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\*\*\*Inherency\*\*\*

One way Mission Now

NASA is funding the one-way mission already

Williamson, Topnews, 10

(Jamie, Topnews.com, 10-28-11, “NASA’s ‘Hundred Years Starship’ ‘to take you to Mars but never return’, http://www.topnews.in/usa/nasa-s-hundred-years-starship-take-you-mars-never-return-25693, accessed 6-2-11, JG)

Washington: NASA is planning a one-way mission to Mars in a program called ‘Hundred Years Starship’ in which, a manned spacecraft will take astronauts to Mars and leave them there forever. NASA Ames Director Pete Worden revealed that one of NASA’s main research centres, Ames Research Centre, has received 1million dollars funding to start work on the project. Washington State University researchers had said that while technically feasible, a manned mission to Mars and back is unlikely to lift off anytime soon and so, a manned one-way mission to Mars would not only cut the costs by several fold, but also mark the beginning of long-term human colonization of the planet.

Obama Solves

Nasa’s new Multi-Purpose Crew Vehicle means Obama Mars plan solves

Hoover, Master in International Relations, 11

(Siddha, Green Answers, 5-30-11, “NASA Moves Closer to Manned Missions to Mars”, http://greenanswers.com/news/241396/nasa-moves-closer-manned-missions-mars, accessed 5-31-11, JG)

**NASA has moved one step closer to sending astronauts into deep space with the** announced **development of the Multi-Purpose Crew Vehicle** (MPCV). The MPCV replaces the Orion Crew Exploration Vehicle, commissioned under President Bush and nixed under President Obama due to budgetary constraints. Funds used in the development of the Orion ship had exceeded five billion dollars at the time of the project’s cancellation. **President Obama has** instead **set goals of a** manned mission to a near-earth asteroid in the next twenty years, and a possible **manned mission to Mars** in the next thirty. NASA hopes the MPCV will help meet these goals. Unlike the Orion, which had been developed with the moon as its only destination, **the MPCV will be used as the primary vehicle in the manned exploration of entirely new frontiers**, such as asteroids or the Martian moons. **The development of the MPCV was brought about by the 2010 NASA Authorization Act, which shifted NASA’s focus away from the moon and towards a “permanent human presence beyond low Earth orbit**.” NASA Administrator Charles Bolden spoke on the Authorization Act and development of the MPCV in a statement released Tuesday.

ESA/NASA Solves Now

The European Space Agency and Nasa restarted a joint mars exploration effort

Selding, Space News Writer, 11

(Peter B., Space News, 5-27-11, “ESA Cleared To Restart Work on 2016 Mars Mission”, <http://www.spacenews.com/civil/110527-esa-cleared-restart-work-mars.html>, accessed 5-31-11, JG)

**The European Space Agency** (ESA) on May 26 **gave a** sufficiently strong **endorsement of a redesigned Mars exploration program with NASA to permit contract payments to restart in July**, ESA officials said, adding that the new schedule leaves enough time — but just barely — to meet the program’s launch dates. Meeting in Utrecht, Netherlands, May 26-27, **ESA’s Human Spaceflight and Operations directorate agreed to the general outlines of an ESA-NASA cooperative effort that includes launches in 2016 and 2018**. The two-launch program was destabilized in March when NASA said it could no longer afford to build its own rover for the 2018 mission to be launched alongside a European rover. Instead, **NASA proposed a joint rover for the 2018 mission**. With the rover mission facing a major review, ESA in early April issued a stop-work order on not only the 2018 rover work, but also on a 2016 mission with NASA to launch a Mars orbiter and an entry, descent and landing technology package. The payment freeze was necessary because **ESA governments approved the 2016 and 2018 missions as a single program called ExoMars**. In addition to coping with the rover issue, ESA’s ExoMars project was struggling to fit its industrial contract package into a budget of 1 billion euros ($1.4 billion). That figure includes only ESA’s work, and does not account for some 400 million euros in ExoMars experiments that will be provided by individual ESA member states. ESA officials had planned to ask the agency’s check-writing body, the Industrial Policy Committee, for authority to resume payments for the 2016 mission while waiting for the rover issues to be settled. That would have permitted a restart of work in mid May. ESA Director-General Jean-Jacques Dordain said he scrapped that idea because it would have required approval of the 2016 financing pending a resolution of the wider ExoMars budget issues and the NASA rover cooperation. Instead, he elected to seek prior approval by the Human Spaceflight and Operations panel. In a May 26 interview, **Dordain said that having now obtained that approval, the agency can present a complete package to the Industrial Policy Committee for financial approval on June 29-30. “This allows us to restart work on July 1**, which our industrial contractors have told us gives them enough time to meet the 2016 launch schedule,” Dordain said. Alvaro Gimenez, ESA’s director of science and robotic exploration, said negotiations with the ExoMars industrial team in recent weeks have come close to the target price for ExoMars.

NASA Solves Now

NASA already has plan for colonization– offering incentives to Corporations

Jijo 11 (Jacob, February 11, International Business Times, “Mars for sale! NASA draws up plan to 'colonize' red planet with corporate help”, http://www.ibtimes.com/articles/111476/20110211/nasa-mars-colonization-red-planet-mission-space-one-way-corporate-sponsorship.htm)AH

Researchers at NASA have drawn up a plan to make the greatest adventure in the history of the human race possible - sending a human mission to the red planet and, hold your breath, colonize it! And the daring act of "selling" and carving up the red planet will be made possible with the help of corporate bigwigs who will paint the space ships in their logo colors. NASA scientists have said in a research paper that corporate financing is the right way to support a $160-billion project to take human beings to Mars and start a colony there, according to space.com. Joel Levine, a senior research scientist at NASA Langley Research Center, calls is a "revolutionary business proposal" as it removes budgetary bottlenecks that have diluted the Mars mission's focus over the years. And there is more music to the ear: The researchers say the project will generate as many as 500,000 jobs in the U.S. over 10 years in aerospace and manufacturing sectors. The researchers discussed the plan in the book, "The Human Mission to Mars: Colonizing the Red Planet," which was published in December.

Status quo solves – Nasa and Darpa funding the spacecraft and exploration

Boyle 10 (Rebecca Boyle, PopSci.com, NASA and DARPA Plan ‘Hundred-Year Starship’ To Bring Humans to Other Worlds And Leave Them There Forever, [http://www.popsci.com/science/article/2010-10/‘hundred-year-starship’-could-bring-humans-other-worlds-and-leave-them-there-forever] JG)

And like the first pilgrims, Martian explorers might set sail with the knowledge they would never return home. **NASA and DARPA have joined forces to build something called a Hundred-Year Starship, according to the director of NASA’s** Ames **Research Center**. Simon “Pete” Worden said **NASA contributed $100,000 to the project and DARPA kicked in $1 million. “The human space program is now really aimed at settling other worlds**,” Worden said, according to a Singularity University blog that covered the event. “Twenty years ago you had to whisper that in dark bars and get fired.” (Worden added that he was fired by President George W. Bush.) Beyond that, there are no details. But **the prospect of a DARPA-NASA spaceship collaboration for** Star Trek-esque **exploration sounds thrilling** — even if by definition, a 100-year ship means **leaving Earth and never coming back. Incidentally, that’s exactly the proposal in a new paper in press in the Journal of Cosmology**, a relatively new, peer-reviewed open access journal. **Dirk Schulze-Makuch and Paul Davies suggest sending astronauts to Mars with the intention of staying for the rest of their lives**, as trailblazers for a permanent Mars colony. They would get periodic supply missions, but they would be expected to fend for themselves for water, shelter, nutrients and mineral/chemical processing. They would be expected to develop some kind of homegrown Martian industry, which could ultimately serve as a hub for an expanded colonization program. Plus, leaving some people on another planet would probably ensure that we’d want to go back, to visit them and see what they created.

Neg Inherency

NASA is already funding a one-way mission to Mars

Times of India, Newspaper, 10

(The Times of India, 10-29-10, “Nasa mulling one-way manned Mars mission”, http://m.timesofindia.com/PDATOI/articleshow/6832690.cms, accessed 6-2-11, JG)

WASHINGTON: It may sound like Hollywood science fiction , but **Nasa is mulling a new one-way mission in which astronauts will be sent to** another world such as Mars to settle there for ever. **The US space agency has confirmed that it is carrying out feasibility studies to assess whether astronauts could be sent permanently to the red planet**, or its moons, to establish human colonies under the ambitious project called the "Hundred Years Starship". The astronauts would be sent supplies from Earth on a regular basis but they would have to become self-sufficient as soon as possible. The astronauts would have to embark on the mission knowing that they would never return to earth as the cost of returning would make the project prohibitively expensive. Speaking at a conference in San Francisco, Pete **Worden, Director of Nasa's Ames Research Centre**, recently **said his division has received funding to start work on the project. The research team has also received an additional $100,000 grant from Nasa**, he said.

The status quo solves eventual Mars Mission

Siasat Daily, Newspaper, 11

(Siasat Daily, 4-8-11, “NASA eyeing ‘manned flight’ on Mars”, http://www.siasat.com/english/news/nasa-eyeing-manned-flight-mars, accessed 6-3-11, JG)

Washington, April 08: The National Aeronautics and Space Administration **(NASA) has said that the next decade US Space programme will have focus on working on the** International Space Station (ISS) as it will be the **first step in preparing for manned flights on Mars**. "ISS is an anchor for the future of human space exploration and major component of our current human space programme," said NASA Administrator Charles Bolden at the International Space Station and Mars Conference at George Washington University Wednesday. "Over at least next ten years, we will continue collaboration with other nations in order to live and work together in space and perform research and technology demonstrations," Bolden said. He stressed the importance of the ISS as the most realistic model to test life support and other technologies that would ensure successful human exploration of deep space. "A journey to Mars will require robot systems, ensuring the crew stays healthy and safe. The station (ISS) is the start of this journey," he said. Bolden confirmed that a US delegation will travel to Russia April 12-15 to discuss the extension of the ISS's service life and future joint projects in space exploration, including the development of a nuclear-powered spaceship. In a major space policy speech at Kennedy Space Center April 15, 2010, **US President Barack Obama predicted a manned Mars mission to orbit the planet by the mid-2030s, followed by a landing. The US Congress has approved manned missions** to the Moon, followed by asteroid exploration in 2025 and a trip **to Mars in the 2030s.**

Despite NASA’s new direction a Mars mission is still on track

Iaconis, New York Times, 10

(Rosario A., New York Times Online, 6-15-10, “LETTERS; A Mission To Mars?”, http://query.nytimes.com/gst/fullpage.html?res=9D00E2DA1E3DF936A25755C0A9669D8B63, accessed 6-4-11, JG)

Despite President Obama's misguided rollback of the space program, a manned mission to Mars remains a feasible, affordable and fundamentally sound national undertaking. Absent a cold war imperative, the United States can harness liftoff technologies developed in the private sector -- and work in tandem with other major space-faring nations. Witness Mars500, the 520-day experiment wherein Russian, Chinese, Italian and French astronauts are simulating a trek to the Red Planet. To paraphrase J.F.K.: We must choose to go to Mars.

Neg Inherency

The status quo is already solving for Mars exploration

**Chatterjee, ET Bureau, 11**

(Rituparna, Economic Times, 4-17-11, “Human mission to Mars by 2035: Is it possible?”, http://articles.economictimes.indiatimes.com/2011-04-17/news/29425609\_1\_mars-missions-human-mission-red-planet, accessed 6-5-11, JG)

Aldrin's dream points to the next wave of space exploration, focused not on the moon but on Mars. "The moon is no longer our primary destination. Last year, the US National Aeronautics and Space Administration (Nasa) was directed to focus on human exploration beyond low-Earth orbit...reach a near-Earth object by 2025 and then fly by Mars in the mid-2030s," a Nasa spokesperson told The Economic Times on Sunday. Lacking oxygen and flowing water and with extreme temperatures, Mars isn't exactly hospitable. But it has plenty of land, minerals, Earth-like seasons and is close to both the sun and the Earth. Mars is still our best bet in the solar system for a second home. That's why major space research agencies across the world are targeting it. Leading the pack is the US, which has already launched 20 Mars exploration missions. "We're now preparing for what many are calling one of human kind's greatest robotic Mars missions," said the spokesperson, referring to the Mars Science Laboratory's Curiosity Rover which is being built at the Jet Propulsion Laboratory in Pasadena, California. It will gauge Mars' environment and provide daily weather reports. Given the magnitude and complexities and the expertise required, international collaborations are a hallmark of most major Mars missions. The European Space Agency's (Esa) ExoMars missions for instance, are taking place in collaboration with Nasa. They are a part of the Esa's Mars Robotic Exploration Preparation (MREP) programme under which the two space organisations plan to send joint robotic missions in 2016, 2018 and 2020.

NASA’s Hundred Years Starship solves

Spak, Newser Staff, 10

(Kevin, Newser.com, 10-27-10, “NASA Plans to Send Men to Mars, Leave Them There”, http://www.newser.com/story/103953/nasa-plans-to-send-men-to-mars-leave-them-there.html, accessed 6-7-11, JG)

NASA is hatching an audacious plan to send astronauts into space to colonize Mars and other planets—and never return. The project, known as the Hundred Year Starship, has already received more than $1.5 million in funding, the Daily Mail reports, though that’s a small fraction of what the roughly $10 billion ship would ultimately cost. NASA’s hoping to raise money from interested billionaires—Google’s Larry Page has already expressed interest. “You heard it here,” said the director of NASA’s Ames Research Center. “The human space program is now really aimed at settling other worlds. Twenty years ago, you had to whisper that in dark bars and get fired.” New research has found that a one-way mission to Mars would be cheaper and more feasible than a round-trip. Astronauts would get regular supply shipments, but would be expected to be at least marginally self-sufficient.

\*\*\*Adv 1 – Colonization\*\*\*

Don’t solve Extinction

Even Mars and Moon colonies would face extinction

Williams 10 (Linda, Physics Instructor, Santa Rosa Junior College, Spring, Peace Review Journal of Social Justice, “Irrational Dreams of Space Colonization”, http://www.scientainment.com/lwilliams\_peacereview.pdf) CH

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 hundred 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.

Their extinction scenarios aren’t exclusive—there are other ways to solve, and terraforming puts their solvency at a double bind

Lind, Policy Director of Growth at the New America Foundation, 11

Michael, New America Foundation, “Why We Should Embrace the End of Human Spaceflight”, 4-12-11, http://www.newamerica.net/node/48345, CH

What about the argument that part of the human race needs to dwell somewhere other than on Earth, if humanity is to avoid extinction? In 500 million years the gradually warming sun may boil the oceans, and a few billion years later the sun will evolve into a red giant, incinerating or engulfing the Earth. Our descendants, if there are any, might consider relocating. In the half-billion years until then, the chances of war, plague or global warming producing the total extinction of a species as numerous, widespread and versatile as humanity are pretty low. A sufficiently large asteroid or comet impact like the one that caused the extinction of the dinosaurs could do the job. But if a massive bolide threatened the Earth, we would send unmanned spacecraft, not Robert Duvall or Bruce Willis, to steer it away or destroy it. In the event some other natural catastrophe -- a supervolcano, a nearby supernova -- rendered the surface of the Earth temporarily or permanently uninhabitable, it would be cheaper and easier to build and maintain underground bunkers than to use the same technology to do the same thing at vastly greater cost on the moon or other planets or in space stations. By the same token, if humanity had the technology to "terraform" the surface of Mars, it would have the power to make the ruined surface of a dead Earth habitable again, making the colonization of Mars unnecessary.

Earth Environment Turn

Terrestrial problems are priority issues—space focus only exacerbates environmental threats

Williams 10 (Linda, Physics Instructor, Santa Rosa Junior College, Spring, Peace Review Journal of Social Justice, “Irrational Dreams of Space Colonization”, http://www.scientainment.com/lwilliams\_peacereview.pdf) CH

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 we face. 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?

Colonization discourages R&D on Earth, makes Earth’s destruction inevitable—Earth’s preservation comes first

Williams 10 (Linda, Physics Instructor, Santa Rosa Junior College, Spring, Peace Review Journal of Social Justice, “Irrational Dreams of Space Colonization”, http://www.scientainment.com/lwilliams\_peacereview.pdf) CH

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 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.

Environment

Mars won’t support sustainable life in the status quo—pressure, temperature, radiation

Victoria Junior College, 4

Oracle ThinkQuest, “Quest to Planet Mars—Colonization of Mars”, http://library.thinkquest.org/03oct/01858/text-only/manned\_problems.html, CH

Current Martian environment and problems for biology At present the Martian surface environment is effectively sterilizing for all forms of terrestrial organisms, although some protected niches may exist above and below the surface of Mars. \* Low pressure. The atmospheric pressure on Mars, mostly due to carbon dioxide, varies from approximately 7.4 to 10 millibar (mbar). Extremely low pressure damages organisms and can affect efficient DNA repair. \* Low temperature. During the Martian summer the temperature perhaps rises above the freezing point of water at some equatorial latitudes. From temperature requirements alone, organisms would not be able to survive on present day Mars for a number of reasons: First, the temperatures would completely freeze any organism and depending on the freezing process would cause cellular damage through the formation of ice crystals. \* Water. Liquid water, under mar's low pressure becomes instable, hence cannot stay in liquid form. \* Radiation. The main source of radiation at the Martian surface is ultraviolet (UV) radiation between the wavelengths of 190 and 300 nm. UV-radiation as we know, causes skin cancer and burns to the human skin. With no ozone or such protective layers, the full force of the radiation is going to be felt. \* Carbon dioxide. In organisms the relatively high concentration of carbon dioxide would probably cause a low intracellular pH. A change in pH conditions would then alter biochemical reactions in the human body due to a change in the working medium of enzymatic reactions. As our breathing is regulated by the levels of carbon dioxide in our body, a high carbon dioxide concentration also affect our breathing (faster, due to need to clear carbon dioxide in lungs).

Human Colonization contaminates Mars Life

Human col contaminates Mars, stopping search for life

Glavin et al, 4

(D.P. Glavin-1\*, J.P. Dworkin-1, M. Lupisella-1, G. Kminek-2 and J.D. Rummel-3 1-NASA Goddard Space Flight Center, 2-European Space Agency, 3-NASA Headquarters, International Journal of Astrobiology 0 (0) : 1–7 (2004), “Biological contamination studies of lunar landing sites: implications for future planetary protection and life detection on the Moon and Mars” June 24, 2004)

The use of sensitive robotic experiments to detect contamination that may still be present nearly 40 years after humans first explored the surface of the Moon may be critical to help establish a contamination baseline, but there are broader contamination challenges regarding a more sustained human presence on both the Moon and Mars. Such considerations should be kept in mind as we prepare for sustained human exploration (McKay & Davis 1989; Lupisella 1999). Human exploration could, in fact, confound the search for life on Mars, since the presence of humans will dramatically increase the amount of terrestrial organic material, potentially making the detection of indigenous organic matter exceedingly difficult, if not impossible. If we are concerned about human contamination unduly compromising the search for organic material and life, several interrelated questions arise : How much robotic exploration will be required before establishing a sustained human presence on the Moon and Mars? What are the criteria for robotically assessing the biological status of a location, region or entire body? How well will we be able to control contamination once humans are present? How might contamination be distributed as a result of a sustained human presence?

Life on Mars YES

There’s life on Mars – multiple warrants

Gibson et al, 1

(E.K. Gibson, Jr a,\*, D.S. McKay a, K.L. Thomas-Keprta b, S.J. Wentworth b, F. Westall a, A. Steele c, C.S. Romanek d, M.S. Bell b, J. Toporski c a SN2, Planetary Sciences, NASA Johnson Space Center, Houston, TX 77058, USA, b C23, Lockheed Martin Corp., NASA Road 1, Houston, TX 77058, USA, c University of Portsmouth, Portsmouth, UK, “Life on Mars: evaluation of the evidence within Martian meteorites ALH84001, Nakhla, and Shergotty” Precambrian Research 106 (2001) 15-34, http://as17.as.uky.edu/academics/departments\_programs/EarthEnvironmentalSciences/EarthEnvironmentalSciences/FacultyResearch/Profiles/ChrisRomanek/Documents/gibson.pdf, accessed 6-15-11, JMB)

The Viking Mission to Mars in 1976 was the first attempt to search for life in situ on another to search for visible signs of life, a gas chromatograph: mass spectrometer to detect reduced carbon compounds, and three biological experiments (a labeled release experiment, a gas exchange experiment, and a metabolic release experiment) to seek evidence of biological activity within the soil samples. Although the concensus among the scientific community is that the results were negative, Levin and Straat (1977) and Levin and Levin (1998) argue that the labeled release experiment did, in fact, detect evidence of life. Since it was first demonstrated by Bogard and Johnson (1983) that meteorite EETA79001 of the Shergottite–Nakhlite–Chassignite (SNC) class contained trapped Martian atmospheric gases, 16 other meteorites have joined the Martian meteorite group. Seven of them contain trapped Martian atmosphere (Bogard and Garrison, 1998). In addition to the trapped gases, the unique composition of the oxygen isotopes within the silicate minerals of all the SNC meteorites shows they were from a unique oxygen reservoir within our solar system (Clayton and Mayeda, 1983; Romanek et al., 1998; Franchi et al., 1997, 1999). The lines of evidence which indicate possible biogenic activity in the Martian meteorite ALH84001 (McKay et al., 1996) are: (1) the presence of carbonate globules which had been formed at temperatures favorable for life, (2) the presence of biominerals (magnetites and sulfides) with characteristics nearly identical to those formed by certain bacteria, (3) the presence of indigenous reduced carbon within Martian materials, and (4) the presence in the carbonate globules of features similar in morphology to biological structures. Each of these phenomena could be interpreted as having abiogenic origins but the unique spatial relationships indicated that, collectively, they recorded evidence of past biogenic activity within the meteorite. Both criticism and support have been directed toward this hypothesis (Anders, 1996; Bradley et al., 1996, 1997, 1998; Valley et al., 1997; Kirschvink et al., 1997; Bada et al., 1998; Oro´ , 1998, 1999; Friedmann et al., 1998; Hoover, 1998; Scott, 1999; Treiman, 1999). In this paper, we re-evaluate the evidence of our original paper (McKay et al., 1996) in the light of the results of the investigations made subsequent to its publication. We conclude that there is strong evidence for a low-temperature, Martian origin of the carbonate in the meteorite, for the presence of Martian organic carbon, and for a biological origin of a portion of the single domain magnetites in the carbonate globule rims. New morphological structures associated with the carbonates are similar to terrestrial biogenic structures, but the presence of known biological contaminants associated with the fusion crust urges caution in interpretation until the extent of terrestrial contamination has been fully established. We also document the presence of structures in two other Martian meteorites, Nakhla and Shergotty, which are morphologically similar to terrestrial fossil bacteria.

Yes Contamination

Significant risk of contamination of Martian life tests – this answers all your counter-arguments

Lupisella, engineer at NASA and PhD candidate in biology, 99

(Mark, “Ensuring the Integrity of Possible Martian Life” Paper IAA-99-IAA.13.1.08 presented at the 49th International Astronautical Federation Congress, Amsterdam, October 1999, http://innovim.academia.edu/MarkLupisella/Papers/211749/A\_Theoretical\_Microbial\_Contamination\_Model\_for\_a\_Human\_Mars\_Mission 6-13-11, JMB )

Although the preservation of extraterrestrial environments is important for scientific knowledge in general, a primary concern of planetary protection is to ensure the integrity of life-detection experiments by minimizing the chance of a false-positive result.3 Underlying these concerns is the widely acknowledged importance of discovering the “second data point” that biology is so desperate for. The National Academy of Sciences Space Science Board writes: “Forward contamination is a significant threat to interpretation of results of in situ experiments specifically designed to search for evidence of extant or fossil martian microorganisms”, and that protecting Mars from terrestrial contamination so as to not jeopardize future life-detection experiments is “profoundly important”.4 However, some suggest that contamination concerns are misguided. There are least three kinds of arguments. One, Mars and Earth have exchanged much material already. Two, the co-evolutionary dependence of pathogens and hosts makes it impossible for Martian and terrestrial organisms to adversely affect each other.5 Three, life almost certainly does not, and cannot, exist on the Martian surface. Unfortunately, it may not be that simple. The fact that material has been exchanged between our planets does not mean that contamination has occurred in the way it could with a sustained and significantly more intrusive human presence on Mars. If panspermia has occurred, then Martian organisms could be genetically compatible with new organisms that arrive via contamination, calling into question the claim that a lack of co-evolutionary dependence should mitigate contamination concerns. Also, *indirect* adverse effects could be important as will be discussed later. Lastly, the lack of existence of life on the surface cannot be known with sufficient confidence until we conduct more missions. While life on Mars may be improbable, we should not underestimate how unpredictable, and possibly lifebearing, our solar system might be. Terrestrial extremophiles and potentially life-bearing features of other solar system bodies justify this caution. Even if we were to confirm that no life exists on the surface of Mars, there is the possibility of subsurface life—which should still be of great concern since our intrusive missions could contaminate the subsurface of Mars via drilling and other activities.6 Surface or subsurface life could also be adversely affected by toxic substances, predation, competition, and general environmental modifications.7 Lastly, we only understand one kind of biology. How confident can we be that life on Mars will be consistent with our present understanding of life when we really only have one example?

Mars Microbes Valuable – Ethics

Homocentric viewpoints bad – short-sighted. Uniqueness of Martian microbes makes them valuable.

Lupisella, engineer at NASA and Logsdon, Director of the Space Policy Institute, 97 (Mark, University of Maryland, and John, George Washington University, “Do We Need a Cosmocentric Ethic” pg. 4, November 4, 1997, accessed 6-13- http://innovim.academia.edu/MarkLupisella/Papers/211754/Do\_We\_Need\_a\_Cosmocentric\_Ethic, JMB)

Homocentrists would not have much reservation about displacing or possibly destroying indigenous extraterrestrial life if it was required for human exploration and colonization of an extraterrestrial environment. Homocentric ethical views make humans needs and desires the priority, generally at the expense of all else. As Robert Zubrin points out, the obvious problem for those who would answer no to whether human settlement of Mars should take priority over the continued existence of extraterrestrial microbes is to provide some explanation of why such an answer wouldn’t apply to terrestrial microbes which we wouldn’t hesitate to kill with an antibiotic pill.16 This is a reasonable challenge. However, at the same time, it also seems reasonable to suppose that extraterrestrial microbes should not be treated the same as terrestrial microbes. Zubrin himself acknowledges their unique value.17 An answer to Zubrin’s challenge might be to point out that extraterrestrial microbes are not pro-actively destructive to our well-being, as are many terrestrial microbes. Perhaps extraterrestrial microbes should be assumed innocent until proven otherwise. Also, assuming Martian microbes are not of the same phylogenetic tree as life on earth, as a species, they would be unique in a way that terrestrial microbes are not. This significant uniqueness seems to imply some kind or degree of value, instrumental or otherwise, that might not necessarily be attributed to terrestrial microbes.18 Criticisms of homocentrism that it fails to consider ecological concerns and long-term effects are not so obvious since one can be concerned about the longterm ecological impacts on humans.19 However, it has generally been the case that homocentrism has been more short-sighted than far-sighted. These complaints reflect a deeper instinct articulated by the philosopher Don MacNiven that theories biased towards humans are suspect.20 This concern is supported by thousands of years of seeing our knowledge expand, constantly de-centralizing human beings—”The Great Demotions,” as Ann Druyan has poignantly observed. It may ultimately be true, if we can even know such a thing, that homocentric value theories are valid, but we would be wise to heed the lessons of history and consider broader views.

If we win cosmocentricism good, exploration should be conservative – discovering and preserving extraterrestrial life has large value

Lupisella, engineer at NASA and Logsdon, Director of the Space Policy Institute, 97 (Mark, University of Maryland, and John, George Washington University, “Do We Need a Cosmocentric Ethic” pg. 4, November 4, 1997, accessed 6-13-11 http://innovim.academia.edu/MarkLupisella/Papers/211754/Do\_We\_Need\_a\_Cosmocentric\_Ethic, JMB)

A cosmocentric ethic should provide a framework in which we can explain and capitalize on the instrumental value associated with something like primitive extraterrestrial life forms. More specifically, an appropriately conservative exploration approach seems to be a reasonable implication for a cosmocentric ethic, especially given the unknown aspects of interacting with extraterrestrial life. This would ensure that the instrumental value of such a discovery would be realized. A further extension of this instrumental value, as the Drake equation indicates, is the connection between the existence of primitive life and the probability of intelligent life in the universe. Shedding light on the existence of intelligent life in the universe clearly goes far beyond the bounds of biology and transcends science.

Disease

A mission now would undermine scientific research and spread earth-threatening diseases

Rummel et al 10 (John, Margaret Race, Catharine Cronley, David Liskowsky, November 2010, Institute for Coastal Science and Policy, “The Integration of Planetary Protection Requirements and Medical Support on a Mission to Mars”, http://journalofcosmology.com/Mars126.html) CH

The process of planning a human mission to Mars has only just begun. It will take decades to balance the limitations of our transport and life support systems against the need for complex medical care during the mission, and the overall hazards of the martian environment. The potential for human contamination to spread on Mars could destroy scientific and resource-use opportunities for generations to come, while the potential to encounter unknown martian life forms (which may be more dangerous if they turn out to be closely related to us) generates the concern that such a mission could endanger even the Earth, itself. For such a mission to be truly successful, and for its planning to be truly robust given the potential for robotic discoveries on Mars, it is essential that planetary protection requirements be developed from the first, and that future medical care systems for Mars embody planetary protection support as a critical requirement.

Disease

Space radiation mutates bacteria into unmanageable lethal strains which kills Mars colonists or renders them useless

Than**, National Geographic News Writer,** 09

(Ker, *National Geographic*, “Mutant Diseases May Cripple Missions to Mars, Beyond,” November 4th, http://news.nationalgeographic.com/news/2009/11/091104-space-diseases-mutants-mars.html, 5-31-2011, SRF).

Charged particles zipping through space, known as cosmic rays, can mutate the otherwise manageable microbes, spurring the bugs to reproduce quicker and become more virulent, recent studies show. (Related: ["Lethal Bacteria Turn Deadlier After Space Travel."](http://news.nationalgeographic.com/news/2007/09/070924-space-bacteria.html)) At the same time, exposure to cosmic rays and the stresses of long-term weightlessness can dampen the human immune system, encouraging [diseases](http://science.nationalgeographic.com/science/health-and-human-body/human-diseases) to take hold. Aboard spaceships without advanced medical care, illness could cripple human missions to Mars and beyond, according to a new report published this month in the *Journal of Leukocyte Biology.* (Get [Mars exploration pictures, facts, and more](http://ngm.nationalgeographic.com/2008/12/planet-mars/updike-text.html).) "What is the interest of having people on Mars if they cannot efficiently perform the analyses and studies scheduled during their mission?" said study co-author Jean-Pol Frippiat, an immunologist at Nancy University in France. Cells Change in Zero G For the new report, Frippiat and colleagues analyzed more than 150 studies of the effects of space flight on humans, animals, and pathogens. (Get the scoop on how [low gravity makes it harder to get pregnant in space](http://blogs.nationalgeographic.com/blogs/news/breakingorbit/2009/08/making-babies-in-space.html).) On Earth humans are protected from the effects of cosmic rays, because most of the particles are deflected by the planet's magnetic field. Out in space, however, such protections vanish, and cosmic radiation can cause mutations when it strikes the DNA inside cells. (Find out more about [where cosmic rays come from](http://news.nationalgeographic.com/news/2009/11/091102-cosmic-rays-galaxies-picture.html).) The absence of gravity can also be detrimental to human health, because weightlessness allows structures to shift around within cells. One study, for instance, found that astronauts who had recently returned from space had white blood cells that were less effective at seeking out and destroying E. coli bacteria. Left untreated, E. coli can cause severe cramps, vomiting, and diarrhea as well as kidney and blood-cell damage that can lead to fatal complications.

