 1986, Alan Pell Crawford wrote hopefully that “space commercialization … is a reality,” and looked forward to the country making progress toward a free market in space. The elimination of NASA was a recommendation in the *Cato Handbook for Congress* in 1999. Edward L. Hudgins, former editor of Regulation magazine, wrote a great deal about private options in space. In 1995, he testified before the House Committee on Appropriations that the government should move out of non-defense related space activities, noting the high costs and wastefulness incurred by NASA. In 2001, Hudgins wrote “A Plea for Private Cosmonauts,” in which he  urged the United States to follow the Russians (!) in rediscovering the benefits of free markets after NASA refused to honor Dennis Tito’s request for a trip to the ISS. Hudgins testified again before the House in 2001, this time before the Subcommittee on Space and Aeronautics. He noted that since the beginning of the Space Age, NASA has actively discouraged and barred many private space endeavors. This effectively works against the advancement and expansion of technology, while pushing out talent to foreign countries who court American scientists and researches to launch from their less-regulated facilities. In “Move Aside NASA,” Hudgins reported that neither the station nor the shuttle does much important science. This makes the price tag of $100 billion for the ISS, far above its original projected cost, unjustifiable. Michael Gough in 1997 argued that the space “shuttle is a bust scientifically and commercially” and that both successful and unsuccessful NASA programs have crowded out private explorers, eliminating the possibility of lessening those problems. Molly K. Macauley of Resources for the Future argued in the Summer 2003 issue of Regulation that legislators and regulators had failed to take into account “the ills of price regulation, government competition, or command-and-control management” in making laws for space exploration.

# Article: NASA Should Step Back

**Joseph N. Pelton: *A new space vision for NASA - And for space entrepreneurs too?* May, 2010**

NASA – now past 50 – is well into middle age and seemingly experiencing a mid-life crisis. Any honest assessment of its performance over the past two decades leads to the inexorable conclusion that it is time for some serious review—and even more serious reform. National U.S. Space Study Commissions have been recommending major reform for some years and finally someone has listened. President Obama has had the political and programmatic courage to make some serious shifts in how NASA does its business. It is no longer sufficient to move some boxes around and declare this is the new and improved NASA.

One of the key messages from the 2004 Aldridge Commission report, which was quickly buried by NASA, was words to this effect: “Let enterprising space entrepreneurs do what they can do better than NASA and leave a more focused NASA do what it does best—namely space science and truly long range innovation” [1]. If one goes back almost 25 years to the Rogers Commission [2] and the Paine Commission [3] one can find deep dissatisfaction with NASA productivity, with its handling of its various space transportation systems, and with its ability to adapt to current circumstances as well as its ability to embark on truly visionary space goals for the future. Anyone who rereads the Paine Commission report today almost aches for the vision set forth as a roadmap to the future in this amazing document. True there have been outstanding scientific success stories, such as the Hubble Telescope, but these have been the exception and not the rule.

The first step, of course, would be to retool and restructure NASA from top to bottom and not just tweak it a little around the edges. The first step would be to explore what space activities can truly be commercialized and see where NASA could be most effective by stimulating innovation in the private sector rather than undertaking the full mission itself.

XPrize Founder Peter Diamandis has noted that we don't have governments operating taxi companies, building computers, or running airlines—and this is for a very good reason. Commercial organizations are, on balance, better managed, more agile, more innovative, and more market responsive than government agencies. People as diverse as movie maker James Cameron and Peter Diamandis feel that the best way forward is to let space entrepreneurs play a greater role in space development and innovation. Cameron strongly endorsed a greater role for commercial creativity in U.S. space programs in a February 2010 *Washington Post* article and explained why he felt this was the best way forward in humanity's greatest adventure: “I applaud President Obama's bold decision for NASA to focus on building a space exploration program that can drive innovation and provide inspiration to the world. This is the path that can make our dreams in space a reality” [4].

One of the more eloquent yet haunting calls for change came some six years ago. The occasion was when Space X founder Elon Musk testified before the US Senate in April, 2004 at a Hearing on The Future of Launch Vehicles:

“The past few decades have been a dark age for development of a new human space transportation system. One multi-billion dollar Government program after another has failed….When America landed on the Moon, I believe that we made a promise and gave people a dream. It seemed then that…someone who was not a billionaire, not an Astronaut with the “Right Stuff”, but just a normal person, might one

day see Earth from space. That dream is nothing but broken disappointment today. If we do not now take action different from the past, it will remain that way” [5].

One might think that, since Musk was seeking to develop his own launch capability, he was exaggerating; but a review of the record suggests otherwise. Today nearly 25 years after the Rogers and Paine Commission reports that followed the *Challenger* disaster, we find that the recommendations for NASA to develop a reliable and cost-effective vehicle to replace the Shuttle is somewhere between being a disappointment and a fiasco. Billions of dollars have gone into various spaceplane and reusable launch vehicle developments by NASA over the past 20 years. Spaceplane projects have been started by NASA time and again amid great fanfare and major expectations and then a few years later either cancelled in failure or closed out with a whimper. The programs that NASA has given up on now include the Delta Clipper, the HL-20, X-33, the X-34, X-37, X-38, and X-43 after billions of US funds and billions more of private money have been sacrificed to the cause [6].

In the field of space research NASA has a long and distinguished career. In the area of space transportation and space station construction its record over the past 30 years has largely been a record of failure. The Space Shuttle was supposed to have been an efficient space truck that would fly every two weeks and bring cargo to orbit at a fraction of the cost of early space transportation systems—perhaps a few thousand dollars per pound to low-Earth orbit. In fact, the fully allocated cost of the Shuttle is over $1 billion a flight and it is by far the most expensive space transportation system ever. After the *Columbia* accident NASA spent years and billions more dollars to correct serious safety problems with the Space Shuttle and still was never able to fulfill the specific recommendations of the Columbia Accident Investigation Board. Yes, that's correct. After grounding the Space Shuttle for some 2.5 years (from February 2004 to August 2006) and expending $1.75 billion dollars in the wake of the CAIB report, NASA was not able to correct the identified problems and complete the tasks asked of it. Then, after the foam insulation problem re-emerged with *Discovery* and STS flight 114, hundreds of millions more dollars were spent to solve the problem again, bringing the grand total to over $2 billion [7].

The first rendition of a space station was scheduled during the Reagan years to have been completed in 1991 for several billions of dollars. The projected completion date extended to 1994 when the project was redesigned and it became the International Space Station (ISS). Today the ISS is not only late, but its total cost has ballooned to over $100 billion [8].

Project Constellation, with a projected cost of over $100 billion until its recent cancellation by President Obama, seemed to loom as an eerie repetition of the ISS – another mega-project always over budget, always late, and with constantly lowered expectations. Henry Spencer, writing for the New Scientist, has characterized Project Constellation as an “Illusion, Wrapped in Denial.” His specific observations about the NASA Moon/Mars program were as follows:

First, it probably wasn't going to work. Even so early in its life, the programme was already deep into a death spiral of “solving” every problem by reducing expectation of what the systems would do. Actually reaching the moon would probably have required a major redesign, which wasn't going to be funded [9].

Any private company with NASA's record on the Space Shuttle, the ISS deployment and spaceplane development, would have gone bankrupt decades ago. In all three cases the US Congress has been told by NASA essentially what it wanted to hear rather than the grim facts as to cost, schedule and performance. I personally remember when Congress was being told quite unbelievable things about the cost and expected performance of the Space Shuttle. We at Intelsat presented testimony that strongly contradicted NASA's statements on cost and performance.

There are dozens of examples of entrepreneurial space enterprises that have generated innovative ideas that seemed to show us how we could have gotten ourselves into space faster, cheaper and better.

▪ A private, Boulder, CO-based company called the External Tanks Corporation (ETC) suggested in the 1980s that we could just add a little more thrust to the External Tanks for the Space Transportation System (i.e. the Space Shuttle) and lo and behold we could put them into Low-Earth Orbit. Dr. Randolph “Stick” Ware of the ETC explained that one could then strap these tanks together and create the structure of a space station at a fraction of the cost of the ISS, and much more quickly as well.

▪ Bob Zubrin has for years championed the idea of sending methane generators to Mars to produce the fuel for the astronauts' return trip. The cost of a Mars mission with a refueling station on Mars would be dramatically lower.

▪ Burt Rutan's Scaled Composites took a few million dollars of backing from Microsoft's Paul Allen and developed the White Knight carrier craft and the SpaceShipOne spaceplane. This vehicle system, which won the X Prize, set the stage for a space adventures industry that will begin launches in 2011. When this experimental spaceplane landed at Edwards Air Force Base in 2004, a spectator's sign said it all: “SpaceShipOne – NASA Zero”.

Some have suggested that President Barack Obama's cancellation of the unwieldy and expensive Project Constellation to send astronauts back to the Moon for a few exploratory missions was a blow to NASA and the start of the end of the US space program. The truth is just the reverse. Project Constellation, accurately described by former NASA Administrator Michael Griffin as “Apollo on Steroids” provided little new technology or innovation and had an astronomical price tag. It was clearly too much for too little. If the opportunity costs of Project Constellation are examined (i.e. if we think what could have been done with an extra $100 billion of space funds), dumping it defies argument.

With much less invested in a questionable Project Constellation enterprise we can do much more in space astronomy. We can invest more wisely in space science to learn more about the Sun, the Earth and threats from Near Earth Objects. David Thompson, Chairman and CEO of Orbital Sciences said the following in a speech that endorsed the new commercial thrust of the NASA space policies on Nine February 2010:

“Let us, the commercial space industry, develop the space taxis we need to get our Astronauts into orbit and to ferry those wanting to go into space to get to where they want to go. We are in danger of falling behind in many critical areas of space unless we shift our priorities” [10].

With a change in priorities we can deploy far more spacecraft needed to address the problems of climate change via better Earth observation systems. We can fund competitions and challenges to spur space entrepreneurs to find cheaper and better ways to send people into space. We can also spur the development of solar power satellites to get clean energy from the sun with greater efficiency. We can deal more effectively with finding and coping with “killer” asteroids and near earth objects. We may even find truly new and visionary ways to get people into space with a minimum of pollution and promote the development of cleaner and faster hypersonic transport to cope with future transportation needs.

The real key is to unlock the potential of commercial space initiatives while giving a very middle-aged NASA a new lease on life. Here are just some of the possibilities that are on the horizon of a revitalized commercial space industry.

▪ *Solar power satellites*: The new space company Solaren has recently contracted with a US west coast

energy utility to start beaming clean solar energy from space to Earth in 2016 via a tri-part solar power system. Its three key components are: 1) a lightweight solar concentrator; 2) a high performance solar cell array that will see the equivalent of many suns 24 h a day; and 3) a transmission system from space to Earth. Solar power satellites could be a major new part of the new mix of “green energy systems” we need to reduce our addiction to carbon-based fuels. Serious efforts are now underway not only in the USA but in Japan and other countries seeking a new source of clean energy [11].

▪ *Commercial spaceplanes and space stations*: Space adventure tours to go into dark sky to see the big Blue Marble from space may become reality as soon as 2011. To date only some 500 people have gone into space since the dawn of the Space Age. This new industry (‘space tourism’ is not the right name for this high-risk-type adventure, which is much more dangerous than a commercial air flight) will potentially create the opportunity for thousands of “citizen astronauts” to fly over 100 km into space. The space adventure business is currently being developed by enterprising billionaires. Sir Richard Branson, head of Virgin Galactic, is the most visible leader, but there are many others willing to risk capital on commercial space. They include Jeff Bezos, founder of

[Amazon.com](http://www.sciencedirect.com.revproxy.brown.edu/science?_ob=RedirectURL&_method=externObjLink&_locator=url&_issn=02659646&_origin=article&_zone=art_page&_plusSign=%2B&_targetURL=http%253A%252F%252Famazon.com), Robert Bigelow, owner of Budget Suites, Paul Allen, one of the backers of the Space Ship Corporation, John Carmack, creator of video games such as “Doom”, and Elon Musk, founder of PayPal. Each of these entrepreneurs of great wealth is currently putting serious money into developing spaceplane technology and commercial space platforms. Robert Bigelow has already launched his Genesis 1 and 2 commercial space station prototypes [12].

▪ *Innovative challenge prizes to spur new space technology*: The Google Lunar XPrize has developed a wide range of innovative technologies that show us much more cost-effective ways to explore the Moon and get more ‘bang for the buck’. The Bigelow $50 million America's Challenge may produce a breakthrough in “space taxi” designs in the next few years. Most exciting of all could be current and planned prizes to develop the technology to create a space elevator that could get us to space not only safely but at a truly modest cost, and cleanly. In the 20th century Arthur C. Clarke not only showed us how geosynchronous satellites could revolutionize global communications, but also popularized the notion of a space elevator that would give us cost-effective access to the Moon and Mars. In the 21st century a revitalized and innovation-driven NASA, along with other space agencies, could redefine our human destiny by providing key answers to climate change, making space travel safer and much less costly and helping us solve our energy problems. All this could be achieved with the right incentives to move us toward enlightened space commerce and entrepreneurial innovation. On the other hand, this could all prove to be merely a momentary illusion killed by bureaucratic inertia in a space agency that is too large and indifferent to truly change. Only the future can provide the answer. Only concerted political will exercised from both the inside and the outside will bring significant change

[12].

