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#### Commercial Space Race favors American Companies that cements space dominance – shift away endangers our lead – losing green-lights Chinese Dominance across the board.

Autry and Kwast 19 Greg Autry and Steve Kwast 8-22-2019 "America Is Losing the Second Space Race to China" (Greg Autry, a clinical professor of space leadership, policy, and business at Arizona State University’s Thunderbird School of Global Management, and Steve Kwast)//Elmer

America Is Losing the Second Space Race to China The private sector can give the United States a much-needed rocket boost. The current U.S. space defense strategy is inadequate and on a path to failure. President Donald Trump’s vision for a Space Force is big enough. As he said on June 18, “It is not enough to merely have an American presence in space. We must have American dominance in space.” But the Air Force is not matching this vision. Instead, the leadership is currently focused on incremental improvements to existing equipment and organizational structures. Dominating the vast and dynamic environment of space will require revolutionary capabilities and resources far deeper than traditional Department of Defense thinking can fund, manage, or even conceive of. Success depends on a much more active partnership with the commercial space industry— and its disruptive capabilities. U.S. military space planners are preparing to repeat a conflict they imagined back in the 1980s, which never actually occurred, against a vanished Soviet empire. Meanwhile, China is executing a winning strategy in the world of today. It is burning hard toward domination of the future space markets that will define the next century. They are planning infrastructure in space that will control 21st-century telecommunications, energy, transportation, and manufacturing. In doing so, they will acquire trillion-dollar revenues as well as the deep capabilities that come from continuous operational experience in space. This will deliver space dominance and global hegemony to China’s authoritarian rulers. Despite the fact that many in the policy and intelligence communities understand exactly what China is doing and have been trying to alert leadership, Air Force leadership has convinced the White House to fund only a slightly better satellite command with the same leadership, while sticking a new label onto their outmoded thinking. A U.S. Space Force or Corps with a satellite command will never fulfill Trump’s call to dominate space. Air Force leadership is demonstrating the same hubris that Gen. George Custer used in convincing Congress, over President Ulysses S. Grant’s better experience intuition, that he could overtake the Black Hills with repeating rifles and artillery. That strategy of technological overconfidence inflamed conflict rather than subduing it, and the 7th Cavalry were wiped out at the Battle of the Little Bighorn. The West was actually won by the settlers, ranchers, miners, and railroad barons who were able to convert the wealth of the territory itself into the means of holding it. They laid the groundwork that made the 20th century the American Century and delivered freedom to millions of people in Europe and Asia. Of course, they also trampled the indigenous people of the American West in their wake—but empty space comes with no such bloody cost. The very emptiness and wealth of this new, if not quite final, frontier, however, means that competition for resources and strategic locations in cislunar space (between the Earth and moon) will be intense over the next two decades. The outcome of this competition will determine the fate of humanity in the next century. China’s impending dominance will neutralize U.S. geopolitical power by allowing Beijing to control global information flows from the high ground of space. Imagine a school in Bolivia or a farmer in Kenya choosing between paying for a U.S. satellite internet or image provider or receiving those services for free as a “gift of the Chinese people.” It will be of little concern to global consumers that the news they receive is slanted or that searches for “free speech” link to articles about corruption in Western democracies. Nor will they care if concentration camps in Tibet and the Uighur areas of western China are obscured, or if U.S. military action is presented as tyranny and Chinese expansion is described as peacekeeping or liberation. China’s aggressive investment in space solar power will allow it to provide cheap, clean power to the world, displacing U.S. energy firms while placing a second yoke around the developing world. Significantly, such orbital power stations have dual use potential and, if properly designed, could serve as powerful offensive weapons platforms. China’s first step in this process is to conquer the growing small space launch market. Beijing is providing nominally commercial firms with government-manufactured, mobile intercontinental ballistic missiles they can use to dump launch services on the market below cost. These start-ups are already undercutting U.S. pricing by 80 percent. Based on its previous success in using dumping to take out U.S. developed industries such as solar power modules and drones, China will quickly move upstream to attack the leading U.S. launch providers and secure a global commercial monopoly. Owning the launch market will give them an unsurmountable advantage against U.S. competitors in satellite internet, imaging, and power. The United States can still build a strategy to win. At this moment, it holds the competitive advantage in every critical space technology and has the finest set of commercial space firms in the world. It has pockets of innovative military thinkers within groups like the Defense Innovation Unit, under Mike Griffin, the Pentagon’s top research and development official. If the United States simply protects the intellectual property its creative minds unleash and defend its truly free markets from strategic mercantilist attack, it will not lose this new space race. The United States has done this before. It beat Germany to the nuclear bomb, it beat the Soviet Union to the nuclear triad, and it won the first space race. None of those victories was achieved by embracing the existing bureaucracy. Each of them depended on the president of the day following the only proven path to victory in a technological domain: establish a small team with a positively disruptive mindset and empower that team to investigate a wide range of new concepts, work with emerging technologies, and test innovative strategies. Today that means giving a dedicated Space Force the freedom to easily partner with commercial firms and leverage the private capital in building sustainable infrastructure that actually reduces the likelihood of conflict while securing a better economic future for the nation and the world.