Space travel creates lethal bacteria, undermining mission

Than, writer for National Geographic, 9

Ker, National Geographic, “Mutant Diseases May Cripple Missions to Mars, Beyond”, 11-4-9, http://news.nationalgeographic.com/news/2009/11/091104-space-diseases-mutants-mars.html, CH

Mutant hitchhikers may become a major hurdle in the quest to send humans deeper into the galaxy, scientists say. That's because no matter how fit astronauts feel at liftoff, they're likely to be carrying disease-causing microbes such as toxic E. coli and Staphylococcus strains. Charged particles zipping through space, known as cosmic rays, can mutate the otherwise manageable microbes, spurring the bugs to reproduce quicker and become more virulent, recent studies show. At the same time, exposure to cosmic rays and the stresses of long-term weightlessness can dampen the human immune system, encouraging diseases to take hold. Aboard spaceships without advanced medical care, illness could cripple human missions to Mars and beyond, according to a new report published this month in the Journal of Leukocyte Biology. "What is the interest of having people on Mars if they cannot efficiently perform the analyses and studies scheduled during their mission?" said study co-author Jean-Pol Frippiat, an immunologist at Nancy University in France.

Turn—Space Race

Colonization triggers a space race and risks space junk

Williams 10 (Linda, Physics Instructor, Santa Rosa Junior College, Spring, Peace Review Journal of Social Justice, “Irrational Dreams of Space Colonization”, http://www.scientainment.com/lwilliams\_peacereview.pdf) CH

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. 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 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? 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.

Solar Pulses

Mars habitation impossible—double solar waves strip the atmosphere

Popular Science 10 (by Stuart Fox, 3/17, “Bad News for Terraformers: Periodic Bursts Of Solar Radiation Destroy The Martian Atmosphere”, http://www.popsci.com/environment/article/2010-03/sorry-terraformers-periodic-bursts-solar-radiation-destroy-martian-atmosphere, IWren)

Unfortunately for anyone looking to terraform Mars, a new study shows that powerful waves of solar wind periodically strip the Red Planet of its atmosphere. Scientists had known for years that Mars has atmosphere troubles, but only by analyzing new data from he Mars Express spacecraft were they able to identify the special double solar waves as the specific cause. Double solar waves are a rare phenomenon that result when the Sun emits waves of differing speeds. If a fast wave follows a slow wave, the fast wave crashes into the back of the slow one, rolling them both up into a super-charged double wave. Scientists were able to correlate Martian atmosphere loss, as measured by the the Mars Express spacecraft, with records of double radiation waves in 2007 and 2008 taken by the Advanced Composition Explorer spacecraft. According to the study, one third of Martian atmosphere loss occurs during these waves, which are only present 15 percent of the time. Unlike Earth, Mars lacks a magnetic field that deflects waves of solar radiation. Without that protection, the waves simply strip the atmosphere right off the planet. However, at the poles, Mars does have the remnants of a magnetic field, protecting the ice caps from these bursts. Only comet strikes and the occasional melting of dry ice from the poles provide Mars with any atmosphere at all. To make Mars habitable would require some sort of giant underground alien air generator.

Reproduction Failures

Mission to Mars mission will fail – plants cannot reproduce in space

**ThinkQuest 2K** (Oracle ThinkQuest, a database website, year 2000, “Reproduction in Space”, <http://library.thinkquest.org/C003763/index.php?page=habitat05>) JYJ

Many biological processes are affected by the weightless conditions in space, and reproduction is no exception. Gravity acts as a downward force on Earth, but in space, the lack of this ‘downward force’ has a disorienting effect on living things. Not a lot of research has gone into reproduction in space. So far the reproductive abilities of organisms such as plants, fish, amphibians, insects and small animals have been studied in microgravity, but no serious effort has gone into studying the reproduction of humans in space (that we are aware of!). A thorough understanding of how organisms reproduce in space is vital to the success of future long-distance space missions. On a mission to Mars, for example, plants would be an integral part of a life support system. Plants will take up the carbon dioxide exhaled by humans to use in photosynthesis and will return oxygen and food to the crew. We need to learn how to maximize the reproductive abilities and health of these plants in space. Scientific studies have demonstrated that microgravity has adverse effects on plant cell division. Experiment results have shown genetic abnormalities occur in plants during space flight. The division and development of plant cells, which are essential for plant growth and reproduction, are hindered by the lack of gravity. Although certain plants have actually pollinated and produced seeds in microgravity, we are a long way from successfully growing plants as a food source in space. There are a few reasons that might explain why plants have difficulties reproducing in space. Life in space is susceptible to a number of hazards that are not major concerns on Earth. In addition to microgravity, another hazard is the exposure to radiation. Fetal and embryo development can be deleteriously effected by radiation. Because of this, NASA prohibits pregnant women from going into space.

Radiation

Mars radiation is too harmful for colonization

NASA 4 (February 15, “Can People Go to Mars?” <http://science.nasa.gov/science-news/science-at-nasa/2004/17feb_radiation/>) NS 5/25/11

NASA astronauts have been in space, off and on, for 45 years. Except for a few quick trips to the moon, though, they've never spent much time far from Earth. Deep space is filled with protons from solar flares, gamma rays from newborn black holes, and cosmic rays from exploding stars. A long voyage to Mars, with no big planet nearby to block or deflect that radiation, is going to be a new adventure. Right: "Distant Shores." NASA artwork by Pat Rawlings/SAIC. [Larger image] NASA weighs radiation danger in units of cancer risk. A healthy 40-year-old non-smoking American male stands a (whopping) 20% chance of eventually dying from cancer. That's if he stays on Earth. If he travels to Mars, the risk goes up. The question is, how much? "We're not sure," says Cucinotta. According to a 2001 study of people exposed to large doses of radiation--e.g., Hiroshima atomic bomb survivors and, ironically, cancer patients who have undergone radiation therapy--the added risk of a 1000-day Mars mission lies somewhere between 1% and 19%. "The most likely answer is 3.4%," says Cucinotta, "but the error bars are wide." The odds are even worse for women, he adds. "Because of breasts and ovaries, the risk to female astronauts is nearly double the risk to males."

Negative Impacts of Zero-G

**Exploration simulations found that microgravity conditions rendered the crew exhausted and unable to perform physically demanding experiments**

Grimm and Stillman, 2009 (Robert E., David E., “Subsurface water detection on Mars by astronauts using a seismic refraction method: Tests during a manned Mars simulation” Acta Astronautica, Volume 64, Issues 5-6, March-April 2009, pgs. 654-655, <http://www.sciencedirect.com.ezproxy.baylor.edu/science/article/pii/S0094576508002609>, SL)

The experiment performance under EVA conditions was very physically demanding. Crew members at the end of EVAs were quite exhausted, not only due to physical activities while wearing EVA suits of about 20 kg, such as transporting heavy equipment, walking over long distances carrying part of the instrumentation, handling the sledge hammer, and so on, but also due to riding the ATVs with EVA suits and overheating despite the ambient Arctic Summer conditions (with temperatures around or less than 5 °C). This has a direct consequence on the choice of conditions for the several month interplanetary journey between Earth and Mars. An interplanetary flight under microgravity conditions would have well-known debilitating effects on the musculo-skeletal system to a point where a human crew after landing on Mars could no longer be engaged in physically demanding scientific activities like this seismic experiment. Therefore, the design of an interplanetary spacecraft should foresee some sort of artificial gravity system for the Earth–Mars leg of the mission, even if it is at a partial earth gravity level, for example a Martian gravity level of 0.38 g.

Health Risks

Risks to human and Martian life include radiation risks and contamination

Horneck 8 (Gerda, “The microbial case for Mars and its implication for human expeditions to Mars,” Acta Astronautica, 24 January 2008, <http://www.sciencedirect.com.ezproxy.baylor.edu/science/article/pii/S0094576507003104>, SL)

The risks of contamination involved in the presence of humans on Mars are threefold: (i) the risks to the crew from Martian microbes (if any exist), (ii) the risk to life on Earth via returned Martian samples (accidentally or deliberately brought back to Earth), and (iii) the risk to Mars from imported terrestrial microorganisms. For the latter case, the planetary protection concept as accepted by the Committee on Space Research (COSPAR) requires a contamination control to be elaborated specifically for each space-mission/target-planet combinations, such as orbiters, landers or sample return missions [55] and [56]. In view of the current and planned landing activities on Mars with robotic and finally human visits, the planetary protection guidelines are currently under review within ESA and NASA. Special attention has to be given to the so-called “special regions” which are currently defined as a region within which terrestrial organisms are likely to propagate, or a region which is interpreted to have a high potential for the existence of extant Martian life forms [57]. The environmental conditions on Mars that are relevant for a “special region” are currently under definition [58] and [59]. Missions to “special regions” require nearly complete sterilization of the lander or its parts that come into contact with the “special region” in order to prevent contamination of the Martian surface with terrestrial microorganisms—which would jeopardize the chance to detect life forms indigenous to Mars Strict requirements to keep Mars clean can only be met with robotic missions to Mars The scenario changes when humans are involved in the mission. Since humans carry vast amounts of microbes required to sustain important body functions, Mars will become inevitably contaminated with terrestrial microorganisms as soon as humans arrive on its surface. Although the surface of Mars seems to be very hostile to microbial life, it cannot be excluded that some terrestrial microorganisms accidentally imported may find protective ecological niches where they could survive or even metabolize, grow and eventually propagate. This concern emphasizes the vital importance of a substantial series of robotic missions to precede a human mission to Mars in order to carry out the essential exploratory search for life by in situ measurements at selected sites. There is a need for implementing appropriate planetary protection guidelines for human missions to Mars especially for missions with long stay times on the Martian surface. In addition to planetary protection considerations, several human health issues need further consideration before sending humans to Mars These are as follows: (i) radiation risks, especially from SPE, (ii) very long 0-gravity levels during interplanetary transfers, followed by very high gravity levels at Mars arrival (up to 6g during aerocapture and landing) with severe consequences to the human body, (iii) almost no mission abort nor fast return capability and (iv) psychological issues which pertain crew size, composition and corresponding education. Substantial research and development activities are required in order to provide the basic information for appropriate integrated risk management, including efficient countermeasures and tailored advanced life support systems, as outlined in a roadmap for future European activities in life sciences in preparation of human exploratory missions (Fig. 3), recommended in the HUMEX study of ESA [60].

Stress

Stress stops colonization – the crew members will fail

Bishop 10, Ph.D. in Social Psychology and Associate Professor at the University of Texas, 10

(Sheryl L., Journal of Cosmology, Vol 12, 3711-3722 “Moving to Mars: There and Back Again: Stress and the Psychology and Culture of Crew and Astronaut”, October-November 2010, http://journalofcosmology.com/Mars106.html, accessed 5-28-11, JMB)

Yet another unknown is the effects of extraterrestrial environments upon the brain. Bone and muscle loss after even short duration flights are now well documented. However, neurobiological processes dramatically affect personality and intellectual functioning. Early and subsequent studies of prolonged social, sensory, and perceptual isolation in primates and other animals have consistently demonstrated significant effects on learning, memory, perception, and nerve growth versus neural degeneration (Casagrande & Joseph 1980; Joseph & Gallagher 1980; Joseph 1999). From these and other studies it can be concluded that it is of the utmost importance to keep astronauts socially and intellectually engaged and to provide optimal amounts of stimulation at all phases of the mission. The presence of even low levels of chronic stressors, if not met with functional adaptation and/or countermeasures, produce subjective symptoms of stress, persistent performance incompetence, accelerated fatigability, altered mood states, increased rate of infections, and decrements in attention and cognitive functioning (Bishop, Kobrick, Battler, & Binsted, in press; Kanas & Manzey, 2008; Palinkas L., 1991; Sloan & Cooper, 1986; Smith, 1990). Most of the performance effects found so far seem to be associated with more general stress effects related to problems of adaptation to the extreme living and working conditions in a confined and isolated environment that are mediated by individual factors such as personality and culture. In the context of a Mars mission, it has been proposed that the most severe stressors might involve the monotony and boredom resulting from the long periods of low workload, hypo-stimulation, and restricted social contacts due to isolation from family and friends. Yet any mission of significant length will be characterized by periods of hyperarousal stemming from intense work schedules, high activity, excitement, media and public attention, and heightened performance demands which all interact to impact sleep, motivation, attention, physical and mental functioning, e.g., the Earth proximate departure and return phases of the journey, or arrival at Mars and deployment to and return from the surface. The juxtaposition of prolonged periods of low work schedules, minimal activity, repetitive and monotonous station-keeping duties, isolation, confinement, loss of privacy, restricted social contacts, over-familiarity with team-members and environment which undermine motivation, performance and psychosocial functioning, providing countermeasures for this dynamic environment-situation becomes a challenge indeed! One could argue that the stress of exploration is inherent in any endeavor that is characterized by unknown dangers, isolation and confinement. What makes the stress associated with long duration space missions of special concern? The obvious answer is that there is no exit for participants. Once launched on a trajectory to Moon or Mars, the crew is committed. There is no turning back, no quick rescue, no way out except forward. The implications of the incapability to terminate an expedition are profound. The role of stress and its impact on coping, performance, motivation, behavior, cognitive functioning and psychological well-being must be taken into account in mission planning. All required resources for assessing, monitoring and countering stressors must be resident with the crew given the delays in communication and isolation. Without the ability to return at will, the success of the mission rests with how well planners have selected the best individuals and provided the right resources.

Stress

Specifically, the crew would fail during an emergency or break apart over time

Bishop 10, Ph.D. in Social Psychology and Associate Professor at the University of Texas,

(Sheryl L., Journal of Cosmology, Vol 12, 3711-3722 “Moving to Mars: There and Back Again: Stress and the Psychology and Culture of Crew and Astronaut”, October-November 2010, http://journalofcosmology.com/Mars106.html, accessed 5-28-11, JMB)

Expeditionary missions (e.g., flags and footsteps like the lunar missions) typically engage very task focused individuals with lesser demands for skills in sustained interpersonal interaction whereas missions dedicated to science or establishment of sustainable bases enroll the expertise of individuals with notably different personality profiles and skill sets as well as mission demands for sustained group engagement. The fact that psychological stress has been found in all isolated and confined environments supports a view that these same factors are a risk for long duration lunar and Martian crews as well (Kanas, 2004). Psychological difficulties not only affect individual crewmembers, but they could have potentially disastrous effects on mission performance, e.g., a clinically depressed astronaut might be unable to perform required tasks in an emergency situation. If such problems are not understood and addressed, they will most certainly result in 1) decreased crew morale and compatibility; 2) withdrawal or territorial behavior as crewmembers cease to interact with each other; 3) scapegoating or singling out individuals for blame for various outcomes as solutions to group conflicts; and 4) the formation of subgroups that compete with each other and destroy crew unity.

Colonization impossible-Technology costs

Technology costs make colonization impossible

Loder, ex-professor Emeritus at the University of New Hampshire, is known for his work to end the energy crisis, 2003

(Theodore C., “Implications of Outside-The-Box Technologies on Future Space Exploration and Colonization”, EBSCO, 2-5, http://www.theorionproject.org/en/documents/STAIF03Loder.pdf, 6-16-2011, SRF)

Human exploration and, ultimately, colonization of low earth orbit, the moon, asteroids, and other planets will never "get off the ground” with the present costs of technology. At present the United States' only public human lift capability is the nearly two-decade-old shuttle fleet, which is expensive to maintain and limited in turn-around flight capability. Recent projected estimates by NASA for more than the next decade plan for about eight flights per year at a cost of approximately $300 million per flight with lower costs for two more flights (NASA, 2002). With only five flights per year considered to be a "safe" number and ten flights per year considered the maximum number, it is obvious that almost any kind of human exploration and colonization is nearly out the question in the foreseeable future. Even the less expensive Russian launch costs are still prohibitive for significant advances in space exploration and colonization.

Humans can’t colonize space-too many technical obstacles

Launius, Chief Historian for NASA and author of many books on aerospace history, 2010

(Roger D., “Can we colonize the solar system? Human Biology and survival in the extreme space environment”, *Science Direct*, Volume: 34 No. 3, 124, SRF)

Although microbial life might survive the extreme conditions of space, for Homo sapiens sapiens the space environment remains remarkably dangerous to life. One space life scientist, Vadim Rygalov, remarked that ensuring human life during spaceflight was largely about providing the basics of human physiological needs. From the most critical-meaning that its absence would cause immediate death, to the least critical-these include such constants available here on Earth of atmospheric pressure, breathable oxygen, temperature, drinking water, food, gravitational pull on physical systems, radiation mitigation, and others of a less immediate nature. As technologies, and knowledge about them, stand at this time, humans are able to venture into space for short periods of less than a year only by supplying all of these needs either by taking everything with them (oxygen, food, air, etc.) or creating them artificially (pressurized vehicles, centrifugal force to substitute for gravity, etc.) Space-flight would be much easier if humans could go into hibernation during the extremes of spaceflight, as did the Streptococcus mitis bacteria. Resolving these issues has proven difficult but not insurmountable for such basic spaceflight activities as those undertaken during the heroic age of space exploration when the United States and the Soviet Union raced to the Moon. Overcoming the technological hurdles encountered during the Mercury, Gemini, and Apollo programs were child’s play in comparison to the threat to human life posed by long duration, deep space missions to such places as Mars. Even the most sophisticated of those, the lunar landings of Project Apollo, were relatively short camping trips on an exceptionally close body in the solar system, and like many camping trips undertaken by Americans the astronauts took with them everything they would need to use while there. This approach will continue to work well until the destination is so far away that resupply from Earth becomes highly problematic if not impossible if the length of time to be gone is so great that resupply proves infeasible. There is no question that the U.S. could return to the Moon in a more dynamic and robust version of Apollo; it could also build a research station there and resupply it from Earth on a regular basis. In this instance, the lunar research station might look something like a more sophisticated and difficult to support version of the Antarctic research stations. A difficult challenge, yes; but certainly it is something that could be accomplished with presently envisioned technologies. The real difficulty is that at the point a lunar research station becomes a colony profound changes to the manner in which humans interact with the environment beyond Earth must take place. Countermeasures for core challenges-gravity, radiation, particulates, and ancillary effects-provide serious challenges for humans engaged in space colonization.

Terraforming Impossible

Their author concedes - Terraforming fails —takes too long for air to be breathable by humans

Zubrin, Aerospace engineer, President of Mars Society and Pioneer Astronautics, PHD, 97

 (Robert, 1997, Aerospace engineer, president of Mars Society and Pioneer Astronautics, “The Vaibility of Colonizing Mars”, http://www.aleph.se/Trans/Tech/Space/mars.html, AH)

Nevertheless, Mars will not be considered fully terraformed until its air is breathable by humans. Assuming complete coverage of the planet with photosynthetic plants, it would take about a millennia to put the 120 mbar of oxygen in Mars' atmosphere needed to support human respiration in the open. It is therefore anticipated that human terraformers would accelerate the oxygenation process by artificial technological approaches yet to be determined, with the two leading concepts being those based on either macroengineering (i.e. direct employment of very large scale energy systems such as terrawatt sized fusion reactors, huge space-based reflectors or lasers, etc.) or self reproducing machines, such as Turing machines or nanotechnology. Since such systems are well outside current engineering knowledge it is difficult to provide any useful estimate of how quickly they could complete the terraforming job. However in the case of self-replicating machines the ultimate source of power would be solar, and this provides the basis for an upper bound to system performance. Assuming the whole planet is covered with machines converting sunlight to electricity at 30% efficiency, and all this energy is applied to releasing oxygen from metallic oxides, a 120 mbar oxygen atmosphere could be created in about 30 years.

Colonization impossible – Electric Dust storms

Electrical Dust storms and other factors make it impossible to live on mars

Cain, Publisher at Universe Today, University of British Columbia, 6

(Fraser, *Universe Today*, “Electrical Dust Storms Could Make Life on Mars Impossible”, 6-31-06, http://www.universetoday.com/405/electrical-dust-storms-could-make-life-on-mars-impossible/, AH)

New research is suggesting that planet-wide dust storms on Mars could create a snow of corrosive chemicals toxic to life. These Martian storms generate a significant amount of static electricity, and could be capable of splitting carbon dioxide and water molecules apart. The elements could then reform into hydrogen peroxide molecules, and fall to the ground as a snow that would destroy organic molecules associated with life. This toxic chemical might be concentrated in the top layers of Martian soil, preventing life from surviving. The planet-wide dust storms that periodically cloak Mars in a mantle of red may be generating a snow of corrosive chemicals, including hydrogen peroxide, that would be toxic to life, according to two new studies published in the most recent issue of the journal Astrobiology. Based on field studies on Earth, laboratory experiments and theoretical modeling, the researchers argue that oxidizing chemicals could be produced by the static electricity generated in the swirling dust clouds that often obscure the surface for months, said University of California, Berkeley, physicist Gregory T. Delory, first author of one of the papers. If these chemicals have been produced regularly over the last 3 billion years, when Mars has presumably been dry and dusty, the accumulated peroxide in the surface soil could have built to levels that would kill “life as we know it,” he said. “If true, this very much affects the interpretation of soil measurements made by the Viking landers in the 1970s,” said Delory, a senior fellow at UC Berkeley’s Space Sciences Laboratory. A major goal of the Viking mission, comprised of two spacecraft launched by NASA in 1975, was testing Mars’ red soil for signs of life. In 1976, the two landers aboard the spacecraft settled on the Martian surface and conducted four separate tests, including some that involved adding nutrients and water to the dirt and sniffing for gas production, which could be a telltale sign of living microorganisms. The tests were inconclusive because gases were produced only briefly, and other instruments found no traces of organic materials that would be expected if life were present. These results are more indicative of a chemical reaction than the presence of life, Delory said. “The jury is still out on whether there is life on Mars, but it’s clear that Mars has very chemically reactive conditions in the soil,” he said. “It is possible there could be long-term corrosive effects that would impact crews and equipment due to oxidants in the Martian soil and dust.” All in all, he said, “the intense ultraviolet exposure, the low temperatures, the lack of water and the oxidants in the soil would make it difficult for any microbe to survive on Mars.” The article by Delory and his colleagues appearing in the June issue of Astrobiology demonstrates that the electrical fields generated in storms and smaller tornadoes, called dust devils, could split carbon dioxide and water molecules apart, allowing them to recombine as hydrogen peroxide or more complicated superoxides. All of these oxidants react readily with and destroy other molecules, including organic molecules that are associated with life. A second paper, coauthored by Delory, demonstrates that these oxidants could form and reach such concentrations near the ground during a storm that they would condense into falling snow, contaminating the top layers of soil. According to lead author Sushil K. Atreya of the Department of Atmospheric, Oceanic, and Space Sciences at the University of Michigan, the superoxidants not only could destroy organic material on Mars, but accelerate the loss of methane from the atmosphere.

Colonization fails – General

Colonization fails – solar rays, lack of oxygen, lack of tech and terraforming failure

Williams, Physics Instructor, Santa Rosa College, 10

(Lynda, Peace Review Journal of Social Justice, The New Arms Race in Outer Space 22.1, “Irrational Dreams of Space Colonization.” Spring 2010, http://www.scientainment.com/lwilliams\_peacereview.pdf, AH)

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.

Colonization fails – Water and Power

Colonization fails – cant get water or power and other methods are infeasible

Williams, Physics Instructor, Santa Rosa College, 10

(Lynda, *Peace Review Journal of Social* Justice, The New Arms Race in Outer Space 22.1, “Irrational Dreams of Space Colonization.” Spring 2010, http://www.scientainment.com/lwilliams\_peacereview.pdf, AH)

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.

Colonization fails – Astronauts die

Colonization fails – Astronauts die on trip

Williams, Physics Instructor, Santa Rosa College, 10

(Lynda, Peace Review Journal of Social Justice, The New Arms Race in Outer Space 22.1, “Irrational Dreams of Space Colonization.” Spring 2010, http://www.scientainment.com/lwilliams\_peacereview.pdf, AH)

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.

\*\*\*A2: Warming

Warming Not Real

Global warming is overstated and doesn’t have harmful effects even if it exists.

Lieberman, sr. environmental policy analyst at Heritage, 10

(Ben, “The late, great global warming scare;
Americans see [Al Gore](http://www.lexisnexis.com/lnacui2api/search/XMLCrossLinkSearch.do?bct=A&risb=21_T12208421810&returnToId=20_T12208430414&csi=8176&A=0.20298114300670111&sourceCSI=9369&indexTerm=%23PE0009XOY%23&searchTerm=Al%20Gore%20&indexType=P)as the boy who cried wolf,” The Washington Times, 15 February 2010, B(1), LexisNexis, JT)

Global-warming skeptics were hit with numerous setbacks over the past few years - from a major 2007 U.N. report that seemingly confirmed the warming crisis, to [Al Gore's](http://www.lexisnexis.com/lnacui2api/search/XMLCrossLinkSearch.do?bct=A&risb=21_T12208421810&returnToId=20_T12208430414&csi=8176&A=0.20298114300670111&sourceCSI=9369&indexTerm=%23PE0009XOY%23&searchTerm=Al%20Gore's%20&indexType=P) popularization of this gloomy message through his book and Oscar-winning documentary, "An Inconvenient Truth." And let's not forget the shifting political winds that elected a greener Congress and brought in an administration that made climate change a priority. But now those skeptics are facing a new challenge: overconfidence. That's because everything of late has been breaking their way. OK, overconfidence may be an exaggeration, but the wheels are really coming off the global-warming cart. "Climategate" - the recent leak of e-mails showing gross misconduct among scientists with key roles in the U.N. report - raises serious questions about how much of the global-warming science we can trust. The scientists were, after all, manipulating the temperature data to show more warming and subverting requests by independent researchers to see the underlying data. Other scary claims in the U.N. report, such as the assertion that Himalayan glaciers are on pace to melt completely by 2035, also turned out to be false and have been retracted recently. Climategate and other scandals only add to the reasons for doubt. At the same time, Mr. Gore's many terrifying predictions are not withstanding the test of time. His book and movie really played up the supposed link between global warming and Hurricane Katrina. Unfortunately for the scaremongers (and fortunately for those who live on the coast) we haven't seen anything even close to Katrina since. The 2006 through 2008 hurricane seasons were at or below average, and the 2009 season went down as the weakest in more than a decade. So much for a global-warming-induced hurricane trend - and many other such scares. Another thing missing from the global-warming crisis? Global warming. Temperatures have been flat for more than a decade, and 2009 adds one more year to that trend.

Impacts to global warming are just political hype – multiple alt causes.

Rowland, dpt. of environment and resource management in Brisbane Australia, 10

(Michael, “Will the sky fall in? Global warming - an alternative view,” Antiquity, December 2010, 84(326), p. 1163, Ebsco, JT)

Climatologists do not agree on all aspects of their discipline and much has still to be learnt about feedbacks and oscillations in climate systems (Pearce 2007). There is, however, general agreement that climates arc non-stationary, vary over a number of temporal and spatial scales, and may be impacted by factors both internai and external to the system itself (McGregor 2006). The advance and retreat of glaciers follow predictable cycles and with such regularity that some argue an ice age is due (Macdougall 2004; Singer & Avery 2006). Archaeologists are also in a position to contribute to discussion on human responses to other past natural catastrophes (e.g. volcanoes, cyclones, tsunamis) that occurred at magnitudes greater than any historically known examples (e.g. Nott 2006; Petraglia et al. 2007). During the Holocene, people may also have begun to impact on climate (Ruddiman 2005). But political and economic systems also play a role in enhancing or reducing climate impacts: famines may not have been caused directly by climate change, but by political barriers to food distribution (Davis 2001). In July 1995, 700 deaths occurred in Chicago due to a heat wave and while many focused on global warming as the cause, KJinenberg (2002) provided a more complex explanation that included issues of poverty, racism, social isolation and criminal and civic negligence. It is on these last examples that anthropological/archaeological perspectives could provide significant further insights.

**Ice Age Now**

Global warming theory is false – we’re heading for an ice age.

Sheppard, associate editor of NewsBusters, 9

(Noel, “Global Warming Update: 'Earth on the Brink of an Ice Age,” 11 January 2009, p. <http://newsbusters.org/blogs/noel-sheppard/2009/01/11/global-warming-update-earth-brink-ice-age>, JT)

As Democrats and their president-elect -- with invaluable assistance from their media minions -- continue spreading climate hysteria in order to [raise taxes and redistribute wealth](http://newsbusters.org/blogs/noel-sheppard/2009/01/01/nasas-hansen-obama-use-global-warming-redistribute-wealth), a possibly inconvenient truth has just been presented to the international community: "The earth is now on the brink of entering another Ice Age, according to a large and compelling body of evidence from within the field of climate science." Additionally, the entire bogus manmade global warming theory that climate alarmists and their surrogates have been forcing down the throats of the citizenry "is based on data that is drawn from a ridiculously narrow span of time and it demonstrates a wanton disregard for the ‘big picture’ of long-term climate change."  Such was [reported](http://english.pravda.ru/science/earth/106922-earth_ice_age-0) by Russia's Pravda Sunday, and it not only goes quite counter to the junk science being espoused by folks like Nobel Laureate [Al Gore](http://newsbusters.org/people/political-figures/al-gore) and his accomplices [James Hansen](http://newsbusters.org/blogs/noel-sheppard/2009/01/01/nasas-hansen-obama-use-global-warming-redistribute-wealth) and [Gavin Schmidt](http://newsbusters.org/blogs/noel-sheppard/2008/07/17/nasa-climate-alarmist-attacks-newsbusters-sheppard), but it has also been regularly proffered by many of the real scientists and climatologists around the world that global warming loving media not only refuse to cite and/or interview, but also disgracefully ridicule as deniers and flat earthers. According to Pravda, it is Gore, Hansen, Schmidt, and all their sycophant devotees that are the flat earthers who are distracting the world from a much more serious climate threat (emphasis added throughout): The earth is now on the brink of entering another Ice Age, according to a large and compelling body of evidence from within the field of climate science. Many sources of data which provide our knowledge base of long-term climate change indicate that the warm, twelve thousand year-long Holocene period will rather soon be coming to an end, and then the earth will return to Ice Age conditions for the next 100,000 years. Ice cores, ocean sediment cores, the geologic record, and studies of ancient plant and animal populations all demonstrate a regular cyclic pattern of Ice Age glacial maximums which each last about 100,000 years, separated by intervening warm interglacials, each lasting about 12,000 years. Sounds much like what the realist side has been saying for years, doesn't it? But it gets better: During the 1970s the famous American astronomer Carl Sagan and other scientists began promoting the theory that ‘greenhouse gasses’ such as carbon dioxide, or CO2, produced by human industries could lead to catastrophic global warming. Since the 1970s the theory of ‘anthropogenic global warming’ (AGW) has gradually become accepted as fact by most of the academic establishment, and their acceptance of AGW has inspired a global movement to encourage governments to make pivotal changes to prevent the worsening of AGW. The central piece of evidence that is cited in support of the AGW theory is the famous ‘hockey stick’ graph which was presented by Al Gore in his 2006 film “An Inconvenient Truth.” The ‘hockey stick’ graph shows an acute upward spike in global temperatures which began during the 1970s and continued through the winter of 2006/07. However, this warming trend was interrupted when the winter of 2007/8 delivered the deepest snow cover to the Northern Hemisphere since 1966 and the coldest temperatures since 2001. It now appears that the current Northern Hemisphere winter of 2008/09 will probably equal or surpass the winter of 2007/08 for both snow depth and cold temperatures. The main flaw in the AGW theory is that its proponents focus on evidence from only the past one thousand years at most, while ignoring the evidence from the past million years -- evidence which is essential for a true understanding of climatology. The data from paleoclimatology provides us with an alternative and more credible explanation for the recent global temperature spike, based on the natural cycle of Ice Age maximums and interglacials.

Gases KT prevent Ice Age

Greenhouse gas caused warming is key to prevent an impending ice age.