▪ *Totally new visions*: The most exciting aspect of having revitalized space agencies spurring totally new visions about space, space transportation, space technology, space applications and space research is the unknown potential that could be released. There may be totally unexpected ways of addressing climate change. This might be a 100,000 km long space elevator system that also acts as a mega-heat exchanger to cope with climate change. Another might be a new type of space-based chemical exchange system to release gases similar to those from a volcanic eruption that would change the Earth's solar reflectivity and thus help to cool the planet [13]. There are dozens of big ideas about how space-related innovations could change the course of humankind and NASA should be at the forefront of new visions, working together with commercial partners in new and exciting ways [14].

Much is currently being made about the US losing its access to space by human-rated launchers. Had heed been given to the Rogers and Paine Commission reports NASA would not be mired in the dilemmas it finds itself in today. The Space Shuttle and the ISS have swallowed NASA's budget and future prospects for two decades. As the CAIB report made clear, the problem with the US space program has been a “failure of national leadership”. Failings in Congress and the presidency, plus failings at NASA and the lack of a National Space Council, all bear a part of the blame. At least for the time being there is new leadership, with a US President who says “the buck stops here!” Time will tell if this new course will truly be a new beginning or yet another opportunity lost.

**Privatization Counterplan Affirmative**

# Privatization Counterplan Affirmative

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# Glossary

**Market size –** The total amount of money contained within a market. The dollar value total number of potato chips sold in the U.S. is the size of the potato chip market

**Market failures** – a situation where the way a market allocates goods is not efficient. This is in contrast to how markets tend to operate, where goods and services are allocated optimally between participants

Investor. Traditionally, it is acknowledged that markets should not exist for goods that create market failures, and the government usually provides this good instead.

**Spearhead** – to take the lead or commanding role.

**Gestation** – the time it takes something to develop into maturity

**Plethora** – an abundance of something

**‘black box’** – a black box refers to something that you cannot see inside of. More abstractly, it refers to processes that are not open and transparent, so you do not know how decisions are made.

**ESA** – European Space Agency

**IPO** – Initial Public Offering. An investment term. An IPO occurs when a company that was previously owned by those who operated it issue stock to be traded on the stock market, in effect transferring ownership of the company to others.

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# Permutation

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### **[\_\_\_\_] Cooperation between the public and private sectors can overcome the problems with privatization.**

**Vasilis Zervos and David Seigel, Professor of economics and space policy at the International Space University; Dean and Professor School of Business, University at Albany, October 2008, “Technology, Security, and policy implications of future transatlantic partnerships in space: lessons from Galileo”, Research Policy Volume 37, Issue 9, October 2008, Pages 1630-1642]**

Despite encouraging market projections for navigation markets for example, such industries are subject to numerous market failures. The most prominent market failures are related to early-stage technology and risks associated with future market size, as well as uncertainties in the development of competing and existing publicly developed and owned systems and future security restrictions. Thus, it is unlikely that such a project can be undertaken by industry alone despite the existence of optimistic market projections and returns (see Section 3). For example, in the presence of conflict, such as war between two nations or civil war, where adversaries utilize the signals for military purposes, the stakeholders exercising political pressure for or against regionally jamming the signal could range from the UN and the authorities in the country in question, to financial institutions owning shares in the enterprise. Although ultimately the commercial entity is responsible for obeying the laws and regulations of the licensing country, numerous issues relating to politics and international law are likely to turn potential investors with no public involvement away into ‘safer’ and less strategically significant investments. Multi-public–private partnerships (MP3) spread the financial risk associated with high-technology requirements, while easing investor concerns over politically sensitive security issues and decisions. Moreover, the presence of multiple countries in space projects results in more resilient public commitments, reassuring the private firms.

### **[\_\_\_\_] Public-private partnerships mitigate the risk of commercial space failure**.

**Vasilis Zervos and David Seigel, Professor of economics and space policy at the International Space University; Dean and Professor School of Business, University at Albany, October 2008, “Technology, Security, and policy implications of future transatlantic partnerships in space: lessons from Galileo”, Research Policy Volume 37, Issue 9, October 2008, Pages 1630-1642]**

The formation of transatlantic multi-public–private partnerships, where partners such as NASA, ESA and industrial firms develop and commercialize space programs such as re-usable launch vehicles for commercial applications (space travel), or radio-navigation services, could provide blueprints for addressing economic and security concerns of using space for commercial purposes. This would require space agencies evolving from acting as ‘black boxes’ of government space programs into more flexible partnerships that would be able to contribute to the commercialization of space programs and systems. Export restrictions and technological-related security issues could then be addressed by the participation of the relevant national agents in the partnerships. Traditionally, national security enhancement has been addressed by government control over the relevant industries (nationalized utilities). Increasingly however, regulation is used to address the security dimension of security sensitive industries and technologies, allowing companies to participate in international partnerships, for example in the aerospace and the oil industry.

# Privatization Fails – No demand

**[\_\_\_\_]**

**[\_\_\_\_] There isn’t sufficient demand to go into space for privatization to be successful.**

**Eric Sterner, former Associate Deputy Administrator for Policy & Planning at NASA, April, 2010, “Worthy of a Great Nation? NASA’s Change of Strategic Direction,” http://www.marshall.org/pdf/materials/798.pdf, pg. 8-9**

Some may argue that demand will be higher because the private sector will seek to go to space as well, once a private capability to take people to orbit exists. This seems to be the logic behind the administration’s plans. It hopes increased demand will lead to new suppliers, which promotes competition, which eventually lowers prices. Unfortunately, increased demand normally leads to higher prices until the market reaches a new equilibrium, a “benefit” that the administration does not advertise. Even then, there is not much evidence to support the notion that private demand will eventually lead to greater, less expensive access to space for people, largely 8 *Marshall Institute Policy Outlook* because no compelling private rationale has been offered to engage in human spaceflight to LEO. According to material prepared for the Committee on Science and Technology in the House of Representatives, NASA did not conduct market research to assess potential demand for private access to LEO before changing its strategy for accessing LEO. Indeed, all that White House officials reportedly could point to in the way of supporting documentation for their underlying assumptions was an eight year old market survey that overestimated the demand for commercial human spaceflight by roughly 300%.28

**[\_\_\_\_]**

**[\_\_\_\_] Privatization attempts have failed in the past because there is not a large enough market.**

**Richard Kaufman et al. member of the board of directors and a vice chair of Economists for Peace and Security, and Director of Bethesda Research Institute, Henry Hertzfield, Jeffrey Lewis, and Michael Intriligator, 09/2008, “SPACE, SECURITY AND THE ECONOMY”, 9**

The overall government attempts to privatize and outsource functions. The attempted privatization of the remote sensing satellites, first in the late 1970s and again in the mid-1980s were premature and not very successful. In fact, the suggestion that the satellite weather service be privatized resulted in Congress declaring that meteorology and the satellite-based weather system was a “public good” and would not be privatized. The private market for space goods and services has not developed as rapidly as was expected although most of the privatization proposals have not been implemented due mainly to a lack of a sizable nongovernment market as well as to the large up-front investment requirements.

# Privatization Fails – International Law

**[\_\_\_\_]**

**[\_\_\_\_] The laws regarding profit in space are not clear enough to encourage investment.**

**American Bar Association Journal, 7/20/2009 ABA, “Revising the Outer Space Treaty”**

It's not at all clear that the Outer Space Treaty as currently fashioned is adequate to deal with private exploitation of space. The ABA Journal explains that: In viewing space as the province of mankind, the Outer Space Treaty borrows principles from customary maritime law, which guarantees peaceful passage through navigable waters by ships of all nations. But in application, the Outer Space Treaty is more similar to the Antarctic Treaty System, a series of international agreements that call for cooperative management of Antarctica as a nonmilitarized environment and put off claims of sovereignty for an indefinite period. But as the prospects for commercial ventures in space increase, it will be necessary to address the issue of who will be allowed to profit from the fruits of those ventures, say lawyers in the field. “The current system works if nations accept a détente in space and all the resources are only used for the benefit of all mankind,” Keefe says. “If that’s the case, then there will never be commercialization of space and there will be little benefit for mankind. I know that’s a cynical capitalist viewpoint, but I think if everyone is afraid to launch a venture because they might not be allowed to profit from it, then nothing will happen.”

# Privatization Fails – Too Long For Profit

**[\_\_\_\_]**

**[\_\_\_\_] Space investments take too long to return with profit, which means investors won’t invest in private space companies.**

**A.J. Mackenzie, writer for the space review, 10/5/2005, “Tax Policy and space commercialization,” http://www.thespacereview.com/article/300/1**

Using those criteria, space ventures don’t look that appealing. For one, they have long gestation periods. As an example, look at Virgin Galactic, Branson’s space tourism venture. Branson announced his investment in 2004, but it will be at least 2007 before the company will have a chance of recording any revenue. Worse, that’s with the vehicle technology the company needs already having been developed and tested—in the form of SpaceShipOne—over the course of several years. Those kinds of timelines would try the patience of most investors, given the plethora of other opportunities that could pay off in a much shorter time period. Second, commercial space is still a small market. When telecommunications ventures that just happen to use satellites (like satellite TV providers) are eliminated, the space industry looks remarkably small: just $37 billion in 2002 revenues, or less than a single quarter’s revenue for GM. (See “What is the ‘space industry’?”, The Space Review, July 14, 2003) Most of that is tied up in what one might call “legacy” space applications: the manufacture and launch of big communications satellites, a field where there’s plenty of competition and little chance for a startup to have much success. Even space tourism, touted by the alt.space community as the savior for commercial space, looks tiny: the Futron study shows tourism won’t get above a billion dollars a year in revenues until the end of the next decade. That’s not a lot of money to chase after in the big picture.

# Privatization Fails – Safety

**[\_\_\_\_]**

**[\_\_\_\_] Private sector rockets are not safe enough.**

**Alicia Changand and Seth Bronstein, Associated Press contributors for MSNBC, 1/31/2010 “NASA's space change: Renting the Right Stuff,”**

But the Aerospace Safety Advisory Panel, created after NASA's first fatal accident, warned that the existing private rockets are not rated by the government as safe for people to fly on. That has to be addressed with testing and study before jumping into commercial space, the panel said. It's not that it is impossible to certify these rockets as safe enough for astronauts but it is a long process that is not spelled out, said former NASA associate administrator Scott Pace, now a space policy professor at George Washington University.

**[\_\_\_\_]**

**[\_\_\_\_] Business will not be able to comply with safety regulations.**

**Alan Boyle, Science editor for MSNBC, 1/28/2011, “New spaceships should be safer than the space shuttle”,** [**http://www.msnbc.msn.com/id/41279893/ns/technology\_and\_science-space/t/new-spaceships-should-be-safer-space-shuttle/**](http://www.msnbc.msn.com/id/41279893/ns/technology_and_science-space/t/new-spaceships-should-be-safer-space-shuttle/)

NASA eventually hopes to use commercial craft to ferry astronauts back and forth to the space station as well. But the job won't be easy. In a set of draft requirements issued last month, NASA said it expected commercial companies to measure up to the same risk standards the space agency expected for itself: a 1-in-1,000 chance that the crew would be lost during a journey to and from the space station. "These are quite demanding and rigorous standards," Logsdon said. Some space veterans think the commercial companies can't do it. Apollo 17 commander Gene Cernan — who was the last man to walk on the moon back in 1972 — complained to Congress last year that the new players in spaceflight "do not yet know what they don't know, and that can lead to dangerous and costly consequences." In addition to the dollars-and-cents issue, the commercial companies are wary of being too hamstrung by hundreds of pages of written requirements. Former space shuttle program director Wayne Hale, who retired from NASA last year, warned that excessive red tape could lead to a "train wreck" for the space agency's commercialization effort.

# Privatization Fails – Tax Incentives Fail

### **[\_\_\_\_]**

### **[\_\_\_\_]Tax incentives will not solve. The problem with privatization is not sufficient investment incentives.**

**A.J. Mackenzie, writer for the space review, 10/5/2005, “Tax Policy and space commercialization,” http://www.thespacereview.com/article/300/1**

But what about more targeted tax incentives, like Calvert’s and Rohrabacher’s proposals? Well, even without those tax credits, there still has been considerable investment in space startups. Allen reportedly put up about $25 million to develop SpaceShipOne, and now Richard Branson plans to spend up to $100 million to develop a commercial successor. Jeff Bezos has put some fraction of his Amazon.com billions into his secretive space startup, Blue Origin, while Elon Musk has reportedly invested tens of millions of his own money into SpaceX. John Carmack has spent a lesser, but still significant, sum on Armadillo Aerospace. That’s great, but proponents of tax credits will argue that these incentives will encourage more people to invest in space companies. There are certainly other worthy companies out there to invest in, but are there really people sitting on the sidelines waiting for tax credits to take the plunge? My gut feeling is that such credits won’t help much. Why am I so negative? I believe that, credits or not, space transportation and related companies just aren’t that attractive from the standpoint of typical investors, particularly large institutional investors. Such investors are looking for companies that quickly—on the order of just a few years—grow and thrive, or at least do well enough to provide investors with an exit strategy in the form of an acquisition or IPO. Major investors know that most of the companies they invest in may fail, but they hope to have one or two “home runs” that will more than make up for their failures (in much the same way Boston Red Sox fans remember infielder Mark Bellhorn for his game-winning home run in Game 1 of the 2004 World Series, not for leading the American League in strikeouts the same season.) Credits or not, space transportation and related companies just aren’t that attractive from the standpoint of typical investors, particularly large institutional investors.