#### Appropriation uniquely key for private sector.

**Cheng 20** [Dean Cheng, 09-16-2020, "Outer Space and Private Property," Heritage Foundation, https://www.heritage.org/space-policy/commentary/outer-space-and-private-property]//DDPT

Fully 53 years after the Outer Space Treaty, however, this has begun to change. The success of SpaceX, Blue Origin, Virgin Galactic, and other private companies has led to what has been termed Space 2.0.

The Obama administration’s decision to rely on commercial space-launch services to resupply the International Space Station opened the door to expanding private enterprise’s role in space.

The innovation exhibited in the various Falcon launches, including the ability to reuse the booster rockets, has seen a significant drop in the cost of placing payloads into orbit. As a result, a real opportunity exists for companies to begin thinking about how to use space not simply to improve terrestrial operations, but to make money from space and its physical resources.

The uncertainty associated with private property rights, however, has had a constraining effect on the ability to exploit space more extensively. Companies are unlikely to be willing to risk capital and assets if they are not sure that they will be able to profit from their investments.

#### Public sector space growth undermines innovation necessary to maintain U.S space dominance.

**Beames 21** [Charles Beames, Charles is currently the Executive Chairman of York Space Systems, a leader in commercial satellite design and manufacturing, as well as Chairman of the SmallSat Alliance. He is also a retired Air Force Colonel, having served 23 years in space & intelligence leadership positions around the world, 9-30-2021, Forbes, "It Is Time Our Government Stops Competing Against The Commercial Space Industry", <https://www.forbes.com/sites/charlesbeames/2021/09/30/it-is-time-our-government-stops-competing-against-the-commercial-space-industry/> accessed on 12-21-2021] Adam

* A2 Public sector fill in
* Also works as a link for the innovation DA

With its fiery engines and impressive reusable rockets, SpaceX is the most visible example of the power of private enterprise in space. Every month, SpaceX makes another great leap further into the stars with another launch and often carrying satellites from other companies. Conservative estimates suggest that tens of thousands more are scheduled to be launched over the next five years to perform missions limited to the providence of major nations only a decade ago.

An outstanding example of an agency leveraging corporate R&D rather than spending its own capital is the Space Development Agency (SDA). When devising its strategy to build the nation’s next-generation missile tracking and communication systems, SDA mandated that the satellites hosting the specialized instruments onboard must be built on an off-the-shelf commodity bus already in rate production. SDA has already awarded four successful companies at a fixed price contract with 10 others deemed competitive, which means we can expect that very little development is required.

Every time the government develops their own version of the same technologies, it inhibits the investment and creative thinking necessary for America’s next big play in space. The boldest and most innovative investors and engineers in the commercial sector shy away from space as a business opportunity when the government insists on staying in the ring, because there are no longer the 10-20X multiples on private investment that commercial opportunities in the tech sector can deliver. Institutional investors do still pour capital into traditional defense companies, especially in times of increasing hostilities. Unfortunately for them, however, the valuation multiples on revenue are far lower – about 2X – and only match the pace of government expansion.

We must rethink the policy incentive structure of last century’s space industrial model to reward unbounded free market economic growth instead of companies whose market cap only grows with more national defense spending. Admittedly, there are instances in which it is still necessary for the government to develop their own satellite, component or rocket, but it is increasingly rare.