Dell’Amore, science at the University of Colorado Boulder, National Geographic, 9

(Christine, , 3 September 2009, “Next Ice Age Delayed by Global Warming, Study Says,” p. <http://news.nationalgeographic.com/news/2009/09/090903-arctic-warming-ice-age.html>, JT)

Humans are putting the brakes on the next ice age, according to the most extensive study to date on Arctic [climate change](http://environment.nationalgeographic.com/environment/global-warming/gw-overview.html). The Arctic may be warmer than it's been in the past 2,000 years—a trend that is reversing a natural cooling cycle dictated by a wobble in Earth's axis. Previously, researchers had looked at Arctic temperature data that went back just 400 years. (See [photos of how climate change is transforming the Arctic](http://environment.nationalgeographic.com/environment/photos/arctic-climate-change.html).) That research showed a temperature spike in the 20th century, but it was unclear whether human-caused greenhouse gas emissions or natural variability was the culprit, noted study co-author Gifford Miller of the Institute of Arctic and Alpine Research at the University of Colorado, Boulder. By looking even farther back in time, Miller and colleagues' newest study reveals that the 20th century's abrupt warming may have in fact interrupted millennia of steady cooling. It's "pretty clear that the most reasonable explanation for that reversal is due to increasing greenhouse gases," Miller said. The researchers' computer climate models dovetails with field data such as sediment cores and tree rings, which "really … solidifies our understanding," he said. Eventually Earth will slip again into the pattern of cyclical ice ages, Miller added, but it may be thousands of years before that happens.

An ice age causes starvation and death.

Hartman, Common Dreams News Center, 4

(Thom, “How global warming may cause the next ice age,” 30 January 2004, p. <http://www.commondreams.org/cgi-bin/print.cgi?file=/views04/0130-11.htm>, accessed: 21 June 2011, JT)

The spring would come late, and summer would never seem to really arrive, with the winter snows appearing as early as September. The next winter would be brutally cold, and the next spring didn't happen at all, with above-freezing temperatures only being reached for a few days during August and the snow never completely melting. After that, the summer never returned: for 1500 years the snow simply accumulated and accumulated, deeper and deeper, as the continent came to be covered with glaciers and humans either fled or died out. (Neanderthals, who dominated Europe until the end of these cycles, appear to have been better adapted to cold weather than Homo sapiens.) What brought on this sudden "disappearance of summer" period was that the warm-water currents of the Great Conveyor Belt had shut down. Once the Gulf Stream was no longer flowing, it only took a year or three for the last of the residual heat held in the North Atlantic Ocean to dissipate into the air over Europe, and then there was no more warmth to moderate the northern latitudes. When the summer stopped in the north, the rains stopped around the equator: At the same time Europe was plunged into an Ice Age, the Middle East and Africa were ravaged by drought and wind-driven firestorms. . If the Great Conveyor Belt, which includes the Gulf Stream, were to stop flowing today, the result would be sudden and dramatic. Winter would set in for the eastern half of North America and all of Europe and Siberia, and never go away. Within three years, those regions would become uninhabitable and nearly two billion humans would starve, freeze to death, or have to relocate. Civilization as we know it probably couldn't withstand the impact of such a crushing blow.

**A2: Warming – I/L turn**

Turn – increased pollution stops global warming.

Tollefson, environment at Congressional Quarterly, 10 (Jeff, “Asian pollution delays inevitable warming,” Nature, 17 February 2010, p. 2 <http://www.environmentportal.in/files/Asian%20pollution%20delays%20inevitable%20warming.doc>, JT)

The grey, sulphur-laden skies overlying parts of Asia have a bright side — they reflect sunlight back into space, moderating temperatures on the ground. Scientists are now exploring how and where pollution from power plants could offset, for a time, the greenhouse warming of the carbon dioxide they emit. A new modelling study doubles as a thought experiment in how pollution controls and global warming could interact in China and India, which are projected to account for 80% of new coal-fired power in the coming years. If new power plants were to operate without controlling pollution such as sulphur dioxide (SO2) and nitrogen oxides (NOX), the study finds, the resulting haze would reflect enough sunlight to overpower the warming effect of CO2 and exert local cooling.

Warming Incoherent

There is no way to measure or determine warming – their studies are flawed.

Essex, math at the University of Western Ontario, McKitrick, econ@U of Guelph, and Andresen, physics@U of Copenhagen, 6

(Christopher, Ross, Bjarne, “Does a Global Temperature Exist?” June 2006, p. <http://www.uoguelph.ca/~rmckitri/research/globaltemp/GlobTemp.JNET.pdf>, JT)

While that statistic is nothing more than an average over temperatures, it is regarded as the temperature, as if an average over temperatures is actually a temperature itself, and as if the out-of-equilibrium climate system has only one temperature. But an average of temperature data sampled from a non-equilibrium ﬁeld is not a temperature. Moreover, it hardly needs stating that the Earth does not have just one temperature. It is not in global thermodynamic equilibrium — neither within itself nor with its surroundings. It is not even approximately so for the climatological questions asked of the temperature ﬁeld. Even when viewed from space at such a distance that the Earth appears as a point source, the radiation from it deviates from a black body distribution and so has no one temperature [6]. There is also no unique “temperature at the top of the atmosphere”. The temperature ﬁeld of the Earth as a whole is not thermodynamically representable by a single temperature. The global temperature statistic is also described as the average, as if there is only one kind of average. Of course there is an inﬁnity of mathematically legitimate options. Indeed over one hundred diﬀerent averages over temperatures have been used in meteorology and climate studies [7] with more appearing regularly. For the case of temperature, or any other thermodynamic intensity, there is no physical basis for choosing any one of these from the inﬁnite domain of distinct mathematical options

\*\*\*A2: Oil Dependence

Oil dependence low

US oil dependence is at an all-time low and is dropping.

Reuters 2011 (“U.S. Oil Dependency Drops Below 50 Percent, Energy Department Reports”, 5/25/2011, http://www.huffingtonpost.com/2011/05/25/us-oil-dependency-drops-energy-department\_n\_867131.html) KF

WASHINGTON (Reuters/Tom Doggett) - U.S. dependence on imported oil fell below 50 percent in 2010 for the first time in more than a decade, thanks in part to the weak economy and more fuel efficient vehicles, the Energy Department said on Wednesday. The department's Energy Information Administration said it expected the moderating trend in U.S. oil-import dependency to continue through the next decade due to improvements in energy efficiency and even higher fuel economy standards. The new data could undercut efforts by Republican lawmakers to expand offshore oil drilling to reduce oil imports, and support the position of the Obama administration and environmental groups that higher mileage requirements for cars and trucks would help cut dependence on foreign oil. Imports of crude and petroleum products accounted for 49.3 percent of U.S. oil demand last year, down from the recent high of 60.3 percent in 2005. It also marked the first time since 1997 that America's foreign oil addiction fell under the 50 percent threshold. "This decline partly reflects the downturn in the underlying economy after the financial crisis of 2008," the EIA said in its weekly review of the oil market. Increased domestic production of ethanol and other biofuels that are blended with gasoline and consumer purchases of more fuel efficient vehicles also slashed the need for oil imports, according to the EIA. Crude oil production, especially in the deep waters of the Gulf of Mexico, increased by 334,000 barrels per day (bpd) between 2005 and 2010, which also cut into foreign oil purchases. U.S. demand for gasoline, jet fuel, heating oil and other petroleum products that were processed from crude oil dropped by 1.7 million bpd to 19.1 million bpd in 2010 from 20.8 million bpd in 2005. At the same time, U.S. exports of petroleum products more than doubled to a record 2.3 million bpd last year from 1.1 million bpd in 2005. "Nowhere have U.S. product exports increased more than in the Americas, including Mexico, Canada, Central and South America and the Caribbean, thanks to economic and population growth and inadequate refining capacity in those countries," the EIA said. As a result, U.S. net imports of refined petroleum products fell last year to their lowest level since 1973, when the government began collecting such data.

Dependence on Middle Eastern oil is highly exaggerated.

Hyde, chairman of the House Committee on International Relations, 2002 (Henry, “OIL DIPLOMACY: FACTS AND MYTHS BEHIND FOREIGN OIL DEPENDENCY”, http://commdocs.house.gov/committees/intlrel/hfa80291.000/hfa80291\_0.htm, accessed 6/21/2011) KF

Contrary to popular belief, a surprisingly large amount of our imported energy, from oil and natural gas to electricity, comes to us not from the volatile Middle East but from the Western Hemisphere, primarily Canada and Mexico, with other Latin American countries accounting for much of the rest. Canada is already our largest source of imported oil, including crude oil and refined petroleum. It also supplies 93 percent of our natural gas imports. Electricity from Canada comprises a significant portion of the U.S. supply and is projected to grow strongly over the next few years. Our imports of energy from Mexico are at a much lower level, but Mexico's potential export capacity is enormous, especially in the area of petroleum. Thus, many of the pieces needed for our energy security are already in place, waiting to be assembled. There is no reason why we cannot work with our North American friends in the immediate future to share expertise and investment in creating an integrated energy market. With the adoption of a common vision of energy security, a commitment to removing the obstacles that hinder the development of the continent's vast energy resources, and the creation of an integrated energy infrastructure, energy resources can be used for the common good between Canada, Mexico, and the United States. This North American Energy Alliance would provide our three nations with energy security. Maybe in just 5 years' time we would be in a much better position than we are today.

\*\*\*A2: Nuclear War

A2: Nuclear War Inevitable

Their inevitability scenario is fundamentally flawed-if it was right we should have died already. No country will risk the MAD scenario.

Waltz, Emeritus Professor of Political Science at UC Berkeley, 95

(Kenneth Neal, *University of California Institute on Global Conflict and Cooperation,* “Peace, Stability, and Nuclear Weapons”, 8-01-95, <http://igcc.ucsd.edu/pdf/policypapers/pp15.pdf>, 6-21-11, SRF)

“War is like love,” the chaplain says in Bertolt Brecht’s Mother Courage, “it always finds a way.” 11 For half a century, nuclear war has not found a way. The old saying, “accidents will happen,” is translated as Murphy’s Law holding that anything that can go wrong will go wrong. Enough has gone wrong, and Scott Sagan has recorded many of the nuclear accidents that have, or have nearly, taken place. 12 Yet none of them has caused anybody to blow anybody else up. In a speech given to American scientists in 1960, C.P. Snow said this: “We know, with the certainty of statistical truth, that if enough of these weapons are made—by enough different states—some of them are going to blow up. Through accident, or folly, or madness—but the motives don’t matter. What does matter is the nature of the statistical fact.” In 1960, statistical fact told Snow that within, “at the most, ten years some of these bombs are going off.” Statistical fact now tells us that we are twenty-five years overdue. 13 But the novelist and scientist overlooked the fact that there are no “statistical facts.” Half a century of nuclear peace has to be explained since divergence from historical experience is dramatic. Never in modern history, conventionally dated from 1648, have the great and major powers of the world enjoyed such a long period of peace. Large numbers of weapons increase the possibility of accidental use or loss of control, but new nuclear states will have only small numbers of weapons to care for. Lesser nuclear states may deploy, say, ten to fifty weapons and a number of dummies, while permitting other countries to infer that numbers of real weapons are larger. An adversary need only believe that some warheads may survive its attack and be visited on it. That belief is not hard to create without making command and control unreliable. All nuclear countries live through a time when their forces are crudely designed. All countries have so far been able to control them. Relations between the United States and the Soviet Union, and later among the United States, the Soviet Union, and China, were at their bitterest just when their nuclear forces were in early stages of development and were unbalanced, crude, and presumably hard to control. Why should we expect new nuclear states to experience greater difficulties than the ones old nuclear states were able to cope with? Although some of the new nuclear states may be economically and technically backward, they will either have expert scientists and engineers or they will not be able to produce nuclear weapons. Even if they buy or steal the weapons, they will have to hire technicians to maintain and control them. We do not have to wonder whether they will take good care of their weapons. They have every incentive to do so. They will not want to risk retaliation because one or more of their warheads accidentally strike another country. Deterrence is a considerable guarantee against accidents, since it causes countries to take good care of their weapons, and against anonymous use, since those firing the weapons can know neither that they will be undetected nor what punishment detection might bring. In life, uncertainties abound. In a conventional world, they more easily lead to war because less is at stake. Even so, it is difficult to think of conventional wars that were started by accident. 14 It is hard to believe that nuclear war may begin accidentally, when less frightening conventional wars have rarely done so. Fear of accidents works against their occurring. This is illustrated by the Cuban Missile Crisis. Accidents happened during the crisis, and unplanned events took place. An American U-2 strayed over Siberia, and one flew over Cuba. The American Navy continued to play games at sea, such games as trying to force Soviet submarines to surface. In crises, political leaders want to control all relevant actions, while knowing that they cannot do so. Fear of losing control propelled Kennedy and Khrushchev to end the crisis quickly. In a conventional world, uncertainty may tempt a country to join battle. In a nuclear world, uncertainty has the opposite effect. What is not surely controllable is too dangerous to bear.

Human’s don’t all die

Nuclear war won’t kill all humans

Child, Associate Professor of Philosophy and Senior Research Fellow at the Center for Social Philosophy and Policy at Bowling Green, 86

(James W., *Nuclear War: The Moral Dimension,* page 63, SRF)

But life is not so simple; we will not all be annihilated. Some Americans will be alive and that has moral consequences. The conclusion that we have reached, contrary to Schell, is shared by almost all scientifically responsible studies. The Office of Technology Assessment has compiled studies from the Department of Defense, the Arms Control and Disarmament Agency, and the Defense Civil Preparedness Agency." The results range from 23 percent fatalities in the U.S. population to 88 percent, depending upon an array of assumptions including evacuation, fallout protection, and ratio of ground bursts to air bursts." This means that in the worst case 195 million Americans would die in the near term. That is a staggering number, but still nearly 30 million would live. Herbert Abrams and William von Kaenel, writing in the New England Journal of Medicine, believe that in a practically unlimited Soviet attack, 133 million Americans would die within two months." Kosta Tsipis projects 100 million near-term deaths." The Federation of American Scientists estimates 150 to 190 million deaths, or 30 to 70 percent of the U.S. population." The International Physicians for the Prevention of Nuclear War estimate that in the United States and the Soviet Union, 200 million would be killed immediately and another 60 million seriously injured or seriously sickened.16 Assuming that all those injured would die within three months, that is almost exactly 50 percent of the combined population of both countries. A vastly important conclusion follows from all these studies: somewhere between 23 million and 150 million Americans would survive an unlimited nuclear war.

\*\*\*A2: Asteroids

 **A2: Asteroid—No XTN**

No risk of asteroid strike by 2029—even if it does strike it won’t cause extinction.

Boyle 4

(Alan Boyle, Science Editor for msnbc, 12/27/2004, <http://www.msnbc.msn.com/id/6751433/ns/technology_and_science-space/t/astronomers-rule-out-asteroid-risk/>, accessed 6/21/11) CJQ

After issuing an unprecedented "yellow alert" for a potential cosmic collision, astronomers said further observations showed that a recently discovered asteroid had no chance of hitting Earth in the year 2029. Monday's announcement, issued by the [Near Earth Object Program](http://neo.jpl.nasa.gov/) at NASA's Jet Propulsion Laboratory, capped a high-priority search for [data](http://www.msnbc.msn.com/id/6751433/ns/technology_and_science-space/t/astronomers-rule-out-asteroid-risk/##) about the space rock, which was discovered in June and designated 2004 MN4. At one point, astronomers said the uncertainty factor about 2004 MN4 allowed for a 1-in-40 chance of a collision on Friday, April 13, 2029. That led them to give the asteroid a rating of 4 on the 1-to-10 Torino scale that is used to gauge the threats posed by near-Earth asteroids and comets. Until 2004 MN4, no object had been graded higher than 1. The asteroid is thought to be about 1,400 feet (430 meters) long. That's not large enough to create a mass-extinction event, like the one that scientists say contributed to the demise of the dinosaurs 65 million years ago. But if the asteroid were to hit the wrong place at the wrong time, it could cause a giant tsunami wave or deliver a nuclear-scale blast. Fortunately, the alert led astronomers to check their archives for images of the asteroid that might have gone unnoticed at the time. Guided by the latest data about 2004 MN4's orbit, the Arizona-based Spacewatch Project spotted the rock on five images made back on March 15, said Donald Yeomans, manager of the Near Earth Object [Program](http://www.msnbc.msn.com/id/6751433/ns/technology_and_science-space/t/astronomers-rule-out-asteroid-risk/##).

 **A2: Asteroid—Nonunique**

Asteroids won’t cause extinction: they strike every 100 years, making the impact nonunique—only one in 4 billion chance of getting hit by the deathstroid.

The Mirror 10

(The Mirror, “Asteroids No danger Reveal Star Trekkers,” lexis, Sept. 29, 2010, accessed 6/21/11) CJQ

IT weighs 70,000 tons and it's hurtling towards Earth at more than 20 miles a second. But a team of the world's finest minds, including boffins from Queen's University in Belfast, are tracking asteroid 2010 ST3. Fortunately, they told the Daily Mirror yesterday, it will hopefully not wipe out the planet. Professor Alan Fitzsimmons said the 150ft wide rock, first detected on September 16, will come close in cosmic terms on December 27, 2098 - but close is around 4,000,000 miles. He added: "The chances of this one hitting us are about 400 billion to one, but if there was a danger of an asteroid like this hitting Earth we'll have a fair few years warning thanks to this project." Prof Fitzsimmoms said plans to deal with asteroids include sending an unmanned spacecraft to intercept it and steer it off course or "evacuate" cities in the impact zone. Asked what would happen if 2010 ST3 did hit Earth he said: "It depends how much it broke up, but it would certainly have serious consequences for people near the impact zone." Large asteroids strike earth usually every century - the last one hit Siberia in 1908.

 **A2: Asteroid—Data Checks**

No risk of an impact: accurate data tracking checks the possibility of any collision—their hyperbolic claims are analogous to fears over earthquakes.

MIT 5

(<http://space.about.com/od/nearearthobjects/a/revisedtorino.htm>, Apr 12 2005, from MIT, accessed 6/21/11) CJQ

Equally important in the revisions, says Binzel, "is the emphasis on how continued tracking of an object is almost always likely to reduce the hazard level to 0, once sufficient data are obtained." The general process of classifying NEO hazards is roughly analogous to hurricane forecasting. Predictions of a storm's path are updated as more and more tracking data are collected. According to Dr. Donald K. Yeomans, manager of NASA's Near Earth Object Program Office, "The revisions in the Torino Scale should go a long way toward assuring the public that while we cannot always immediately rule out Earth impacts for recently discovered near-Earth objects, additional observations will almost certainly allow us to do so." The highest Torino level ever given an asteroid was a 4 last December, with a 2 percent chance of hitting Earth in 2029. And after extended tracking of the asteroid's orbit, it was reclassified to level 0, effectively no chance of collision, "the outcome correctly emphasized by level 4 as being most likely," Binzel said. "It is just a matter of the scale becoming more well known and understood. Just as there is little or no reason for public concern over a magnitude 3 earthquake, there is little cause for public attention for NEO close encounters having low values on the Torino scale." He notes that an object must reach level 8 on the scale before there is a certainty of an impact capable of causing even localized destruction.

 **A2: Asteroid—Strikes Mars**

Asteroids on course to crash into Mars: NASA actively encourages collision—enrages aliens who will lash back at Earth and means aff can’t solve.

Skipper 8

(Joseph P. Skipper, Commentator at Mars Anomaly Research, <http://www.marsanomalyresearch.com/general-directories/commentary/24/asteriod-strike-mars.htm>, Jan. 6, 2008, accessed 6/21/11) CJQ

Meanwhile, consider the following highlighted text that is an entry made in this website's guest book. *Heard on the news a few days ago that* Nasa hopes for that asteroid to crash into Mars. *Makes one wonder if they hope it will wipe out some if not all of the anomalies.* These guys must be really sick. That poor planet has gone through quite some rough times through the ages*, so hopefully it will be spared from this mess. Personally* I hope it will miss. Perhaps a few small fragments will smack into the heads of those Nasa*/JPL* eggheads and strike some sense into them. *... 12/23/2007 ... Robin\_Shadowes ...* Sounds to me like someone we could learn something from, maybe a little compassion. Even if some of us can't have compassion for all of the unique Mars biological life ecology's under this asteroid threat, don't forget that some of this website evidence suggests the presence of not just biological life but intelligent life more technologically advanced than our own. If so, maybe we should at least selfishly hope that this life is ignoring us or, if not, they are more understanding of our myopic behavior than very many of us appear to be. While some of us are hoping and praying for the asteroid to strike Mars, crowing blindly about it in the media and in meetings, and seeing no further than their own self interest, let's hope that someone on Mars doesn't take offense at this ignorant crass behavior and decide it's pay back time for Earth. Some may regard this speculation as ridiculous but my advise is don't tempt fate and be careful what you wish for, it could come back to haunt us all. Although there is nothing constructive we can do to help from the technological view, I say we extend our sincere sympathy to sister planet Mars and its life along with our sincere hope that the asteroid either misses Mars completely or that any advanced technology that may be there is up to the task of deflecting the asteroid away from impact and into a harmless path.

 **A2: Asteroid—Strikes Ocean**

No risk of impact—data checks and even if it does strike Earth it will only cause a tsunami—no chance of sun cloud out.

ADDR 9

(Aerospace Daily & Defense Report, “Threat from 2036 Asteroid Pass Drops With New Calculations,” News; Pg. 5 Vol. 232 No. 7, October 9, 2009, accessed 6/21/11) CJQ

NASA scientists have recalculated the trajectory of the asteroid Apophis using updated data, and determined there is a «significantly reduced» likelihood that it will strike Earth when it passes by in 2036. Only ever a remote possibility, the estimated chance of an impact has now dropped from 1 in 45,000 to 1 in 250,000. The new data were documented by near-Earth object (NEO) scientists Steve Chesley and Paul Chodas at NASA’s Jet Propulsion Laboratory in Pasadena, Calif., based primarily on observations by the University of Hawaii’s Institute for Astronomy in Manoa using the 2.2-meter (88-inch) telescope near the summit of Mauna Kea. Measurements from the Steward Observatory’s 2.3-meter (90-inch) Bok telescope on Kitt Peak in Arizona and the Arecibo Observatory in Puerto Rico also were used in Chesley’s calculations. The 320-meter (1,050-foot) diameter asteroid was first discovered in 2004, and made headlines when Apollo astronaut Rusty Schweickart called on the government to confirm his calculations that there was a remote chance it could strike the Pacific Ocean in 2036. Such an impact could create a wave 10-12 meters (33-40 feet) high, comparable to the wave heights at Banda Aceh, Indonesia, during the 2004 tsunami (Aerospace DAILY, May 23, 2005). Apophis (previously known as 2004 MN4) will have close encounters with Earth in 2029, 2036, and 2068. During the 2029 encounter, the asteroid will pass as close as 29,450 kilometers (18,300 miles) from the surface, although there is no chance of impact. Current estimates of the chance of an impact in 2068 are about 3 in 1 million, although it is anticipated that this will diminish as well with further observation.

 **A2: Nuclear Fusion—Impossible**

Nuclear fusion is a waste of time—they’ve been trying and failing for 50 years.

The Economist 2 (<http://www.economist.com/node/1234632>, Jul 18, 2002, accessed 6/21/11) CJQ

SOME say that a dollar spent on nuclear fusion is a dollar wasted. And many, many dollars have been spent on it, as physicists try to duplicate, in a controlled setting, the process by which the sun shines. Since 1951, America alone has devoted more than $17 billion (see chart) to working out how to fuse atomic nuclei so as to generate an inexhaustible supply of clean, safe power. The claim that this money is wholly wasted may not be entirely fair, though. Fusion science has made a big return on this investment in the form of a new universal constant. This constant is the number 30, a figure that has for the past half-century or so been cited almost religiously by researchers as the number of years that it will take before fusion power becomes a commercial reality. That this number has not fallen explains why the budget for fusion research in America has. Fit a line to the decline, reckons Pete Politzer, a scientist at General Atomics, an atomic-energy company based in San Diego, and it looks as though fusion funding will disappear entirely by 2007. So it is with a heightened sense of purpose that America's fusion physicists have gathered for a fortnight's conference in Snowmass, Colorado, to discuss the future of their country's fusion-research programme. If they act quickly and in concert with their colleagues around the world, they might save their jobs and their research budgets from a quiet and unlamented death.

\*\*\*A2: Deuterium Add – on

Deuterium on Mars NOT key

Not really important - 46 Trillion TONS of Deuterium on earth – and you can get it from Electrolysis

(4.6x10^13 = 46,000,000,000,000 = 46 Trillion tones)

NODE, 11

(*Nederlands Onderzoekplatfrom Durrzame Energievoorziening*, “The fuel: deuterium and lithium”, 6-21-11“http://www.energyresearch.nl/energieopties/kernfusie/achtergrond/techniek/de-brandstof-deuterium-en-lithium/, accessed 6-21-11, AH)

Deuterium is the non-radioactive isotope of hydrogen. Around 0.015% of all the hydrogen on earth is deuterium; a litre of water contains 33 milligrams. This makes deuterium available in copious amounts: the quantity of deuterium in the world’s oceans is estimated at 4.6 x 1013 tonnes. Deuterium can be recovered via electrolysis of water (heavy water is more difficult to electrolyse and remains behind during the electrolysis of water), via the distillation of liquid hydrogen, or using various chemical adsorption techniques.

Electrolysis is simple

NMSEA, 4

(*New Mexico Solar Energy Association*, “Electrolysis: Obtaining hydrogen from water: The Basis for a Solar-Hydrogen Economy”, 3-11-4 http://www.nmsea.org/Curriculum/7\_12/electrolysis/electrolysis.htm, Accessed 6-21-11, AH)

As covered in the discussion section below, it is possible to use hydrogen as a fuel, that is, a way to store energy, for days when the Sun doesn't shine, or at night time, or for powered mobile devices such as cars. The process by which we generate hydrogen (and oxygen) from water is called electrolysis. The word "lysis" means to dissolve or break apart, so the word "electrolysis" literally means to break something apart (in this case water) using electricity. Electrolysis is very simple - all you have to do is arrange for electricity to pass through some water between to electrodes placed in the water, as shown in the diagram above. Its as simple as that! The principle of electrolysis was first formulated by Michael Faraday in 1820.

More ev – you can literally do it in your kitchen – this procedure proves

NMSEA, 4

(*New Mexico Solar Energy Association*, “Electrolysis: Obtaining hydrogen from water: The Basis for a Solar-Hydrogen Economy”, 3-11-4 http://www.nmsea.org/Curriculum/7\_12/electrolysis/electrolysis.htm, Accessed 6-21-11, AH)

Procedure

1. Remove the erasers and their metal sleeves from both pencils, and sharpen both ends of both pencils.

2. Fill the glass with warm water.

3. Attach wires to the electrodes on the solar cell or battery, and the other ends to the tips of the pencils, as shown in the diagram above. It is important to make good contact with the graphite in the pencils. Secure the wires with tape.

4. Punch small holes in the cardboard, and push the pencils through the holes, as shown in the diagram above.

5. Place the exposed tips of the pencils in the water, such that the tips are fully submerged but are not touching the bottom, and adjust the cardboard to hold the pencils.

6. Wait for a minute or so: Small bubbles should soon form on the tips of the pencils. Hydrogen bubbles will form on one tip (associated with the negative battery terminal - the cathode) and oxygen from the other.

\*\*\*A2: Hydro Economy impact

Hydrogen Econ = More CO2

Hydrogen Econ increases C02 – even if they use nuclear extraction it doesn’t solve

Behar, Popular Science, 5

(“Warning: The Hydrogen Economy May Be More Distant Than It Appears”, Popular Science, Jan. 2005, http://www.michaelbehar.com/popsci/warninghydrogen.html, accessed 6-21-11, AH)

Unlike internal combustion engines, hydrogen fuel cells do not emit carbon dioxide. But extracting hydrogen from natural gas, today’s primary source, does. And wresting hydrogen from water through electrolysis takes tremendous amounts of energy. If that energy comes from power plants burning fossil fuels, the end product may be clean hydrogen, but the process used to obtain it is still dirty. Once hydrogen is extracted, it must be compressed and transported, presumably by machinery and vehicles that in the early stages of a hydrogen economy will be running on fossil fuels. The result: even more C02. In fact, driving a fuel cell car with hydrogen extracted from natural gas or water could produce a net increase of CO2 in the atmosphere. “People say that hydrogen cars would be pollution- free,” observes University of Calgary engineering professor David Keith. “Lightbulbs are pollution-free, but power plants are not.” In the short term, nuclear power may be the easiest way to produce hydrogen without pumping more carbon dioxide into the atmosphere. Electricity from a nuclear plant would electrolyze water—splitting H2O into hydrogen and oxygen. Ballard champions the idea, calling nuclear power “extremely important, unless we see some other major breakthrough that none of us has envisioned.” Critics counter that nuclear power creates long-term waste problems and isn’t economically competitive. An exhaustive industry analysis entitled “The Future of Nuclear Power,” written last year by 10 professors from the Massachusetts Institute of Technology and Harvard University, concludes that “hydrogen produced by electrolysis of water depends on low-cost nuclear power.” As long as electricity from nuclear power costs more than electricity from other sources, using that energy to make hydrogen doesn’t add up.

A2: Hydro-Econ Cheapens

Doesn’t cut costs – that would take decades

Exclusive hydrogen economy can’t solve – other technologies can – and their authors are hacks

Behar, Popular Science, 5

(“Warning: The Hydrogen Economy May Be More Distant Than It Appears”, Popular Science, Jan. 2005, http://www.michaelbehar.com/popsci/warninghydrogen.html, accessed 6-21-11, AH)

Simply mass-producing fuel cell cars won’t necessarily slash costs. According to Patrick Davis, the former leader of the Department of Energy’s fuel cell research team, “If you project today’s fuel cell technologies into high-volume production—about 500,000 vehicles a year—the cost is still up to six times too high.” Raj Choudhury, operations manager for the General Motors fuel cell program, claims that GM will have a commercial fuel cell vehicle ready by 2010. Others are doubtful. Ballard says that first there needs to be a “fundamental engineering rethink” of the proton exchange membrane (PEM) fuel cell, the type being developed for automobiles, which still cannot compete with the industry standard for internal combustion engines—a life span of 15 years, or about 170,000 driving miles. Because of membrane deterioration, today’s PEM fuel cells typically fail during their first 2,000 hours of operation. Ballard insists that his original PEM design was merely a prototype. “Ten years ago I said it was the height of engineering arrogance to think that the architecture and geometry we chose to demonstrate the fuel cell in automobiles would be the best architecture and geometry for a commercial automobile,” he remarks. “Very few people paid attention to that statement. The truth is that the present geometry isn’t getting the price down to where it is commercial. It isn’t even entering into the envelope that will allow economies of scale to drive the price down.” In the short term, conventional gasoline-burning vehicles will be replaced by gas-electric hybrids, or by vehicles that burn clean diesel, natural gas, methanol or ethanol. Only later will hydrogen cars make sense, economically and environmentally. “Most analysts think it will take several decades for hydrogen to make a large impact, assuming hydrogen technologies reach their goals,” notes Joan Ogden, an associate professor of environmental science and policy at the University of California at Davis and one of the world’s leading researchers of hydrogen energy.

Hydro econ expensive

**Hydro econ is really expensive – and others aren’t footing the bill**

Behar, Popular Science, 5

(“Warning: The Hydrogen Economy May Be More Distant Than It Appears”, Popular Science, Jan. 2005, http://www.michaelbehar.com/popsci/warninghydrogen.html, accessed 6-21-11, AH)

“If you are serious about [hydrogen], you have to commit a whole lot more money,” contends Guenter Conzelmann, deputy director of the Center for Energy, Environmental and Economic Systems Analysis at Argonne National Laboratory near Chicago. Conzelmann develops computer models to help the energy industry make predictions about the cost of implementing new technology. His estimate for building a hydrogen economy: more than $500 billion, and that’s if 60 percent of Americans continue to drive cars with internal combustion engines. Shell, ExxonMobil and other oil companies are unwilling to invest in production, distribution, fueling facilities and storage if there are just a handful of hydrogen cars on the road. Nor will automakers foot the bill and churn out thousands of hydrogen cars if drivers have nowhere to fill them up. Peter Devlin, head of the Department of Energy’s hydrogen-production research group, says, “Our industry partners have told us that unless a fourth to a third of all refueling stations in the U.S. offer hydrogen, they won’t be willing to take a chance on fuel cells.” To create hydrogen fueling stations, California governor Arnold Schwarzenegger, who drives a Hummer, has championed the Hydrogen Highway Project. His plan is to erect 150 to 200 stations—at a cost of at least $500,000 each—along the state’s major highways by the end of the decade. So that’s one state. Now what about the other 100,775 filling stations in the rest of the U.S.? Retrofitting just 25 percent of those with hydrogen fueling systems would cost more than $13 billion.