# Privatization Fails – High Start Up Cost

**[\_\_\_\_]**

**[\_\_\_\_] Private innovation requires trial and error, which is too expensive in space travel.**

**John McGowan, contractor at NASA Ames Research Center, 6/8/2009**

**Space Review, “Can the private sector make a breakthrough in space access?”, 6/8/09, http://www.thespacereview.com/article/1388/1**

Modern “professional” research has not overcome the need for large amounts of trial and error to achieve major breakthroughs or significant inventions and discoveries. Indeed, the number of actual breakthroughs may have declined with increased funding and professionalization, at least in part because the per-trial cost has risen relative to funding. (See “Cheap access to space: lessons from past breakthroughs”, The Space Review, May 11, 2009) In space, a full launch attempt costs on the order of $50–100 million, depending on the vehicle, meaning that $1 billion can fund only 10–20 trials, a small number relative to the hundreds or thousands usually involved in a major breakthrough. There has been minimal progress in power and propulsion in aviation and rocketry since about 1970.

**[\_\_\_\_] Reaching space requires enormous amounts of resources. So far, only the three most powerful countries in the world have been able to do it.**

**Eric Sterner, former Associate Deputy Administrator for Policy & Planning at NASA, April, 2010, “Worthy of a Great Nation? NASA’s Change of Strategic Direction,” http://www.marshall.org/pdf/materials/798.pdf, pg. 8-9**

NASA seems to assume that buying human spaceflight services will lead to lower prices. Typically, in a free market, price falls as the result of competition among suppliers to offer better goods and services for any given number of customers. Is that a reasonable expectation in the case of commercial human spaceflight? The short answer is no. Simply put, a competitive, free-market in commercial human spaceflight is unlikely to develop for several reasons. 1. First, developing a spacecraft capable of safely launching people into orbit, operating there, and returning them safely to the planet is extraordinarily difficult, with extremely low tolerances for risk**.** For comparison purposes, launching SpaceShip 1, a privately-developed and revolutionary spacecraft capable of carrying people to suborbital space, requires roughly 2% of the total energy required to take the same mass to low-earth orbit.24 Solving such complex problems is not beyond the wherewithal of the private sector. After all, the bulk of NASA’s spacecraft were developed by contractors, and the private sector developed, owns and operates much of the nation’s infrastructure. Human spaceflight to LEO is different, however, than developing or operating the complex terrestrial systems frequently created by the private sector. It requires the development of entirely new technologies and capabilities, for which there has been no private demand or commercial reward. So, there have not been sufficient incentives for the private sector to bring its otherwise healthy abilities to mobilize massive amounts of capital or solve complex problems to bear. There simply is no useful comparison between the public and private sector interests when it comes to human spaceflight. Indeed, to date, only three governments have been able to organize the financial, organizational, scientific, and technical resources to achieve this task. At the time, two of them were superpowers and the third appears to be on the verge of becoming one.

**Frontier Critique**

# Frontier Critique

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# Explanation

The frontier critique takes issue not with the plan action itself, but rather the way the plan justifies itself. Critiques frequently argue that the “framing” of the plan is inappropriate, and that we should not justify a potential action on those terms. Critiques argue that different justifications for the same plan or action produce different results. As a simple example, consider the abolition of slavery. Before slavery was made illegal, there were several different groups arguing that the slaves should be made free. One group, known as abolitionists, argued that slaves should be free because all humans have equal rights. Another group was in favor of recolonization. They argued for the same goal, that slavery should be abolished, but their reasons were that blacks were beneath whites and incapable of living in white society. Freed slaves, they argued, would ultimately return to Africa and America would be rid of its race problem forever. Can you see how the same plan with different justifications could produce extremely different results?

The frontier critique makes the same type of argument, even though the faulty justification is nowhere near as obvious as it is in the slavery example. The critique argues that the way that people talk about space exploration and colonization in the status quo is very similar to the way that they spoke of Manifest Destiny and the colonization of the western United States in the 19th century. Manifest destiny was the idea that Americans were chosen to expand and settle the country all the way from the east coast the Pacific Ocean. The idea of the “frontier,” a romantic place where settlers would travel to, became very popular. The frontier was depicted as a place of freedom and near limitless opportunity and resource, existing in a pristine state simply to be taken. Many historians believe that this attitude, this notion of entitlement that the west and its resources “belonged” to America, legitimated some very horrible actions. For example, the buffalo, which used to be extremely plentiful on the western plains, nearly went extinct as Americans went westward to claim what they believed as their. More tragically, Americans fought many wars against the Indian tribes, forcing them off land that they had lived on for hundreds of years, because of a faulty belief that the land had been reserved for Americans.

How does this relate to space exploration? The disadvantage argues that space has replaced the west in our imaginations as the next frontier, the next location reserved for American expansion. Have you ever heard of space referred to as “the final frontier?” President Kennedy’s famous speech that began the Space Race in 1961 said that space was something that could be “explored and mastered.” Some believe that this belief that space has limitless resources that could solve the problems on Earth is equivalent to the romantic view of the frontier in the 19th century. Ultimately, they feel if we continue to think of space just as the people of the 19th century though of the west, we will ultimately commit regrettable actions like the settlers did then.

# Glossary

**Manifest destiny** - The 19th-century doctrine or belief that the expansion of the United States throughout the American continents was both justified and inevitable.

**Mobilizing** - Organize and encourage people to act in a certain way in order to bring about a particular political objective

**Military industrial complex** - A country's military establishment and those industries producing arms or other military materials

**Frontier** – The edge of a nation’s territory. More than just a border, a frontier is a place where it is expected that a country’s settlers will eventually move to and assimilate.

**Metaphor** - A thing regarded as representative or symbolic of something else, esp. something abstract. Many think that the frontier and manifest destiny have become the guiding metaphor for space exploration

**Astroenvironmentalism** – Applying the principles of environmentalism to the space environment. Instead of viewing it as something to be exploited, we should view it as something to be preserved for its own sake.

**Jurisprudence** - The theory or philosophy of law.

**Myth** - A traditional story, esp. one concerning the early history of a people or explaining some natural or social phenomenon, and typically involving supernatural beings or events.

**Materialistic** - A tendency to consider material possessions and physical comfort as more important than spiritual values.

**Rhetoric** - Language designed to have a persuasive or impressive effect on its audience, but often regarded as lacking in sincerity or meaningful content

**Discourse** - Written or spoken communication or debate.

**Terraformating** – the act of making another planet like Earth by changing its climate or other fundamental geological features.

# Frontier Critique 1NC [1/3]

**A. Link. Current plans for exploration and development are a product of the idea of the frontier and manifest destiny from America’s past. The affirmative sets out to colonize and master the new frontier of space, which paves the way for future conflict.**

**Linda Billings, Manager of Communications, NASA Astrobiology Program, 1997, “Frontier Days in Space: Are they Over?” http://lindabillings.org/papers.html**

The rationale of the US space programme, a rationale conceived by the USA’s military-industrial complex, persistently retains the idea of manifest destiny as a mobilizing concept**.** As the theory of historical materialism explains, history is not a matter of ‘destiny’ but human-made.Nonetheless, the rhetoric of manifest destiny still permeates public discourses on national identity and national security; and space exploration is still described as pioneering the frontier, conquering the unknown, exploiting space resources.The cold war rhetoric and today’s rhetoric are virtually the same.This sort of thinking reinforced the idea that conquest and exploitation are reasonable ends for space exploration. US space exploration initiatives today are ostensibly intended to promote global leadership, economic competitiveness, scientific excellence, and technological progress**.** Butthe idea of conquest and exploitationfor the sake of profitis an insidious threat to achieving any of these ends. With the Cold War over and the entire world accessible, the military-industrial complex is extending the doctrine of manifest destiny into outer space. In the late 20th centurythe common wisdom is that humankind has conquered nature here on Earth. Now the conquerors who run the military-industrial complex are looking towards the chaos and emptiness of space as new territory to claim and tame. As the doctrine of manifest destiny was used to justify purging US territory of indigenous residents, it is being used to justify clearing the way into space. Hence space enthusiasts continue to speculate about mining the asteroidsand staking claims on the Moon, proposals immediately started surfacing for developing the Moon and the asteroids**.** Aerospace industries continue to air plans for expanding their businesses into outer space**.** Lockheed Martin executive James Blackwell has expressed the corporate viewpoint very well: “In the 20th century we have called space ‘The Final Frontier’. In the 21st century we will call it something new. We call it ‘Open for Business’.”6 (It is worth noting also that the USA refuses to ratifuy the 1979 UN Agreement governing the Activiities of States on the Moon and Other Celestial Bodies because it prohibits sovereign claims on extraterrestrial property.) It is undoubtedly possible that space exploration could degenerate into the kind of conquest and exploitation that characterized the West’s domination over what is now called the developing world. Thus, NASA and its partners in space should be vigilant in their efforts to avoid repeating past mistakes. Exploration for the purpose of aiding and abetting conquest and exploitation will not build a sound foundation for humanity’s future in space. Initiatives intended to conquer and exploit, to fence off bits and pieces of the Solar System and extend private property rights into space, are not worthy of public funding.

# Frontier Critique 1NC [2/3]

**Impact. Continuing to think of space as the next frontier means that we ignore the negative consequences of space exploration, such as the huge income inequality that will result from the fact that only a few nations will be able to reap the benefits of working in space.**

**Ray Williamson, Professor of Space Policy and International Affairs in the Space Policy Institute, George Washington University, October 1987 “Outer Space as Frontier: Lessons for Today,” Western Folklore,**

However, the analogy between conquering and settling North America and settling outer space, with its utopian overtones, is seriously flawed.9 As Stoeltje points out, the images of the frontier that space enthusiasts resort to bear little relationship to the actual experiences of life on the frontier.10 The picture they show is rather a construct of images rooted in the eastern seaboard: a deliberate attempt to conjure a positive, romantic, masculine image of life in the West. They convey none of the loneliness, the exploitation, or the risks actually experienced by settlers." Except to depict them as an enemy, these images virtually ignore the Native Americans who inhabited North America before European intrusion; suppressed too are the violence and struggle for domination characteristic of the west. Clothing their aspirations in the mythic garments of a romanticized frontier is a way of ignoring or pushing aside the possible negative aspects of the exploitation of space. For example, although in space there are no Indians and no plasmoid buffaloes to exploit, the only nations that can afford to make use of the potential material wealth in space are those that can now afford the enormous expense to reach them. It is likely that in exploiting space we shall continue the same imbalances of resources and material wealth we experience on Earth.

# Frontier Critique 1NC [3/3]

**C. Alternative. Instead of thinking of space as the frontier with resources and opportunities for us to take advantage of, we should view space as a new environment we must protect and preserve. Seeing space more like a national park than a mine will allow us to approach it more productively.**

**Linda Billings, Manager of Communications, NASA Astrobiology Program, 2/3/2006’ “To the moon mars and back: Culture, Law and Ethics in Space fairing societies.”** [**http://lindabillings.org/lb\_papers/space\_law\_ethics\_culture.pdf**](http://lindabillings.org/lb_papers/space_law_ethics_culture.pdf)

The wilderness metaphor has been suggested as an alternative to the frontier. This metaphor is encompassed in the concept of “astroenvironmentalism,” the idea of applying the values of environmental protection and preservation to space exploration (Miller, 2005, 2001). Treating the solar system like “a space wilderness to protect” rather than a frontier to exploit could keep nuclear weapons, nuclear power, human-made debris, and environmental hazards out of space and prohibit private and sovereign property claims. The point is to “avoid making the same mistakes in space as we have on earth” (Miller, 2001, n.p.). One place where legal and ethical considerations of protection and preservation in space currently do intersect is in planetary protection policy. NASA and the international Committee on Space Research (COSPAR) have long-standing planetary protection policies in place directing solar system exploration missions to take steps to prevent the transport of terrestrial biological contamination to extraterrestrial environments and the transport of extraterrestrial biological contamination (should it exist) to Earth through solar system sample returns.10 The rationale for these policies is to maintain pristine conditions in extraterrestrial environments for the purpose of scientific exploration. An expert panel of the National Academy of Sciences has recently suggested that the space community consider expanding this rationale to include preservation of pristine extraterrestrial environments for their own sake – that is, the wilderness rationale (Space Studies Board, 2005). Moving from human interactions with the space environment to human interactions with humans in space, the idea of space jurisprudence – the governance of “relations between earthkind and spacekind and among spacekind themselves” – has been addressed by Robinson and White (1986). They propose “first principles for the governance of space societies” and a “spacekind declaration of independence” (p. xxii) for future space migrants and space natives. Noting that “the conception of space as the common heritage of humankind [is] the keystone of all…space treaties” (p. 38), they suggest it could well serve as a keystone for future space law (or “astrolaw”) as well.11 They acknowledge, too, the difficulties terrestrial experts face in conceptualizing social and legal structures for extraterrestrial human communities: “How do we design social structures and reflective legal regimes for human societies in space on the basis of empirical data generated by Earth-sitters” (p. 103)?