The U.S. government once again must transition to become a consumer of commercial space goods and services so that America’s space industry outpaces its adversaries. An organic, commercial space marketplace exists now and must be rewarded, not stifled. We are on a tight schedule, because near-peer competitors like China (and others) are aware of this strategic competition and instead choose to [leverage their nascent technologies to outpace us](https://www.forbes.com/sites/charlesbeames/2020/10/14/the-dragon-is-breathing-down-our-neck-action-is-americas-best-weapon/?sh=67a437724cb5).

The role for the government is larger and more strategic than ever before, but it is our capital markets that are our biggest advantage in Great Power competition. We must maximize this strength by encouraging private investments in the new space economy, promoting competition among commercial providers, and not competing against the very technologies we hope to leverage to secure America’s promising future in space.

#### Hegemony solves Extinction.

Ikenberry 20 John Ikenberry 6-9-2020 “The Next Liberal Order: The Age of Contagion Demands More Internationalism, Not Less” <https://www.foreignaffairs.com/articles/united-states/2020-06-09/next-liberal-order> (Albert G. Milbank Professor of Politics and International Affairs at Princeton University and Global Eminence Scholar at Kyung Hee University, in South Korea)//Elmer

The rivalry between the United States and China will preoccupy the world for decades, and the problems of anarchy cannot be wished away. But for the United States and its partners, a far greater challenge lies in what might be called “the problems of modernity”: the deep, worldwide transformations unleashed by the forces of science, technology, and industrialism, or what the sociologist Ernest Gellner once described as a “tidal wave” pushing and pulling modern societies into an increasingly complex and interconnected world system. Washington and its partners are threatened less by rival great powers than by emergent, interconnected, and cascading transnational dangers. Climate change, pandemic diseases, financial crises, failed states, nuclear proliferation—all reverberate far beyond any individual country. So do the effects of automation and global production chains on capitalist societies, the dangers of the coming revolution in artificial intelligence, and other, as-yet-unimagined upheavals. The coronavirus is the poster child of these transnational dangers: it does not respect borders, and one cannot hide from it or defeat it in war. Countries facing a global outbreak are only as safe as the least safe among them. For better or worse, the United States and the rest of the world are in it together. Past American leaders understood that the global problems of modernity called for a global solution and set about building a worldwide network of alliances and multilateral institutions. But for many observers, the result of these efforts—the liberal international order—has been a failure. For some, it is tied to the neoliberal policies that produced financial crises and rising economic inequality; for others, it evokes disastrous military interventions and endless wars. The bet that China would integrate as a “responsible stakeholder” into a U.S.-led liberal order is widely seen to have failed, too. Little wonder that the liberal vision has lost its appeal. Liberal internationalists need to acknowledge these missteps and failures. Under the auspices of the liberal international order, the United States has intervened too much, regulated too little, and delivered less than it promised. But what do its detractors have to offer? Despite its faults, no other organizing principle currently under debate comes close to liberal internationalism in making the case for a decent and cooperative world order that encourages the enlightened pursuit of national interests. Ironically, the critics’ complaints make sense only within a system that embraces self-determination, individual rights, economic security, and the rule of law—the very cornerstones of liberal internationalism. The current order may not have realized these principles across the board, but flaws and failures are inherent in all political orders. What is unique about the postwar liberal order is its capacity for self-correction. Even a deeply flawed liberal system provides the institutions through which it can be brought closer to its founding ideals. However serious the liberal order’s shortcomings may be, they pale in comparison to its achievements. Over seven decades, it has lifted more boats—manifest in economic growth and rising incomes—than any other order in world history. It provided a framework for struggling industrial societies in Europe and elsewhere to transform themselves into modern social democracies. Japan and West Germany were integrated into a common security community and went on to fashion distinctive national identities as peaceful great powers. Western Europe subdued old hatreds and launched a grand project of union. European colonial rule in Africa and Asia largely came to an end. The G-7 system of cooperation among Japan, Europe, and North America fostered growth and managed a sequence of trade and financial crises. Beginning in the 1980s, countries across East Asia, Latin America, and eastern Europe opened up their political and economic systems and joined the broader order. The United States experienced its greatest successes as a world power, culminating in the peaceful end to the Cold War, and countries around the globe wanted more, not less, U.S. leadership. This is not an order that one should eagerly escort off the stage. Any alternative is worse and causes great power war. The major alternatives to a modernized world order supported by the United States appear unlikely, unappealing, or both. A Chinese-led order, for example, would be an illiberal one, characterized by authoritarian domestic political systems and statist economies that place a premium on maintaining domestic stability. There would be a return to spheres of influence, with China attempting to domi-nate its region, likely resulting in clashes with other regional powers, such as India, Japan, and Vietnam, which would probably build up their conventional or even nuclear forces. A new democratic, rules-based order fashioned and led by medium powers in Europe and Asia, as well as Canada, however attractive a concept, would simply lack the military capacity and domestic political will to get very far. A more likely alternative is a world with little order—a world of deeper disarray. Protectionism, nationalism, and populism would gain, and democracy would lose. Conflict within and across borders would become more common, and rivalry between great powers would increase. Cooperation on global challenges would be all but precluded. If this picture sounds familiar, that is because it increasingly corresponds to the world of today. The deterioration of a world order can set in motion trends that spell catastrophe. World War I broke out some 60 years after the Concert of Europe had for all intents and purposes broken down in Crimea. What we are seeing today resembles the mid-nineteenth century in important ways: the post– World War II, post–Cold War order cannot be restored, but the world is not yet on the edge of a systemic crisis. Now is the time to make sure one never materializes, be it from a breakdown in U.S.-Chinese relations, a clash with Russia, a conflagration in the Middle East, or the cumulative effects of climate change. The good news is that it is far from inevitable that the world will eventually arrive at a catastrophe; the bad news is that it is far from certain that it will not.