Hydro-Econ can’t solve & Authors hack

Exclusive hydrogen economy can’t solve – other technologies can – and their authors are hacks

Behar, Popular Science, 5

(“Warning: The Hydrogen Economy May Be More Distant Than It Appears”, Popular Science, Jan. 2005, http://www.michaelbehar.com/popsci/warninghydrogen.html, accessed 6-21-11, AH)

The near-future prospects for a hydrogen economy are dim, concludes The Hydrogen Economy: Opportunities, Costs, Barriers, and R&D Needs, a major government-sponsored study published last February by the National Research Council. Representatives from ExxonMobil, Ford, DuPont, the Natural Resources Defense Council and other stakeholders contributed to the report, which urges lawmakers to legislate tougher tailpipe-emission standards and to earmark additional R&D funding for renewable energy and alternative fuels. It foresees “major hurdles on the path to achieving the vision of the hydrogen economy” and recommends that the Department of Energy “keep a balanced portfolio of R&D efforts and continue to explore supply-and-demand alternatives that do not depend on hydrogen.” Of course, for each instance where the study points out how hydrogen falls short, there are scores of advocates armed with data to show how it can succeed. Physicist Amory Lovins, who heads the Rocky Mountain Institute, a think tank in Colorado, fastidiously rebuts the most common critiques of hydrogen with an armada of facts and figures in his widely circulated white paper “Twenty Hydrogen Myths.” But although he’s a booster of hydrogen, Lovins is notably pragmatic. “A lot of silly things have been written both for and against hydrogen,” he says. “Some sense of reality is lacking on both sides.” He believes that whether the hydrogen economy arrives at the end of this decade or closer to midcentury, interim technologies will play a signal role in the transition. The most promising of these technologies is the gas-electric hybrid vehicle, which uses both an internal combustion engine and an electric motor, switching seamlessly between the two to optimize gas mileage and engine efficiency. U.S. sales of hybrid cars have been growing steadily, and the 2005 model year saw the arrival of the first hybrid SUVs—the Ford Escape, Toyota Highlander and Lexus RX400h. Researchers sponsored by the FreedomCAR program are also investigating ultralight materials—plastics, fiberglass, titanium, magnesium, carbon fiber—and developing lighter engines made from aluminum and ceramic materials. These new materials could help reduce vehicle power demands, bridging the cost gap between fossil fuels and fuel cells. Most experts agree that there is no silver bullet. Instead the key is developing a portfolio of energy- efficient technologies that can help liberate us from fossil fuels and ease global warming. “If we had a wider and more diverse set of energy sources, we’d be more robust, more stable,” says Jonathan Pershing, director of the Climate, Energy and Pollution Program at the World Resources Institute. “The more legs your chair rests on, the less likely it is to tip over.” Waiting for hydrogen to save us isn’t an option. “If we fail to act during this decade to reduce greenhouse gas emissions, historians will condemn us,” Romm writes in The Hype about Hydrogen. “And they will most likely be living in a world with a much hotter and harsher climate than ours, one that has undergone an irreversible change for the worse.”

Hyrdrogen econ uses resources

Hydrogen economy requires non-renewable energy and requires trillions of gallons of water

Behar, Popular Science, 5

(“Warning: The Hydrogen Economy May Be More Distant Than It Appears”, Popular Science, Jan. 2005, http://www.michaelbehar.com/popsci/warninghydrogen.html, accessed 6-21-11, AH)

Perform electrolysis with renewable energy, such as solar or wind power, and you eliminate the pollution issues associated with fossil fuels and nuclear power. Trouble is, renewable sources can provide only a small fraction of the energy that will be required for a full-fledged hydrogen economy. From 1998 to 2003, the generating capacity of wind power increased 28 percent in the U.S. to 6,374 megawatts, enough for roughly 1.6 million homes. The wind industry expects to meet 6 percent of the country’s electricity needs by 2020. But economist Andrew Oswald of the University of Warwick in England calculates that converting every vehicle in the U.S. to hydrogen power would require the electricity output of a million wind turbines—enough to cover half of California. Solar panels would likewise require huge swaths of land. Water is another limiting factor for hydrogen production, especially in the sunny regions most suitable for solar power. According to a study done by the World Resources Institute, a Washington, D.C.–based nonprofit organization, fueling a hydrogen economy with electrolysis would require 4.2 trillion gallons of water annually—roughly the amount that flows over Niagara Falls every three months. Overall, U.S. water consumption would increase by about 10 percent.

Hydro leaks cause warming

Hydrogen gas leaks are likely in a hydrogen economy and cause global warming

Behar, Popular Science, 5

(“Warning: The Hydrogen Economy May Be More Distant Than It Appears”, Popular Science, Jan. 2005, http://www.michaelbehar.com/popsci/warninghydrogen.html, accessed 6-21-11, AH)

Hydrogen gas is odorless and colorless, and it burns almost invisibly. A tiny fire may go undetected at a leaky fuel pump until your pant leg goes up in flames. And it doesn’t take much to set compressed hydrogen gas alight. “A cellphone or a lightning storm puts out enough static discharge to ignite hydrogen,” claims Joseph Romm, author of The Hype about Hydrogen: Fact and Fiction in the Race to Save the Climate and founder of the Center for Energy and Climate Solutions in Arlington, Virginia. A fender bender is unlikely to spark an explosion, because carbon-fiber-reinforced hydrogen tanks are virtually indestructible. But that doesn’t eliminate the danger of leaks elsewhere in what will eventually be a huge network of refineries, pipelines and fueling stations. “The obvious pitfall is that hydrogen is a gas, and most of our existing petrochemical sources are liquids,” says Robert Uhrig, professor emeritus of nuclear engineering at the University of Tennessee and former vice president of Florida Power & Light. “The infrastructure required to support high-pressure gas or cryogenic liquid hydrogen is much more complicated. Hydrogen is one of those things that people have great difficulty confining. It tends to go through the finest of holes.” To calculate the effects a leaky infrastructure might have on our atmosphere, a team of researchers from the California Institute of Technology and the Jet Propulsion Laboratory in Pasadena, California, looked at statistics for accidental industrial hydrogen and natural gas leakage—estimated at 10 to 20 percent of total volume—and then predicted how much leakage might occur in an economy in which everything runs on hydrogen. Result: The amount of hydrogen in the atmosphere would be four to eight times as high as it is today. The Caltech study “grossly overstated” hydrogen leakage, says Assistant Secretary David Garman of the Department of Energy’s Office of Energy Efficiency and Renewable Energy. But whatever its volume, hydrogen added to the atmosphere will combine with oxygen to form water vapor, creating noctilucent clouds—those high, wispy tendrils you see at dawn and dusk. The increased cloud cover could accelerate global warming.

\*\*\*Adv 2 – Leadership\*\*\*

A2: Heg - I/L Turn

They have it wrong – the only reason China would weaponize is because of perceived U.S. dominance of space.

Zhang, research associate at Harvard, 5

(Hui, “Action/Reaction: U.S. Space Weaponization and China,” December 2005, p. <http://www.armscontrol.org/act/2005_12/Dec-cvr#bio>, accessed: 21 June 2011, JT)

Chinese officials have expressed a growing concern that U.S. space and missile defense plans will stimulate a costly and destabilizing arms race. In particular, the prevailing view in Beijing is that the United States seeks to neutralize China’s strategic nuclear deterrent, freeing itself to intervene in China’s affairs and undermining Beijing’s efforts to prod Taiwan to reunify. If U.S. plans are left unchecked, therefore, Beijing may feel compelled to respond by introducing its own space weapons. Beijing, however, would prefer to avoid this outcome. Chinese officials argue that weaponizing space is in no state’s interest, while continued peaceful exploitation redounds to the benefit of all states. Rather than battling over space, China wants countries to craft an international ban on space weaponization.

**A2: Heg—Nonunique**

Multipolarity in the status quo—space policy emphasizes international agreement and outsourcing power.

**Defense Daily 10** (“New Space Policy Promotes International Cooperation, Private Industry,” by Marina Malenic, June 30, 2010, accessed 6/21/11, lexis) CJQ

The [Obama administration](http://www.lexisnexis.com.proxy.uchicago.edu/lnacui2api/search/XMLCrossLinkSearch.do?bct=A&risb=21_T12209206730&returnToId=20_T12209206775&csi=156289&A=0.3538166400502485&sourceCSI=9369&indexTerm=%23PE000A0BO%23&searchTerm=Obama%20administration%20&indexType=P)  has issued a new national space policy that emphasizes international cooperation and support for a robust space industrial base. In a written statement issued June 28 by the White House, President Barrack [Obama](http://www.lexisnexis.com.proxy.uchicago.edu/lnacui2api/search/XMLCrossLinkSearch.do?bct=A&risb=21_T12209206730&returnToId=20_T12209206775&csi=156289&A=0.3538166400502485&sourceCSI=9369&indexTerm=%23PE000A0BO%23&searchTerm=Obama%20&indexType=P)  said the new plan would "rapidly increase our capabilities in space while bolstering America's competitive edge in the global economy." "The United States will engage in expanded international cooperation in space activities," the policy document states. "The United States will pursue cooperative activities to the greatest extent practicable in areas including: space science and exploration; earth observations, climate change research and the sharing of environmental data; disaster mitigation and relief; and space surveillance for debris monitoring and awareness." However, Washington remains committed to the use of space systems "in support of its national and homeland security," according to the document. "The United States will invest in space situational awareness capabilities and launch vehicle technologies; develop the means to assure mission essential functions enabled by space; enhance our ability to identify and characterize threats; and deter, defend, and if necessary, defeat efforts to interfere with or attack U.S. or allied space systems," it states. The document also addresses arms control in space. The policy expresses the administration's willingness to "consider" arms control agreements for the space domain. Defense Secretary Robert Gates welcomed the release of the policy. "Space-based capabilities are critical to our military's ability to navigate accurately, strike precisely, and gather battle space awareness efficiently," he said in a press statement. "However, changes in the space environment over the last decade challenge our operations. Today, space is increasingly contested as our systems face threats of disruption and attack, increasingly competitive as more states, private firms, and others develop space-based capabilities, and increasingly congested with orbital debris." Gates pledged to work closely with his counterparts in other U.S. government agencies to mitigate such risks. The policy also calls for a "robust and competitive" industrial base. "In support of its critical domestic aerospace industry, the U.S. government will use commercial space products and services in fulfilling governmental needs, invest in new and advanced technologies and concepts, and use a broad array of partnerships with industry to promote innovation," it states. "The U.S. government will actively promote the purchase and use of U.S. commercial space goods and services within international cooperative agreements."

**A2: Heg—Unilateral Space Bad**

Muscle-flexing space policies are bad: competition with China and Russia collapses NPT cred and contributes to proliferation.

**NYT 6** (New York Times, <http://www.nytimes.com/2006/10/22/opinion/22iht-edspace.3246904.html>, October 21, 2006, accessed 6/21/11) CJQ

This chest-thumping is being portrayed as a modest extension of the Clinton administration's space policy issued a decade ago. And so far there is no mention of putting American weapons in space. But the more aggressive tone of the Bush policy may undercut international cooperation on civilian space projects a goal to which the new policy subscribes or set off an eventual arms race in space. The new policy reflects the worst tendencies of the Bush administration a unilateral drive for supremacy and a rejection of treaties. And it comes just as the White House is desperately seeking help to rein in the nuclear programs of North Korea and Iran. That effort depends heavily on cooperation from China and Russia, two countries with their own active space programs. The administration regards the policy as a necessary update to reflect how important space is becoming for the American economy and defense. But outside experts who have parsed the language are struck by how forceful and nationalistic it sounds. Whereas the 1996 policy opened with assurances that the United States would pursue greater levels of partnership and cooperation in space, the new policy states: ''In this new century, those who effectively utilize space will enjoy added prosperity and security and will hold a substantial advantage over those who do not. Freedom of action in space is as important to the United States as air power and sea power.'' The only solace is that the new policy does not endorse placing weapons in space or fighting in, through or from space, as the Air Force has been urging. But neither does it rule out these activities. In keeping with the more muscular stance, the administration is also opposing any negotiations on a treaty to prevent an arms race in outer space arguing that it may impede America's ability to defend its satellites from ground-based weapons. That seems shortsighted. An international treaty to keep space free of weapons might well provide greater security than a unilateral declaration that America will do whatever it has to do to preserve its own space assets.

**A2: Heg—Nonunique/->Spacejunk**

Multinational cooperation exists now—key to solve space junk.

Herald Sun 10 (The Herald Sun(Australia), “Peace in Our Space,” lexis, June 30, 2010, accessed 6/21/11) CJQ

The new policy, Mr [Obama](http://www.lexisnexis.com.proxy.uchicago.edu/lnacui2api/search/XMLCrossLinkSearch.do?bct=A&risb=21_T12209206730&returnToId=20_T12209385037&csi=244784&A=0.4843426825188045&sourceCSI=9369&indexTerm=%23PE000A0BO%23&searchTerm=Obama%20&indexType=P)  wrote, acknowledged the US space policy -- crafted decades ago during the Cold War with the former Soviet Union -- was no longer ``racing against an adversary''. Instead, he called for greater co-operation with space-faring nations, including Russia and China. A key concern is the amount of space debris in orbit. More than half a million pieces of space junk larger than 1cm are whipping around Earth at up to 29,600km/h -- much faster than the fastest bullet. Even an errant screw could destroy a satellite or endanger an astronaut. Mr [Obama](http://www.lexisnexis.com.proxy.uchicago.edu/lnacui2api/search/XMLCrossLinkSearch.do?bct=A&risb=21_T12209206730&returnToId=20_T12209385037&csi=244784&A=0.4843426825188045&sourceCSI=9369&indexTerm=%23PE000A0BO%23&searchTerm=Obama%20&indexType=P)  said the US aimed to lead the globe in developing a better system to monitor space junk while finding ways to avoid a repeat of the 2009 collision between a US and Russian satellite -- the first time two intact satellites had hit. The paper also touted using commercial rocket companies -- rather than NASA-designed spaceships -- to send crew and cargo to the International Space Station after NASA retires the space shuttle. It added this was ``vital'' to the US economy and its security.

Space Leadership High

Obama’s current 2011 budget ensures space leadership will remain high in the next 50 years

Bolden, Administrator of NASA, 10

(Charles, *Senate Documents,* “Senate Commerce, Science, and Transportation Committee Hearing,” 5-12-2010, Lexis, SRF)

The President's FY 2011 budget request is good for NASA because it sets the Agency on a sustainable path that is tightly linked to our Nation's interests. The President recognizes that what is truly needed for beyond low-Earth orbit (LEO) exploration are game-changing technologies; making the fundamental investments that will provide the foundation for the next half-century of American leadership in space exploration. In doing so, the President has put forward what I believe to be the most authentically visionary policy for human space exploration that we have had since President Kennedy challenged NASA to send humans to the Moon and return them safely back to Earth. At the same time, under the new plan, we will ensure continuous American presence in space on the International Space Station (ISS) throughout this entire decade and likely beyond, re-establish a robust and competitive American launch industry, launch more robotic probes into our solar system as precursors for human activity, invest in a new heavy lift research and development (RandD) program, and build a technological foundation for sustainable, beyond-LEO exploration, with more capable expeditions in lunar space, and human missions to near-Earth asteroids, the Moon, Lagrange points, and, ultimately, Mars. NASA will embark on these transformative initiatives by partnering with the best in industry, academia and other government agencies, as well as with our international partners.

US will stay ahead in space-good leadership and resources

Proietti, Air Force Chief Master Sgt., 08

(Matt, *Space Daily,* “US Can Retain Space Leadership Role”, 11-26-08, <http://www.spacewar.com/reports/US_Can_Retain_Space_Leadership_Role_999.html>, 6-21-11, SRF)

Solid leadership and the coordination of resources will enable the United States to retain its leadership in space, Secretary of the Air Force Michael B. Donley said Nov. 21 during the Air Force Association's Global War Symposium in Los Angeles. Strong government and collaboration among leaders also will be required, said Secretary Donley, who described Airmen as "the connective tissue" across the national security space enterprise. "Space is an interagency domain, and for decades, the United States, and Airmen in particular, have sought to be good stewards of (it)," he said.

US space leadership high.

Giffords, chair of the space and aeronautics subcommittee of the house science and technology committee, 2009 (Gabrielle, “THE GROWTH OF GLOBAL SPACE CAPABILITIES: WHAT'S HAPPENING AND WHY IT MATTERS”, 11/19/2009, Lexis) KF

We face, of course, different challenges than the ones that were faced by President Kennedy, and folks that come before us in the Congress. But it was really that vision of the importance of space and the future of this country and the importance generally of overall U.S. leadership in exploring and utilizing space that has been borne out over the intervening years. It's clear that the space capabilities that have been created around the world can play a constructive and significant role in addressing the many societal challenges we face today. But it's also clear that our next great space endeavor that of human and robotic exploration of our solar system, can benefit greatly from those same global space capabilities. Yet if we are to harness those capabilities, the United States needs to make clear to the rest of the world that we are not wavering. We are not wavering in our own commitment to space exploration and to the path that we started down. Of course it's hard to lead without a clear sense of direction. Fortunately, this Congress has a sense of direction. The NASA Authorization Act of 2008 established a congressional consensus in support of a strong human and robotic exploration initiative as part of a robust and balanced space program and in support of devoting the resources needed to pay for it. I know the president is currently grappling with many hard decisions in the days ahead as he attempts to balance competing priorities. But what to do about the nation's space program doesn't have to be one of them. Based on the actions already taken by Congress over the last four years, I think there's a clear path ahead that already has broad congressional support. And I am confident that he will support it too. With that, again I thank you.

Space Race Bad

Empirically unilateral space endeavors risk economic strain and dangerous competition—ISS proves success of cooperative missions

Som 10

(Sanjoy, senior graduate student in Earth and Space Sciences, University of Washington, Space Policy 26, “An international symbol for the sustained exploration of space”, ScienceDirect, CH)

Space exploration strategies have evolved substantially since their beginnings in the late 1950s, when they were closely associated with military technological prowess. Yet today, some 20 years after the end of the Cold War, space development is still considered a strategic asset. Technological achievements by one nation are often viewed as threats by others, as expressed by satellite-destroying missile demonstrations [1,2]. If history is a witness, then a space race between nations will not benefit humanity in the long run. The most ambitious space program of all time, to place a man on the Moon in a decade, illustrates the amount of resources necessary for such a bold endeavor to succeed. In 1966, during the height of expenditures of the Apollo program, NASA’s budget peaked at 5.5% of the US federal budget, compared with 0.5% today. In 2004, despite a substantial reduction of budget over the years, the US president presented a vision for a human return to the moon and Mars, in addition to a shift in NASA funding for the development of humanrated spacecraft dedicated to exploring thoseworlds as precursors to human settlements. In 2009, the Augustine report commissioned by the following US administration indicated that this vision was unsustainable with the current budget of the agency. Likewise, the bold vision of the European Space Agency (ESA) for Mars exploration, ExoMars, has been a victimof budget cuts, and will be a scaled-down mission done in collaborationwith NASA. Space exploration spending at cold-war levels is not sustainable in the present economic realities of our society. Particularly after the worldwide economic downturn of 2008e2009, mass spending is viewed with a more cautious eye. This underlines the fact that space exploration is a particularly vulnerable field, because the associated benefits are typically poorly understood by the general public, and it is an inherently expensive discipline with non-immediate returns on investment. This provides a challenging environment for business ventures because bold explorations such as human lunar landings will, for the foreseeable future, require substantial costs beyond those that a private company can provide, particularly because of international technology transfer restrictions. Consequently, such bold exploration-enabling spending will only be achievable through cooperation between spacefaring nations, as is increasingly occurring [3,4]. The International Space Station (ISS) is a great example of what can be accomplished through sustained international collaboration, and as a result, one can reasonably claim that the relationship between NASA and Roscosmos (its Russian counterpart) has been stronger and more stable than that between the White House and the Kremlin.

Cooperation Key to Peace

International space co-op key to peaceful future—that outweighs short-term economic competitiveness

Som 10

(Sanjoy, senior graduate student in Earth and Space Sciences, University of Washington, Space Policy 26, “An international symbol for the sustained exploration of space”, ScienceDirect, CH)

It is clear that the way our society returns to the Moon and beyond will be of crucial importance. We cannot afford, in our global economy, to return beyond low-Earth orbit in a competition between superpowers. It may spur development and bolster economic return in the short run, but it is financially unsustainable in the long run. While competition is healthy in the private enterprises, and capitalistic endeavors are valuable for spurring competition and driving down cost, the need for a united humanity in space goes beyond investment returns, and thus beyond a capitalist framework. It must be thought of on a different level, a level where the sustainability of our species beyond Earth is at stake [7]. A greater vision for human peace, international awareness, and sustainability could help steer our world toward a more hopeful future. Space appears to be a great medium by which to do this, because of its lack of international boundaries. Future space explorers will have an opportunity to send a clear message that they are, above all else, ambassadors of planet Earth. This will by no means lessen the triumph of the nations or companies involved in successful exploration, for everyone will know who they are, where they come from, and how they got there. But exploration under a symbol of international unity in space willmake the whole world, not just the country’s citizens, feel pride over the accomplishments of humanity. This is what we need in our 21st century. Media coverage of a moon landing, particularly with today’s web 2.0 technologies, will be followed by an order ofmagnitudemore people than those who followed the Apollo successes; the international broadcast of a symbol of peace and world unity emanating from world superpowers would be completely new, striking and inspiring, particularly for the up and coming generation who will lead our world in the future.

Cooperation Key to Stability

Level of cooperation will determine stability in space

Hayes and Lutes 7

(Peter, Visiting Fellow and Colonel Charles, Senior Military Fellow, both at Institute for National Strategic Studies at National Defense University, Space Policy 23,“Towards a Theory of Spacepower”, 10-18-07, ScienceDirect, CH)

Although most, if not all, spacefaring actors subscribe to the principles of the Outer Space Treaty, a number of issues have arisen to challenge the dominant paradigm. They include definitional problems, concerns about sovereignty and properly rights, prospects of weapons in space, and pursuit of self-interests. 6.2, International security in space The space political environment is still in its infancy, and it is unclear how the balance between purely national and global interests will be managed. A refraining of the current paradigm may be required to accommodate the changing nature of space activity. Nation-stales will probably seek alternative arrangements in space as they perceive increased vulnerabilities or greater security. Some alternative ways that nations may choose to enhance security, either individually or collectively, are: pursuing unilateral strategies; applying balance of power approaches, developing alliance-based security arrangements; establishing "rules of the road;" enhancing frameworks for cooperation and interdependence in space; and/or negotiating arms control or other legal restraints. From the standpoint of international security, one can identify an optimal condition of enduring stability in the space domain. Its attributes would include: a norm of unfettered access to space as a feature of amicable interstate relations: a solid measure of protection, through individual or collective measures, against the aggressive or capricious acts of spoilers; and a situation in which the real or perceived vulnerabilities among space actors are minimized. Ultimately, creating a condition of enduring stability in outer space will hinge upon how tensions between national interests are addressed and whether there emerges over lime a convergent perception of what actions tend, on balance, to strengthen or undermine stability. The prospects for military competition and conflict will increase if enduring stability is not a primary goal of major space powers. 6.3. Enhancing the international system In a stable environment, space can enhance and strengthen the international system. The economic and sociocultural imperatives discussed earlier suggest the importance of maintaining space as a domain for wealth creation and for solving the problems of humankind. Spacefaring actors should consider adopting cooperative approaches in space to address issues of global concern such as energy scarcity, climate change, space situational awareness, space debris, defense against earth colliding objects, material resource scarcity, and extraterrestrial property regimes. Forging collective action on these and other issues will enhance understanding, confidence building, and sharing of knowledge that will contribute to the stability of space as a regime and to its effectiveness in enhancing human prosperity.

No threat to US Space Dominance

Military strength guarantees US dominance in space

Hendriskson 5

David, Coalition for a Realistic Foreign Policy World Policy Journal, “The Curious Case of American Hegemony”, Summer, http://personalwebs.coloradocollege.edu/~dhendrickson/Essays/WPJ\_Curious\_Case\_of\_Amer\_Hegemony.pdf

It is upon the superiority of its arms that American empire rests today. The factors that made for the preservation of Europe’s plural state system from the fifteenth century to the twentieth century—geographic barriers, the relatively equal size of the participating units, the traditional maxims of European policy—have all been notably weakened in the contemporary period. Against smaller powers, U.S. firepower is irresistible in toppling regimes and forcing enemies underground, since it can destroy everything that it can see, and this superiority is especially marked when it can make use of allies on the ground who welcome aid against their historic oppressors. Whether the United States can create new political orders in places such as Afghanistan and Iraq is still an open question, but its destructive capacity is not in doubt. American strategic nuclear superiority will likely be further enhanced by yet more accurate offensive capabilities and new defensive systems, and U.S. domination of the sea and air lanes, and of space, seems assured for the next generation. The emergence of a global military rival to the United States is very difficult to envisage, for the two most plausible candidates, the European Union and China, are unlikely to contend for those stakes, and Russia, India, and Japan are “hinge powers” rather than potentially opposing poles.

\*\*\*Solvency\*\*\*

Not Technically Feasible

Spacecraft cannot land on Mars easily – probability of failure too much to risk

**Cain 9** (Fraser Cain, publisher of Universe Today, an online newspaper dedicated to astronomy and space exploration, “Why Can’t We Land on Mars”, 2/13/09, <http://www.universetoday.com/25438/why-cant-we-land-on-mars/>)JYJ

We get this question quite a bit at [Universe](http://www.universetoday.com/36425/the-universe/) Today. When people imagine a spacecraft entering the Martian [atmosphere](http://www.universetoday.com/74524/atmosphere/), they think that it’s going to be very similar to the Earth. But the reality is that Mars’ atmosphere is only 1% as dense as the Earth’s atmosphere. When they’re trying to land on a planet, spacecraft use the atmosphere to slow themselves down to a reasonable speed. For example, the space [shuttle](http://www.universetoday.com/82635/space-shuttle/) enters the Earth’s atmosphere, and uses it to slow down to the point that it can land like a regular airplane. It’s losing thousands of km/h of [velocity](http://www.universetoday.com/34063/orbit-velocity/). Since the Martian atmosphere is so thin, spacecraft will just smack into the surface of the planet. NASA engineers use a series of techniques to slow a spacecraft down for landing on Mars. Just like Earth, spacecraft heading to Mars will use the atmosphere to slow themselves down a bit. They’ll deploy large parachutes to catch as much Martian air as possible. That’s not enough, though, and the spacecraft will then fire their retro-rockets to slow down even more. In some cases, that’s enough that the spacecraft can use an airbag system to bounce across the surface of the planet (the Mars rovers did this). In other cases, spacecraft use retro-rockets all the way down until they’re safely on the surface (this is what the Phoenix Mars Lander will do).

One Way Mission PMNs

Lack of international cooperation and culture of safety prevent a one – way mission to Mars

Smith 10 (Sandy, Oct 28, HULIQ, “NASA contemplates manned mission to Mars – one-way,” http://www.huliq.com/8738/nasa-contemplates-manned-mission-mars-one-way) KA

A project of this scope and ambition, however, would also likely require political cooperation and some changes in the way people think. Writing in the Journal of Cosmology, scientists Dirk Schulze-Makuch and Paul Davies argue that putting humans on Mars "would require not only major international cooperation, but a return to the exploration spirit and risk-taking ethos of the great period of Earth exploration, from Columbus to Amundsen, but which has nowadays been replaced with a culture of safety and political correctness." Advocates would certainly have to address the ethical concerns of those who would claim that the mission is simply abandoning the astronauts to their fate, or worse still, sacrificing them. By the time Columbus began his voyage, enough was known about the Earth to have made rescue in case something went wrong possible, and our understanding of long distance space flight is not at that point yet.

Motivation “to boldly go where no has before” is lacking

Lamb 10 (Gregory M., November 17, CSMonitor, “One-way ticket to Mars?,” http://www.csmonitor.com/Innovation/One-way-ticket-to-Mars) KA

And in the long term, a Martian colony would be a huge first step toward humans moving away from Earth.Famed theoretical physicist [Stephen Hawking](http://www.csmonitor.com/tags/topic/Stephen%2BHawking) has been among those arguing thatbecause of the chance of a disaster on Earth, humans must start moving out into the solar system. But these kinds of scientific and long-range concerns haven't really spurred the history of exploration here on Earth, points out [Michael Robinson](http://www.csmonitor.com/tags/topic/Michael%2BRobinson), a historian of science at the [University of Hartford](http://www.csmonitor.com/tags/topic/University%2Bof%2BHartford) in [Connecticut](http://www.csmonitor.com/tags/topic/Connecticut). Most explorers from [Columbus](http://www.csmonitor.com/tags/topic/Columbus) to Lewis and Clark set forth with "mercenary and pragmatic goals," such as finding a new trading route to [Asia](http://www.csmonitor.com/tags/topic/Asia). The idea that humans have an innate urge "to boldly go where no one has gone before" is more myth than fact, Dr. Robinson says. Throughout most of history, humans have been "moving toward a more settled lifestyle," moving from a nomadic life into towns and cities. In general, "people don't want to die out in a wilderness," he says.

No Solvency – NASA doesn’t have Tech

NASA doesn’t have the tech to make an effective base on Mars

Gage, Ph.D. in Physics, 10

(Douglas W., Journal of Cosmology, Vol 12, 3904-3911 “Mars Base First: A Program-level Optimization for Human Mars Exploration”. October-November 2010, <http://journalofcosmology.com/Mars103.html>, accessed 5-28-11, JMB) (NSF CP? – see last sentence)

Viewed from an engineering perspective, it is clear that a Mars base will constitute a complex "system of systems", one whose development will involve a large number of technical disciplines, and this fact must be explicitly acknowledged if we are to succeed. Here is a listing of some of the technologies and tools we will need to develop in order to create a human base on Mars: - Surface nuclear power plant (nominally 150 kW electrical, plus thermal energy) - Cryogenic storage and handling tools/systems - Thermal control systems (including insulation) – different on Mars than in space - Methane (and/or propane?)-oxygen power sources (electrical, thermal, motive; very small to very large) - Vehicles (manned and unmanned, ground and air, pressurized and unpressurized, all sizes) - Construction technologies and equipment (including robots, autonomous or supervised) - Communications and navigation systems (intra-base, off-base, and off-planet; supporting systems, vehicles, and people) - Ultra-reliable computing and other IT support (redundant, radiation-hard; wearable systems, etc) - Medical strategies/tools: auto-medicine (taking care of yourself), para-medicine (taking care of each other), and tele-medicine (accessing medical resources back on Earth) Not only is this not "rocket science", it’s not even just technology. We need to think about construction, physiology, and robotics; and psychology and sociology; and nutrition, gardening, and medicine; and architecture, history, insulation, and HVAC; and power distribution, IT, sensors, and AI; and biology, chemistry, geology, and seismology; and… In fact, the successful development of an effective base on Mars will require more than a solid systems centric engineering perspective; it will also require a human-centric perspective, involving numerous social as well as technical disciplines. In essence, we are attempting to design the smallest-scale possible viable human economy and supporting ecology, and we don’t know in advance what this "nano-society" will look like. But NASA as an organization is focused on the "rocket science." To understate the case considerably, "studies of surface activities and related systems have not always been carried out to the same breadth or depth as those focused on the space transportation and entry or ascent systems needed for a Mars mission" (NASA, 2001, p. 1). Perhaps the National Science Foundation (NSF), with its broad scientific purview and experience managing U.S. Antarctic bases, might effectively participate in the development of the Mars base.