# Link – Generic

**[\_\_\_\_]**

**[\_\_\_\_] Space exploration is described as analogous to settling the American West, a place to go to seek magical solutions to the problems America has created.**

**M. Jane Young, Professor of American Studies at the University of New Mexico, October 1987, “Parables of the Space Age-The Ideological Basis of Space Exploration,” Western Folklore,**

Stoeltje emphasizes that the metaphor of the frontier as applied to outer space is a false metaphor, a construct that maintains a sense of excitement while obscuring the reality that the endeavor is essentially a materialistic enterprise. Stoeltje adds that the term metaphor implies a similarity between outer space and the western frontier that is lacking; instead, it is the concept of the frontier as entitling myth, as unambiguous justification for an authorative plan of action, which shapes the U.S. space program. Williamson uses his unique position to explore the way in which the concept of outer space as frontier affects the direction of the U.S. space program, suggesting at the same time that the analogy between settling the American West and settling space may be seriously flawed. It has been suggested that the real motivation behind the early Apollo moon shots was political rather than scientific. In fact, a number of the scientists involved have complained that they were not given time between one shot and the next to analyze the material brought back from the moon, nor has such analysis been a major consideration since then.4 One needs only to consider the image of big business as a new frontier to realize that the prime aim of space exploration is not so much to obtain knowledge of the unknown as it is to obtain a replacement for earth's dwindling natural resources. It is only a small leap from this to the assertion that humans have begun to look towards outer space for an almost magical solution to the problems we have created here on earth by our excessively materialistic orientation.

# Link – Asteroid Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] Seeing an asteroid impact as a freak occurrence of a wandering object is linked to the frontier image of the outlaw rolling into town.**

**Gerrit Verschuur, Adjunct Professor of Physics at the University of Memphis, 1996, Impact: the Threat of Comets and Asteroids, p. 158)**

From this sobering perspective, let's take a look at the likelihood that our planet will be struck by a rogue asteroid or comet, and consider two groups of scientists offering odds who look at the issue very differently. The first group is predominantly located in the United States and has until recently described dangerous impacts as being caused by a lone wanderer through space that slams into the earth with little warning. I will refer to this as the Lone Ranger model, because it reminds me of Western mythology (that is, cowboy fiction) where all's well until the lone bad guy rides into town and begins to shoot up the citizens. In the movies, the town is rendered safe by a good guy, the Lone Ranger, doing brave deeds. In the case of future impacts, the brave deeds are being accomplished by those who are searching to identify the rogue asteroids and comets so that we might someday ride out and shoot them up (see chapter 16).

**[\_\_\_\_] Attempts to mine space for its resources through asteroid mining are tied into the frontier metaphor of space.**

**Linda Billings, Manager of Communications, NASA Astrobiology Program, 2/3/2006’ “To the moon mars and back: Culture, Law and Ethics in Space fairing societies.”** [**http://lindabillings.org/lb\_papers/space\_law\_ethics\_culture.pdf**](http://lindabillings.org/lb_papers/space_law_ethics_culture.pdf)

The social, political, economic and cultural context for the U.S. civil space program has changed radically since the 1960s. But the rhetoric of space policy making has not. In the 21st century, politicians and other advocates are promoting “the Moon-Mars thing” as exploration for the sake of exploring and also as a means of opening up the solar system to private property claims, resource exploitation, and commercial development. In the words of one space advocate, “The solar system is like a giant grocery store. It has everything we could possibly want…. The solar system’s seemingly limitless energy and mineral resources will solve Earth’s resource shortages.”8 In these remarks is reflected a belief that the values of materialism, consumerism, and hyper-consumption prevalent today are values worth extending into the solar system. This conception of outer space depends on the idea of a solar system (and beyond) of wide-open spaces and limitless resources. The so-called “the myth of the frontier” (Slotkin, 1973) in American history embodies a worldview in which the United States is “a wide-open land of unlimited opportunity for the strong, ambitious self-reliant individual to thrust his way to the top” (p. 5). President Kennedy’s “new frontier” of the 1960s was “a heroic engagement” in a campaign against communism, including the civilian space program (Slotkin, 1990, p. 3). The frontier metaphor has been, and still is, a dominant metaphor in rhetoric about space exploration; it thrives today in discourse of space exploration planning and policy making. “Space frontier” means different things to different people, and it is worth thinking about the range of meanings invoked by the metaphor in considering what values are, could be, or should be embodied in the space exploration enterprise.

# Link – Constellation Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] Fundamental to the idea of the frontier is that America should be the most powerful country and lead others.**

**Linda Billings, Manager of Communications, NASA Astrobiology Program**, **Societal Impact of Space Flight, p. 483-484)**

The ideas of frontier pioneering, continual progress, manifest destiny, free enterprise, and rugged individualism have been prominent in the American national narrative, which has constructed and maintained an ideology of "Americanism"—what it means to be American, and what America is meant to be and do. In exploring the history of U.S. spaceflight, it is useful to consider how U.S. space advocacy movements and initiatives have interpreted and deployed the values and beliefs sustained by this national narrative. The aim here is to illuminate the role and function ot ideology and advocacy in the history of spaceflight by examining the rhetoric of spaceflight advocacy.' Starting from the premise that spaceflight has played a role in the American national narrative and that this national narrative has played a role in the history of spaceflight, this paper examines the relationship between spaceflight and this narrative. Examining the history of spaceflight advocacy reveals an ideology of spaceflight that draws deeply on a durable American cultural narrative—a national mythology—of frontier pioneering, continual progress, manifest destiny, free enterprise, rugged individualism, and a right to life without limits. This ideology rests on a number of assumptions, or beliefs, about the role of the United States in the global community, the American national character, and the "right" form of political economy. According to this ideology, the United States is and must remain "Number One" in the world community, playing the role of political, economic, scientific, technological, and moral leader. That is, the United States is and must be exceptional. This ideology constructs Americans as independent, pioneering, resourceful, inventive, and exceptional, and it establishes that liberal democracy and free-market capitalism (or capitalist democracy) constitute the only viable form of political economy." The rhetoric of space advocacy exalts those enduring American values of pioneering, progress, enterprise, freedom, and rugged individualism, and it advances the cause of capitalist democracy.

# Link – Constellation Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] Using hegemony and economic leadership to justify American space activities reflects an underlying frontier mentality.**

**Ray Williamson, Professor of Space Policy and International Affairs in the Space Policy Institute, George Washington University, October 1987 “Outer Space as Frontier: Lessons for Today,” Western Folklore,**

Within a few months of the Princeton meeting, I confronted for the first time the extent to which the myth of the frontier had been subsumed into the immediate drive to expand this nation's capacity for working in space. At a briefing in my office, representatives of a large aerospace firm argued that exploitation of outer space was a means for maintaining U.S. national power and prestige, and stressed the use of outer space as "America's Frontier for Growth, Leadership and Freedom."'7 In other words, fully exploiting space will pull the United States out of its national and international doldrums and give it a new economic and political edge over other nations. Without this outward growth, they argued, we as a nation are likely to become stifled. It is part of our heritage as Americans that "exploration and growth have been synonymous."'8 Our ancestors explored, conquered, and settled the "new" land just beyond the boundaries of civilization, and in doing so, each time they moved the boundaries out just a bit further. So, in a sense, by living on the edge of the unknown,19 as a nation we became accustomed to being unsettled, became inured to the continually new, were ever ready to move on and out. But the American spirit is not characterized solely by continual physical movement and expansion. We have also made scientific research and engineering development our hallmark. And we have manifested that emphasis to ourselves and the world by highly visible, well-publicized exploits in outer space. First we traveled to the moon and then developed a reusable orbiting space shuttle. By becoming masters of the space spectacular, covered extensively on television and radio, we have maintained our place on the edge of our collective seats.20

# Link – SETI Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] Searching for aliens as a solution to Earth’s problems perpetuates the idea of space as the next frontier.**

**M. Jane Young, Professor of American Studies at the University of New Mexico, October 1987, “Parables of the Space Age-The Ideological Basis of Space Exploration,” Western Folklore,**

Thus, not only is outer space the "new frontier" in the sense of physical exploration, it has also become an arena for the projection of fantasies. Mary O'Drain suggests, for example, that the gods of early Western mythology have given rise to the extraterrestrials of today, those benevolent beings who will have the knowledge and resources to repair the mistakes we have made.5 The answers are located "out there," rather than within ourselves. Another example of this reliance on a "fantastic" solution to earth's dilemma is the tendency in recent times to translate faith in a myth sequence or the tenets of religion into overweening faith in "the wonders of Science." Among modern, technologically-oriented Americans, not only has the belief in UFOs and extraterrestrial beings become the folkloric expression of traditional ideologies, but science has replaced myth as the sacred charter, the system of beliefs that mediate between the known and the unknown.

**[\_\_\_\_]**

**[\_\_\_\_] The belief in extraterrestrial life is a product of the frontier myth.**

**Howard McCurdy, Professor of Public Affairs at American University, 2007, Societal Impact of Spaceflight, p. 14**

Two recent developments help to illustrate this situation. The first is the so-far disappointing pursuit of extraterrestrial life. The widespread expectation that spaceflight will result in the discovery of extraterrestrial life permeates the early literature on spaceflight, from the contemplation of environmental conditions on Mars to the presentation of alien forms in science fiction.'4 In a rashion similar to other metaphors imposed on space travel, the vision of a universe teeming with life derives much of its force from the widespread expectation that expeditions in the extraterrestrial realm will be similar to earlier ventures in the terrestrial one. Terrestrial explorers returned with tales of exotic species and strange cultures, fueling expectations that extraterrestrial journeys would reveal the same. Throughout the first 50 years of spaceflight, at least, this expectation has not been fulfilled. Confounding widespread expectations, robotic spacecraft have revealed the surface of Mars to be essentially sterile, not the "abode of life" that writers such as Percival Lowell and Willy Ley portrayed. Inspection ofVenus, which was often portrayed in pre-Space Age writings as a Paleozoic planet, has exposed a hellish place much too warm to permit the development of complex life.2"1

# Link – Mars Colonization Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] The drive to colonize Mars gets its inspiration from manifest destiny and the colonization of the American west.**

**Catherine Gouge, Associate Professor of English at West Virginia University, Fall 2002, “The Great Storefront of American Nationalism: Narratives of Mars and the Outerspatial Frontier” Americana: The Journal of American Popular Culture (1900-present), Fall 2002, Volume 1, Issue 2**

One of the "First Hundred" colonists in Robinson's *Red Mars*, John Boone (whose name seems to recall somewhat ironically the mythical American, Daniel Boone), calls the transposition of the American frontier analogy to the Martian frontier a "false analogy"**:** Oh come on [...] You all have to get it through your heads that this whole [Martian] revolution scenario is nothing but a fantasia on the American Revolution, you know, the great frontier, the hardy pioneer colonists exploited by the imperial power, the revolt to go from colony to sovereign state—it's all just false analogy! (348) The historical analogy breaks down, according to Boone, because the "fantasia" is not "real,"and the charactersto whom Boone is speakingare merely transposing their fantasy of American history onto the very real Martian frontier experience. In so doing, these characters narrativize their experience such that they become the underdog heroes of history: the exploited pioneers who eventually gain autonomy and power**.** The trilogy suggests that if we project such a fantasy onto the Martian frontier, if we treat the fantasy as if it were reality, no matter how long one may have been there, Mars will remain, "the place you have never seen" (*Green Mars* 189). Indeed, "seeing" Mars is key to surviving there since, as Boone explains later in the passage, one of the key differences between Mars and the originary American frontier is that,without a long process of terraformation, the Martian terrain cannot sustain colonists as he imagines the originary American frontier did. Robert Markley notes that the necessity of terraformation is represented by the trilogy as fundamental to the transformation of the frontier subject: "The impossibility of fitting Mars into paradigms imported from Earth forces characters to move beyond false historical analogies and, consequently, to take moral responsibility for the complex changes—social as well as biospheric—initiated by terraformation" (787). The ecology of Mars both forces Robinson's characters to take "moral responsibility" and is responsible, according to the trilogy, for teaching colonists to be more humble about their place in history, to accept responsibility for their actions and yet to resist the impulse to stake too large a claim for themselves in history books.

# Link – Mars Colonization Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] The depiction of the Earth as a dying planet is related to the concept of frontier expansion—their plan reaffirms a distorted picture of manifest destiny.**

**Linda Billings, Manager of Communications, NASA Astrobiology Program**, **Societal Impact of Space Flight, p**. **486-487**

Author Ishmael Reed has made the link between progress and spaceflight in an essay called "Progress: A Faustian Bargain": In order to justify its programs, NASA, in its brochures, describes the Earth as a dying planet, a fact which for them justifies colonizing the universe . . . .You can understand why, in many science fiction movies, the goal of the invaders is to destroy this planet, lest this progress be extended to their neighborhoods.15 Historically and presently, the rhetoric of space advocacy advances a conception of outer space as a place of wide-open spaces and limitless resources—a space frontier. The metaphor of the frontier, with its associated images of pioneering, homesteading, claim-staking, and taming, has been persistent in American history. In the rhetoric of spaceflight advocacy, the idea of the frontier is a dominant metaphor. It is worth noting that the root of the word "frontier" is the Old French word for "front." In the English language, that word "front" conveys a complex of meanings, ranging from the most common definition—the part of anything that faces forward—to the definition that probably comes closest to the meaning of"front" in "frontier": an area of activity, conflict, or competition. A common military definition of'front" is also tied up in the meaning of "frontier." that is, the area of contact between opposing combat forces. Other meanings of "front" that should be considered in assessing the meaning of the frontier metaphor are: a facade; a position of leadership or authority; and a person or thing that serves as a cover for secret, disreputable, or illegal activity. What meanings are advocates intending to convey, and what meanings are they in fact conveying, when they talk about the space frontier?"'