#### Specifically, solves Nuclear War – shift causes Transition Wars.

Khalizad 16 Zalmay Khalizad 3-23-2016 “4 Lessons about America's Role in the World” http://nationalinterest.org/feature/4-lessons-about-americas-role-the-world-15574?page=show (former U.S. ambassador to the United Nations, counselor at the CSIS)//Elmer

Ultimately, however, we concluded that the United States has a strong interest in precluding the emergence of another bipolar world—as in the Cold War—or a world of many great powers, as existed before the two world wars. Multipolarity led to two world wars and bipolarity resulted in a protracted worldwide struggle with the risk of nuclear annihilation. To avoid a return such circumstances, Secretary of Defense Dick Cheney ultimately agreed that our objective must be to prevent a hostile power to dominate a “critical region,” which would give it the resources, industrial capabilities and population to pose a global challenge. This insight has guided U.S. defense policy throughout the post–Cold War era. Giving major powers the green light to establish spheres of influence would produce a multipolar world and risk the return of war between the major powers. Without a stabilizing U.S. presence in the Persian Gulf and U.S. relationships with Jordan and the Gulf States, Iran could shut down oil shipments in its supposed sphere of influence. A similar scenario in fact played out during the 1987 “tanker war” of the Iran-Iraq war, which eventually escalated into a direct military conflict between the United States and Iran. Iran’s nuclear program makes these scenarios even more dangerous. The United States can manage the rise and resurgence of great powers like China, Russia and Iran at an acceptable cost without ceding entire spheres of influence. The key is to focus on normalizing the geopolitics of the Middle East, Europe and the Asia-Pacific, which the United States can do by strengthening its transatlantic and transpacific alliances and adapting them to the new, dangerous circumstances on the horizon. The United States should promote a balance of power in key regions while seeking opportunities to reconcile differences among major actors.

### Case – Space Wars

#### Turn – aff grows the public sector and space wars are more likely when governments are the only ones with vested interest in space, because they’re the ones with military interests.

#### They don’t solve nuclear tests – there’s no reason launching a nuke into space is appropriation.

#### No nation is going to give a company nukes – it would wreck deterrence, and lead to unimaginable prolif where companies can make demands from nations, and the country would be ostracized in the international sphere.

#### It’s illegal to put nukes in space.

Arms Control Association 20 <https://www.armscontrol.org/factsheets/outerspace#:~:text=The%201967%20Outer%20Space%20Treaty,exploration%20and%20use%20of%20space>. | MU

The 1967 Outer Space Treaty bans the stationing of weapons of mass destruction (WMD) in outer space, prohibits military activities on celestial bodies, and details legally binding rules governing the peaceful exploration and use of space.