No Qualified Volunteers

Volunteers for Mars are not qualified, don’t understand consequences

Lott 11 (Maxim, January 10, FoxNews.com, “To Boldy Go: What Made 400 People Volunteer for a One-Way Mission to Mars?,” http://www.foxnews.com/scitech/2011/01/10/space-volunteer-way-mission-mars/) KA

But more than spiritual issues will arise, warn psychologists who have worked with NASA. "It's going to be a very long period of isolation and confinement," said Albert Harrison, who has studied astronaut psychology since the 1970s as a professor of psychology at UC Davis. He also warned that life on Mars wouldn't be as romantic as it sounded. "After the excitement of blast-off, and after the initial landing on Mars, it will be very difficult to avoid depression. After all, one is breaking one’s connections with family, friends, and all things familiar," he told FoxNews.com. "Each day will be pretty much like the rest. The environment, once the novelty wears off, is likely to be deadly boring. Despite being well prepared and fully equipped there are certain to be unanticipated problems that cannot be remedied. One by one the crew will get old, sick, and die-off." All communications with Earth would also come with a delay of about 45 minutes. The volunteers said they are aware of the psychological issues, but believe they would be able to handle them. "I've spent an inordinate amount of time with myself and my own thoughts, and am happy to do so till the end of days," Greaves said. Are they qualified? Volunteering is all well and good, but would Greaves or Gregersen have a chance of being selected? NASA spokesman James Hartsfield referred to the astronaut application guidelines posted on the agency's website. Currently, the requirement of a college degree in science, engineering, or math -- followed by years of professional experience -- would probably disqualify most, he said. However, the mission in question is not intended to be sponsored by NASA. Harrison said he was more upbeat about the volunteers. “The people within this group show high interest and would bring varied backgrounds and experiences to the mission,” he said. “Also, there will be spiritual issues to address, and it would not surprise me at all if the mission would benefit from someone who served as a chaplain.” Currently, NASA astronauts must complete at least 4 to 5 years of training before going on long-duration missions. The training includes intense physical tests. “Astronaut Candidates are required to complete military water survival before beginning their flying syllabus, and become SCUBA qualified to prepare them for spacewalk training,” the guidelines read. Harrison said that he was sure good colonists could be found, but that political and regulatory hurdles would be a tougher issue.

\*\*\*CPs\*\*\*

\*\*\*Moon First CP

Moon First CP Shell

Text: The United States federal government should claim sovereignty over and establish a permanent colony on the Moon.

Moon first is the fastest way to Mars.

USA Today, 2009 (written by Traci Watson, “What's our next step?; The moon again? Mars? An asteroid? Four decades after the moon landing, NASA seeks a new -- and affordable -- frontier in space”, 7/17/2009, Lexis) KF

Yes, America has been there. That doesn't mean it's not worth going back, say scientists and an astronaut who's been to the lunar surface. Humans went to the moon six times from 1969 to 1972, spending fewer than 13 days there. Lunar advocates say that's hardly time enough to plumb the moon's mysteries. Sending humans back to the moon could help unlock the secrets of the early solar system, says Jack Burns, a University of Colorado astronomer. The forces that shaped the Earth have not scarred the lunar surface, making the moon a pristine record of how planets formed, he says. Burns scoffs at the idea that because Americans have landed on the moon, there's no reason to go back. "It's like Thomas Jefferson sending Lewis and Clark to the West, and ... people saying, 'We're done, we don't need to go there anymore,' " he says. NASA's plans for the moon include not just short, Apollo-style stopovers but eventually a moon base. The agency hopes to send the astronauts back to the moon around 2020. Operating a moon base would allow astronauts to practice living on another planet, NASA's Jeff Hanley says. Crews would need that experience before pressing on to Mars, the long-term goal of most space enthusiasts. "The fastest way to get to Mars is through the moon," says Harrison Schmitt, who in 1972 was one of the last two men on the moon. "We need to learn how to work in deep space again. That's what the moon does for us."

Moon first- allows for development of space law.

Dinkin, columnist, 2004 (Scott, The Space Review, “Colonize the Moon before Mars”, 9/7/2004, http://www.thespacereview.com/article/221/1, accessed 6/21/11) KF

The Moon may become a very exciting destination with a substantial GDP. Being there first means that the high ground is already occupied for any future militarization of the Moon. It’s possible that colonizing the Moon will help muster the political will to colonize Mars. Earthers will be able to see the colony directly with their own eyes. A convincing existence proof will be there for everyone to see that colonization is feasible and profitable. A lunar colony is a politically feasible off-Earth gene bank increasing the chances that the species will be immortal. The act of leaving the cradle may be the other addition to our chances for immortality. It will be harder to monopolize communication between the Earth and Moon than Earth and Mars. This will create a free flow of ideas that will benefit both societies. There will be a greater spirit of freedom sooner with lunar colonization due to speedier development, and the faster mixing of ideas. Colonizing the Moon will also be a faster spur to legal development. The development of space law, especially property rights, mineral rights, and to a lesser extent labor law and human rights will create additional liquidity for other space colonization activities. The Moon may make a Mars colony feasible or desirable, thus enabling three branches of humanity. Having independent space nations will enrich the solar system polity and make the solar system and the species more secure from natural disaster. We can speed interstellar exploration and colonization. Ultimately we may create two new worlds that are every bit as rich, varied and interesting as our own.

I-Law Net Benefit (1/2)

Developments in space law spill over to larger international law development

Hurewitz 94

(Barry Hurewitz, Attorney, <http://www.law.berkeley.edu/journals/btlj/articles/vol9/Hurewitz.pdf>, 1994, accessed 6/21/11) CJQ

Finally, the free access principles articulated in the Outer Space Treaty constitute binding international law independent of the Outer Space Treaty. Commentators have noted that, based on the behavior of states in the international community, there is ground for the assumption that "all the members of the international community are bound by the fundamental principles and rules contained in [the Outer Space Treaty] because these principles and rules have acquired the status of general customary [international] law."48 Customary international law applies to all states, including those not parties to the Outer Space Treaty.49 For a principle or practice to become recognized as customary international law, three basic conditions must be met. First, the practice must be widespread.50 Second, it must arise from a sense of legal obligation.51 Finally, it must be long-standing in practice,52 as determined by an appropriate international authority.53 The first requirement-widespread adherence to an international norm-may be satisfied by states' explicit acceptance of the rule or by states' acquiescence to it.54 The right of free and equal access to space is widely recognized under this standard, since most of the world's nations explicitly accepted the norm by voting for Resolutions 1721 and 1962 and by signing the Outer Space Treaty.55 With regard to the second requirement, the free access principles set forth in the Outer Space Treaty were generally considered to be legally binding obligations even before the treaty was drafted. Subsequent statements by signatories indicate that the treaty is commonly viewed, in large part, as a codification of principles which had already evolved into binding customary international law.56 Some commentators have questioned the continued vitality of the third traditional requirement-that a rule be "long-standing" before rising to the level of customary international law.57 Given the rapid and open development of national activities in space, "the development of customary legal principles has become an accelerated process rather than a gradual evolution."58 Consequently, "[t]he passage of only a short period of time after the beginning of the exploration and use of outer space did not prevent the customary norms of the international law of outer space from coming into existence."59 Thus, the fundamental principles set forth in the Outer Space Treaty, including freedom of use and exploration, prohibition of national appropriation, and non-prohibition of military equipment, bind all nations as customary international law, notwithstanding any one state's interpretation of the terms of the treaty.60 These concepts had crystallized into customary international law even before the drafting of the 1967 treaty.61 To summarize, the 1967 Outer Space Treaty articulated pre-existing norms of customary international law, including the right of all states to enter space freely for exploration, use, and scientific investigation, without discrimination or national appropriation, and in accordance with general principles of international law. Moreover, the treaty established that states are free to employ any technology, civilian or military in origin, for peaceful activities in space or on celestial bodies. The United States fully supported all of these principles and is bound by them either as a treaty signatory or under customary international law.

I-Law Net Benefit (2/2)

International law solves every impact.

Demonchonok 9 (Prof. Edward Demenchonok, President, Department of English and Foreign Languages, Fort Valley State University, “From Power Politics to the Ethics of Nonviolence and Co-Responsibility”) CJQ

TODAY WE WITNESS a contrast between the two tendencies concerning international relations. One is a power politics and hegemonic unipolar model, pursuing an elusive goal: "to create a dominant American empire throughout the world." (38) An alternative to this is the philosophers' call for nonviolence, co-responsibility, and "the cosmopolitan model of democracy" to be implemented by strengthening the network of transnational grass-roots movements and international institutions, including the United Nations. The idea of a hegemonic-centered world order is a recent version of what Kant two centuries ago called a "world republic," warning that it would become an amalgamation of the nations under a hegemonic state like a despotic "universal monarchy." Kant noticed that, since this is not the will of the nations, this idea cannot be realized, and thus as an alternative he proposed a league of nations or a pacific federation of free states as a basis for peace in the world. (39) Although world hegemony is an unrealistic and failed project, attempts of its implementation are undermining the collective efforts in establishing a peaceful and just world order since World War II. The project of a hegemonic-centered world order means abandoning the international system based on the rule of law and collective actions (including collective security), and replacing it by unilateral actions of individual states (or coalitions of states). Removing the existing legal-procedural constraints on the use of force will result in the stronger states becoming unchecked, while the weaker ones remain unprotected. This would also mean falling back toward the violent, unlawful "state of nature." The prospects of a unipolar hegemonic world look grim: a world of "social Darwinism," where the divided nations would be dominated by a hegemonic power, bur each nation would be left on its own in striving for survival in a hostile environment. Facing the economic challenges and the negative consequences of climate change and other environmental problems, the poor nations would be the most vulnerable. The major powers would more aggressively compete for the dominant position and control over the economy and the limited natural resources of the planet. Since the decisive factor in this competition is military force, this would boost militarization and the arms race, thus increasing the possibility of wars and the escalation of global violence. A traditional reaction to social and global problems is governmental reliance on force and power politics, accompanied by "emergency" measures and a myth of protection. This simplistic approach obfuscates the root causes of the problems and thus is unable to solve them. Instead, the resulting arms race, the infringement of civil liberties, and the tendency toward neototalitarian control have become problems in themselves, keeping society hostage to a spiral of violence. (40) For those politicians who rely mainly on military "hard power" rather than on the "soft power" of diplomacy, the reasoning seems to be that the use of force is a quick and efficient means for the solution to the problems of security, stability, human rights, and so on. However, many human and social problems by their very nature can not be resolved by force, and an unrestricted use of force can make things even worse, creating new problems. Even well-intentioned leaders or "benevolent hegemons," being limited by their political cultures and interests, cannot know whether the consequences of their policies and actions are equally good for all. Therefore, policies and decisions that potentially could affect society and the international community must be based on collective wisdom in a broad context, through deliberative democracy, international multilateral will-formation, and inclusive legal procedures, thus equally considering the cognitive points of view and interests of all those potentially affected. The complex, diverse, and interdependent high-tech world of the twenty-first century requires genuinely robust democratic relations within society and among nations as equals, an adequate political culture, and an enlightened "reasoning public." Otherwise, a society that has powerful techno-economic means bur is ethically blind and short-sighted could ultimately suffer the same fate as the dinosaurs, with their huge bodies bur disproportionately small brains.

Moon First=More Money

The moon is just better than Mars- saves money.

Dinkin, columnist, 2004 (Scott, *The Space Review,* “Colonize the Moon before Mars”, 9/7/2004, http://www.thespacereview.com/article/221/1, accessed 6/21/11) KF

The Moon has many relative advantages. The first is capital utilization. A Lunar cycler can make hundreds of round trips in the time that a Mars cycler can make. Second, there is much less fuel required to get from the Earth to the Moon than to Mars. Existing technology can be used to get to the Moon (see “Soyuz to the Moon?”, The Space Review, August 2, 2004). A lunar landing mission might cost $120 million for an Ariane 5 booster. If each mission cost another $120 million for the Soyuz, service module and everything else, then that would be $240 million per flight instead of $5 billion per flight. That means that a $50-billion level of commitment from Earth can afford over 400 flights every two years. Of course, that level of commitment could be optimally spent in much better ways. By creating a lunar cycler, a station at L-1, an orbital fuel depot, in situ utilization of lunar oxygen and possibly lunar water, there could be a vibrant community on the Moon. While a single Ariane 5 could not heft as much as a Mars Direct flight, it may still transfer a comparable amount of resources and people as a Mars Direct flight would to Mars. Since life support and consumables are much less onerous for a short trip than a long trip, there is a lower mass requirement for crew transfer flights to the Moon and much less depreciation of capital in transit. Having new heavy lift that would enable Mars Direct would also enable more sensible lunar colonization missions

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The moon makes more money.

Dinkin, columnist, 2004 (Scott, The Space Review, “Colonize the Moon before Mars”, 9/7/2004, http://www.thespacereview.com/article/221/1, accessed 6/21/11) KF

The Moon offers a near-term self-sufficiency without any technological breakthroughs. The tourism industry can potentially provide a high-end alternative to orbital tourism (see “Space elevator dry run: next stop, the Moon”, The Space Review, this issue). Patrick Collins makes a good case that cheap orbital access can enable a vibrant lunar tourism industry. With a heavy subsidy, the Moon may become a cheaper destination for a long stay than even an orbital hotel. That is, lunar in situ resource utilization can potentially make oxygen, water, and structural materials less expensive on the Moon than in orbit. Since the Moon is a more exotic and varied destination than orbit, it will likely rate a higher level of demand than orbit. Thus a vibrant tourism industry could result in a strong lunar economy that does not need to be subsidized as early as 2030. There could be a faster development to Antarctic level of commerce (13,000 tourists a year) or Alaska level of commerce (population 600,000). There would still need to be imports from Earth, but every nation on Earth has imports, so becoming self-sufficient in all commodities is not a necessary condition for the success of a colony. In addition to tourism, the Moon could export video entertainment to the Earth. Lunar sports might make great television. Lunar trampoline, diving, and gymnastics should be very interesting to watch and would likely bring in ratings higher than similar events on Earth. Lunar dance rates to be extraordinary. A lunar movie studio may also make some great exports to the Earth. The Moon also offers a great spot for astronomical observation. This allows the reclaiming of terrestrial radio frequencies currently used for that purpose. There are also new Earth observation possibilities. Space skills will be valuable and firms and people with experience on the Moon will be well able to help develop cislunar and martian systems. Radiation management experience, artificial gravity creation technology, operation and maintenance, flywheel, maglev, and mass driver technologies are all likely to be developed on the Moon and useful in future efforts. There could be a huge wave of private investment that is coincident with government colonization efforts. Labor-saving technologies are likely to give a boost to the terrestrial economy. The fine details of how this will affect us is hard to predict, but if the cost of labor on the Moon is high because of the high cost of transportation, new and varied uses of teleoperation and robotics will become cost effective. Some of those technologies will have immediate application on Earth. The less scripted and higher intensity nature of lunar development will allow these to emerge more quickly from lunar than martian colonization. To sum up, the lunar economy can pay for all its imports through the tourism industry, intellectual property exports, science, entertainment, space skills, low-g skills and labor saving technology.

Moon is Easier to Resupply

Moon better- easier to resupply

Dinkin, columnist, 2004 (Scott, The Space Review, “Colonize the Moon before Mars”, 9/7/2004, http://www.thespacereview.com/article/221/1, accessed 6/21/11) KF

First, on a mission to the Moon, Earth rescue is a decent possibility for certain kinds of failures. On a trip to Mars, this would be out of the question. As NASA is finding out with its shuttle return to flight efforts, having a standby rescue ship and a space station to go to makes failure recovery for many failures feasible without too much increased capability from our existing hardware. Second, the proximity to Earth allows for just-in-time planning. With Earth only a few days away, a regular resupply mission can have last minute changes to its manifest. That means that fewer spares need to be kept on hand to assure the same level of safety as in a Mars mission. Third, the short distance between the Earth and the Moon allow Earth based teleoperation to be a viable alternative to robotics and local human operation. This vastly leverages the capability of capital equipment on the Moon.

Moon makes Mars planning easier

Moon first helps plan for Mars.

Dinkin, columnist, 2004 (Scott, The Space Review, “Colonize the Moon before Mars”, 9/7/2004, http://www.thespacereview.com/article/221/1, accessed 6/21/11) KF

If we are colonizing both Mars and the Moon, colonizing the Moon first would help inform the colonization plan of Mars. The reverse would not be as true because Mars colonization would take longer. Fourth, there is valuable information that can be learned in setting up a space colony that will raise the likelihood of success of all future colonization efforts. So if we are colonizing both Mars and the Moon, colonizing the Moon first would help inform the colonization plan of Mars. The reverse would not be as true because Mars colonization would take longer. Finally, resource and energy options are opened up to guard against our energy appetite increasing (as our nuclear appetite isn’t) or carbon appetite decreasing. In addition to lunar resource utilization, creating an option to colonize near Earth asteroids is very interesting and makes many resource extraction strategies feasible even if it would take technology breakthroughs or huge changes in the economy to make them financially viable.

Tests technologies – Overcomes Mars Failures (1/4)

Mars first good - Allows to find ways to overcome inevitable Mars failures

Dinkin, The Space Review, 4

(Sam, The Space Review, “Colonize the Moon before Mars.” 9-7-04, http://www.thespacereview.com/article/221/1, accessed 6-21-11, AH)

First, on a mission to the Moon, Earth rescue is a decent possibility for certain kinds of failures. On a trip to Mars, this would be out of the question. As NASA is finding out with its shuttle return to flight efforts, having a standby rescue ship and a space station to go to makes failure recovery for many failures feasible without too much increased capability from our existing hardware. Second, the proximity to Earth allows for just-in-time planning. With Earth only a few days away, a regular resupply mission can have last minute changes to its manifest. That means that fewer spares need to be kept on hand to assure the same level of safety as in a Mars mission. Third, the short distance between the Earth and the Moon allow Earth based teleoperation to be a viable alternative to robotics and local human operation. This vastly leverages the capability of capital equipment on the Moon. If we are colonizing both Mars and the Moon, colonizing the Moon first would help inform the colonization plan of Mars. The reverse would not be as true because Mars colonization would take longer. Fourth, there is valuable information that can be learned in setting up a space colony that will raise the likelihood of success of all future colonization efforts. So if we are colonizing both Mars and the Moon, colonizing the Moon first would help inform the colonization plan of Mars. The reverse would not be as true because Mars colonization would take longer. Finally, resource and energy options are opened up to guard against our energy appetite increasing (as our nuclear appetite isn’t) or carbon appetite decreasing. In addition to lunar resource utilization, creating an option to colonize near Earth asteroids is very interesting and makes many resource extraction strategies feasible even if it would take technology breakthroughs or huge changes in the economy to make them financially viable.

Tests technologies – Overcomes Mars Failures (2/4)

Going to the moon first is key to understand and test so we can avoid failures on Mars – we have to stop to preserve competition

Gugliotta, Washington Post, 6

(Guy, Washington Post Staff Writer, “U.S. Planning Base on Moon To Prepare for Trip to Mars”, March 26, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/03/25/AR2006032500999.html, accessed 6-21-11, AH)

HOUSTON -- For the first time since 1972, the United States is planning to fly to the moon, but instead of a quick, Apollo-like visit, astronauts intend to build a permanent base and live there while they prepare what may be the most ambitious undertaking in history -- putting human beings on Mars. President Bush in 2004 announced to great fanfare plans to build a new spaceship, get back to the moon by 2020 and travel on to Mars after that. But, with NASA focused on designing a new spaceship and spending about 40 percent of its budget on the troubled space shuttle and international space station programs, that timetable may suffer. Still, NASA's moon planners are closely following the spaceship initiative and, within six months, will outline what they need from the new vehicle to enable astronauts to explore the lunar surface. "It's deep in the future before we go there," said architect Larry Toups, head of habitation systems for NASA's Advanced Projects Office. "But it's like going on a camping trip and buying a new car. You want to make sure you have a trailer hitch if you need it." Scientists and engineers are hard at work studying technologies that don't yet exist and puzzling over questions such as how to handle the psychological stress of moon settlement, how to build lunar bulldozers and how to reacquire what planetary scientist Christopher P. McKay of NASA's Ames Research Center calls "our culture of exploration." The moon is not for the faint of heart. It is a lethal place, without atmosphere, pelted constantly by cosmic rays and micrometeorites, plagued by temperature swings of hundreds of degrees, and swathed in a blanket of dust that can ruin space suits, pollute the air supply and bring machinery to a screeching halt. And that says nothing about the imponderables. Will working in one-sixth of Earth's gravity for a year cause crippling health problems? What happens when someone suffers from a traumatic injury that can't be treated by fellow astronauts? How do people react to living in a tiny space under dangerous conditions for six months? "It's like Magellan. You send them off, and maybe they come back, maybe they don't," said planetary scientist Wendell W. Mendell, manager of NASA's Office for Human Exploration Science, during an interview at the recently concluded Lunar and Planetary Science Conference here. "There's a lot of pathologies that show up, and there's nobody in the Yellow Pages." In some ways, the moon will be harder than Mars. Moon dust is much more abrasive than Mars dust; Mars has atmosphere; Mars has more gravity (one-third of Earth's); Mars has plenty of ice for a potential water supply, while the moon may have some, but probably not very much. Still, the moon is ultimately much more forgiving because it is much closer -- 250,000 miles away, while Mars is 34 million miles from Earth at its closest point. If someone needs help on the moon, it takes three days to get there. By contrast, Mars will be several months away even with the help of advanced -- and as yet nonexistent -- propulsion systems. Not having to pay as dearly for mistakes is one key reason why the moon is an integral part of the Bush initiative. The other, as even scientists point out, is that if the United States does not return to the moon, others will. "The new thing is China, and they've announced they're going to the moon. The Europeans want to go; the Russians want to go; and if we don't go, maybe they'll go with the Chinese," Mars Institute Chairman Pascal Lee said in an interview. "Could we bypass the moon and go to Mars while India and China are going to the moon? I don't think so." Bush's 2004 "Vision for Space Exploration," by calling for a lunar return and a subsequent Mars mission, set goals, which, if achieved, would keep the United States in the forefront of space exploration for decades. Since then, mishaps and delays with the space shuttle and the space station programs have shrunk both the moon research budget and the rhetoric promoting the mission. Instead, NASA Administrator Michael D. Griffin has focused agency attention and resources on the design and construction of a new "crew exploration vehicle" and its attendant rocketry -- the spacecraft that will push U.S. astronauts once again beyond low Earth orbit. Despite the moon's current low profile, however, NASA continues to plan a lunar mission and to promote the technological advances needed to achieve it. Toups, one of the moon program's designers, said NASA envisions that a lunar presence, once achieved, will begin with two-to-four years of "sorties" to "targeted areas." These early forays will resemble the six Apollo lunar missions, which ended in 1972. "You have four crew for seven to 10 days," Toups said in a telephone interview. "Then, if you found a site of particular interest, you would want to set up a permanent outpost there." The south pole is currently the top target. It is a craggy and difficult area, but it is also the likeliest part of the lunar surface to have both permanent sunlight, for electric power, and ice, although many scientists have questions about how much ice there is. Without enough water, mission planners might pick a gentler landscape. Site selection will mark the end of what McKay calls Apollo-style "camping trips." "There's got to be a lot more autonomy, so we keep it simple," McKay said. "We're going to be on Mars for a long time, and we have to use the moon to think in those terms." The templates, cited frequently by moon mavens, are the U.S. bases in Antarctica, noteworthy for isolation, extreme environment, limited access, lack of indigenous population and no possibility of survival without extensive logistical support. "The lunar base is not a 'colony,' " Lee said. " 'Colonization' implies populating the place, and that's not on the plate. This is a research outpost." Once planners choose a base, the astronauts will immediately need to bring a host of technologies to bear, none of which currently exist. "Power is a big challenge," Toups said.

Solar arrays are an obvious answer, but away from the poles 14 days of lunar sunlight are followed by 14 days of darkness, so "how do you handle the dormancy periods?" Next is the spacesuit. Apollo suits weighed 270 pounds on Earth, a relatively comfortable "felt weight" of 40 to 50 pounds on the moon, but an unacceptable 102 pounds on Mars. "You can't haul that around, bend down or climb hills," Lee said. "Somehow we have to cut the mass of the current spacesuit in half." And the new suit, unlike the Apollo suits or the current 300-pound shuttle suit, is going to have to be relatively easy to put on and take off, and to be able withstand the dreaded moon dust. After three days, Apollo astronauts reported that the dust was causing the joints in their suits to jam, "and we're not talking about three outings," Lee said of the next moon missions. "We're talking about once a week for 500 days -- between 70 and 100 spacewalks." Dealing with dust is also a major concern in building shelters on the lunar surface. Toups said it might be possible to harden the ground by microwaving it, creating a crust "like a tarp when you're camping." Otherwise, the dust pervades everything, and prolonged exposure could even lead to silicosis. Dust also makes it virtually impossible to use any kind of machinery with ball bearings. Civil engineer Darryl J. Calkins, of the Army Corps of Engineers Cold Regions Research and Engineering Laboratory, warned that the combination of dust, low gravity, temperature swings and the high cost of flying things to the moon is going to define the lunar tool kit in unforeseen ways. "You can't put a diesel up there; you can't put a 20,000-pound bulldozer up there; and none of our oils or hydraulic fluids are going to survive," Calkins said in a telephone interview. "We may have to go back to the 19th century to find appropriate tools -- use cables, pulleys, levers." And even then, it will be difficult to level a base site and haul away the fill because there's not enough gravity to give a tractor adequate purchase. Instead, Calkins envisions a device that can "scrape and shave" small amounts of soil and take it away bit by bit. But in the end, "you have to learn how to do it, with real people," McKay said. "This is hard, but we can learn it. And if we do it right on the moon, we will be able to answer my ultimate question: Can Mars be habitable? I think the answer is 'yes.' "

Tests technologies – Overcomes Mars Failures (3/4)

Moon first is key – allows to test technologies and NASA’s committed to it

NASA, National Aeronautics and Space Administration, 5

(“En Route to Mars, The Moon”, 2005, http://science.nasa.gov/science-news/science-at-nasa/2005/18mar\_moonfirst/, accessed 6-21-11, AH)

Why the Moon before Mars? "The Moon is a natural first step," explains Philip Metzger, a physicist at NASA Kennedy Space Center. "It's nearby. We can practice living, working and doing science there before taking longer and riskier trips to Mars." The Moon and Mars have a lot in common. The Moon has only one-sixth Earth's gravity; Mars has one-third. The Moon has no atmosphere; the Martian atmosphere is highly rarefied. The Moon can get very cold, as low as -240o C in shadows; Mars varies between -20o and -100o C. Even more important, both planets are covered with silt-fine dust, called "regolith." The Moon's regolith was created by the ceaseless bombardment of micrometeorites, cosmic rays and particles of solar wind breaking down rocks for billions of years. Martian regolith resulted from the impacts of more massive meteorites and even asteroids, plus ages of daily erosion from water and wind. There are places on both worlds where the regolith is 10+ meters deep. Operating mechanical equipment in the presence of so much dust is a formidable challenge. Just last month, Metzger co-chaired a meeting on the topic: "Granular Materials in Lunar and Martian Exploration," held at the Kennedy Space Center. Participants grappled with issues ranging from basic transportation ("What kind of tires does a Mars buggy need?") to mining ("How deep can you dig before the hole collapses?") to dust storms--both natural and artificial ("How much dust will a landing rocket kick up?"). Lunar dust is different: "It's almost like fragments of glass or coral--odd shapes that are very sharp and interlocking," says Metzger. (View an image of lunar dust.) "Even after short moon walks, Apollo 17 astronauts found dust particles had jammed the shoulder joints of their spacesuits," says Masami Nakagawa, associate professor in the mining engineering department of the Colorado School of Mines. "Moondust penetrated into seals, causing the spacesuits to leak some air pressure." In sunlit areas, adds Nakagawa, fine dust levitated above the Apollo astronauts' knees and even above their heads, because individual particles were electrostatically charged by the Sun's ultraviolet light. Such dust particles, when tracked into the astronauts' habitat where they would become airborne, irritated their eyes and lungs. "It's a potentially serious problem." Dust is also ubiquitous on Mars, although Mars dust is probably not as sharp as moondust. Weathering smooths the edges. Nevertheless, Martian duststorms whip these particles 50 m/s (100+ mph), scouring and wearing every exposed surface. As the rovers Spirit and Opportunity have revealed, Mars dust (like moondust) is probably electrically charged. It clings to solar panels, blocks sunlight and reduces the amount of power that can be generated for a surface mission. For these reasons, NASA is funding Nakagawa's Project Dust, a four-year study dedicated to finding ways of mitigating the effects of dust on robotic and human exploration, ranging from designs of air filters to thin-film coatings that repel dust from spacesuits and machinery. The Moon is also a good testing ground for what mission planners call "in-situ resource utilization" (ISRU)--a.k.a. "living off the land." Astronauts on Mars are going to want to mine certain raw materials locally: oxygen for breathing, water for drinking and rocket fuel (essentially hydrogen and oxygen) for the journey home. "We can try this on the Moon first," says Metzger. Both the Moon and Mars are thought to harbor water frozen in the ground. The evidence for this is indirect. NASA and ESA spacecraft have detected hydrogen--presumably the H in H2O--in Martian soil. Putative icy deposits range from the Martian poles almost to the equator. Lunar ice, on the other hand, is localized near the Moon's north and south poles deep inside craters where the Sun never shines, according to similar data from Lunar Prospector and Clementine, two spacecraft that mapped the Moon in the mid-1990s. If this ice could be excavated, thawed out and broken apart into hydrogen and oxygen ... Voila! Instant supplies. NASA's Lunar Reconnaissance Orbiter, due to launch in 2008, will use modern sensors to search for deposits and pinpoint possible mining sites. "The lunar poles are a cold place, so we've been working with people who specialize in cold places to figure out how to land on the soils and dig into the permafrost to excavate water," Metzger says. Prime among NASA's partners are investigators from the Army Corps of Engineers' Cold Regions Research and Engineering Laboratory (CRREL). Key challenges include ways of landing rockets or building habitats on ice-rich soils without having their heat melt the ground so it collapses under their weight. Testing all this technology on the Moon, which is only 2 or 3 days away from Earth, is going to be much easier than testing it on Mars, six months away. So ... to Mars! But first, the Moon.

Tests technologies – Overcomes Mars Failures (4/4)

Need to understand tech first

O'Neill, The Institute of Electronics Communications and Information Technology (ECIT), PhD, 8

(Ian, Universe Today, “Building A Moon Base: Part 1 – Challenges And Hazards”, 2-7-08, http://www.universetoday.com/12726/building-a-base-on-the-moon-challenges-and-hazards/, accessed 6-21-11, AH)

So, we want to go to the Moon. Why? Because the Moon is an ideal “staging post” for us to accumulate materials and manpower outside of the Earth’s deep gravitational well. From the Moon we can send missions into deep space and ferry colonists to Mars. Tourists may also be interested in a short visit. Mining companies will no doubt want to set up camp there. The pursuit of science is also a major draw. For what ever reason, to maintain a presence on this small dusty satellite, we will need to build a Moon base. Be it for the short-term or long-term, man will need to colonize the Moon. But where would we live? How could we survive on this hostile landscape? This is where structural engineers will step in, to design, and build, the most extreme habitats ever conceived… Manned missions to Mars take up a lot of the limelight insofar as colonization efforts are concerned, so it’s about time some focus is aimed at the ongoing and established concepts for colonization of the Moon. We currently have a means of getting there (after all, it is nearly 40 years ago since Apollo 11) and our technology is sufficiently advanced to sustain life in space, the next step is to begin building… In this first installment of “Building a Moon Base”, we look at the immediate issues facing engineers when planning habitats on a lunar landscape. “Building a Moon Base” is based on research by Haym Benaroya and Leonhard Bernold (“Engineering of lunar bases“) The debate still rages as to whether man should settle on the Moon or Mars first. Mars is often considered to be the ultimate challenge for mankind: to live on a planet other than Earth. But looking down on us during cloudless nights is the bright and attainable Moon. From here we can see the details of the lunar landscape with the naked eye, it is so close astronomically when compared with the planets, that many believe that the Moon should be our first port of call before we begin the six month (at best) voyage to the Red Planet. It also helps as we’ve already been there… Opinion has shifted somewhat in recent years from the “Mars Direct” plan (in the mid-1990s) to the “Moon First” idea, and this shift has recently been highlighted by US President George W. Bush when in 2004 he set out plans for re-establishing a presence on the Moon before we can begin planning for Mars. It makes sense; many human physiological issues remain to be identified, plus the technology for colonization can only be tested to its full extent when… well… colonizing. Understanding how the human body will adapt to life in low-G and how new technologies will perform in a location close enough to home will be not only be assuring to lunar colonists and astronauts, it will also be sensible. Exploring space is dangerous enough, minimizing the risk of mission failure will be critical to the future of manned exploration of the Solar System.