# Impact – Conflict

**[\_\_\_\_]**

**[\_\_\_\_] Using the frontier metaphor means that we will run into the same problems and conflicts that we did while settling the west.**

**Patrick Lin, Assistant Professor at California Polytechnic State Univeristy, 5/6/2006 “Viewpoint: Look Before Taking Another Leap For Mankind- Ethical and Social Considerationa in Rebuilding Society in Space” *Astropolitics***

Going back a few centuries to colonial America, our history lessons seemed to have glossed over the fierce ethical debate that had surrounded English colonialism, which focused on the moral permissibility of settling on lands already occupied by the indigenous people of America or Amerindians. It was not at all obvious that colonialism was an unproblematic practice, and in fact, it seemed to be such an intractable and important ethical dilemma that it inspired some of the most notable thinking in political philosophy. For instance, John Locke’s influential Second Treatise of Government, which explained the origins of private property and civil govern­ ment, is now believed to be a defense of English colonialism,establishing a legitimate mechanism to claim property in lands that are already occupied, though not ‘‘owned’’ by Amerindians as they were believed to be nomadic and only wandered across the land rather than have ownership in it.1 The difference between colonialism and space exploration, of course, is that we do not run immediately into the problem of displacing or interfering with pre-existing inhabitants of whatever space bodies we explore next, since no such ‘‘alien’’ life-form has yet to be established. And given Fermi’s Paradox, this may be a problem we need not tackle in the near future. Rather, the point here is if we are taking another giant leap into the space frontier, our position is not too different from that of colonialists, as we have the unique opportunity to start a new world, but in doing so, there may be important ethical and social issues we should consider first. Our last ‘‘New World’’ proved to hold many conflicts and challenges—from territorial disputes with other nations to the chaos of the Wild West to current population-related issues—that may similarly arise in the context of space exploration. But now, we have the benefit of hindsight and another unique opportunity to identify and defuse those potential landmines before we step on them. It has not been easy getting from a loose collection of American colonies to where we are now, and we might expect similar trials on our road to space settlements as well.

# Impact – Turns Case

**[\_\_\_\_] Simply colonizing space under the same mindset of colonialism will lead to the same problems of resource depletion in space, ultimately solving nothing.**

**Patrick Lin, Assistant Professor at California Polytechnic State Univeristy, 5/6/2006 “Viewpoint: Look Before Taking Another Leap For Mankind- Ethical and Social Considerationa in Rebuilding Society in Space” *Astropolitics***

If not for adventure or knowledge, there are other, more pragmatic reasons to consider. For example, notable scientists, like the late Carl Sagan and Stephen Hawking, discuss ‘‘backing up the biosphere’’ in case our world becomes uninhabitable. Of course, if that ever happened, it may be our own fault, given our weapons of mass destruction, freely-distributed recipes for the 1918 killer virus, predicted misapplications of biotechnology and nanotech­ nology, and other possible man-made catastrophes. So is it a good enough reason to inhabit another planet, because we want a ‘‘do­ over’’ if we destroy our own? And if so, again, what are we doing to ensure that we do not make the same mistakes and lay waste to another biosphere? If we have put ourselves in a position where weneed a back-up plan, it is unclear how settling space will improve our self-destructive tendencies until we address those root issues. Less metaphysically, does having a safety net, such as a back­ up planet, make it more likely that we take more chances and treat our home planet less carefully? This would seem to be consistent with human behavior: as risks decrease, we are more likely to engage in that activity. However, an argument might be made that people who engage in possibly catastrophic acts are not the kind of people worried about our future and would proceed ahead regard­ less of a back-up biosphere. Further, perhaps having a ‘‘Plan B’’ does make sense, if we think that a natural apocalypse may occur, such as an asteroid collision. Another related reason for space development is that inhabit­ ing other planets is the ‘‘social release valve’’ we need to alleviate overcrowding and diminishing resources here on our home planet. But is this an argument for space exploration, or for population control and more intelligent use of our natural resources? Once again, if we need to escape our own planet for societal, political, or economic reasons, what is our plan for doing it right on another planet, or will we be bringing the same baggage into space to create more of the same?

# Alternative – Reconsider Space

**[\_\_\_\_]**

**[\_\_\_\_] We should explore space for its own sake instead of seeking to exploit it.**

**Linda Billings, Manager of Communications, NASA Astrobiology Program, 1997, “Frontier Days in Space: Are they Over?” http://lindabillings.org/papers.html**

Instead of profit, what the space community should be attending to in developing long-term exploration plans are the social, political, ethical and even spiritual ramifications of extending human presence into space. Fundamentally, what space exploration is about is not profit-but evolution, revelation and inspiration. “Explorers… are driven by a desire to discover which transcends the urge to conquer, the pursuit of trade’, writes Robin Hanbury-tenison.7 Apollo 11 astronaut Michael Collins has observed that ‘exploration produces a mood in people, a widening of interest, a stimulation of the thought processess’.8 Such efforts as NASA’s Discovery programme – a series of low-cost missions to study planets, moons, asteroids and comets – embody the true spirit of exploration. The search for extraterrestrial intelligence (abandoned by NASA in 1993) and search for extrasolar planets epitomize the spirit of exploration as well. Patricia Nelson Limerick has recommended that the space community abandon the frontier metaphor. But at the same time she acknowledges that it is ‘an enormously persistent and determining patter of thought’. Ultimately, it may not be feasible to expunge the frontier metaphor from the public discourse about space exploration. But it certainly is possible and practical, to re-examine it as a motivating force for space exploration. What is the space frontier? It might be useful to think of the space frontier as a vast and distant sort of Brazilian rainforest, Atacama Desert, Antarctic continent – a great unknown that challenges humans to think creatively and expansively, to push their capabilities to the limits, a wild and beautiful place to be studied and enjoyed but left unsullied. Curiosity is what brought humans out of caves, took them across oceans and continents, compelled them to invent aeroplanes and now draws them towards the stars. The broad, deep public value of exploring the universe is the value of discovery, learning and understanding; thus the space frontier could be a school for social research, a place where new societies could frow and thrive. This is the space frontier: the vast, perhaps endless frontier of intellectual and spiritual potential.

# AT: Permutation

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] The myth of the frontier is used to distract from the negative consequences of space exploration. Doing the plan and the alternative together means that we do not have to examine these consequences.**

**Catherine Gouge, Associate Professor of English at West Virginia University, Spring 2007, “The American Frontier: History, Rhetoric, Concept” Americana: The Journal of American Popular Culture (1900-present), Spring 2007, Volume 6, Issue 1**

In arguing for the role of “frontier conditions” (37) in the creation of a certain kind of democratic frontier subject which he called “American,” Turner chronicles the development of that subject formation and credits this process with the formation of our allegedly democratic political ideals and sense of American exceptionalism. To this end, he writes that “this at least is clear: American democracy is fundamentally the outcome of the experiences of the American people in dealing with the West” (266). In this way, he develops a frontierist theory which posits that the influence of the existence of “free” land extends to a political economy and acknowledges a crucial socio-spatial dialectic. As Harvey writes, The Jeffersonian land system, with its repetitive mathematical grid that still dominates the landscape of the United States, sought the rational partitioning of space so as to promote the formation of an agrarian democracy. In practice this proved admirable for capitalist appropriation of and speculation in space, subverting Jefferson’s aims, but it also demonstrates how a particular definition of objective social space facilitated the rise of a new kind of social order. (*Justice* 240) Thus, while Turner argued that “so long as free land exists, the opportunity for a competency exists, and economic power secures political power” (32), he might as well have said, "So long as a frontier exists for appropriation and speculations," both literal and figurative. Indeed, the frontierist socio-spatial dialectic which Turner articulates did “facilitate the rise of a new kind of social order.” It assisted the growth of capitalism in the United States. This romantic narrative of a frontierist socio-spatial dialectic is, in fact, advanced by many post-originary American frontier narratives which attempt to naturalize the contradictions of the economic and political imperatives of liberal democracy.

# Article: Space and Manifest Destiny

**Linda Billings: *Frontier Days in Space: Are They Over?* October, 2005**

For more than 150 years, the metaphor of the frontier and the idea of manifest destiny have held prominent places in American consciousness. These concepts were important elements of the rationale for American westward expansion in the nineteenth century. And they have played a significant part in the history of the U.S. civil space program as well, providing a goal somewhat loftier than simply winning the Cold War space race .

The frontier spirit is still alive and well in the American space community. Aerospace leaders in government and industry continue to use the metaphor of the frontier in speaking of the future of space exploration. The National Aeronautics and Space Administration’s official “vision” statement revalidates the concept, for example, stating that “as explorers, pioneers, and innovators, we boldly expand frontiers in air and space....”

But at the end of the 20th century it may be time to abandon, or at least rethink, the frontier metaphor. The social, political, economic and cultural context of the U.S. civil space program has changed radically since the 1960s. NASA’s Mercury, Gemini, and Apollo programs were products of a geopolitical competition that is now, with the end of the Cold War, history.

In the post-Cold War world, geoeconomic competition is a prevailing force. Thus, the rationale of national security no longer masks the aerospace industry’s relentless drive for profit. This profit motive threatens to undermine future space exploration efforts, by absorbing most of NASA’s budget into infrastructure projects. With profiteers landing contracts for multi- billion-dollar launch systems and orbital facilities and talking of mining the asteroids and building on the moon, space advocates need to reexamine what the frontier metaphor means today.

Dictionaries describe a frontier as a shifting or advancing zone that marks the limits of settlement and civilization. As historian Frederick Jackson Turner explained in his famous essay, “The Significance of the Frontier in American History,” a frontier is a physical and a psychological place, a sort of organizing principle. Patricia Nelson Limerick, a leading contemporary historian of the American West, has said that members of the space community should think more deeply about what they are saying as they exercise the frontier metaphor. “To many advocates of space development, American history is a straight line, a vector of inevitability and manifest destiny linking the westward expansion of Anglo-Americans directly to the exploration and colonization of space.” By this model, space exploration is promoted as an escape from Earthly problems, colonization as a safety valve for social stresses.

“ Space boosters promise a wide and open distribution of benefits,” says Limerick. But “in situations of colonization and settlements, occasions in which everyone gains and no one loses have been extremely rare.... Whether it occurs in terrestrial space or celestial space, expansion has been tough on the ideals and practices of democracy. Principle takes a beating and expediency triumphs....” (Proceedings, “What is the Value of Space Exploration?”, July 18- 19, 1994, Washington, D.C.)As Limerick explains and as Turner’s critics have argued, materialistic interests played a major role in driving U.S. westward expansion. And just as profit was a primary motive for conquering America’s Western frontier, profit is a primary motive for space exploration. Thus it is infrastructure development that consumes most of NASA’s budget; NASA’s most expensive endeavors are the international space station, the space

shuttle, and the development of new launch vehicles are all multi-billion-dollar endeavors which fill up corporate coffers whether or not they ever fly. The U.S. aerospace industry lobbies hard to ensure that such programs survive and thrive. And, not coincidentally, salaries for chief executive officers and other top officials of U.S. Aerospace companies are obscenely large, and growing.

Though perhaps not so clearly articulated as the frontier metaphor, the idea of a manifest destiny in space is still alive. Manifest destiny in nineteenth-century American thought “expressed a spirit of confidence and a sense of power,” writes historian Norman Graebner (Manifest Destiny, Bobbs-Merrill, Indianapolis and New York, 1968). This idea “implied that the United States was destined by the will of Heaven to become a country of political and territorial eminence. It attributed the probability and even the necessity of this growth to a homogeneous process created by certain unique qualities in American civilization -- the energy and vigor of its people, their idealism and faith in their democratic institutions, and their sense of mission....”

Advocates actually declared that expansion was a natural process. John O’Sullivan, a journalist credited with coining the term “manifest destiny,” wrote in 1839 that the United States was “destined to be the great nation of futurity.... We are the nation of human progress, and who will, what can, set limits to our onward march?” (“The Great Nation of Futurity,” Democratic Review)

This rhetoric is old and tired, even threatening today, and certainly not suited to the current global political environment. Yet it persists among space advocates, supported by a prevailing belief among Americans that the United States remains “Number One” among all the nations of the world. Even President Bill Clinton has described his country as “the world’s only superpower.”

The rhetoric of the U.S. space program, a rhetoric conceived by America’s military industrial complex, persistently retains the idea of manifest destiny as a mobilizing concept. As the theory of historical materialism explains, history is not a matter of “destiny” but human-made. Nonetheless, the rhetoric of manifest destiny still permeates public discourses on national identity and national security. And space exploration is still described as pioneering the frontier, conquering the unknown, exploiting space resources.

The Cold War rhetoric and today’s rhetoric are virtually the same. This sort of thinking reinforces the idea that conquest and exploitation are reasonable ends for space exploration. American space exploration initiatives today are ostensibly intended to promote global leadership, economic competitiveness, scientific excellence, and technological progress. But the idea of conquest and exploitation for the sake of profit is an insidious threat to achieving any of these ends.

With the Cold War over and the entire world accessible, the military industrial complex is extending the doctrine of manifest destiny into outer space. In the late 20th century, thecommon wisdom is that humankind has conquered nature here on earth. Now the conquerors who run the military industrial complex are looking toward the chaos and emptiness of space as new territory to claim and tame. As the doctrine of manifest destiny was used to justify purging U.S. territory of indigenous residents, it is being used to justify clearing the way into space.

Hence, space enthusiasts continue to speculate about mining the asteroids and staking claims on the moon. And aerospace industries continue to air plans for expanding their businesses into outer space. Lockheed Martin executive James Blackwell has expressed the corporate viewpoint very well: “In the 20th century we have called space ‘The Final Frontier.’ In the 21st we will call it something new. We will call it ‘Open for Business.’ “ (“Space Shots,” Space News, February 3-9, 1997) (It is worth noting that the United States refuses to ratify the 1979 United Nations Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, because it prohibits sovereign claims on extraterrestrial property.)