#### No space wars --- dependence on space creates a de facto taboo

Triezenberg, 17

Bonnie Triezenberg, Senior engineer at RAND. Previously, she was the senior technical fellow at the Boeing Company, specializing in agile systems and software development. “Deterring Space War: An Exploratory Analysis Incorporating Prospect Theory into a Game Theoretic Model of Space Warfare,” RAND Corporation. 2017. <https://www.rand.org/pubs/rgs_dissertations/RGSD400.html>

The above discussion suggests that a likely means to achieve deterrence of acts of war in outer space is to increase civilian dependence on space to support day-to-day life—if everyone on earth is equally dependent on space, no one has an incentive to destroy space. Largely by accident, this dependence appears to have, in fact, occurred. The space age was born in an age of affluence and rapid economic expansion; space quickly became a domain of international commerce as well as a domain of national military use. Space assets and the systems they enable have transformed social, infrastructure and information uses perhaps more visibly than they have transformed military uses. In fact, in the current satellite database published by the Union of Concerned Scientists, of the 1461 satellites in orbit 40% support purely commercial ventures, while only 16% have a strictly military use.46 The first commercial broadcast by a satellite in geo-synchronous orbit was of international news between Europe and the United States.47 The first telephony uniting the far flung islands of Indonesia was enabled by satellite48. Those of us who are old enough remember the 1960s “magic” of intercontinental phone calls and international “breaking news” delivered by satellite. Today, most social and infrastructure uses of space are taken for granted – even in remote locales of Africa, people expect to be able to monitor the weather, communicate seamlessly with colleagues and to find their way to new and unfamiliar locations using the GPS in their phones. All of us use space every day.49 These unrestricted economic and social uses of space may be the best deterrent, making everyone on all sides of combat equally dependent on space and heightening the taboo against weaponizing space or threatening space assets with weapons.

#### Transparency inevitable ---Nothing slips by in space

--Surprise attacks either fail bc they’re ragged, or are detected bc the enemy has to load a ton of stuff into space

--Launch capacity is international – would have to ask to do it

--Monitoring satellites is easy – as early as 50s elementary school classes saw stuff – remote sensing means we see everything in space or on the ground

--International nonproliferation agreements democratized site monitoring – we can see states interior regions

--Even if no guarantee, uncertainy means no state would risk it

Handberg, 17 – Faculty and Research, School of Politics, Security, and International Affairs, UCF

Roger Handberg, “Is space war imminent? Exploring the possibility,” Comparative Strategy. 2017. <https://www.tandfonline.com/doi/pdf/10.1080/01495933.2017.1379832?needAccess=true>

Second, surprise requires that sufficient offensive space assets be placed in orbit without triggering a response by other states—the scale of such technology deployment is in itself possibly self-defeating given high costs and a likely lack of launch capacity. In addition, much launch capacity is now international rather than national, so maintaining secrecy becomes even more difficult. Space as an operational environment suffers from excessive transparency, meaning any launches can be monitored and tracked by others with strong evidence as to what is being deployed. One must remember that the original satellite launches in the 1950s were accurately tracked by a British grade-school class as a science project. In addition, at least since the early 1960s, remote sensing has increased exponentially the global capability to detect buildup of military assets of differing types, whether in space or on the ground. Commercial remote-sensing capabilities further enhance the capacity to detect militarily relevant actions. For example, commercial imagery is accessed by private parties to monitor the North Korean missile and nuclear weapons programs, in effect expanding the capacity of the world to look in on various states’ interior regions, scanning for relevant information, including weapons buildup and launch capabilities. Even construction of physical facilities for production of space assets or for other weaponry can be monitored, making surprise more difficult but not impossible, as demonstrated in earlier monitoring of North Korea and, in 1998, the nuclear tests by both Pakistan and India. That means if the ASAT weapons come from ground locations, there is a high probability that they can be detected but no guarantee exists that detection will in fact occur. The uncertainty will impact calculations of attack success.

#### Space Wars are not that dangerous—they’ll be robotized and end as soon as communication satellites are taken out. Corporations are specifically key to this peaceful outcome

--space wars have no terrorist groups or failed states

--mostly robotized means few lives lost

--brief because destroying communication satellites ends conflict, also incentivizes states to innovate in a way that reduces casualties

Szoic et al 17-- Szocik, Konrad [Department of Philosophy and Cognitive Science, University of Information Technology and Management in Rzeszow], Tomasz Wójtowicz [Institute of Security and Civic Education, Pedagogical University in Cracow, Podchorążych 2 Street, 30-084 Kraków, Poland], and Leszek Baran [Chair of Internal Security, University of Information Technology and Management in Rzeszow, Poland]. "War or peace? The possible scenarios of colonising Mars." Space Policy 42 (2017): 31-36. <https://doi.org/10.1016/j.spacepol.2017.10.002>. (AG DebateDrills)