Mars not that important anyway – no spillover like moon

Dinkin, The Space Review, 4

(Sam, The Space Review, “Colonize the Moon before Mars.” 9-7-04, http://www.thespacereview.com/article/221/1, accessed 6-21-11, AH)

Robert Zubrin constantly beats the drum for exploring Mars first. It is disingenuous to say that the goal of space exploration is the colonization of Mars. Even colonization advocates would be happy with colonization of the Moon, the asteroids, and many other destinations. The discovery of life on Mars would not matter much one way or the other. Suppose there is Earth-like life on Mars. That might point to a common origin or a similar bootstrap method. What is that worth commercially? If you knew the answer, how much could you sell it for? Ten billion? What follow on activities would that news generate? None. Life may be an exciting discovery perhaps the most exciting in all history, but it does not amount to a large inducement to go to Mars.

Moon first boosts economy

Moon key first –increases the economy

Dinkin, The Space Review, 4

(Sam, The Space Review, “Colonize the Moon before Mars.” 9-7-04, http://www.thespacereview.com/article/221/1, accessed 6-21-11, AH)

The Moon offers a near-term self-sufficiency without any technological breakthroughs. The tourism industry can potentially provide a high-end alternative to orbital tourism (see “Space elevator dry run: next stop, the Moon”, The Space Review, this issue). Patrick Collins makes a good case that cheap orbital access can enable a vibrant lunar tourism industry. With a heavy subsidy, the Moon may become a cheaper destination for a long stay than even an orbital hotel. That is, lunar in situ resource utilization can potentially make oxygen, water, and structural materials less expensive on the Moon than in orbit. Since the Moon is a more exotic and varied destination than orbit, it will likely rate a higher level of demand than orbit. Thus a vibrant tourism industry could result in a strong lunar economy that does not need to be subsidized as early as 2030. There could be a faster development to Antarctic level of commerce (13,000 tourists a year) or Alaska level of commerce (population 600,000). There would still need to be imports from Earth, but every nation on Earth has imports, so becoming self-sufficient in all commodities is not a necessary condition for the success of a colony. In addition to tourism, the Moon could export video entertainment to the Earth. Lunar sports might make great television. Lunar trampoline, diving, and gymnastics should be very interesting to watch and would likely bring in ratings higher than similar events on Earth. Lunar dance rates to be extraordinary. A lunar movie studio may also make some great exports to the Earth. The Moon also offers a great spot for astronomical observation. This allows the reclaiming of terrestrial radio frequencies currently used for that purpose. There are also new Earth observation possibilities. Space skills will be valuable and firms and people with experience on the Moon will be well able to help develop cislunar and martian systems. Radiation management experience, artificial gravity creation technology, operation and maintenance, flywheel, maglev, and mass driver technologies are all likely to be developed on the Moon and useful in future efforts. There could be a huge wave of private investment that is coincident with government colonization efforts. Labor-saving technologies are likely to give a boost to the terrestrial economy. The fine details of how this will affect us is hard to predict, but if the cost of labor on the Moon is high because of the high cost of transportation, new and varied uses of teleoperation and robotics will become cost effective. Some of those technologies will have immediate application on Earth. The less scripted and higher intensity nature of lunar development will allow these to emerge more quickly from lunar than martian colonization. To sum up, the lunar economy can pay for all its imports through the tourism industry, intellectual property exports, science, entertainment, space skills, low-g skills and labor saving technology. There could be a huge wave of private investment that is coincident with government colonization efforts. That could result in a co-development of many industries such as terrestrial point-to-point rocket service, orbital tourism, teleoperation, and robotics. Economic opportunities of a more long shot nature are also worth adding to the calculus. Turning the Moon into a TV (see “Buy the light of the Moon”, The Space Review, August 30, 2004) is exciting. A testbed for space elevator deployment would be nice, too. Politics The Moon may become a very exciting destination with a substantial GDP. Being there first means that the high ground is already occupied for any future militarization of the Moon.

Moon first avoids Politics DA’s

Stopping at moon first musters political will to colonize Mars

Dinkin, The Space Review, 4 (Sam, The Space Review, “Colonize the Moon before Mars.” 9-7-04, http://www.thespacereview.com/article/221/1, accessed 6-21-11, AH)

It’s possible that colonizing the Moon will help muster the political will to colonize Mars. Earthers will be able to see the colony directly with their own eyes. A convincing existence proof will be there for everyone to see that colonization is feasible and profitable.

A2: Moon expensive too

Moon stop incredibly cheap – 5 billion over 20 years compared to 1 trillion

Dinkin, The Space Review, 4 (Sam, The Space Review, “Colonize the Moon before Mars.” 9-7-04, http://www.thespacereview.com/article/221/1, accessed 6-21-11, AH)

The Moon has many relative advantages. The first is capital utilization. A Lunar cycler can make hundreds of round trips in the time that a Mars cycler can make. Second, there is much less fuel required to get from the Earth to the Moon than to Mars. Existing technology can be used to get to the Moon (see “Soyuz to the Moon?”, The Space Review, August 2, 2004). A lunar landing mission might cost $120 million for an Ariane 5 booster. If each mission cost another $120 million for the Soyuz, service module and everything else, then that would be $240 million per flight instead of $5 billion per flight. That means that a $50-billion level of commitment from Earth can afford over 400 flights every two years. Of course, that level of commitment could be optimally spent in much better ways. By creating a lunar cycler, a station at L-1, an orbital fuel depot, in situ utilization of lunar oxygen and possibly lunar water, there could be a vibrant community on the Moon. While a single Ariane 5 could not heft as much as a Mars Direct flight, it may still transfer a comparable amount of resources and people as a Mars Direct flight would to Mars. Since life support and consumables are much less onerous for a short trip than a long trip, there is a lower mass requirement for crew transfer flights to the Moon and much less depreciation of capital in transit. Having new heavy lift that would enable Mars Direct would also enable more sensible lunar colonization missions.

Moon first causes Legal spillover

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Causes legal spillover – key to make mars possible

Dinkin, The Space Review, 4 (Sam, The Space Review, “Colonize the Moon before Mars.” 9-7-04, http://www.thespacereview.com/article/221/1, accessed 6-21-11, AH)

Colonizing the Moon will also be a faster spur to legal development. The development of space law, especially property rights, mineral rights, and to a lesser extent labor law and human rights will create additional liquidity for other space colonization activities. The Moon may make a Mars colony feasible or desirable, thus enabling three branches of humanity. Having independent space nations will enrich the solar system polity and make the solar system and the species more secure from natural disaster. We can speed interstellar exploration and colonization. Ultimately we may create two new worlds that are every bit as rich, varied and interesting as our own.

Mars first Kills Heg

Mars over Moon first kills heg - only Moon first gets political support

David, Space.com, 8

(Leonard, “Moonwalker Stomps on New Space Plan”, 14 November 2008, http://www.space.com/6115-moonwalker-stomps-space-plan.html, accessed 6-21-11, AH)

A master plan for space just issued by the Planetary Society is in the cross-hairs of former Apollo 17 moonwalker and U.S. Senator Jack Schmitt. Schmitt said the new plan, which favors Mars over the moon as a destination for a globally inclusive manned mission, would initiate the decline of American global influence and open the door for other countries to conquer space. The Planetary Society's Beyond the Moon: A New Roadmap for Human Space Exploration in the 21st Century report was briefed to the media in Washington, D.C. on Nov. 13. That roadmap, in part, calls for the United States to focus on Mars as the driving goal of human spaceflight and defer humans landing on the moon until the costs of the interplanetary transportation system and shuttle replacement are largely paid. Those goals "seem to have gone back to being more political than rational," Schmitt responded in a letter to Louis Friedman, Executive Director of the Planetary Society; Cornell University Professor and planetary scientist Jim Bell, the Society's President; and Stanford University Professor and Society Board member Scott Hubbard. Last month, Schmitt stepped down from his chairmanship of the NASA Advisory Council -- a high-powered group that provides advice to the NASA administrator on important program and policy matters related to the U.S. space program. "Having been deeply involved in this issue for many years, and having led several objective studies related to it, it is clear to me, and many other knowledgeable people, that returning to the moon is the fastest and most cost effective path to Mars," Schmitt advised in the letter also sent to this reporter. "Not going by way of the moon will make the Mars objective far more difficult and more costly to achieve," Schmitt explained. Sustaining political support Schmitt spotlights a host of moon-first reasons, and adds: "Returning to the moon has a far better chance of sustained political support than does a far, far more costly, start from scratch Mars program. Absent sustained and increased budgetary support for the Vision for Space Exploration by the incoming Administration and Congress, any deep space initiative will be in doubt." As for deferring humans landing on the moon until the costs of the interplanetary transportation system and shuttle replacement are largely paid, Schmitt also finds fault with the Planetary Society roadmap. "This strategy would leave deep-space activities, exploration and resources to others, i.e., China, India, maybe Russia, for the indefinite future," Schmitt complained. "I believe that would be major step in initiating the decline of America's global influence for freedom and the improvement the human condition."

Moon first gets Helium-3

Conquering the moon is key to get helium-3 which solves energy crisis

Straits Times, editorial, 7

(“US, Russia tangle over precious moon isotope;

Isotope Helium-3 may replace fossil fuels and end threat of global warming.” May 2, 2007, lexis, accessed 6-21-11, AH)

While the Americans have either been coy or dismissive on the subject, Russia openly says the main purpose of its lunar programme is the industrial extraction of helium-3, according to the Telegraph. Dismissed by critics as a 21st century equivalent of the medieval alchemist's fruitless quest to turn lead into gold, some scientists say helium-3 could be the answer to the world's energy woes. A non-radioactive isotope of helium, helium-3 is a proven and potent fuel for nuclear fusion - so potent that just six metric tonnes would supply Britain with enough energy for a year. As helium-3 is non-polluting and is so effective in such tiny quantities, many countries are taking it very seriously. Germany, India and China, which will launch a lunar probe to research extraction techniques in September, are all studying ways to mine the isotope. 'Whoever conquers the moon first will be the first to benefit,' said Mr Ouyang ZiYuan, the chief scientist of China's lunar programme. Energia says it will start 'industrial scale delivery' of helium-3, transported by cargo space ships via the International Space Station, no later than 2020. Gazprom, the stateowned energy giant directly controlled by the Kremlin, is said to be strongly supportive of the project. The US has appeared much more cautious, not least because scientists have yet to discover the secrets of large scale nuclear fusion. Commercial fusion reactors look unlikely to come on line before the second half of this century.

Helium-3 Good – Solves energy Crisis

Helium 3 solves energy crisis - getting it from the moon is key

Whittington, Staff writer at the Wallstreet Journal, LA Times and USAToday, 11

(Mark, *Yahoo*! “Harrison Schmitt's Plan to Solve the Energy Problem by Mining the Moon” May 4, http://news.yahoo.com/s/ac/20110504/us\_ac/8419965\_harrison\_schmitts\_plan\_to\_solve\_the\_energy\_problem\_by\_mining\_the\_moon, assessed 6-21-11, AH)

Harrison Schmitt, Apollo moonwalker, geologist, and former U.S. Senator, spoke at the Williston Basin Petroleum Conference recently and presented his plan to solve the long-term energy needs of the world by mining the moon. The idea is to mine a substance that is almost nonexistent on the Earth, but extant on the moon called helium 3 (3HE), an isotope of the well known substance usually put in party balloons. Helium 3 has been deposited in lunar soil over billions of years by solar wind and exists in trace amounts waiting to be extracted. 100 kilograms of helium 3 could be obtained from processing a 2 kilometer square area of lunar soil down to the depth of three meters. That amount would run a 1,000 megawatt fusion reactor for a year. Schmitt says helium 3 is an ideal fuel for future fusion reactors because it leaves little or no radioactive residue, which obviates the need to decontaminate the reactor periodically. The downside is that a helium 3 fusion reaction has to take place at hotter temperatures than other fusion reactions using, for example, deuterium. Schmitt proposes that $5 billion be spent to build a test reactor that would burn helium 3 to create power. In the meantime a return to the moon would have as its main focus the extraction and shipping back to Earth helium 3 to fuel the reactor. A return to the moon was ruled out over a year ago by President Barack Obama when he canceled the Constellation space exploration program. However, there has recently been a resurgence in interest in sending astronauts back to the moon, especially in the Congress. Schmitt's scheme has the virtue of connecting the desire to go back to the Moon with solving the long term energy needs of planet Earth. While there are abundant fossil fuels, the supply is finite and in any case using oil and coal causes various forms of pollution. Solar and wind have thus far proven inadequate as a means of replacing fossil fuels. Helium 3 fueled hydrogen provides a potential of providing clean, virtually limitless energy for the foreseeable future.

Helium-3 key to Mars Exploration

Moon first key – it develops Helium-3 tech which creates fusion technology and also helps to develop technology to go to mars

 Johnstone, Leader-Post, 11

(Bruce, Leader Post “Astronaut has $15 billion plan to mine the moon” “May 3, 2011, http://www.leaderpost.com/technology/Astronaut+billion+plan+mine+moon/4718531/story.html, accessed 6-21-11, AH)

Harrison Schmitt, the keynote speaker at the Williston Basin Petroleum Conference in Regina on Monday, has a plan to mine helium-3 on the moon. Harrison Schmitt, the keynote speaker at the Williston Basin Petroleum Conference in Regina on Monday, has a plan to mine helium-3 on the moon. The last man to set foot on the moon wants to go back, only this time to mine a rare element used in the production of fusion energy -a waste-free form of nuclear energy that could help power the planet in the 21st century. Harrison Schmitt, the first geologist and the last of 12 men who left their footprints on the moon, is promoting an ambitious $15-billion US project to obtain helium-3 (He-3) -an isotope of the inert element -that is rare on earth, but relatively abundant on the moon. Schmitt, who spoke to the Williston Basin Petroleum Conference here Monday, helped discover the substance when exploring the moon's surface on Dec. 11, 1972, as a member of Apollo 17, the last of NASA's missions to the moon. "Those footprints . will stay in recognizable form for about a million years -maybe a couple of million years,'' Schmitt told the annual petroleum conference. "So if you want to leave your footprints in the sands of time, that's not a bad place to do it,'' said Schmitt, who trained as a geologist, jet and helicopter pilot and astronaut, before becoming NASA's head of lunar science training for the Apollo astronauts in 1965. What Schmitt helped discover during his 75-hour sojourn on Taurus-Littrow, a lunar valley deeper than the Grand Canyon bordered by mountains up to 7,000-feet (2,133metres) high, was the mixed layer of material called regolith contained small amounts of helium-3. **"Helium-3 is a nearly ideal fuel for fusion nuclear power . It's ideal because it produces little or no radioactive waste, unlike almost all other nuclear systems.''**  Containing 20 parts per billion of helium-3, about 100 kg of He-3 could provide sufficient fuel to allow a fusion reactor to generate 1,000 megawatts (MW) of power for a year, Schmitt said. "That 100 kg could be produced by mining the lunar regolith to a depth of three metres and an area of about two square kilometres,'' Schmitt said. The value of that energy is about $140 million (based the energy equivalent in coal at today's prices). Schmitt believes the commercial feasibility of He-3 as a fuel source for nuclear fusion could be proven with a $5-billion US demonstration plant. Another $5 billion US could "re-create" the Saturn V-class launch vehicle or rockets used to propel the Apollo astronauts into space. The lunar settlement required to mine the He-3 -"basically a company town on the moon" -would cost another $2.5 billion US. As an added bonus, the helium-3 initiative would also help the U.S. send human beings to Mars. "I believe the first human mission to Mars could be launched in 2025 because the development of the helium-3 initiative would also develop just about everything we would need to do in order to start that process of going to Mars -large rockets, the ability to work and live on another space body and the like.'' Following his speech, Schmitt said his $15-billion project, which he outlined in his 2006 book, Return to the Moon, could be implemented over 15 or 20 years. Far from being "out of this world,'' Schmitt believes this lunar mining venture could be financed primarily by the private sector. "If NASA or some other government space agency decides they're going to support technology development, then that will improve the financial position (of the helium-3 project). Unfortunately, when you start getting governments involved, it also prolongs the time and also raises the cost. So I'd rather see it entirely done by the private sector." Schmitt, who also served a sixyear stint as U.S. senator starting in 1977, said the He-3 project could also jump-start the U.S.-planned mission to Mars for 2030. "Having an upgraded heavy-lift launch vehicle, like the Saturn V, would be a major part of what you'd require for a Mars expedition. In addition, becoming really familiar with living and working in space on the moon . would certainly give you the experience base you need to do that on Mars." Not only that, but the helium-3 project could provide the fuel to get a manned mission to Mars. "(Helium-3) also is an ideal rocket fuel. Fusion rockets to allow you to accelerate and decelerate on the way to Mars would shorten the timeframe that human beings are exposed to radiation in space." In fact, if the He-3 project goes ahead, it would almost certainly expedite the manned mission to Mars. "If you got going aggressively and successively on a helium-3 initiative . then you would be putting yourself in a position that by 2025 you could have the first Mars mission going as well.''

\*\*\*UN CP

UN CP Shell

Text: The United Nations General Assembly should, on behalf of the world community, establish a permanent international colony on the planet Mars.

The UN has lawful authority to appropriate celestial bodies—solves colonization and compliance with OST.

Gorove 69 (Stephen, Chairman of the Graduate Program of the School of Law at the University of Miss. School of Law, “Interpreting Article II of the Outerspace treaty”, *The Fordham Law School Institutional Repository*, Vol.37 issue 3/2, 1-1 69,http://ir.lawnet.fordham.edu/cgi/viewcontent.cgi? article=1966&context=flr, accessed 6-21-11, AH)

Turning to the second question which involves the meaning of "national" appropriation, it has been suggested that only the United Nations acting on behalf of the world community as a whole, should be entitled to appropriate.3 While further developments in space law, by international custom or treaty, may eventually prohibit spatial appropriations by an individual or a chartered company or the European communities, the Treaty in its present form appears to contain no prohibition regarding individual appropriation or acquisition by a private association or an international organization, even if other than the United Nations. Thus, at present, an individual acting on his own behalf or on behalf of another individual or a private association or an international organization could lawfully appropriate any part of outer space, including the moon and other celestial bodies. Whether or not an ad hoc international organization could be created for the exclusive purpose of enabling it to appropriate outer space is a delicate question. The answer may have to depend on the good faith of the parties.

The UN lacks credibility now—it talks a good talk but fails to do anything. Counterplan results in the UN kicking ass.

Weinberger 5 (Seth Weinberger, Assistant Professor of Politics and Government at Puget Sound, <http://lawofnations.blogspot.com/2005/12/un-international-law-and-hegemony-part.html>, Dec 7, 2005, accessed 6/21/11) CJQ

For a scholar of IR, this demonstrates the fundamental problem with international law: the bodies charged with interpreting and enforcing the law have little to no ability to enforce it. While the UN is most capable of passing symbolic, non-binding statements and resolutions, when it comes to actually enforcing the dictates of international law, it has few teeth. Rwanda is left to slide into genocide, Sudan continues to allow the janjaweed to rape and pillage while sitting on the UN Human Rights Commission, UN peacekeepers stand by and allow the Serb army to massacre the inhabitants of Srebrenica, and Kosovo is only defended thanks to the good graces of NATO. However, that is not to say that international law has no purposes or power. It does. But not in the sense that domestic law does. International law much resembles a domestic society with a judiciary and legislature, but no police force. There are bodies that can create law and interpret it, but not to arrest law-breakers and punish them. The power of international law rests mostly in the phenomenon of legitimacy. States that conform to international law develop a characteristic of legitimacy that makes it more likely that other states will cooperate on other issues in the future, which can contribute to the creation of a legalistic international community. Such a community still needs a police force. Lately, the US has filled this role (although leaving enforcement up to a posse means that the law will be enforced capriciously), but there is a growing movement towards internationalizing the enforcement mechanism, such as in the ICC. But, so long as the international community lacks a communal understanding of justice, fairness, equity, interest, security, and all the other concepts that go into a common identity and legal understanding, it is impossible to imagine states ceding their sovereignty to an international body with enforcement powers. Even the enlightened, post-modern institution that is the EU is running into problems with efforts to enforce its deficit rules on France and Germany, or attempts to cut farm subsidies (which contributed to the rejection of the EU constitution by France).

**OST Turn**

Plan violates the OST—it’s an appropriation of territory.

FAS 10 (Federation of American Scientists “TREATY ON PRINCIPLES GOVERNING THE ACTIVITIES OF STATES IN THE EXPLORATION AND USE OF OUTER SPACE, INCLUDING THE MOON AND OTHER CELESTIAL BODIES”, 10-22-10, http://www.fas.org/nuke/control/ost/text/space1.htm, accessed 6-21-11, AH)

Article II Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

Plan is a unique violation of the treaty—no permutation can overcome.

Gorove 69 (Stephen, Chairman of the Graduate Program of the School of Law at the University of Miss. School of Law, “Interpreting Article II of the Outerspace treaty”, *The Fordham Law School Institutional Repository*, Vol.37 issue 3/2, 1-1 69,http://ir.lawnet.fordham.edu/cgi/viewcontent.cgi? article=1966&context=flr, accessed 6-21-11, AH)

With respect to the concept of appropriation the basic question is what constitutes "appropriation," as used in the Treaty, especially in contradistinction to casual or temporary use. The term "appropriation" is used most frequently to denote the taking of property for one's own or exclusive use with a sense of permanence. Under such interpretation the establishment of a permanent settlement or the carrying out of commercial activities by nationals of a country on a celestial body may constitute national appropriation if the activities take place under the supreme authority (sovereignty) of the state. Short of this, if the state wields no exclusive authority or jurisdiction in relation to the area in question, the answer would seem to be in the negative, unless, the nationals also use their individual appropriations as cover-ups for their state's activities.5 In this connection, it should be emphasized that the word "appropriation" indicates a taking which involves something more than just a casual use. Thus a temporary occupation of a landing site or other area, just like the temporary or nonexclusive use of property, would not constitute appropriation. By the same token, any use involving consumption or taking with intention of keeping for one's own exclusive use would amount to appropriation.

OST—Brink

Any breach of the OST collapse its foundations and causes actors to vie for its own rules and refuse settling conflicts

Quinn 8 (Adam G. University of Minnesota Law School and Carlson School of Management “The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space.” Minnesota Journal of International Law, 17 Minn. J. Int'l L. 475, Summer 2008, lexis, AH)

Any interpretation of the Outer Space Treaty that attempts to bind the hands of the United States to keep weapons out of space will be rejected as harshly as the Moon Treaty. n177 Coupling this weakness with the absence of an international court to adjudicate conflicts means that the first time the Outer Space Treaty is tested, it will become apparent that it has no teeth. n178 Although this is problematic because countries could simply refuse to cooperate in settling conflicts, the absence of procedure is even more worrisome. n179 With no agreed upon procedure, discovery alone could grind proceedings to a halt as [\*496] each nation attempts to use its own rules of dispositions, service, production of documents, etc. n180 The Outer Space Treaty is propped up on so little that it should be examined before further action destroys its already eroding foundation

**OST Turn—CIL**

And, the OST constitutes customary international law. Success key to new I-law standards.

Hurewitz 94

(Barry Hurewitz, Attorney, <http://www.law.berkeley.edu/journals/btlj/articles/vol9/Hurewitz.pdf>, 1994, accessed 6/21/11) CJQ

Finally, the free access principles articulated in the Outer Space Treaty constitute binding international law independent of the Outer Space Treaty. Commentators have noted that, based on the behavior of states in the international community, there is ground for the assumption that "all the members of the international community are bound by the fundamental principles and rules contained in [the Outer Space Treaty] because these principles and rules have acquired the status of general customary [international] law."48 Customary international law applies to all states, including those not parties to the Outer Space Treaty.49 For a principle or practice to become recognized as customary international law, three basic conditions must be met. First, the practice must be widespread.50 Second, it must arise from a sense of legal obligation.51 Finally, it must be long-standing in practice,52 as determined by an appropriate international authority.53 The first requirement-widespread adherence to an international norm-may be satisfied by states' explicit acceptance of the rule or by states' acquiescence to it.54 The right of free and equal access to space is widely recognized under this standard, since most of the world's nations explicitly accepted the norm by voting for Resolutions 1721 and 1962 and by signing the Outer Space Treaty.55 With regard to the second requirement, the free access principles set forth in the Outer Space Treaty were generally considered to be legally binding obligations even before the treaty was drafted. Subsequent statements by signatories indicate that the treaty is commonly viewed, in large part, as a codification of principles which had already evolved into binding customary international law.56 Some commentators have questioned the continued vitality of the third traditional requirement-that a rule be "long-standing" before rising to the level of customary international law.57 Given the rapid and open development of national activities in space, "the development of customary legal principles has become an accelerated process rather than a gradual evolution."58 Consequently, "[t]he passage of only a short period of time after the beginning of the exploration and use of outer space did not prevent the customary norms of the international law of outer space from coming into existence."59 Thus, the fundamental principles set forth in the Outer Space Treaty, including freedom of use and exploration, prohibition of national appropriation, and non-prohibition of military equipment, bind all nations as customary international law, notwithstanding any one state's interpretation of the terms of the treaty.60 These concepts had crystallized into customary international law even before the drafting of the 1967 treaty.61 To summarize, the 1967 Outer Space Treaty articulated pre-existing norms of customary international law, including the right of all states to enter space freely for exploration, use, and scientific investigation, without discrimination or national appropriation, and in accordance with general principles of international law. Moreover, the treaty established that states are free to employ any technology, civilian or military in origin, for peaceful activities in space or on celestial bodies. The United States fully supported all of these principles and is bound by them either as a treaty signatory or under customary international law.

**OST Turn—CIL S War**

Two impacts to customary international law:
First is it checks all conflict escalation;

Second, only after violations of CIL are countries attacked—key internal link to war.

Ratney 91 (Michael Ratney, Director of the Center for Constitutional Rights, May 11, 1991, accessed 6/21/11, <http://deoxy.org/wc/wc-ilaw.htm>) CJQ

In the work of this Commission, we are undertaking an historic task. We are here to inquire into and ultimately judge whether the United States has violated laws that are fundamental to a civilized world; laws that are designed to protect people, human beings, from the barbarity of war. These laws prohibit war except in the narrowest of circumstances; they severely restrict who can be killed, the types of weapons that can be used and the appropriate targets. An indicia of a civilized country is adherence to these laws, not only by pious words but through actions. To act outside these laws, to disobey these laws, to flaunt these laws is to become "hostis hurnani generis," an enemy of all mankind. In days past "enemies of all mankind" were slave traders and pirates. They could be brought to justice wherever found. Today such enemies include those countries and individuals who violate the fundamental laws that protect the peace and limit war. The testimony presented at the various Commissions of Inquiry here in New York and in other hearings throughout the world will determine whether the United States and its leaders are enemies of all mankind.

**OST—Every impact**

International law solves every impact.

Demonchonok 9 (Prof. Edward Demenchonok, President, Department of English and Foreign Languages, Fort Valley State University, “From Power Politics to the Ethics of Nonviolence and Co-Responsibility”) CJQ

TODAY WE WITNESS a contrast between the two tendencies concerning international relations. One is a power politics and hegemonic unipolar model, pursuing an elusive goal: "to create a dominant American empire throughout the world." (38) An alternative to this is the philosophers' call for nonviolence, co-responsibility, and "the cosmopolitan model of democracy" to be implemented by strengthening the network of transnational grass-roots movements and international institutions, including the United Nations. The idea of a hegemonic-centered world order is a recent version of what Kant two centuries ago called a "world republic," warning that it would become an amalgamation of the nations under a hegemonic state like a despotic "universal monarchy." Kant noticed that, since this is not the will of the nations, this idea cannot be realized, and thus as an alternative he proposed a league of nations or a pacific federation of free states as a basis for peace in the world. (39) Although world hegemony is an unrealistic and failed project, attempts of its implementation are undermining the collective efforts in establishing a peaceful and just world order since World War II. The project of a hegemonic-centered world order means abandoning the international system based on the rule of law and collective actions (including collective security), and replacing it by unilateral actions of individual states (or coalitions of states). Removing the existing legal-procedural constraints on the use of force will result in the stronger states becoming unchecked, while the weaker ones remain unprotected. This would also mean falling back toward the violent, unlawful "state of nature." The prospects of a unipolar hegemonic world look grim: a world of "social Darwinism," where the divided nations would be dominated by a hegemonic power, bur each nation would be left on its own in striving for survival in a hostile environment. Facing the economic challenges and the negative consequences of climate change and other environmental problems, the poor nations would be the most vulnerable. The major powers would more aggressively compete for the dominant position and control over the economy and the limited natural resources of the planet. Since the decisive factor in this competition is military force, this would boost militarization and the arms race, thus increasing the possibility of wars and the escalation of global violence. A traditional reaction to social and global problems is governmental reliance on force and power politics, accompanied by "emergency" measures and a myth of protection. This simplistic approach obfuscates the root causes of the problems and thus is unable to solve them. Instead, the resulting arms race, the infringement of civil liberties, and the tendency toward neototalitarian control have become problems in themselves, keeping society hostage to a spiral of violence. (40) For those politicians who rely mainly on military "hard power" rather than on the "soft power" of diplomacy, the reasoning seems to be that the use of force is a quick and efficient means for the solution to the problems of security, stability, human rights, and so on. However, many human and social problems by their very nature can not be resolved by force, and an unrestricted use of force can make things even worse, creating new problems. Even well-intentioned leaders or "benevolent hegemons," being limited by their political cultures and interests, cannot know whether the consequences of their policies and actions are equally good for all. Therefore, policies and decisions that potentially could affect society and the international community must be based on collective wisdom in a broad context, through deliberative democracy, international multilateral will-formation, and inclusive legal procedures, thus equally considering the cognitive points of view and interests of all those potentially affected. The complex, diverse, and interdependent high-tech world of the twenty-first century requires genuinely robust democratic relations within society and among nations as equals, an adequate political culture, and an enlightened "reasoning public." Otherwise, a society that has powerful techno-economic means bur is ethically blind and short-sighted could ultimately suffer the same fate as the dinosaurs, with their huge bodies bur disproportionately small brains.

**OST—Weaponization**

Now is the key time – weaponization on the brink

Quinn, University of Minnesota Law School and Carlson School of Management, 8

(Adam G. “The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space.” Minnesota Journal of International Law, 17 Minn. J. Int'l L. 475, Summer 2008, lexis, AH)

The twenty-first century has brought a new set of fears to the ongoing space race. Fears of national security and economic turmoil have brought the world's eyes back to outer space as the hope for the future. The current body of space law still looks to old fears, and so inadequately addresses the needs of the international community. As nations continue to test the boundaries of the Outer Space Treaty, it is becoming ever more clear that it has little strength to guide or control space actors. Space is becoming dangerously close to outright weaponization, and when it does there will be no guides to navigate through the uncharted dangers. A new body of space law is required; one that can recognize changes as rapidly as they arise. Fortunately, the international community can draw upon their successes in the past to create a dynamic and powerful body of space law that can react to the needs of the twenty-first century and beyond.