It is undoubtedly possible that space exploration could degenerate into the kind of conquest and exploitation that characterized the West’s domination over what is now called the developing world. Thus, NASA and its partners in space should be vigilant in their efforts to avoid repeating past mistakes. Exploration for the purpose of aiding and abetting conquest and exploitation will not build a sound foundation for humankind’s future in space. Initiatives intended to conquer and exploit, to fence off bits and pieces of the solar system and extend private property rights into space, are not worthy of public funding.

Instead of profit, what the space community should be attending to in developing long-term exploration plans are the social, political, ethical, and even spiritual ramifications of extending human presence into space. NASA needs a few good social theorists and moral philosophers to guide the design of a meaningful 21st century space exploration program.

Fundamentally, what space exploration is all about is not profit but evolution, revelation, and inspiration. “Explorers...are driven by a desire to discover which transcends the urge to conquer, the pursuit of trade,” writes Robin Hansbury-Tenison. (The Oxford Book of Exploration, Oxford University Press, Oxford and New York, 1993) Apollo 11 astronaut Michael Collins has observed that “exploration produces a mood in people, a widening of interest, a stimulation of the thought process....” (Carrying the Fire: An Astronaut’s Journey, Farrar Straus Giroux, New York, 1974) Such efforts as NASA’s Discovery program -- a series of low-cost missions to study planets, moons, asteroids, and comets -- embody the true spirit of exploration.

The search for extraterrestrial intelligence (abandoned by NASA in 1993) and the search for extrasolar planets epitomize the spirit of exploration as well. Patricia Nelson Limerick has recommended that the space community abandon the frontier metaphor. But at the same time she acknowledges that it is “an enormously persistent and determining pattern of thought....” Ultimately, it may not be feasible to expunge the frontier metaphor from the public discourse about space exploration. But it certainly is possible, and practical, to reexamine it as a motivating force for space exploration. What is this space frontier?

It might be useful to think of the space frontier as a vast and distant sort of Brazilian rainforest, Atacama desert, Antarctic continent -- a great unknown that challenges humans to think creatively and expansively, to push their capabilities to the limits, a wild and beautiful place to be studied and enjoyed but left unsullied.

Curiosity is what brought humans out of caves, took them across oceans and continents, compelled them to invent airplanes, and now draws them toward the stars. The broad, deep public value of exploring the universe is the value of discovery, learning, and understanding; thus, the space frontier could be a school for social research, a place where new societies could grow and thrive. This is the space frontier: the vast, perhaps endless, frontier of intellectual and spiritual potential.

Consider the popularity of director Ron Howard’s film “Apollo 13.” What appealed to audiences about this story was that it was about danger, risk, challenges, hard work, human ingenuity, turning failure to success, life triumphing over death. In his turn of the century essay, “The Moral Equivalent of War,” American philosopher William James wrote that “without risks or prizes for the darer, history would be insipid indeed....” Space exploration offers tremendous opportunities to take extraordinary risks, and thus it promises great challenges to the human mind and spirit. Intellectual and spiritual growth are more than worthy goals of future space exploration efforts.

**Frontier Critique Affirmative**

# Frontier Critique Affirmative

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# Glossary

**Frontier** – The edge of a nation’s territory. More than just a border, a frontier is a place where it is expected that a country’s settlers will eventually move to and assimilate.

**Ethics** - Moral principles that govern a person's or group's behavior.

**Ideology** – a system of ideas and ideals, especially one that forms the basis of economic or political policy

**Nationalism/nationalistic –** nationalism is a feeling of pride for the country you come from. Nationalistic actions are those taken on behalf of your country.

**Manifest destiny** - The 19th-century doctrine or belief that the expansion of the United States throughout the American continents was both justified and inevitable

**Expansionist** – Expansionist policies are meant to expand the United States’ influence to new areas.

**Metaphor** - A thing regarded as representative or symbolic of something else, esp. something abstract. Many think that the frontier and manifest destiny have become the guiding metaphor for space exploration

**Discourse** – Written or spoken communication or debate

**Subjugate** – Bring under domination or control, esp. by conquest

**Aesthetic preferences** – Aesthetic preferences are someone’s preferences for how something should look. Calling environmentalism an “aesthetic preference” is a derogatory way to saying that environmentalism is not important to save the planet, but it is merely a personal preference for how the Earth should look.

# No Link – Space Isn’t Guided By the Frontier Metaphor

**[\_\_\_\_]**

**[\_\_\_\_] Frontier mythology won’t automatically apply to space just because you can find similarities—each frontier is unique to the time period and modern ideas distort the history of frontier expansion**

**Dale M. Gray, President of Frontier Historical Consultants, 1999, “Space as a frontier - the role of human motivation,” Space Policy, August**

Frontiers have the reputation for generating a ‘Frontier Mentality’. This is generally thought of in terms of the American frontier mythos. The sturdy pioneer is seen as independent, self-sufficient, and highly motivated to provide a better life for his family. He is also portrayed as having little regard for any environmental devastation or for any indigenous society he might encounter. While there were no doubt pioneers with these qualities, these values reflect the unique mixing of the historic society and the realities of the resources being utilized on the frontier at that time. Further, our perception of the past is distorted by the ethics of our society and the historic, social and entertainment mediums by which the picture of the past is presented. If historic frontiers are studied in some detail, it soon becomes apparent that each has a unique set of values, ideals and mind-sets.

# Link Turn – Frontier Metaphor Good

**[\_\_\_\_]**

**[\_\_\_\_] Frontier imagery is essential to productively using space – it’s the only thing that can motivated people to overcome the initial hardships in exploration. No one wants to risk their life to visit a space park.**

**Dale M. Gray, President of Frontier Historical Consultants, 1999, “Space as a frontier - the role of human motivation,” Space Policy, August**

Charisma, often overlooked in frontier histories and economic plans, is the motivation that pulls men and women forward into the wilderness to seek their fortunes. Reasons to participate in frontiers can be as numerous as participants – ranging from personal desire for wealth to larger ideologies that shape the course of nations. Among the most common reasons to participate in a frontier is the belief that frontiers offer opportunities no longer available in civilization. It is this belief that sustains participants through unimaginable hardships and failures. In the 1840s, families struggling to make a living on too small farms packed their possessions and crossed the North American continent on the Oregon Trail. Businesses utilize the charisma of frontier to increase profits. From the 1870s through 1890s railroads promoted rail travel to the American West in crowded cities in the American east and in Europe by advertising the cheap and fertile western lands. Nations also utilize frontier issues and ideologies to advance their own agendas. Manifest Destiny which was a belief that the United States should stretch from sea to sea, was a rallying cry for those promoting the settlement of Oregon. Without human motivations, there would be little reason for a frontier participant to work the long hours, face the dangers and assume the risk of a frontier when economic security can be more easily obtained in the comforts of civilization.

**[\_\_\_] Frontier imagery can be motivating and spur people to seek a better life and escape injustice**

**Dale M. Gray, President of Frontier Historical Consultants, 1999, “Space as a frontier - the role of human motivation,” Space Policy, August**

Frontiers have an intrinsic appeal not only to nations and investors, but to individuals as well. Daniel Boone sought the solace of solitude of the wilderness. The Pilgrims were only the first of many groups to escape religious constraints by moving to the American frontier to set up utopian communities. Talented young men eager to prove their worth, tended to enter into frontiers to make a name for themselves. Others, with dubious pasts, escaped to the frontier so that they could start life anew with a clean slate. The reasons for individuals to participate in frontiers are many, but in their basic forms they can be listed as: freedom, opportunity and adventure. The call of the frontier brings meaning and challenge to personal lives. It inspires. The chance to live and work in space is a motivator that has inspired students for four decades. Homer Hickam in the autobiographical movie October Sky found a way out of a dying West Virginia coal town by following his rocketry interests. Ultimately, he was able to attend college and work for NASA as an engineer. The motivator is not exclusively American, Franklin ChangDiaz who grew up in Costa Rica followed his dreams to the USA to graduate from MIT and become an astronaut. He has to date flown on six Shuttle missions. While space is associated with the sciences, it has a place in the dreams and goals of the common man. In the 22–26 March 1999, ‘March Storm’ lobbying effort of ProSpace, many of the participants came from more ordinary walks of life. One participant, Brian Miller of Ohio, is a young father who never got a chance to go to space. He became involved with the ProSpace lobbying effort so that there will be opportunities in space when his son grows up. He is not alone. In a recent American poll, 74% of those interviewed stated that space technology and research should be used for educational purposes in the classroom [5]. Spaceweek, an international organization, has dedicated the first full week of March 1999 to promote space in the classroom and in the community (www.spaceweek.org).

# Link Turn – Frontier Metaphor Good

**[\_\_\_\_]**

**[\_\_\_\_] Technological progress means that frontier competition will no longer be violent. Historically, the space frontier has produced cooperation between countries, not competition**

**Dale M. Gray, President of Frontier Historical Consultants, 1999, “Space as a frontier - the role of human motivation,” Space Policy, August**

However, nationalistic expansion is given a more constructive venue when it is presented with a true wilderness in which it can grow. In the 20th century, physical frontiers were replaced by technological frontiers that provided arenas of expansionist opportunity with no native populations. The Wright Brothers, Henry Ford, Einstein, Yager, Glenn, Jobs and Gates became the new American folk heroes. They personified the expansion of the frontiers of technology and science. Instead of subjugating or pushing peoples aside, these technological frontiers tended to empower and provide new freedoms. The common man learned to put aside old ways of doing things and embrace new technologies. In 20th century America, the ideology of “Manifest Destiny” came to be replaced with ‘You can't stand in the way of progress!'. Nationalistic goals motivated President Kennedy to declare during a speech at Rice University on September 12, 1962, ‘I believe this nation should commit itself, before this decade is out, to landing a man on the moon and return him safely to the earth'. The speech resulted in the spear thrust of Apollo that proved the USA's superiority over the Soviet technological machine. On Sunday, 20 July 1969, America's sphere of influence extended to the lunar surface as Neil Armstrong and Buzz Aldrin planted the American flag on the Sea of Tranquillity.

Having proved its superiority, America could be magnanimous in victory with the symbolic handshake of Apollo–Soyuz. Since America's retreat from the successes of Apollo, nationalistic interests in space have become less clear. The USA began to quietly concentrate on orbiting satellites. Military and security organizations in the government viewed space as the most practical means of providing information they deemed necessary to maintain national security. The USA's new symbol of superiority in space became the Space Shuttle which could take larger crews to space in airline-like comfort. The USA's expansionist policies had once again moved from the physical to the technological. With the fall of the Soviet Union, the USA had little reason to compete in space. Instead, it found more prestige in allowing other countries to participate in Shuttle missions and most recently in the International Space Station. For America's partners, participation in the station provided access to space without having to develop the means to travel there. For these nations, their space programs have become a focus of national pride. For example when SPAR of Canada recently sold its space robotics unit that manufactured the Shuttle's robot arm to a subsidiary of the American company Orbital Sciences, the SPAR stock holders arose to remove the board of directors that had made the decision.

# Alternative is Harmful

**[\_\_\_\_]**

**[\_\_\_\_] Attempting to preserve space means that Earth’s environment will collapse. We need to expand in order to protect the ecosystems on Earth**

**Saara Reiman, Member of the Department of Social and Moral Philosophy, University of Helsinki, 4/25/2009 “Is space an environment?”**

One of the important motivators behind the space exploration effort is the hope that we may find the energy, resources, colonization opportunities and other things that are in short supply here on Earth in space. It would be easy to build mines in space so that their effect on human well-being would be minimal compared with mining operations of similar size on Earth. Hazardous chemical plants could be situated in distant places like Mars and Earth's precious atmosphere and delicate ecosystems could be preserved. If we start worrying about environmental protection of space, are we not seriously out of focus? Do we not squarely miss the important point, namely that our own planet will not tolerate our current way of living in the long run but that exploiting space would at least provide us extra time for solving our problems? It is true that the resources of space will probably not improve things in the long run unless we learn to treat environments with greater respect [[4]](http://www.sciencedirect.com/science/article/pii/S0265964609000289#bib4). But it is probable that the path to a sustainable high technology civilization would be far less rocky if we had access to the resources of near space. Is it not absurd to worry about lifeless environments if the flourishing of Earth is at stake? Our own survival may well depend on being able to take the ecological pressure off Earth and, when survival is at stake, starting to speak seriously about aesthetic values, the rights of micro-organisms and the inherent value of lifeless environments would seem not only foolish but dangerous.

**[\_\_\_\_] In protecting environments, we should prioritize Earth’s environment over the vast emptiness of space. There is more there that is of value.**

**Saara Reiman, Member of the Department of Social and Moral Philosophy, University of Helsinki, 4/25/2009 “Is space an environment?”**

A related argument is one I call ‘Earth first’ (not to be confused with the militant eco-group of the same name). According to the Earth first argument, in order to protect the environment as much and as effectively as possible, we should concentrate our efforts in selected key areas and only after these have been taken care of, expand our sphere of concern further. At the moment, we are not protecting the environment on Earth nearly as effectively as we could, because of a lack of motivation and resources. Despite the expansion of our influence to the universe outside Earth, Earth will still remain the centre of human activity for a very long time, if not forever. Therefore it makes sense to concentrate our environmental protection efforts here. This is where our work will have the most impact and this is where our environmental choices affect the lives of the vast majority of people directly. This kind of attitude is moderate in the sense that adopting it does not mean that we deny the value of alien environments altogether. It is beneficial and praiseworthy to protect alien environments too when there are cost-efficient means of doing so.[3](http://www.sciencedirect.com/science/article/pii/S0265964609000289" \l "fn3) It is simply that our resources are limited and therefore it is wise to prioritize. If we scatter our environmental concern randomly, we may end up being less efficient in all our environmental protection efforts than we would be if we acted in a more organized manner.