Contrary to fourth and fifth generation warfare, space wars will be dominated by nation states and international corporations. Elon Musk, Managing Director of SpaceX, a company dealing with the manufacture of jet engines, carrier rockets, and spaceships, claimed that within the nearest 40–100 years over 1 million people might be sent to Mars. He estimated the cost of one person's reaching the Red Planet at USD 200 million [16]. According to the authors of the Mars one initiative, a sum of USD 6 billion will be needed to send the first four astronauts to Mars [6]. The need to secure such exorbitant funds virtually excludes any entities other than states and international corporations (terrorist groups, criminal organisations or failed states) from participating in space wars. It should be expected that the future space wars will entail an advanced process of conflict robotisation and dehumanisation. The prospective Mars colonisation war may proceed by means of robots – unmanned aerial vehicles. Ender's Game, an American science fiction film dating back to 2013, based on a novel by Orson Scott Card pub- lished under the same title, features scenes presenting such kind of a conflict. The film is set in 2070. The main hero, ten-year-old Andrew Wiggin, is elected leader of the invading fleet, intended to destroy the native world of a foreign life form threatening the Earth. Andrew Wiggin, believing that he is taking part in training, leads the invading fleet and defeats the enemy. The invading forces comprise only un- manned space drones controlled from a secure place [11]. The pro- gressing robotisation and dehumanisation of war will also be influenced by the strategic culture of western countries (the United States) whose societies show limited tolerance to human loss during military conflicts. As stressed by Adrian Lewis in his book The American Culture of War, abolishing the obligatory military service was the most significant change introduced in the 20th century to the U.S. war-fighting model. It triggered the professionalization of armed forces, with a mass army being replaced by mobile troops limited in numbers [14]. Along with the robotisation and dehumanisation, the future space wars should also be expected to be brief. Unless the dispute escalating between the global powers evolves into military activities located in the Earth, the conflict may end soon after the communication satellites of one of the parties are destroyed, or its space station is damaged. Considering the above, the technological arms race between the competing States, aimed at designing, as fast as possible, a weapon which will enable defeating the enemy in the first attack, without any possibility of re- taliation, will prove crucial.

### Case – Colonization

#### 0 ev that a company like space x would be tyrannical – they only say that there wouldn’t be oversight. Independently, they are wrong:

#### 1] Even if a company like Space X opens a colony on another planet, it is still registered as a corporation within the US so it has to answer to US Law. Ie if Space X killed someone at sea they still would be sued in US courts.

#### 2] Shareholders check – no investment would go into a company that is abusing people.

#### 3] Monetary incentives checks – no one will go to space or use spaceX products if they are abusing people.

#### 4] All the people they list were the dictators of states decades ago

#### They also have no uq that space col is happening just that Elon Musk would like it to happen – it costs millions to send a couple people into LEO which was proven by Blue Origin launch so it is decades away at a minimum

#### Space col solves every impact --- only exploration ensures survival

Pelton ‘03(Joseph, Dir – Space and Advanced Communications Research Institute – GWU, 9-12,http://www.space.com/news/commentary\_top10\_030912.html)