I-Law K2 Collaboration

Governing body key to framework that ensures collaboration

Quinn, University of Minnesota Law School and Carlson School of Management, 8

(Adam G. “The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space.” Minnesota Journal of International Law, 17 Minn. J. Int'l L. 475, Summer 2008, lexis, AH)

Space exploration has existed for less than fifty years and so it is presumptuous to assume that the laws created today will remain useful in the next decade, much less the next century. n218 Space law ought to create a framework in which to operate rather than a stable set of laws. Central to a strong framework will be a strong governing body to resolve disputes. n219 A governing body can also distribute and review permits on an equal footing, ensuring that the benefits of space are equitably distributed to those parties best suited. n220 More importantly, by only issuing permits the regulatory body can shift resources toward their best and highest use as technology develops and other actors or uses become more efficient for a segment of space.

\*\*\*Privates CP

Private Sector CP

Private sector funding of the plan would solve NASA hesitance, and it’s already happening.

Geranios ’10 (Nicholas, MSNBC, 11/15/2010, “Scientists propose one-way trips to Mars”) SW

"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 wrote, while acknowledging the proposal is a tough sell for NASA, with its intense focus on safety. They think the private sector might be a better place to try their plan. "What we would need is an eccentric billionaire," Schulze-Makuch said. "There are people who have the money to put this into reality." Indeed, British tycoon Richard Branson, PayPal founder Elon Musk and Amazon.com Inc. CEO Jeff Bezos are among the rich who are involved in private space ventures.

Commercial funding is a possibility for Mars exploration

Astrobiology Magazine 11 (February 15, “Mars, Brought to You by Corporate Sponsers” Nexis) NS 5/26/11

NASA scientists and their colleagues are now proposing corporate financing for a human mission to Mars. This raises the prospect that a spaceship named the Microsoft Explorer or the Google Search Engine could one day go down in history as the first spaceship to bring humans to the red planet. The proposal suggests that companies could drum up $160 billion for a human mission to Mars and a colony there, rather than having governments fund such a mission with tax dollars. The plan covers "every aspect of a journey to the red planet - the design of the spacecrafts, medical health and psychological issues, the establishment of a **Mars** base, **colonization**, and a revolutionary business proposal to overcome the major budgetary obstacles which have prevented the U.S. from sending astronauts to **Mars,**" said Joel Levine, a senior research scientist at NASA Langley Research Center. Money could get raised from the licensing of broadcast rights, clothing, toys, movies, books, games, and so forth. Perhaps even selling the mineral and land rights on Mars could generate money. "The solution is marketing, merchandising, and corporate sponsorships, which is something NASA has never done before," Levine said. "It's a whole new economic plan for financing a journey to **Mars**and what will become the greatest adventure in the history of the human race." The plan, which the researchers detail in the book, "The Human Mission to **Mars:** Colonizing the Red Planet," published last December, suggests that such a project could add 500,000 U.S. jobs over 10 years, boosting the aerospace industry and manufacturing sector. "A mission to Mars would motivate millions of students to pursue careers in science and technology, thereby providing corporate America with a huge talent pool of tech-savvy young scientists," said Rudy Schild of the Harvard-Smithsonian Center for Astrophysics, who edited the book along with Levine. "Then there are the scientific and technological advances which would directly benefit the American people. Cell phones, GPS devices, and satellite TV owe their existence to the space programs of the 1960s. The technologies which might be invented in support of a human mission to **Mars** stagger the imagination." "There can be little doubt that a human mission to Mars will launch a technological and scientific revolution, create incredible business opportunities for corporate America, the manufacturing sector, and the aerospace industry, and inspire boys and girls across the U.S. to become scientists and engineers," Schild said. Levine noted the idea of funding a human mission to **Mars** through corporations and private companies "is a major departure from the way we've done things in space up to now. A lot of things will have to be worked out - NASA in the past has not sold advertising time, television rights and so on."

Privatization CP

Commercial sector key to funding Mars—expands industrial base for R&D

Sabathier, Faith, and Bander, senior fellow and director of Human Space Exploration Initiatives, adjunct fellow, and program manger at CSIS, 9

Vincent, G. Ryan, and Ashley, CSIS, “Commentary on the Augustine Committee Report on the Future of Human Space Exploration”, 11-9-09, <http://csis.org/files/publication/091109_Sabathier_AugustineCommittee_0.pdf>, CH

Second, commercial spaceflight capabilities continue to mature. In the very long term, a human space exploration program will not be viable if the commercial sector is neither able nor relied upon to provide more and more basic services. Without commercial engagement, exploration will continue to push the footprint of human presence further and further outward, continually expanding the scale of government obligations, rather than keeping civil space programs focused on the frontiers of exploration. Expenditure of limited NASA resources on recurrent, repetitive, well-understood operational tasks is and will continue to be an inefficient use of the agency’s core competencies and unique skills. Furthermore, failure to make effective use of existing commercial capabilities will not help sustain an industrial base in need of income to sustain vital RDT&E efforts.

Commercialization solves (1/2)

Commercialization solves – 160 billion potential funds could be acquired without key commercial rights

Journal of Cosmology, Editorial, 10

(“Marketing Mars: Financing the Human Mission to Mars
and the Colonization of the Red Planet.” August 2010, Volume 12: 4068-4080, AH)

The conquest of Mars and the establishment of a colony on the surface of the Red Planet could cost up to $150 billion dollars over 10 years. These funds can be easily raised through a massive advertising campaign, and if the U.S. Congress and the governments of other participating nations, grant to an independent corporation (The Human Mission to Mars Corporation, a hypothetical entity), sole legal authority to initiate, administer, and supervise the marketing, merchandizing, sponsorship, broadcasting, and licensing initiatives detailed in this article. It is estimated that $10 billion a year can be raised by clever marketing and advertising thereby generating public awareness and enthusiasm, and through the sale of Mars' merchandise ranging from toys to clothing. With clever marketing and advertising and the subsequent increase in public interest, between $30 billion to $90 billion can be raised through corporate sponsorships, and an additional $1 billion a year through individual sponsorships. The sale of "naming rights" to Mars landing craft, the Mars Colony, etc., would yield an estimated $30 billion. Television broadcasting rights would bring in an estimated $30 billion. This comes to a total of up to $160 billion, and does not include the sale of Mars' real estate and mineral rights and other commercial ventures.

NASA & and the US government alone fail – only commercialization can solve and it does

Journal of Cosmology, Editorial, 10

(“Marketing Mars: Financing the Human Mission to Mars
and the Colonization of the Red Planet.” August 2010, Volume 12: 4068-4080, AH)

A succession of Presidents and NASA administrators have voiced interest in a human mission to Mars. However, they have also proposed vague, fanciful dates so many decades into the future. Even if a serious 20-year or 30-year plan were to emerge, it would have to survive for decades through multiple NASA and U.S. government administrations to ultimately succeed. Success is not just unlikely, but will be too late, as the ESA, China, Russia, Japan, and other nations are already planning on making it to Mars in the next two decades. The United States of America, the American people, and American business will be the big losers. The Human Mission to Mars must commence now, and it must be an international effort. The conquest of Mars and the establishment of a colony on the surface of the Red Planet could cost 150 billion dollars over 10 years. These funds can be easily raised if the U.S. Congress and other participating nations, grants and enacts legislation to give sole marketing, licensing, and fund-raising authority to an independent corporation (such as the hypothetical Human Mission to Mars Corporation) which initiates and supervises the marketing, merchandizing, sponsorship, broadcasting, and licensing initiatives detailed in this article. The United States Congress and all participating nations must also enact legislation and pass laws to protect these fund-raising efforts and those who sponsor, donate to, and partner with THMMC to make a Human Mission to Mars a reality. The sole mission of The Human Mission to Mars Corporation should be to raise $150 billion to fund a Human Mission to Mars and the colonization of the Red Planet, and this can be accomplished by initiating and following the detailed plans discussed in this article. It is estimated that $10 billion a year can be raised through clever advertising and marketing and the sale of merchandise. Following a massive advertising campaign which increases public interest, between $30 billion to $90 billion can be raised through corporate sponsorships, and an additional $1 billion a year through individual sponsorships. The sale of naming rights would yield an estimated $30 billion. Television broadcasting rights would bring in an estimated $30 billion. This comes to a total of between $100 billion to $160 billion, and does not include other commercial ventures and the sale of real estate and mineral rights. NASA can't do it. The United States government can't do it. An International effort can.

Commercialization solves (2/2)

More ev

Journal of Cosmology, Editorial, 10

(“Marketing Mars: Financing the Human Mission to Mars
and the Colonization of the Red Planet.” August 2010, Volume 12: 4068-4080, AH)

World wide, sports is a $185 billion dollar a year industry which generates much of its income from television and radio broadcasting, merchandizing, sponsorships, advertising, online and mobile media, magazines and periodicals, and athlete endorsements (Miller 2009). The Human Mission to Mars, can be marketed and sold as the ultimate sports and reality TV extravaganza with the conquest of an entire planet as the ultimate prize. Astronauts from around the world, each with their compelling life stories, would compete against one another to be selected for the Mars' teams; Mars' teams would compete against one another to be the first to land on the Red Planet, and all astronauts would be competing against the possibility of death. Astronauts would be marketed for what they are: heroes and athletes in superb physical and mental condition. Merchandise, from toys to clothing, featuring anything and everything associated with the Human Mission to Mars, can be marketed and sold, including official astronaut jerseys, with the names of favorite astronauts emblazoned on front and back. Then there are product endorsements by the most popular astronauts, with all income going to support and pay for the Human Mission to Mars.

Commercialization gets Public Support

Commercialization gets public behind Mars Mission

Journal of Cosmology, Editorial, 10

(“Marketing Mars: Financing the Human Mission to Mars
and the Colonization of the Red Planet.” August 2010, Volume 12: 4068-4080, AH)

Advertising increases public awareness and enthusiasm, not just to buy products (Brigs and Stuart 2006), but to attend and watch movies and sporting events (Gerbrandt 2010). To generate public demand for a mission to Mars requires that the message be repeated in a variety of mediums, TV commercial, print ad, radio ad, and online (Brigs and Stuart 2006). Over 30 major corporations spend over $1 billion each year in advertising all of which significantly impacts public awareness and increases sales (Brigs and Stuart 2006). Hollywood movie studios effectively use advertising in a variety of mediums (particularly TV and online) to successfully generate public interest in very short time periods (Gerbrandt 2010). According to Brigs and Stuart (2006), the numbers prove that the "surround-sound" approach is a big winner. They also note it is best to display the product name and logo for the duration of an ad. Likewise, the human mission to Mars must be advertised and marketed as a product and as entertainment, and must use a product name and logo to generate brand identity. Further, the marketing campaign must be targeted and tailored to those who might be the most interested in what a human mission to Mars might offer, i.e. adventure, drama, and life and death competition with clear winners and losers.

A2: OST disincentives / blocks

OST doesn’t block – it only applies to nations

Journal of Cosmology, Editorial, 10

(“Marketing Mars: Financing the Human Mission to Mars
and the Colonization of the Red Planet.” August 2010, Volume 12: 4068-4080, AH)

Article II of the 1967 Outer Space Treaty, which was ratified by the United States and 61 other countries explicitly states that "Outer Space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." This treaty, however, says nothing about personal or corporate claims of private ownership or individual or corporate rights to extract and mine minerals and ores. Nor is the planet Mars explicitly mentioned in the 1967 Treaty. Although the Space Treaty does not bar private ownership of "celestial bodies", this does not mean that someone can simply say: "I own Mars". Legal precedent requires possession. Consider, for example, maritime salvage law (also known as Admiralty and Maritime Law, and the Law of Salvage), which explicitly states that to claim ownership, the party making the claim must first make contact with and secure the property which must be beyond or outside a nation's national territory (Norris, 1991; Shoenbaum, 1994). In terms of "salvage" the original owner is entitled to a percentage of whatever is recovered. In the case of Mars, there are no original owners (and if there were, they are long dead and gone). Therefore, although some may argue that the 1967 treaty bars national ownership of Mars, the treaty does not apply to private ownership. This means that those who first arrive on Mars, may claim Mars (or all areas of Mars explored by humans) as private property. They may also sell portions of this property to other private parties or corporations. What might humans of Earth pay to own an inch or acre of Mars?

Minerals act can be sold to whoever gets there first – major incentive

Journal of Cosmology, Editorial, 10

(“Marketing Mars: Financing the Human Mission to Mars
and the Colonization of the Red Planet.” August 2010, Volume 12: 4068-4080, AH)

Traditionally, mineral resources within national territory, belong to the government ruling that territory. Corporations and individuals must license the right to extract and sell those resources. Therefore, if those who first take possession of Mars form a government, they may claim ownership of all mineral and other resources (e.g. minerals, metals, gemstones, ores, salt, water). However, in the early history of the United States, private owners owned both "surface rights" and "mineral rights" and they had the right to sell, lease, or give away these rights. According to the Mars Mineral Spectoscropy Database of Mount Holyoke College, a wide variety of over 50 minerals may exist on Mars. Gold, silver, platinum, and other precious metals are likely to exist in abundance above and below the Martian surface; spewed out by volcanoes, and produced by ancient hydrothermal activity and circulating goundwater which acted as a concentrater. Therefore, once humans land on Mars, Martian mineral rights can be sold to the highest bidders, and Martian real estate can be sold by the inch or acre, with all these funds going to support the Human Mission to Mars and the colonization of the Red Planet.

\*\*\*Multilat CP

International Cooperation

International cooperation reduces costs, widens knowledge base, and international relations

Ehrenfreund et al 8 (P., N. Peter, K.U.Schrogl, J.M. Logsdon, Space Policy Institute at George Washington University, “Cross-cultural management supporting global space exploration”, Acta Astronautica 66, https://www.gwu.edu/~spi/assets/docs/080609%20Logsdon.pdf) CH

The benefits of international cooperation are numerous and well documented. Among others, they include improving capability, sharing costs, building common interests and increasing the total level of available resources, eliminating the duplication of efforts, and improving international relationships [7]. Cooperation potentially makes the implementation of a space project more affordable to each individual partner involved, while enriching the pool of scientific and technological expertise. In addition, international cooperation offers robustness and redundancy through added mission options and access to alternative transportation systems. It also enhances domestic legitimacy of space projects and gives them international credibility and consequently makes them less vulnerable to cancellation due to domestic political or financial problems [3]. Successful cooperation requires the satisfaction of a significant amount of the core interests and needs of all partners as the benefits to each partner from cooperation are often neither simultaneous nor of the same nature. However, while cooperation is an important complement to each country's capabilities, it also carries risks. International cooperation adds layers of complexity to the specification andmanagement of the programs and introduces additional elements of dependence and risk that can undermine successful performance within budget and the planned schedule. One of those layers of complexity is the issue of cross-cultural management. A cooperative framework has therefore not only to take into account the differences in political systems, budgets, and goals but also the cultural values of the involved actors. The increased participation of new actors and stakeholders in space exploration activities requires a multi-dimensional understanding of culture and business practices. The new era of space exploration will be international, human centric, trans-disciplinary and participatory. An effective integration of the stakeholders requires bridging the cultural differences in market and financial aspects, technology, regulations and outreach to provide common strategies.

This is a moral obligation—international unity spills over to the economy and humanitarian issues

Som 10

(Sanjoy, senior graduate student in Earth and Space Sciences, University of Washington, Space Policy 26, “An international symbol for the sustained exploration of space”, ScienceDirect, CH)

Space exploration provides a responsibility and opportunity to send a strong message of unity to the world community. It is the moral duty of spacefaring nations to unite in their endeavors because the benefit of humanity’s sustained presence in space is at stake. Indeed, world powers have a responsibility to steer humanity toward a better future and avoid careless abuses of our societal tools and mechanisms that cause dramatic and international consequences, as witnessed in the catastrophic failure of the world financial market that began in 2008. This steering is known to be enabled when there is recognition of the urgency of a particular topic, such as climate change. A united symbol would only enhance the view of spacefaring nations toward international economic and humanitarian leadership

International Cooperation

CP solves—international agencies have had success with planetary exploration, data collection

Ehrenfreund et al 8 (P., N. Peter, K.U.Schrogl, J.M. Logsdon, Space Policy Institute at George Washington University, “Cross-cultural management supporting global space exploration”, Acta Astronautica 66, https://www.gwu.edu/~spi/assets/docs/080609%20Logsdon.pdf) CH

In the domain of space activities two structures have been working over the years on bridging the existing cultural gap in the sector. The activities of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) are important to mention. COPUOS acts as a platform to foster the exchange of knowledge and information on space activities by gathering interested States on a regular basis. COPUOS has grown over the years to 69 members and takes care of organizational arrangements and creates the international legal and policy environment within which space activities take place [8]. The International Space University (ISU) is another major structure raising cultural awareness in the space domain. ISU represents an environment of intercultural spirit and through its “3I” approach (International, Interdisciplinary, Intercultural dimensions). ISU graduates are catalyzing networks worldwide to support cross-cultural management in space activities [9]. International cooperation in Space Science and Earth Observations has led to outstanding achievements in the general context of space activities. The Hubble Telescope exploring the deep universe and the US-European CassiniHuygens mission investigating planets and moons of Saturn are exemplary among the many successful endeavors of international cooperation in Space Science. Another example for worldwide space cooperation is the Group on Earth Observation (GEO), a voluntary partnership which coordinates efforts to build Global Earth Observation System of Systems (GEOSS), which will link together existing and planned Earth observing systems around the world to provide comprehensive, coordinated and sustained Earth observation information to be used as decision support tool by a variety of users [10]. The previous section has highlighted the advancements in cooperation schemes concerning infrastructures in Earth orbit. For space exploration of the Earth–Moon–Mars space we are witnessing a paradigm shift in the last decade [3]. A major achievement is the establishment of the ISECG (International Space Exploration Coordination Group) that represents 14 space agencies (Australia, Canada, China, France, Germany, the United Kingdom, India, Italy, Japan, Russia, the Republic of Korea, the Ukraine, the United States and the European Space Agency) and acts as the coordination mechanism to implement the global exploration strategy [2,11

International Co-op CP - Solvency

Nonbinding collaboration solves

The Global Exploration Strategy 7

(“The Framework for Coordination”, May 2007, http://esamultimedia.esa.int/docs/GES\_framework\_final.pdf, CH)

Sustainable space exploration is a challenge that no one nation can do on its own. This is why fourteen space agencies 1 have developed The Global Exploration Strategy: The Framework for Coordination, which presents a vision for robotic and human space exploration, focusing on destinations within the solar system where we may one day live and work. It elaborates an action plan to share the strategies and efforts of individual nations so that all can achieve their exploration goals more effectively and safely. This Framework does not propose a single global programme. Rather, it recommends a voluntary, non-binding forum, the international Coordination Mechanism, through which nations can collaborate to strengthen both individual projects and the collective effort. Robust science and technology efforts, such as the pursuit of space exploration, help to define nations and their place in the world. The number of countries involved in space exploration is growing steadily and we are entering a new era of historic significance, in which we will extend human presence beyond Earth’s orbit, physically and culturally.

A voluntary international framework reduces risk and improves effectiveness through coordination

The Global Exploration Strategy 7

(“The Framework for Coordination”, May 2007, http://esamultimedia.esa.int/docs/GES\_framework\_final.pdf, CH)

Bilateral and multilateral cooperation among space-faring nations has enabled much of what has been achieved so far, and this will continue in the future. But there’s never been a single, comprehensive strategy for space exploration that allows existing plans to be coordinated and new ones to be developed. This GES Framework for Coordination, developed by 14 space agencies, therefore represents a new beginning. International discussions during 2006 produced a common set of space exploration themes, as elaborated in this document. The Framework makes the case for a voluntary, non-binding forum (the Coordination Mechanism) where nations can share plans for space exploration and collaborate to strengthen both individual projects and the collective effort. As a voluntary mechanism, the international coordination process is open to new participants. Each will bring their own perspectives and skills and, in return, will gain access to the common knowledge and experience. This Framework is not a proposal for a single programme, but recognizes that individual space exploration activities can achieve more through coordination and cooperation. Nations have varying scientific, technological and societal objectives for their space activities, and – inevitably – some can afford to do more than others. For the foreseeable future, the Moon, Mars and near-Earth asteroids are the primary targets for human space exploration. We do not yet have the practical knowledge or skills to send humans to other exciting but more distant destinations such as Jupiter’s moon Europa, or Titan and Enceladus, which orbit Saturn. But exploring even the first group of feasible destinations will require both robotic and human missions of all sizes and complexity. A coordinated strategy will help individual nations with shared objectives to engage in joint projects that will maximise their return on investment. The scientific and technical successes – and even the failures – of each project can be used to improve the ones that follow. The Framework calls for the development of an international exploration coordination tool to enhance mutual understanding among partners and to identify areas for potential cooperation. By jointly creating a common language of exploration building blocks, planners and engineers will be able to agree how practical features such as communications, control, life support and docking systems could be made to work together. Such ‘interoperability’ between space vehicles will lower the risks of space exploration and could assure crew safety in case of life-threatening emergencies.

International Cooperation

Adopting a multilateral framework fosters global security and cooperation

The Global Exploration Strategy 7

(“The Framework for Coordination”, May 2007, http://esamultimedia.esa.int/docs/GES\_framework\_final.pdf, CH)

These successes suggest that much more can be achieved with a global strategy for space exploration. Partnerships will enable nations to develop a common understanding of their respective interests, to share lessons learnt and thus avoid costly mistakes, and to discuss scientific results that will help in planning for the future. Most importantly, we need a forum to discuss the essential building blocks of space exploration and practical issues such as interoperability – ensuring that different systems can work together. Internationally-agreed standards that allow a mobile phone bought in China to work in Canada or a car made in Germany to meet U.S. safety laws are critical to the global economy; they will be just as important when human activities extend beyond Earth. Complex issues such as the protection of areas of scientific importance may arise and can be discussed before they block progress. By developing a common language of space exploration, nations can more readily share their specific objectives and enhance opportunities for joint projects. Leveraging national funds and coordinating mission objectives will enable them to build upon, strengthen, and expand existing global partnerships through space exploration. This spirit of partnership will indirectly enhance global security by providing a challenging and peaceful activity that unites nations in the pursuit of common objectives. It is inclusive; the goal is to expand the opportunity for participation in space exploration to all nations and their citizens.

Unilateral Missions Bad—Drains Money

Unilateral missions will lose interest and drain money, preventing long term colonization, Apollo proves

Logsdon, Professor of Political Science at George Washington University, 10

(John M., “Why Space Exploration Should Be a Global Project”, Space Policy, 1-18-08, p. 3, CH)

Although the US lunar landing program did succeed in meeting its political objectives Apollo should not serve as a model for future human exploration. There are many reasons to make this statement. During Apollo, 12 people, all American men, walked on the lunar surface. They did virtually nothing related to preparing to stay there at some point in the future—they were not preparing the way for others to live and work on the lunar surface. They did explore a limited area of the Moon, but science was rather clearly a secondary motivation; the real point was being there before cosmonauts from the USSR. Once that goal was met by the July 1969 Apollo 11 mission, there were those within and throughout NASA who argued that remaining Apollo flights should be cancelled. Apollo was a very risky project, and there were fears (which Apollo 13 demonstrated were valid) that a crew might be lost on a future mission. The program had enough forward momentum to carry it through six more missions, but Apollo was conceived as a closed-end effort to beat the USSR to the Moon, not as the first step in a long-term, sustainable program of space exploration. Apollo was a unilateral demonstration of US power; almost by definition partners were not wanted. Apollo was most certainly not a "global project". Another way in which Apollo cannot serve as a model for future exploration is in terms of its budget profile. NASA's budget was increased by 89% in the months following President Kennedy's May 1961 speech announcing his decision to go to the Moon. The following year, it went up another 101%. That certainly will not happen again.

Co-op Good—Soft Power

The US will lose the war on terror without soft power generated by space co-op

Johnson-Freese, Professor at the Naval War College, 5

(Joan, “Maintaining US Leadership in Human Spaceflight”, May 2005, Space Policy, p.242, CH)

The USA should plan for the future of human spaceflight from an 'effects-based' perspective. What does it hope to achieve? Is it looking to maintain its pre-eminence in human spaceflight? I suggest it must. If that is the goal, realistically, we need a rationale beyond science and exploration to sustain the momentum. Competition once served that purpose but will not do so any longer. Indeed, competition places the USA in a race not in its best interests. Strategic leadership of a cooperative space mission off planet Earth offers the USA a viable way forward toward maintaining leadership while generating significant soft power globally, soft power necessary toward such strategic goals as effectively fighting the global 'war on terrorism'. US policy makers must look at space from a strategic perspective, not just from a science or exploration perspective.

International Co-op CP—Soft Power

International partnerships garner the US soft power

Sabathier, Faith, and Bander, senior fellow and director of Human Space Exploration Initiatives, adjunct fellow, and program manger at CSIS, 9

Vincent, G. Ryan, and Ashley, CSIS, “Commentary on the Augustine Committee Report on the Future of Human Space Exploration”, 11-9-09, <http://csis.org/files/publication/091109_Sabathier_AugustineCommittee_0.pdf>, CH

First, space exploration is inescapably a global effort. Other nations now can match, or in some cases, exceed the technological capabilities of the U.S. space program. If the U.S. president is willing to take a strong role in guiding NASA leadership in a global program of exploration (but without a domineering posture), building on shared benefit, mutual interdependence, and creation of a global architecture, exploration could become and remain a healthy, vibrant global enterprise. Well thought out engagement of international partners in a manner appropriate to today’s geopolitical realities could yield useful soft-power benefits while ensuring the health of a strong human spaceflight program. Experience throughout the history of the space program – from Kennedy and the Apollo program to Reagan and Clinton support of the International Space Station – demonstrates that healthy civil space programs absolutely require strong presidential leadership.

Improved technologies gained through co-op will boost US capabilities and leadership

Sabathier, Faith, and Bander, senior fellow and director of Human Space Exploration Initiatives, adjunct fellow, and program manger at CSIS, 9

Vincent, G. Ryan, and Ashley, CSIS, “Commentary on the Augustine Committee Report on the Future of Human Space Exploration”, 11-9-09, <http://csis.org/files/publication/091109_Sabathier_AugustineCommittee_0.pdf>, CH

The rest of the world continues to look to the United States not just to have the most advanced space exploration program, but more importantly, to provide global leadership in space. By effectively engaging all space-faring nations, including on the critical path, our global and therefore national space exploration capabilities stand to be improved significantly. Heretofore, in space exploration, a global program has essentially been a series of multiple bilateral agreements. Going forward, if international cooperation is to provide a significant boost to global or even national exploration capabilities, future international cooperation must move beyond a network of bilateral agreements and be structured as a truly multilateral governance system, far closer in character to NATO or the WTO.

International Co-op CP

Collaboration on Mars will fuel collaboration in biodiversity and curing AIDS, malaria, and cancer

Eng, writer for NYT, 00

Dinah, New York Times, “From Jungle to Space in Pursuit of New Drugs”, 11-28-00, http://files.exploreorg.com/files/From%20Jungle%20to%20Space%20in%20Pursuit%20of%20New%20Drugs.pdf, CH

As part of the collaboration, scientists from Latin America and the United States have conducted numerous exchange visits, and students from Earth University have interned at the Johnson Space Center, producing an atlas of space shuttle photography of Costa Rica that will be used by educators and agriculturists. ''We have combined indigenous knowledge and space technology in a way that utilizes each party's strengths to do together what we could not do individually before,'' Dr. Zaglul said. ''I am sure that the potential of finding a cure for AIDS, malaria, cancer and other diseases are here in the biodiversity of the rain forest.'' He went on, ''I've been asked by some, 'Why should we help Latin America? Why don't you solve your disease problems yourself,' which are fair questions. But if we all pull together as one race, and help each other, we will be much more positive about how we perceive others. There will be a time when Latin America can help others.'' Dr. Chang-Diaz sees another potential benefit. ''There is a great connection between the rain forest, biodiversity and space,'' he said. ''Earth University is developing revolutionary techniques for agriculture that take advantage of environmental conditions to grow crops in the framework of environmental wholeness. That's exactly what we must do on long-term duration space missions. ''Manned missions to Mars and beyond, for example, will require crews to grow their own food, recycle oxygen and maintain other environmental life support systems on a ship that must be self-sustaining. Jose moved heaven and earth to bring Earth's resources to the Chagas project. Imagine how much we could do if the whole world worked together like this.''

International Co-op CP—Funds

Lacks of interest means the US will have to turn to international cooperation to fund a long-term mission

Handberg, Professor of Political Science at the University of Central Florida, 10

Roger, The Space Review, “The future of American human space exploration and the ‘Critical Path’”, 1-11-10, <http://www.thespacereview.com/article/1543/1>, CH

What is becoming clear is if the United States is to continue its human exploration program, international partners are going to be critical for any large-scale, long-duration human exploration effort. The thrill is gone as evidenced by the increasing difficulty encountered in mustering political support for NASA’s human spaceflight program. Commercial launch programs are likely to partially replace government vehicles for reaching orbit, but space exploration means going places where there exists no immediate commercial market. The costs are enormous given the likely economic returns. You can subsidize commercial flights but that removes them from economic rationality if the market approach is to work. It is better to keep the two separate because both lose in the exchange. China and India wax very enthusiastically about future manned missions to orbit, the Moon, and beyond, but have not confronted the funding realities of such long-duration programs against likely benefits. For new national space participants, the thrill is getting there since it marks such a state as a major global technological player, but the reality is that long-term human space exploration efforts become ever more expensive, fraught with unanticipated problems, and plagued by delays. All of these factors will fuel domestic calls for retrenchment and other short-term solutions to budget issues even among the new participants. Fortunately for the United States, we lack the goad of the Cold War although nationalism and other competitive factors will continue to fuel our national space program. Those factors will keep the United States in the game, albeit without the war-type funding Apollo generated.

The US can’t maintain a unilateral lead—international co-op is the best option amid political and budget threats

Handberg, Professor of Political Science at the University of Central Florida, 10

Roger, The Space Review, “The future of American human space exploration and the ‘Critical Path’”, 1-11-10, <http://www.thespacereview.com/article/1543/1>, CH

The United States at least temporarily moves from the position of dominant partner to that of dependent. This status will be uncomfortable but doable as a stopgap. The more critical issue is the declining willingness of presidents and congresses to fund long-term space programs, especially human exploration, because it is significantly more expensive than unmanned missions. How NASA is able to fund such programs in the absence of strong political support remains a difficult question. The degree of difficulty has grown over the years but has not yet returned to the levels of congressional antagonism as in 1993 when the ISS came within one vote of cancelation on the House floor while its budgetary competitor, the Superconducting Super Collider, was terminated. There are no easy answers but obviously one approach may be for the United States to fully opt into international partnerships led by a consortium of states with the US as one partner among others. Participation by each state would vary from mission to mission, but would allow continued US support for a manned space program. Such alliances can be critical for sustaining such programs despite the annual congressional and presidential appropriations process that provides repeated opportunities for budget cuts and stretch outs. Politically, international partners become arguments for continued US participation; otherwise, the US loses standing in the international community. What this means is that the US must become comfortable with such close cooperation, as unilateral decisions with no prior consultation with partners will end. The advantage is that true cooperation translates into greater equality in terms of budget share—the US will no longer operate as the funder of last resort with the unpleasantness that situation generates. One downside is that projects will move more slowly (although in truth no one may notice, given the delays common presently) due to the need for effective consultation among the partners before programs are initiated and necessary changes are made. Such partnerships provide a mechanism for incorporating different states into the program based on actual interest and capabilities.