# Alternative Fails

**[\_\_\_\_]**

**[\_\_\_\_] National parks on Earth prove that attempting to protect an environment for its own sake fails. The negative has no right to deny progress into space.**

**Jacob Huebert, Adjunct Professor of Law at Ohio Northern University and Adjunct Faculty Member of the Ludwig von Mises Institute, March 2008, http://jhhuebert.com/articles/environmentalists-in-outer-space/, “Environmentalists in Outer Space” in The Freeman.**

As we’ve mentioned, some have called for part or all of outer space to be declared an untouchable “wilderness.” We find this to be a rather strange preoccupation. Right now space is a de facto 100 percent wilderness preserve and will remain so even if humans go there in large numbers. If environmentalists wanted to preserve specific areas, they could buy or simply homestead land, which some of them have done on earth. Governments, though, have little incentive or ability to determine which parts of any celestial body are best used as wilderness preserves and which are best put to other purposes. Such determinations would surely be corrupted by the influence of special interests, just as special interests have influenced terrestrial environmental laws to the benefit of polluters. Indeed, the U.S. government’s management of its national parks has been dismal, as have governments’ overall environmental records. So if optimal preservation of that which is valuable to scientists and other admirers of pristine lunar wilderness is the goal, the answer again is strictly enforced private property rights. It is entirely unjust for “wilderness” advocates to use government to prevent others from developing their property in space. They may speak in terms of intrinsic value, but they really seek to use the law to forcibly place their personal aesthetic preferences above those of others, and above the welfare of the human race.

# Permutation

**[\_\_\_\_]**

**[\_\_\_\_] We should reexamine the frontier mtyh, not reject it. Doing so allows us to maintain its incredible power to motivate productive action**

**Linda Billings, Manager of Communications, NASA Astrobiology Program, 1997, “Frontier Days in Space: Are they Over?” http://lindabillings.org/papers.html**

Patricia Nelson Limerick has recommended that the space community abandon the frontier metaphor. But at the same time she acknowledges that it is 'an enormously persistent and determining pattern of thought'. Ultimately, it may not be feasible to expunge the frontier metaphor from the public discourse about space exploration. But it certainly is possible, and practical, to re-examine it as a motivating force for space exploration. What is the space frontier? It might be useful to think of the space frontier as a vast and distant sort of Brazilian rainforest, Atacama Desert, Antarctic continent a great unknown that challenges humans to think creatively and expansively, to push their capabilities to the limits, a wild and beautiful place to be studied and enjoyed but left unsullied. Curiosity is what brought humans out of caves, took them across oceans and continents, compelled them to invent aeroplanes and now draws them towards the stars. The broad, deep public value of exploring the universe is the value of discovery, learning and understanding; thus the space frontier could be a school for social research, a place where new societies could grow and thrive. This is the space frontier: the vast, perhaps endless frontier of intellectual and spiritual potential. Consider the popularity of director Ron Howard's film Apollo 13. What appealed to audiences about this story was that it was about danger, risk, challenges, hard work, human ingenuity, turning failure to success, life triumphing over death. In his turn of the century essay, 'The moral equivalent of war', American philosopher William James wrote that 'without risks or prizes for the darer, history would be insipid indeed'. Space exploration offers tremendous opportunities to take extraordinary risks and thus it promises great challenges to the human mind and spirit. Intellectual and spiritual growth are more than worthy goals of future space exploration efforts.

# Permutation

**[\_\_\_\_]**

**[\_\_\_\_] Philosophical criticisms of space policy should be made with practical goals in mind, not abstract rethinkings of how we see space in general**

**Erin Moore Daly and Robert Frodeman, Phd Candidate and Professor of Philosophy at the University of North Texas, 2008. "Separated at Birth, Signs of Rapprochement: Environmental Ethics and Space Exploration." Ethics & the Environment 13.1 (2008): 135-151.**

Revolutions in philosophic understanding and cultural worldviews inevitably accompany revolutions in science. As we expand our exploration of the heavens, we will also reflect on the broader human implications of advances in space. Moreover, our appreciation of human impact on Earth systems will expand as we come to see the Earth within the context of the solar system. Most fundamentally, we need to anticipate and wrestle with the epistemological, metaphysical, and theological dimensions of space exploration, including the possibility of extraterrestrial life and the development of the space environment, as it pertains to our common understanding of the universe and of ourselves. Such reflection should be performed by philosophers, metaphyscians, and theologians in regular conversation with the scientists who investigate space and the policy makers that direct the space program. The exploration of the universe is no experimental science, contained and controlled in a laboratory, but takes place in a vast and dynamic network of interconnected, interdependent realities. If (environmental) philosophy is to be a significant source of insight, philosophers will need to have a much broader range of effective strategies for interdisciplinary collaborations, framing their reflections with the goal of achieving policy-relevant results. If it is necessary for science and policy-makers to heed the advice of philosophers, it is equally necessary for philosophers to speak in concrete terms about real-world problems. A philosophic questioning about the relatedness of humans and the universe, in collaboration with a pragmatic, interdisciplinary approach to environmental problems, is the most responsible means of developing both the science and policy for the exploration of the final frontier.

**Topicality File**

# Topicality

**Resolved: The United States federal government should substantially increase its exploration and/or development of space beyond the Earth’s mesosphere.**

Exploration Means Traveling to Space 1NC [1/1] 1

Space Exploration is Human Exploration 1NC [1/1] 2

Space Exploration is not Planets 1NC [1/1] 3

United States federal government 4

Substantially 5

Space Exploration 6-8

Development 9-10

Beyond 11

Earth 12

Mesosphere 13

# Exploration Means Traveling to Space 1NC [1/1]

**A. Interpretation. Space exploration involves physical exploration in space by satellites, space probes or human-led spacecraft.**

**Columbia Encyclopedia, 2008 "space exploration," Sixth Edition. 2008. Encyclopedia.com. http://www.encyclopedia.com/topic/space\_exploration.aspx**

With over 51,000 entries The Columbia Encyclopedia (Sixth Edition) is an authoritative and exhaustive reference guide. Each entry is thorough and clear, the result of over 200 editors and academic advisors striving for depth and accuracy in the oldest, most venerable English language encyclopedia in the world. space exploration the investigation of physical conditions in space and on stars, planets, and other celestial bodies through the use of artificial satellites (spacecraft that orbit the earth), space probes (spacecraft that pass through the solar system and that may or may not orbit another celestial body), and spacecraft with human crews. Although studies from earth using optical and radio telescopes had accumulated much data on the nature of celestial bodies, it was not until after World War II that the development of powerful rockets made direct space exploration a technological possibility. The first artificial satellite, Sputnik I, was launched by the USSR (now Russia) on Oct. 4, 1957, and spurred the dormant U.S. program into action, leading to an international competition popularly known as the "space race." Explorer I, the first American satellite, was launched on Jan. 31, 1958. Although earth-orbiting satellites have by far accounted for the great majority of launches in the space program, even more information on the moon, other planets, and the sun has been acquired by space probes.

**B. Violation. Radio telescopes are not exploring space, they are merely listening in. Our evidence indicates that they existed before the age of space exploration.**

**C. Standards.**

**Limits. There are any number of ways to look at space from the Earth – you can do it in your own backyard with a telescope. Because going to space is difficult and costly, debating only about plans that take action beyond the mesosphere provides a very clear and predictable base of research that both the affirmative and the negative will benefit from.**

**D. Topicality is a voting issue. Having a clear definition of what the topic includes is essential to fair debate. Without topicality, debate rounds would not be competitive or interesting, and no one would learn because no team would be prepared to debate a case that is not part of the topic. For these reasons you must reject an affirmative that is not topical.**

# Space Exploration is Human Exploration 1NC [1/1]

**A. Interpretation. Humans conduct space exploration. It cannot be done by probes or satellites.**

**Dr. John M. Logsdon, Professor Emeritus of Political Science and International Affairs at The George Washington University's Elliott School of International Affairs; founder and director of GW's Space Policy Institute in 1987, 2009** <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20100025875_2010028362.pdf>

Many believe that the only sustainable rationale for a government-funded program of human spaceflight is to take the lead in exploring the solar system beyond low-Earth orbit.20 The MIT white paper provides an insightful definition of exploration: Exploration is a human activity, undertaken by certain cultures at certain times for particular reasons. It has components of national interest, scientific research, and technical innovation, but is defined by none of them. We define exploration as an expansion of the realm of human experience, bringing people into new places, situations, and environments, expanding and redefining what it means to be human. What is the role of Earth in human life? Is human life fundamentally tied to the earth, or could it survive without the planet? Human presence, and its attendant risk, turns a spaceflight into a story that is compelling to large numbers of people. Exploration also has a moral dimension because it is in effect a cultural conversation on the nature and meaning of human life. Exploration by this definition can only be accomplished by direct human presence and may be deemed worthy of the risk of human life. In the wake of the 2003 Columbia accident that took the lives of seven astronauts and the report of the Columbia Accident Investigation Board that criticized the absence of a compelling mission for human spaceflight as “a failure of national leadership,” the United States, in January 2004, adopted a new policy to guide its human spaceflight activities. The policy directed NASA to “implement a sustained and affordable human and robotic program to explore the solar system and beyond” and to “extend human presence across the solar system, starting with a human return to the Moon by the year 2020, in preparation for human exploration of Mars and other destinations.” This policy seems totally consistent with the definition of exploration provided in the MIT white paper.

**B. Violation. The plan does not use humans to explore space directly. Instead, it uses a proxy such as a satellite.**

**C. Standards.**

**Ground. Sending humans into space is the core of what we should be debating about. After all, as our evidence indicates, the ultimate goal of space exploration and development is for humans to have a presence in space, which means that human exploration is essential. Sending humans into space also ensures that the negative will have access to arguments about astronaut safety and spending, because sending humans to space is very costly.**

**D. Topicality is a voting issue. Having a clear definition of what the topic includes is essential to fair debate. Without topicality, debate rounds would not be competitive or interesting, and no one would learn because no team would be prepared to debate a case that is not part of the topic. For these reasons you must reject an affirmative that is not topical.**

# Space Exploration is not Planets 1NC [1/1]

**A. Interpretation. “Space” is the region between objects in the universe, not the bodies themselves.**

**Dictionary.com. 2011, http://dictionary.reference.com/browse/space**

7. (Astronomy)

a. the region beyond the earth's atmosphere occurring between the celestial bodies of the universe. The density is normally negligible although cosmic rays, meteorites, gas clouds, etc., can occur. It can be divided into cislunar space (between the earth and moon), interplanetary space, interstellar space, and intergalactic space

**B. Violation. The plan explores a planet, not space.**

**C. Standards**

**Predictability. The resolution states that we should be exploring space, not just Mars. The crux of this topic should be about debating space and the difficulties that arise when trying to travel through it by humans or robotic probes, not the conditions on other planets.**

**D. Topicality is a voting issue. Having a clear definition of what the topic includes is essential to fair debate. Without topicality, debate rounds would not be competitive or interesting, and no one would learn because no team would be prepared to debate a case that is not part of the topic. For these reasons you must reject an affirmative that is not topical.**

# United States federal government

“United States” means of or from the United States of North America

Webster’s Third New International Dictionary 1961 p. 2501

Of or from the United States of North America

**“United States” means the federal government**

Ballentine's Legal Dictionary and Thesaurus 1995 p. 689

the federal government

# Substantially

**A substantial increase in Nasa Budget Is 7%.**

**Alexander, 7/3/2007,** Writer for the Planetary Society, “ NASA Mars Program Threatened by Senate Funding Bill” <http://planetary.org/news/2007/0703_NASA_Mars_Program_Threatened_by_Senate.html>

The Senate bill proposes these severe cuts to the Mars program despite the fact that overall it provides for a substantial increase in NASA funding. If approved, the bill will allocate NASA a total of $17.46 billion, $1.2 billion more than the agency’s 2007 budget, and $150 million more than the administration’s request for 2008. The proposal was crafted by the Senate Subcommittee on Commerce, Justice, and Science, and cleared the Senate Appropriations Committee on June 28, 2007.

**Substantially is a worthless word with no clear meaning.**

**Stephen Stark patent attorney from Tennessee, Fall 1997, “NOTE: KEY WORDS AND TRICKY PHRASES: AN ANALYSIS OF PATENT DRAFTER'S ATTEMPTS TO CIRCUMVENT THE LANGUAGE OF 35 U.S.C., Journal of Intellectual Property Law, Fall, 1997 5 J. Intell. Prop. L. 365,**   
  
In patent law, ambiguity of claim language necessarily results in uncertainty in the scope of protection. This uncertainty impairs all of society--the patentee, the competitor, and the public. The process of determining a particular meaning to define a term in a patent claim may result in ambiguity.