Actually the lack of a space program could **get us all killed**. I don’t mean you or me or my wife or children. I mean that Homo sapiens as a species are actually endangered. Surprising to some, a well conceived space program may well be our **only hope for long-term survival.** The right or wrong decisions about space research and exploration may be key to the futures of our grandchildren or great-grandchildren or those that follow. Arthur C. Clarke, the author and screenplay writer for 2001: A Space Odyssey, put the issue rather starkly some years back when he said: “The dinosaurs are not around today because they did not have a space program.” He was, of course, referring to the fact that we now know a quite largish meteor crashed into the earth, released poisonous Iridium chemicals into our atmosphere and created a killer cloud above the Earth that blocked out the sun for a prolonged period of time. This could have been foreseen and averted with a sufficiently advanced space program. But this is only one example of how space programs, such as NASA’s Spaceguard program, help protect our fragile planet. Without a space program we would not know about the large ozone hole in our atmosphere, the hazards of solar radiation, the path of killer hurricanes or many other **environmental dangers**. But this is only a fraction of the ways that space programs are crucial to our future. We rely on space systems for communicating with many parts of the world, for navigating our airplanes, for coping with weather systems, for charting the path of hurricanes and tidal waves, and for monitoring air and water pollution. Right now space scientists and engineers are developing new technology to protect us from **environmental perils**, to alert us to terrorist attacks and to stimulate new industries that actually create new jobs. Cheap energy, essential to sustaining modern life, may very well have to come from space-based energy systems. Every dollar NASA spent on developing the communications satellites industry has put back more than $25 into the economy. It is important for citizens to know that the lack of a space program may truly imperil generations to come. Many people have said the time has come to re-evaluate our space programs, define a new vision and articulate new goals in space. These people are dead right. The time for a major review is indeed now. It is time for everyone to know and understand the ways that space programs are **absolutely critical for solving the largest problems** that all people living on our planet now face. NASA Administrator Sean O’Keefe and President George W. Bush are welcome to share this list with the American people and members of the U.S. Congress who ask, “why do we need a space program?” Prevention of environmental disaster: Remote sensing satellites allow us to monitor the ozone hole, global warming, **air, water and ocean pollution**, the effect of **oil spills** on the melting of the ice caps, the **loss of rain forests** and other environmental threats to human survival. These systems can help us trace our recovery from the worst environmental threats and improve our quality of life. Creating a global network for modern communications, entertainment and networking: Advanced satellites provide global connectivity by means of the telephone, fax, the Internet, radio and television extend far beyond the reach of fiber optic cables. Eleven thousand television channels are now available via satellite and well over 200 countries and territories are linked via satellite. Global education and health services: Over 2 billion of the 6 billion people in our world today lack formal educational systems, health care services, potable water or power. The only way to provide global education and health care services in coming decades at reasonable cost and broad coverage is via space-based communication systems. Socrates once said, “there is only one good — knowledge, and only one evil -- ignorance.” In an age of terrorism and great intolerance the need for global education is ever more important. Cheap and environmentally friendly energy: NASA scientists and engineers already have gone a long way to develop space technology that can provide unlimited low cost energy from space. The operational systems, however, still need to be developed and proven in practice. Transportation safety: The 6,000 commercial airplanes that are aloft at one time during peak periods in the U.S. depend on satellite navigation for safe operation. New systems can provide better fuel efficiency, earlier warnings of safety hazards and alert of terrorist attack. This is but one of the ways that future space systems can provide greater transportation safety in decades to come. Emergency warning and recovery systems: **The ability to warn populations of pending dangers** from hurricanes, monsoons, tidal waves, fires and earthquakes are increasingly dependent on space-based systems. Further rescue operations, from emergency communications to disaster assessment to recovery operations, are dependent on satellite networks as well. Protection of our information networks from cyberterrorists: Many of our current electronic information networks that control transportation systems, energy grids, banking systems and governmental databases are vulnerable. Public Key Infrastructure systems are in need of upgrade. New types of security systems based on GPS location and encryption systems are dependent on space-based systems. National defense and strategic security: Space has been called the high frontier. **National security systems** are increasingly based on smart technologies and instruments that operate in outer space. Ever since Operation Desert Storm, military operations are based heavily on space systems and future systems will be even more so. **Protection against catastrophic planetary accidents**: It is easy to assume that an erratic meteor or comet will not bring destruction to the Earth because the probabilities are low. The truth is we are bombarded from space daily. The dangers are greatest not from a cataclysmic collision, but from not knowing enough about solar storms, cosmic radiation and the ozone layer. An enhanced Spaceguard Program is actually a prudent course that could save our species in time. Creation of new jobs and Industries -- a new vision for the 21st century and a mandate to explore truly new frontiers: Most of the economically advanced countries such as Japan, Canada, Australia and Europe, not to mention China, India and Russia, use their space programs to **stimulate their economy**, expand their educational and health care networks, improve their agriculture, upgrade their information networks, enhance their entertainment networks and create new jobs. In this respect the U.S. space program now spends precious little of its resources in these areas, but it once did and it could again. These are only some of the ways that space programs could help create a better future for generations yet to come, but it is an impressive list that impacts every American. Space is actually our future. Some would argue that space is the next great step forward for a pioneering nation that sees the need for advancement and discovery. In Nebraska a historical display dedicated to the pioneers that went out West notes that the cowards stayed home but the brave died seeking a better tomorrow. Now is the time to assess our values and our aspirations.