International Co-op—Now key

Now is key—best scenario to cooperate with rising space powers

Sabathier, Faith, and Bander, senior fellow and director of Human Space Exploration Initiatives, adjunct fellow, and program manger at CSIS, 9

Vincent, G. Ryan, and Ashley, CSIS, “Commentary on the Augustine Committee Report on the Future of Human Space Exploration”, 11-9-09, <http://csis.org/files/publication/091109_Sabathier_AugustineCommittee_0.pdf>, CH

Achievements in space exploration can be a potent smart-power tool if cultivated and employed effectively, consequently increasing the potentially utility of space program expenditures. It is important to note that international engagement does not mean continuing to look only to our long-standing partners and allies, but toward emerging space powers. It is entirely possible that by 2020, Europe and Japan will still have no human spaceflight program, while China and India could have substantial spaceflight experience. Planning for the next decade and beyond, it is critical to recognize this now, not once it has already become more difficult to engage them on mutually beneficial terms.

International Co-op CP—International Key

Mars mission would have to be international—political and financial repercussions

Firth, Science Editor at Daily Mail, 10

Niall, The UK Daily Mail, “The Hundred Year Starship: The Nasa mission that will take astronauts to Mars and leave them there forever”, 10-29-10, <http://www.dailymail.co.uk/sciencetech/article-1324192/Hundred-Year-Starship-Mars-mission-leave-astronauts-planet-forever.html>, CH

Writing in the Journal of Cosmology, scientists Dirk Schulze-Makuch and Paul Davies, say that they envision sending four volunteer astronauts on the first mission to permanently colonise Mars. They write: ‘A one-way human mission to Mars would not be a fixed duration project as in the Apollo program, but the first step in establishing a permanent human presence on the planet.’ The astronauts would be sent supplies from Earth on a regular basis but they would be expected to become self-sufficient on the red planet’s surface as soon as possible. They say: There are many reasons why a human colony on Mars is a desirable goal, scientifically and politically. The strategy of one-way missions brings this goal within technological and financial feasibility. ‘Nevertheless, to attain it would require not only major international cooperation, but a return to the exploration spirit and risk-taking ethos of the great period of Earth exploration, from Columbus to Amundsen, but which has nowadays being replaced with a culture of safety and political correctness.’

US/China Cooperation

Co-operation on human space mission to Mars improves U.S. – Sino relations

Svitak 11 (Amy, *“*China Viewed as Potential U.S. Partner in Future Mars Exploration”, *Space New*, http://www.spacenews.com/policy/110504-china-partner-mars-exploration.html) EK

WASHINGTON — U.S. President Barack Obama views China as a potential partner for an eventual human mission to Mars that would be difficult for any single nation to undertake, a senior White House official told lawmakers. “But many of us, including the president, including myself, including [NASA Administrator Charles] Bolden, believe that it’s not too soon to have preliminary conversations about what involving China in that sort of cooperation might entail,” Holdren said. “If China is going to be, by 2030, the biggest economy in the world … it could certainly be to our benefit to share the costs of such an expensive venture with them and with others.”

\*\*\*Robots CP

Human Mission Bad, Robots Good

Human exploration is ineffective, robots are a better alternative

Lubell and Heil 10 (November 2, Michael and Martha, Director of Public Affairs American Physical Society Chairman, Dept. of Physics, Media and Government Relations American Institute of Physics, American Physical Society Report “NASA's Moon-Mars Initiative Jeopardizes Important Science Opportunities” <http://www.aps.org/about/pressreleases/moonmars.cfm>) NS 5/26/11

Human vs. Robotic The recent spectacular success of the Mars Rovers reminds us that it is possible to address many important scientific questions by robotic means. The limited autonomy possible with current technology typically reduces the pace at which science is done (so that Rovers may take weeks to do what a field geologist might do in a day). But this is an acceptable compromise given the very large difficulties and costs of using people. The current Rovers cannot reach the most challenging terrains (e.g., cliff faces), but these would also present obstacles to an astronaut and may be achievable with future improvements in robotic systems. Robotic exploration serves as a valuable element of an exploration program; it enables the human explorer to sharpen or even answer questions previously identified and to formulate new ones. Human exploration could offer one real advantage: serendipity, the opportunity to notice and respond immediately to the unexpected. In this regard, astronauts on Mars might achieve greater scientific returns than robotic missions, but at such a high cost and technical challenge that one could not expect to justify their presence on scientific grounds alone. In addition to the cost and risk of deploying humans on Mars, a negative impact on the astrobiological goals must also be considered. Inevitably sending astronauts to Mars will contaminate the surface with terrestrial life forms and thereby compromise a prime target of the exploration program, the search for life on another solar system body. As part of the NRC study proposed here, it is important that there be a scientific assessment of the knowledge relating to present or past life that should be acquired by robotic means before an astronaut landing is undertaken. The results of this analysis would be relevant in defining the appropriate time frame for landing humans on the surface.

Humans could contaminate unpredictable microbiological life forms on Mars

Lupisella 10 (Mark L., NASA consultant on engineering Ph.D. in biology (program in Behavior, Ecology, Evolution, and Systematics) from the University of Maryland, " Human Mars Mission Contamination Issues” <http://www.lpi.usra.edu/publications/reports/CB-1089/lupisella.pdf>) NS 5/26/11

A potential challenge for a human Mars mission is that while humans are by most measures the obvious best way to search for life on Mars, we may also be the most problematic in that we could unduly compromise the search for life by contaminating relevant environments and/or possibly adversely and irreversibly affecting indigenous life. • Perhaps more problematic is the fundamental epistemic challenge of the one data point” limitation which could decrease confidence in applying terrestrially based research to extraterrestrial life issues in general. • An informal decision tree is presented as one way to begin thinking about contamination issues. There are many sub-questions and distinctions not shown such as biological vs. nonbiological (but biologically relevant) contamination, viable vs. dead organisms, masking indigenous organisms vs. merely making the search more difficult, and independent origin vs. panspermia distinctions. • While it may be unlikely that terrestrial microbes could survive on Mars, let alone reproduce and unduly compromise the search for life, the unpredictable potential for microbial life to survive, grow exponentially, evolve and modify (and sometimes destroy) environments, warrants focusing carefully on biologically relevant contamination as we prepare to send humans to the first planet that may have indigenous life-forms.

Asteroid CP

Asteroids solve best—less energy, lower costs, and more resources

Drexler, Associate Editor of L5 News, 84

Eric, Foresight Institute, “The Case Against Mars”, October 1984, <http://www.foresight.org/nano/Mars.html>, CH

To open space to settlement, we must use space for practical purposes. What could be more obvious? In the past, mining and agriculture have motivated people to pack up and settle new lands. History likewise suggests that space development will serve space science, just as mining and agriculture have stimulated geology and plant biology. Space activities fueled by pure politics are far less promising, in the long run. The Ming navy, seeking the glory of China, visited Africa and delivered an ambassador to Arabia. Its technical achievements were awesome for that time. Nonetheless, this effort collapsed when the political winds shifted because it had little economic utility or immediate military value. Apollo followed a similar path, seeking the glory of the US. It visited the Moon and ended with the delivery of "ambassadors" to a meeting in space. Despite awesome technical achievements, its collapse took much of the US space program down with it. History thus joins with common sense to suggest that space development — not national prestige — is the engine that will open a road to the stars. Mars fits in poorly. To advance space development, we need cheap resources in near-Earth space. The Moon is obvious and attractive: the velocity increment needed to escape the Moon and bring materials to near-Earth space is fairly low, and the Moon holds oxygen, rock, metals, and (perhaps) water at the poles. What is more, it can best absorb any politically-inspired mania for a planetary base, being close enough to do so at a comparatively modest cost. The asteroids are less obvious to the casual eye, but more attractive: the velocity increment needed to bring materials from suitable asteroids is lower than that of the Moon, and asteroids contain oxygen, rock, water, hydrocarbons, steel, nickel, cobalt, and precious metals. Mars is not even in the running. Jesco von Puttkamer of NASA, an apparent advocate of men-to-Mars admits that "... Such a program would be unlikely to provide nonterrestrial materials in the foreseeable future as a lunar base or asteroid mining program might do..." Since hardly anyone argues otherwise, this should seal the case against Mars as a goal for the next phase of space development.

Robotic > Human – General

Robonauts are less expensive, more effective, and saves lives

Rahls 5 (Chuck, science writer @ Physorg.com, “Manned vs. Unmanned Space Exploration (Part 1)”, 11/23/5, http://www.physorg.com/news8442.html) JPG

Robotic space exploration has become the heavy lifter for serious space science. While shuttle launches and the International Space Station get all the media coverage, these small, relatively inexpensive unmanned missions are doing important science in the background. Most scientists agree: both the shuttle (STS – Space Transport System) and the International Space Station are expensive and unproductive means to do space science. NASA has long touted the space station as the perfect platform to study space and the shuttle a perfect vehicle to build it. However, as early as 1990, 13 different science groups rejected the space station citing huge expenses for small gains. Shuttle disasters, first the Challenger followed by Columbia’s catastrophic reentry in February, 2003, have forced NASA to keep mum about crewed space exploration and the International Space Station is on hold. The last important media event promoting manned flight was Senator John Glenn’s ride in 1998 – ostensibly to do research on the effects of spaceflight on the human body, but widely seen by scientists as nothing but a publicity stunt. Since each obiter launch cost $420 million dollars in 1998, it was the world’s most expensive publicity campaign to date. Proponents say the publicity is needed to support space program funding. Scientific groups assert the same money could have paid for two unmanned missions that do new science - not repeat similar experiments already performed by earlier missions. Indeed, why do tests on the effects of zero gravity on humans anyway when they can sit comfortably behind consoles directing robotic probes from Earth? Space is a hostile place for humans. All their needs must be met by bringing a hospitable environment up from a steep gravity well, the cost of which is enormous. The missions must be planned to avoid stressing our fragile organisms. We need food, water and air requiring complicated and heavy equipment. All this machinery needs to be monitored, reducing an astronaut’s available time to carry out experiments. Its shear weight alone reduces substantially the useful payload. The space shuttle is a hopelessly limited vehicle. It’s only capable of reaching low earth orbit. Worse, the space station it services is placed in the same orbit – one that is not ideal for any type of space science. Being so close to the Earth, gravity constantly tugs at the station making it unstable for fabrication of large crystals – part of NASA’s original plans but later nixed by the American Crystallographic Association. To date, more than 20 scientific organizations worldwide have come out against the space station and are recommending the funds be used for more important unmanned missions. NASA has gone so far as to create myths about economic spin-offs from manned spaceflight - the general idea being the enormous expense later results in useful technology that improves our lives. Items like Velcro, Tang and Teflon – popularly believed to have come from the space program or invented by NASA. There is only one problem: they did not. Shuttle launches are expensive: very expensive. Francis Slakey, a PhD physicist who writes for Scientific American about space said, “The shuttle’s cargo bay can carry 23,000 kilos (51,000 lbs) of payload and can return 14,500 kilos back to earth. Suppose that NASA loaded the Shuttle’s cargo bay with confetti to be launched into space. If every kilo of confetti miraculously turned into gold during the return trip, the mission would still lose $270 million.” This was written in 1999 when a shuttle flight cost $420 million. Currently, it’s estimated that just the shuttle program average cost per flight has been about $1.3 billion over lifetime and about $750 million per launch over its most recent five years of operations. This total includes development costs and numerous safety modifications. That means each shuttle launch could pay for 2 to 3 unmanned missions. While recent failures have more than quadrupled success rates for unmanned missions, they still have managed to keep space programs alive – not just for the US, but Russia, Japan and China as well. Mars Pathfinder and Mar Exploration Rovers have succeeded beyond the expectations of their designers and continue to deliver important data to earthbound scientists. When the successful Deep Impact mission smashed into comet Temple 1 in July, 2005 it released a cloud of debris that may help understand comet formation and composition. Future robotic missions promise to deliver even more crucial data to widely divergent fields. TRW is now building Hubble’s successor, the Jack Web Space Telescope (formally the Next Generation Space Telescope). Slated for launch in 2010, it will be placed in L2 orbit – a much better position to study the stars. At L2, or Lagrange Point 2, it needs only one simple shield instead of the complicated cooling system required by Hubble because of its nearness to earth. It will also be out of range of the space shuttle should anything go wrong as did on the Hubble mission. As computers become more capable and reliable, robots of greater complexity will be built to handle even the most challenging assignments. The time for humans to explore space may have come…. And, indeed, may have gone forever.

Robotic > Human – General

Robonauts solve every internal link and they’re cheaper

WSJ 11 (Staff, “Yes to Mars but No To Human Astronauts”, 5/27/11, http://online.wsj.com/article/SB10001424052702304066504576345622925228798.html) JPG

Robert Zubrin uses quantitative arguments to explain how we might send people to Mars ("[How We Can Fly to Mars in This Decade—And on the Cheap](http://online.wsj.com/article/SB10001424052748703730804576317493923993056.html)," op-ed, May 14). But his numbers provide a strong case against a human expedition to the Red Planet. Astronauts require massive life-support equipment and many supplies that include food, water and oxygen for a two-way trip, as well as fuel for the return voyage. What will humans do once they reach Mars but collect some samples and perform experiments for a few days? Unmanned missions to distant places can provide as much, if not more, information than human explorers over long periods. By removing astronauts and their need for life-support hardware and software, we can send more and larger robots on lengthy one-way exploration trips.

Robonauts solve every internal link and provide more bang for the buck

Christianson 3/11 (J Scott, writer @ Columbia Daily Tribune, “We can’t afford manned mission to Mars”, http://thefreerangetechnologist.com/2011/03/manned-mission-to-mars/) JPG

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.

Robotic > Human – Radiation

Astronauts are exposed to massive radiation

ISU 1 (Iowa State U, Dept of Physics and Astronomy, “Manned or Unmanned”, 2001, http://www.polaris.iastate.edu/EveningStar/Unit7/unit7\_sub1.htm) JPG

Another risk for humans is the exposure to radiation during the trip, and even to some extent while on Mars. There are two kinds of radiation that are damaging to humans: High energy electromagnetic radiation, and particle radiation. Electromagnetic radiation includes radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, X-rays and gamma-rays. Radiowaves, microwaves, infrared and visible light are low-energy forms of radiation. Microwaves heat our food by jiggling water atoms, but do not mess with our genes. Infrared radiation we feel as heat. Visible light we use to see. Ultraviolet radiation tans our skin, but also sets us up for skin cancer. X-rays allow for medical imaging but high doses also can set us up for cancer. Gamma rays can really mess with our genes or, in high doses, be pretty deadly. The Sun produces a lot of IR/visible/UV light and also some X-rays and gamma rays. The Earth's atmosphere stops much of the UV and essentially all of the X-rays and gamma rays, as well as most of the high-energy particles from space. Only on an airplane do you get a measurable amount of these forms of radiation. However, in space there is no atmosphere to protect us, and to make a spacecraft with enough shielding that is still light enough to send to Mars is not really practical. So our astronauts would be exposed to radiation in excess of what we consider safe, making cancer a possibility and also possibly interfering with them having children later. You can read a [detailed report](http://books.nap.edu/catalog.php?record_id=12045) for free online at the [National Academy Press](http://books.nap.edu/).

That kills – guts solvency

Choi 8 (Charles Q., science writer @ NYT, “Space Radiation Too Deadly For Mars Mission”, 3/31/8, http://www.space.com/5190-space-radiation-deadly-mars-mission.html) JPG

Dangerous levels of radiation in space could bar astronauts from a mission to Mars and limit prolonged activity on the moon, experts now caution. However, more [research](http://www.space.com/5190-space-radiation-deadly-mars-mission.html) could reveal ways to handle the risks that radiation poses to space missions. The [magnetic field](http://www.space.com/3033-report-space-radiation-concern-nasa-exploration-vision.html) of Earth protects humanity from radiation in space that can damage or kill cells. Once beyond this shield, people become far more vulnerable. Astronauts have long seen white flashes while in space due to cosmic rays, or extremely high-energy particles, passing through their heads. A return to the moon or a mission to Mars that NASA and other space agencies are planning would place astronauts at continued risk from cosmic rays or dangerous bursts of solar radiation. Several reports in the past have outlined the [potential risks](http://www.space.com/3033-report-space-radiation-concern-nasa-exploration-vision.html). To further investigate the risks that space radiation currently pose, the National Research Council assembled experts in space and biology together. At the present time, given current knowledge, the level of radiation astronauts would encounter "would not allow a human crew to undertake a Mars mission and might also seriously limit long-term Moon activity," this committee notes in their new report today.

NASA wont overcome that issue – budget cuts

Choi 8 (Charles Q., science writer @ NYT, “Space Radiation Too Deadly For Mars Mission”, 3/31/8, http://www.space.com/5190-space-radiation-deadly-mars-mission.html) JPG

To enable at the very least lunar missions with astronauts, the committee stressed that radiation biology research deserved the highest priority. However, the experts noted that NASA's space radiation biology research has been significantly compromised by recent cuts in funding, leading to major gaps in our knowledge of the [health](http://www.space.com/5190-space-radiation-deadly-mars-mission.html) risks of radiation, such as cancer, neurological damage and degenerative tissue disease. NASA's entire space radiation biology research program is critically dependent on the NASA Space Radiation Laboratory, which in turn relies on the U.S. Department of Energy's heavy ion physics program. The committee strongly recommended that NASA do as much research at this lab as it could, in case Department of Energy's priorities shift and dramatically reduce the availability of the lab.

Robotic > Human – Broken Bones

Space travel causes broken bones upon impact – guts solvency

ISU 1 (Iowa State U, Dept of Physics and Astronomy, “Manned or Unmanned”, 2001, http://www.polaris.iastate.edu/EveningStar/Unit7/unit7\_sub1.htm) JPG

Although you might not expect zero-g to be a problem, many astronauts feel sick at the start of a flight and not everyone gets over that feeling as the days pass. Also, in zero-g or free-fall, the human body changes in subtle ways. Astronauts who are up for a couple of weeks tend to get taller, to the tune of three inches. The extra height disappears after they land again. A more serious health threat is that over an extended time period (months and years), bones get weaker. While the details are not yet understood, this is probably related to the fact that people who do a lot of weight-bearing exercise are less likely to get osteoporosis (fragile bones) when they get old. A trip to Mars that takes several months will have a significant effect on the astronauts’ bones, which might mean that seemingly minor accidents could result in broken bones. Or, they could possibly even break bones during the high-gee episodes when landing on the surface of Mars or when returning to Earth.

AT: Robotic Exploration Bad

No d/as – Robonauts are a pre-requsite

Zubrin 11 (Robert, president of Pioneer Astronautics and of the Mars Society, 5/14/11, “How We Can Fly to Mars in This Decade—And on the Cheap”, http://online.wsj.com/article/SB10001424052748703730804576317493923993056.html) JPG

Thus a Mars mission could be accomplished with three Falcon-9 Heavy launches. One would deliver to Mars orbit an unmanned Dragon capsule with a kerosene/oxygen chemical rocket stage of sufficient power to drive it back to Earth. This is the Earth Return Vehicle. A second launch would deliver to the Martian surface an 11-ton payload consisting of a two-ton Mars Ascent Vehicle employing a single methane/oxygen rocket propulsion stage, a small automated chemical reactor system, three tons of surface exploration gear, and a 10-kilowatt power supply, which could be either nuclear or solar. The Mars Ascent Vehicle would carry 2.6 tons of methane in its propellant tanks, but not the nine tons of liquid oxygen required to burn it. Instead, the oxygen could be made over a 500-day period by using the chemical reactor to break down the carbon dioxide that composes 95% of the Martian atmosphere. Using technology to generate oxygen rather than transporting it saves a great deal of mass and provides power and unlimited oxygen once the crew arrives. The third launch would then send a Dragon capsule with two astronauts to Mars. The capsule would carry 2,500 kilograms of consumables—sufficient, if water and oxygen recycling systems are employed, to support the two-person crew for up to three years. Given the payload capacity, a light ground vehicle and several hundred kilograms of science instruments could be taken along as well. The crew would reach Mars in six months and land their Dragon capsule near the Mars Ascent Vehicle. They would spend the next year and a half exploring.

\*\*\*DAs\*\*\*

Spending DA Link

Colonization would cost 145 billion

Journal of Cosmology, Editorial, 10

(“Marketing Mars: Financing the Human Mission to Mars
and the Colonization of the Red Planet.” August 2010, Volume 12: 4068-4080, AH)

In 2007, NASA chief administrator, Michael Griffin suggested a human mission to Mars could cost as little as $11 billion. However, NASA's vague goal would be to put humans on Mars after the year 2035 (AFP Sep 24, 2007). NASA's current five-year budget is around $86 billion and the $11 billion estimate for a Human Mission to the Red Planet may be unrealistic. Thus, it is possible that a two year round trip journey to Mars could be accomplished with expenditures of around $20 billion whereas a more ambitious mission involving the establishment of a permanent Mars' base would cost considerably more. According to NASA, a single space shuttle cost around 1.6 billion dollars. Estimates are that the entire space shuttle program, since the program became operational in 1981, has cost $145 billion, with much of those costs having accrued in the first 10 years. Therefore, it could be estimated that a Mission to Mars and the establishment and maintenance of a permanent colony, with space craft journeying to and from the Red Planet, could cost around $145 billion over a 10 year period.

Politics

Obama and NASA both oppose a one-way mission to Mars.

Geranios 10 (Nicholas, MSNBC, 11/15/2010, “Scientists propose one-way trips to Mars”) SW

An official for NASA said the space agency envisions manned missions to Mars in the next few decades, but that the planning decidedly involves round trips. President Obama informed NASA last April that he "`believed by the mid-2030s that we could send humans to orbit Mars and safely return them to Earth. And that a landing would soon follow,'" said agency spokesman Michael Braukus. No where did Obama suggest the astronauts be left behind. "We want our people back," Braukus said. Retired Apollo 14 astronaut Ed Mitchell, who walked on the Moon, was also critical of the one-way idea. "This is premature," Mitchell wrote in an e-mail. "We aren't ready for this yet." Davies and Schulze-Makuch say it's important to realize they're not proposing 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 wrote, while acknowledging the proposal is a tough sell for NASA, with its intense focus on safety. They think the private sector might be a better place to try their plan. "What we would need is an eccentric billionaire," Schulze-Makuch said. "There are people who have the money to put this into reality." Indeed, British tycoon Richard Branson, PayPal founder Elon Musk and Amazon.com Inc. CEO Jeff Bezos are among the rich who are involved in private space ventures.

Leadership in Mars would be a key win for Obama

Chang 11 (Kenneth, April 15, The New York Times, “Obama Vows Renewed Space Program”) CH

This was the first time that the president had lent his personal political capital in an increasingly testy fight over the future of the National Aeronautics and Space Administration. “The bottom line is, nobody is more committed to manned spaceflight, to human exploration of space than I am,” he said in a speech to about 200 attendees of a White House-sponsored space conference here. But he was unwavering in insisting that NASA must change in sending people into space. “We’ve got to do it in a smart way,” Mr. Obama said, “and we can’t just keep on doing the same old things we’ve been doing and thinking that’s going to get us where we want to go.” Instead of earlier vague assurances by Charles F. Bolden Jr., the NASA administrator, and other administration officials that NASA would eventually venture beyond Earth orbit, Mr. Obama gave dates and destinations for astronauts. But the goals would be achieved long after he leaves office: a visit to an asteroid after 2025, reaching Mars by the mid-2030s. “Step by step, we will push the boundaries not only of where we can go but what we can do,” Mr. Obama said. “In short, 50 years after the creation of NASA, our goal is no longer just a destination to reach. Our goal is the capacity for people to work and learn, operate and live safely beyond the Earth for extended periods of time.” Mr. Obama noted that President John F. Kennedy challenged Americans to land on the Moon in 1961 — the year the current president was born. But the plan Mr. Obama laid out for now through the 2030s was unlike the Kennedy vision: It was a call for private industry to innovate its way to Mars, rather than a call for a national effort to demonstrate American predominance. Mr. Obama’s budget request to Congress in February proposed a major shift for NASA: canceling the Constellation program, started five years ago to send astronauts back to the Moon, and turning to private companies for carrying astronauts to the International Space Station. Strikingly, Mr. Obama used the speech to blame his predecessors for lacking leadership on space policy and the critics of his own plan for failing to recognize that times have changed. NASA’s budgets, he noted, have “risen and fallen with the political winds.” That appeared to be a shot at President George W. Bush, who announced a new plan for NASA after the Columbia disaster and barely mentioned space policy again for the rest of his presidency. And he argued that turning to private entrepreneurs would result in more space flights and more astronauts in orbit than the space plan he inherited. Some members of Congress, particularly those in states that are home to NASA centers working on Constellation, have objected to the change, and the speech did not sway those who have been most vociferously opposed. “There’s no concrete plan, no deadlines to make it happen,” said Representative Pete Olson, Republican of Texas, whose district includes the Johnson Space Center. “It didn’t change my opinion at all.” Mr. Obama’s speech contained few surprises as White House officials previewed it to reporters two days ago. Among the small concessions to critics, Mr. Obama is now proposing to revive the Constellation’s Orion crew capsule as a stripped-down version to use as a lifeboat for the space station. “This Orion effort will be part of the technological foundation for advanced spacecraft to be used in future deep space missions,” Mr. Obama said. Mr. Obama promised $40 million to help retrain workers in and around the Kennedy Space Center who will lose their jobs when the space shuttles are retired. He also stated that NASA would start developing a heavy-lift rocket by 2015, a promise that presumes the president’s re-election in 2012. The tweaks appear to reflect political calculations. Florida and its 27 electoral votes are a likely key battleground in the next presidential election. On board Air Force One with the president on the flight to the Kennedy Space Center were two Democratic members of Congress from Florida: Senator Bill Nelson and Representative Suzanne M. Kosmas, whose district includes the Kennedy Space Center. Representative Sheila Jackson Lee, a Democrat who represents parts of Houston close to the Johnson Space Center, was one of the attendees. Mr. Olson, a Republican, did not receive an invitation to the conference. Whether appeals for loyalty from Democrats would succeed in gaining Congressional support is unclear. NASA has traditionally received strong support from both political parties, and the opposition to Mr. Obama’s plans has also been bipartisan.

Politics – Public & Political Opposition

Lott 11 (Maxim, January 10, FoxNews.com, “To Boldy Go: What Made 400 People Volunteer for a One-Way Mission to Mars?,” http://www.foxnews.com/scitech/2011/01/10/space-volunteer-way-mission-mars/) KA

"There will be tremendous public and political opposition from many members of the public to a mission which can only end in death ... There are people who can do the job, but the question is, will the public let them do it? I think to sell the missions, there has to be at least some chance of the astronauts returning." The journey home Harrison's comments raise an important issue: Why must this be a one-way mission? Why couldn't the brave few come back home? “We prefer the one-way mission as it would drastically reduce costs,” said Dirk Schulze-Makuch, a professor at Washington State University who contributed to the Journal. His plan involves sending supplies to Mars as necessary, but not a return vehicle. "The astronauts would be re-supplied on a periodic basis from Earth with basic necessities, but otherwise would be expected to become increasingly proficient at harvesting and utilizing resources available on Mars. Eventually the outpost would reach self-sufficiency, and then it could serve as a hub for a greatly expanded colonization program."

DA Link—F-22s

Mars funding trades off with F-22s

The Gazette 9 (July 20, “1969 Moon Landing Inspired the World”, http://www2.canada.com/montrealgazette/features/viewpoints/story.html?id=35634321-d468-4a2a-8e26-4712fb5eeab3)CH

But today a new frontier tempts us back to space. This one was proposed by George W. Bush, who is not to be compared with JFK. But the goal Bush proposed - human colonization of Mars - has a certain bold beauty. Many voices are already raised against the idea. "What will we find there?" "We need the money for social programs! For bailouts! For medicare! For tax cuts! For foreign aid! For Homeland Security! ..." "It's just a boondoggle!" And considering the state of the U.S. budget, it's hard to imagine the Mars project getting right now the new funding its advocates want. But there is a way. the U.S. Congress is now squabbling over spending $1.75 billion U.S. to build just seven more F-22 long-range stealth fighters. The Pentagon already has 187 of these high-tech marvels, and even the generals say they need no more. But the contractor, Lockheed-Martin Aeronautics, has artfully arranged to have factories or suppliers in almost every state; congressmen are lining up to protect well-paid aerospace jobs. But what if the Pentagon cut back on various high-tech weapon systems, starting with the F-22, and devoted the money to Mars engineering?  Some of the same defence contractors might well be involved. There might be few losers in the substitution.

Mission Tradeoff

Mars mission trades off resources and priorities for other space programs

Lubell and Heil 10 (November 2, Michael and Martha, Director of Public Affairs American Physical Society Chairman, Dept. of Physics, Media and Government Relations American Institute of Physics, American Physical Society Report “NASA's Moon-Mars Initiative Jeopardizes Important Science Opportunities” <http://www.aps.org/about/pressreleases/moonmars.cfm>) NS 5/26/11

We believe that human exploration also has a role to play in NASA, but it must be within a balanced program in which allocated resources span the full spectrum of space science and take advantage of emerging scientific opportunities and synergies. We further believe that our understanding of the moons and planets of our solar system takes its full significance only within the more global context of a systematic study of nature: from the early universe to the formation of planets around other stars; from the fundamental laws of physics to the emergence of life; from the relations between the sun and the planets to the complex interactions in ecological systems and the impact of humanity on its environment. Returning Americans to the Moon and landing on Mars would have a powerful symbolic significance, but it would constitute only a small step in the advancement of knowledge, since much will already be known from exploration with the robotic precursor probes that are necessary to guarantee the safety of any human mission. 3 The Moon-Mars initiative presents policy makers with a major challenge: how best to implement the vision of the Administration and modify the NASA priorities without destroying the agency’s balanced scientific program that was carefully crafted with strong scientific community involvement. When external factors impose a significant reorientation, it is imperative that NASA not make decisions with undue haste, without serious evaluation of their impacts, and without broad consultation. A number of mechanisms exist to engage the research community in the process, such as NASA advisory committees and the National Academy of Sciences Committee on Astronomy and Astrophysics, but thus far they have received insufficient attention. Although the Moon-Mars initiative began the needed process of addressing the goals and access vehicles for human spaceflight and the future of the International Space Station, we are concerned that the scope of the proposed initiative has not been sufficiently welldefined, that its long-term cost has not been adequately addressed, and that no budgetary mechanisms have been established to limit the potential deleterious impact of the program on other aspects of NASA’s missions. The recent analysis by the Congressional Budget Office suggests that the new initiative may only be possible at the expense of canceling proposed robotic exploration that has a much better scientific justification. We are also concerned that the impact of an ill-defined Moon-Mars program, whose longterm cost is known only to be very large, could affect programs in other science agencies (such as the National Science Foundation and the Department of Energy) through the pressure of the overall budget allocation process or by putting in question inter-agency collaborative projects.

AT: Economic Spin-Offs

Spin-offs are a lie

Rahls 5 (Chuck, science writer @ Physorg.com, “Manned vs. Unmanned Space Exploration (Part 1)”, 11/23/5, http://www.physorg.com/news8442.html) JPG

NASA has gone so far as to create myths about economic spin-offs from manned spaceflight - the general idea being the enormous expense later results in useful technology that improves our lives. Items like Velcro, Tang and Teflon – popularly believed to have come from the space program or invented by NASA. There is only one problem: they did not. Shuttle launches are expensive: very expensive. Francis Slakey, a PhD physicist who writes for Scientific American about space said, “The shuttle’s cargo bay can carry 23,000 kilos (51,000 lbs) of payload and can return 14,500 kilos back to earth. Suppose that NASA loaded the Shuttle’s cargo bay with confetti to be launched into space. If every kilo of confetti miraculously turned into gold during the return trip, the mission would still lose $270 million.” This was written in 1999 when a shuttle flight cost $420 million. Currently, it’s estimated that just the shuttle program average cost per flight has been about $1.3 billion over lifetime and about $750 million per launch over its most recent five years of operations. This total includes development costs and numerous safety modifications. That means each shuttle launch could pay for 2 to 3 unmanned missions.