1. Ordinary Meaning. First, words in a patent are to be given their ordinary meaning unless otherwise defined. [n30](http://www.lexisnexis.com.proxy.lib.umich.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296265187901&returnToKey=20_T11113197108&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.43807.141755266784" \l "n30) However, what if a particular word has multiple meanings? For example, consider the word "substantial." The Webster dictionary gives eleven different definitions of the word substantial. [n31](http://www.lexisnexis.com.proxy.lib.umich.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296265187901&returnToKey=20_T11113197108&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.43807.141755266784" \l "n31) Additionally, there are another two definitions specifically provided for the adverb "substantially." [n32](http://www.lexisnexis.com.proxy.lib.umich.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296265187901&returnToKey=20_T11113197108&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.43807.141755266784" \l "n32) Thus, the "ordinary meaning" is not clear.

The first definition of the word "substantial" given by the Webster's Dictionary is "of ample or considerable amount, quantity, size, etc." [n33](http://www.lexisnexis.com.proxy.lib.umich.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296265187901&returnToKey=20_T11113197108&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.43807.141755266784" \l "n33) Supposing that this is the precise definition that the drafter had in mind when drafting the patent, the meaning of "ample or considerable amount" appears amorphous. This could have one of at least the following interpretations: (1) almost all, (2) more than half, or (3) barely enough to do the job. Therefore, the use of a term, such as "substantial," which usually has a very ambiguous meaning, makes the scope of protection particularly hard to determine.

# Space Exploration

**Exploration**

## “Space exploration” has a broad definition and includes many things.

Organization for Economic Cooperation and Development, 2007, **“The Space Economy At A Glance,” p. 62)**

*Definition*

Space exploration is the physical exploration of outer-Earth objects, via robotic probes and human missions. More broadly, it also includes the scientific disciplines *(e.g.* astronomy, solar physics, astrophysics, planetary sciences), technologies and policies applied to space endeavours.

**Space means expansion of human presence into space.**

G. Ryan Faith, **adjunct fellow at the Center for Strategic and International Studies (CSIS), 8/31/**9, “**Giving NASA a clear mission,”** [**http://www.thespacereview.com/article/1456/1**](http://www.thespacereview.com/article/1456/1)

Giving NASA a clear mission If neither technology-oriented nor destination-oriented objectives seem able to provide a sense of direction to guide the nation’s efforts in space, then what can? To approach this question, it is useful to ask why President Kennedy’s challenge to go to the Moon was so effective in providing NASA with leadership. The critical element of this challenge that, although never explicit, was so important to NASA’s health and growth during this period was the transformation—at least in fact, if not in law—into an exploration agency. If we wish to see NASA act effectively as a space exploration agency, then the most direct way to do this is to amend the Space Act to explicitly task the agency with the job of space exploration. However, before we do so, we must define what space exploration actually is. Space exploration is the expansion of human influence in space. This definition of exploration is inherently one of capacity building. Human influence in space is a measure of our ability to do useful things beyond the Earth’s surface. In order to do something useful, there has to be some sort of human presence**,** either humans themselves or their robotic proxies. Once some measure of human influence has been established at some destination in space, there are two ways a space exploration agency can expand that influence. One, the agency can decrease the costs and increase the benefits of human influence at a given location until such influence becomes sufficiently useful that it is economically self-sustaining, at which point continued use of agency resources is unnecessary. Alternately, human influence can be extended to some new place that may in future become home to some form of self-supporting human influence. The key element is that such a mandate compels each step to build on past accomplishments and lay the groundwork for future missions.

# Space Exploration

**Space exploration includes returning to Mars.**

**Daniel F. Lester, and Michael Robinson, Department of Astronomy, University of Texas, Austin, Hillyer College, University of Hartford, 2009, “Visions of Exploration,” Space Policy 25 (2009), p. 237**

The optimal strategy for US space exploration has recently been the subject of some decidedly revisionist thinking, manifested in the February 2008 workshop ‘‘Examining the Vision: Balancing Science and Exploration’’ sponsored by Stanford University and the Planetary Society [3]. Human space exploration was defined implicitly by the participants with an implementation plan to wit ‘‘the purpose of sustained human exploration is to go to Mars and beyond’’. This, and also the view that science is a beneficiary of human space flight but is not its primary motivation, is consistent with the thinking of the Aldridge Commission. This consistency became a matter of revisionism here because, following the Aldridge Report with its broad set of science goals, the NASA exploration enterprise subsequently became narrowly focused on lunar return.

**Exploration doesn’t require humans.**

**Mr. Harry J. Goett*, et al*, 25–26 May 1959, NASA, “ Minutes of Meeting of Research Steering Committee on Manned Space Flight,” Chairman Mr. M. B. Ames, Jr. (part time) Mr. De E. Beeler Dr. A. J. Eggers Mr. M. A. Faget Mr. Laurance K. Loftin, Jr. Mr. George M. Low**

Each member then gave this views about how this Committee should operate. There was unanimous feeling that we should not be influenced by other committees or groups. NASA is concerned with the national space program so his committee should do long range objective planning, decide what supporting research and to some extent what vehicle recommendations are appropriate, and then take aggressive steps to assure that the work is implemented with proper orientation and coordination among all NASA Research Centers including JPL and HSFS. Certain space flight objectives have to be decided upon early to work toward. The Committee should not get bogged down with justifying the need for man in space in each of the steps but out-rightly assume that he is needed inasmuch as the ultimate objective of space exploration is manned travel to and from other planets. It is felt that the Committee can help put [3] more objectiveness in NASA space research by stressing overall jobs to be done and concepts to be explored. Past experience as with the X-15 and Mercury has shown that research geared to definite objectives is mutually beneficial to both research planning and project development. On the other hand a point was made that the Committee has to assure that NASA research retains enough diversity to avoid overlooking important new ideas. It is questionable, however, as to whether the NASA will be able to develop space research to the degree of systematic coverage that the NACA was able to do previously for example in the case of the aerodynamics of aircraft wing and body configurations.

# Space Exploration

**Space exploration refers to exploration of deep space and the planets.**

**Harrison Schmitt, Chairman Of Interlune-Intermars Initiative Astronaut before the Senate Commerce, Science, and Transportation Committee's Subcommittee on Science, 2003 “Testimony on the Commercial Development of Lunar Resources”**

The term "space exploration" implies the exploration of the Moon, planets and asteroids, that is, "deep space," in contrast to continuing human activities in Earth orbit. Human activities in Earth orbit have less to do with exploration and more to do with international commitments, as in the case of the Space Station, and prestige and technological development, as in the case of China and Russia. There are also research opportunities, not fully recognized even after 40 years, that exploit the opportunities presented by being in Earth orbit.

**Space exploration is inclusive of ground-based observatories.**

**Andrew MacDonald, research scientist at Carnegie Mellon University, 9/03/2010, “A Brief Note on the Economic History of Space Exploration in America,” http://www.cmu.edu/silicon-valley/files/pdfs/macdonald-alex/brief-history-space-explore.pdf,**

For hundreds of years prior to the Space Age, we explored space through the telescopes of ground-based astronomical observatories. If we consider discoveries made through observations by robotic spacecraft to be space exploration, then we should consider discoveries made through ground-based astronomical observatories to be space exploration as well. In both cases the experience of the human observer is fundamentally the same – that of having vision extended into space through advanced technology. By using a consistent metric to compare the cost of that technology, whether spacecraft or telescope, we can examine the economic history of space exploration in America as a continuum extending from the mid-19th century to the present day and identity long-run trends in funding. Two significant observations can be drawn from the calculations above. First, even before the mid-twentieth century, space exploration projects of comparative relative magnitude to small-to- mid-sized robotic spacecraft were relatively common. Second, for most of its history, space exploration in America has been principally funded by private sources. The re-emergence of this trend, in both astronomy and space exploration more generally, may be robust and long-lasting. Plans for the development of space exploration infrastructure should consider that economically.

# Development

**Space development is private investment in technology and infrastructure in space for the purpose of profit.**

**NASA Academy, The NASA Academy is a leadership development summer program for undergraduate and graduate students interested in pursuing careers in space-related fields at Goddard Space Flight Center, 2008, “Roadmap to a Space Faring Civilization”, http://www.eng.buffalo.edu/~cheetham/index\_files/NA08\_GSFC\_RSFC\_VER\_1.0.pdf**

Space development – private investment in space technologies, capabilities, and infrastructure such that commercial entities work in and profit from space.

**The development of space must contribute directly to the prosperity of life on earth and must be the peaceful employment of humankind’s shared assets.**

**Ward W. Vuillemot, Aerospace Engineering, Masters of Science Computational Fluid Dynamics, Research Assistant; Professor Uri Shumlak, 2001 “Japan’s Space Development: Past, Present, and Future”,** [**http://web.mac.com/wwv/docs/japanese.space.development.pdf**](http://web.mac.com/wwv/docs/japanese.space.development.pdf)

To begin, we will examine how its members perceive the development of outer space within an international and globally inclusive framework. Congruent with other world nations, the commission defined the development of outer space as, “In order to contribute to the continual prosperity of life on Earth, we should strive to effectively maximize the utilization of the limitless possibilities of unknown outer space through mankind’s shared assets.” [11]

# Development

**Development is not limited to economic growth, it also includes management of outer space and its resource, it must entail increased efficiency and technological improvements.**

**Lotta Viikari, researcher at the Northern Institute for Environmental and Minority Law, Arctic Centre, University of Lapland, 2008, “The environmental element in space law**”

In accordance with the ideology of sustainable development, multidisciplinarity and all kinds of cooperational regimes facilitating progressive learning processes and enabling continuous re-evaluation of space activities according to insights gained over time should be specifically encouraged. Moreover, the concept of development should be reconsidered to include other elements in addition to economic growth. Instead of ‘sustainable development’, one might speak of sustainable management of outer space and its resources, because for many the definition of development entails merely increased efficiency resulting from technological improvements. On the other hand, technological improvements which contribute to environmentally less adverse conduct of space activities would be more than welcome. With the technology used today, it seems difficult to slow the rate of environmental change in outer space to a level which that environment can tolerate, at least without considerable restrictions on space activities.

**Exploration means discovery through spacecraft; development is prospecting for resources.**

**Mark Williamson,** **independent SpaceTechnology Consultant serving the space industry, 2007 Sustainable Development Research Advances, p. 173, ed: Larson,**

Although, in general usage, the term 'space exploration' covers almost any space-related endeavour, to those more closely involved with the subject it is confined to the scientific and physical exploration of space by either unmanned or manned spacecraft (and their occupants) and does not include commercial endeavours. Space missions dedicated to prospecting for resources, and perhaps laying claim to real estate, are as yet in the future, and will be covered here under the heading of 'industrial development’.

# Beyond

**Beyond is on the farther side**

**Oxford English Dictionary, 1989, Second Edition** [**http://oed.com/view/Entry/18511?redirectedFrom=beyond#eid**](http://oed.com/view/Entry/18511?redirectedFrom=beyond#eid)

**1.** On the farther side, farther away, at a greater distance.

**Beyond means further in space**

**Oxford English Dictionary, 1989, Second Edition** [**http://oed.com/view/Entry/18511?redirectedFrom=beyond#eid**](http://oed.com/view/Entry/18511?redirectedFrom=beyond#eid)

2. **b.** of an object regarded simply as a point in space: Past, further on than, at a more distant point or position than.

**Beyond means outside the sphere of**

**Oxford English Dictionary, 1989, Second Edition** [**http://oed.com/view/Entry/18511?redirectedFrom=beyond#eid**](http://oed.com/view/Entry/18511?redirectedFrom=beyond#eid)

**a.** Outside the limit or sphere of, past; out of the grasp or reach of.

# Earth

**Earth is the third planet from the Sun.**

**Cambridge Dictionary, no date,** [**http://dictionary.cambridge.org/dictionary/british/earth\_1**](http://dictionary.cambridge.org/dictionary/british/earth_1)

[S or U] (usually Earth) the planet third in order of distance from the Sun, between Venus and Mars; the world on which we live

The Earth takes approximately 365 1/4 days to go round the Sun.

The Circus has been described as the greatest show on Earth (= in the world).

**Earth is the planet on which we live.**

**Macmillan Dictionary, no date, http://www.macmillandictionary.com/dictionary/american/earth**

1

Earth

or

earth

[singular/uncountable] the planet on which we live

the planet Earth

the Earth:

The Moon goes around the Earth.

the Earth’s surface

on Earth:

They studied life on Earth in all its forms.

# Mesosphere

Mesosphere starts just above the stratosphere.

**NASA, 10/8/2003 “Earth’s Atmosphere” National Aeronautics and Space Administration;;** [**http://www.nasa.gov/audience/forstudents/9-12/features/912\_liftoff\_atm.html**](http://www.nasa.gov/audience/forstudents/9-12/features/912_liftoff_atm.html)

Mesosphere The mesosphere starts just above the stratosphere and extends to 85 kilometers (53 miles) high. In this region, the temperatures again fall as low as -93 degrees Celsius as you increase in altitude. The chemicals are in an excited state, as they absorb energy from the Sun. The mesopause separates the mesophere from the thermosphere. The regions of the stratosphere and the mesosphere, along with the stratopause and mesopause, are called the middle atmosphere by scientists. This area has been closely studied on the ATLAS Spacelab mission series.

**Mesosphere is between the stratosphere and thermosphere**

**Merriam-Webster’s Dictionary, 2001, “Mesosphere” Merriam Webster; 2001;** [**http://www.merriam-webster.com/dictionary/mesosphere**](http://www.merriam-webster.com/dictionary/mesosphere)

Definition of MESOSPHERE : the part of the earth's atmosphere between the stratosphere and the thermosphere in which temperature decreases with altitude to the atmosphere's absolute minimum