

Space Warfare Foolosophy: Should the United States be the First Country to Weaponize Space?

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“... The present extent of US dependence on space, the rapid pace at which this dependence is increasing and the vulnerabilities it creates, all demand that US national security space interests be recognized as a top national security priority.”

The Commission to Assess United States National Security Space
Management and Organization¹

Space militarization—the development of space assets for military uses—has become profoundly embedded in the United States (US) military, but the debate over weapons in space rages. This article addresses space weaponization—the placement of weapons in space for the intended use from space to space or space to earth. Specifically, the article proposes that although space weaponization may be inevitable sometime in the distant future, the US does not have to pursue such a policy for quite some time.² Whether one believes that space should be viewed as a sanctuary or a battleground, China and North Korea have already considered this altruistic proposition and dismissed it in favor of a number of counterspace capabilities. This article does not dispute the need to defend US space interests, it simply suggests that there are other alternatives to countering aggression in space. As such, this is an attempt to answer one of the most controversial space policy issues of our time: should the United States be the first country to put weapons in space or can it afford to be second?

The main hypothesis explored is that space weaponization, although inevitable in the distant future, may not be the most appropriate means of protecting US space vulnerabilities in the near term. The article presents evidence that supports the idea that the US does not have to pursue the extreme policy of placing weapons in space and reveals the primary reasons for this assertion by focusing on three main areas. First, the article analyzes US military and civilian reliance on space. Understanding this dependence helps reveal the US vulnerability to attack. Second, it assesses the threat to US commercial and military space activities. Lastly, it explores of the alternatives to weapons in space. Again, although this article does not dispute the inevitability of space weaponization in principle, it simply intends to prove that the US can afford to be second. In fact, it is proposed that the US, for a variety of reasons that will be revealed later, will most likely not be the first country to weaponize space.

The Vulnerability that Stems from Dependence

The United States depends on spacepower to accomplish its national objectives. According to the *Report of the Commission to Assess United States National Security Space Management and Organization*, “the US is more dependent on space than any other nation.”³ Space exploitation may have started primarily, if not entirely, for military purposes (surveillance and reconnaissance), but in the forty plus years since the launch of Sputnik, space activities have evolved to include commercial endeavors. As such, US national objectives in space are not solely focused on military activities such as the weaponization of space. The US two-fold

reliance on space has to be viewed in both the military as well as economic realms. Nonetheless, just as on land, sea, or air, few would argue that the military bears the ultimate responsibility for defending US national interests, even in space. The point here is that the military means should not be considered before the political ends.

One of the most accepted dictums on the subject is that “war is merely the continuation of politics with other means.”⁴ Carl von Clausewitz, in *On War*, proclaimed that war is the means for reaching political ends and, as such, it should not be considered in isolation from its purpose.⁵ Although space exploitation began as a venture solely concerned with military applications, the United States and other have diversified their space activities over time. Beyond the military utility of space resources exists a much more encompassing reality: space assets, in general, have become a critical element of the American way of life. Although initial space activities had primarily a national security purpose, recently, “commercial space activity has grown to the point that it is considered the largest and most important space sector.”⁶ In the age of globalization, space commerce will play a major role in international affairs.

In 2000, for example, global space business generated revenues of \$30 billion a year; Wall Street projections predict this industry to grow to about \$175 billion by 2006.⁷ A big portion of the commercial space market stemmed from military requirements. What began as a military only venture has grown into a multi-billion dollar commercial industry that is built upon the dual nature of space. Admittedly, isolated countries, such as North Korea, have not invested heavily in space commerce. But space commerce is a growth industry in the developed world and a potentially lucrative business venture in the developing world.

One example of the dual quality of space is the Global Positioning System (GPS), a global utility that has become an accepted part of civil and military everyday life.⁸ GPS, like many satellites, is quite vulnerable to attack and a committed foe could affect GPS operations at a global and/or regional scale.⁹ Disruption or degradation of GPS timing could not only affect military activities, but it can also disable digital communications, such as cellular phones and pagers, power distribution systems, and a large part of the global financial network, including automatic teller machines (ATMs). Additionally, a more damaging attack on the GPS infrastructure could endanger the maritime shipping and commercial aviation that use GPS for navigation.¹⁰ In other words, although most military strategists are well aware of the vital importance of GPS in the “rapid prosecution of precision warfare,” they tend to neglect the civilian applications of this global utility.¹¹

In most modern societies, commercial interests often influence national objectives.¹² “Today, some 30 nations operate roughly 550 satellites in Earth orbit. Another 1,000 to 1,500 satellites—worth \$500 billion—are expected to go into orbit over the next five years.”¹³ Peter Hays, an accomplished writer argues that the most significant factor fueling space commercial growth is the booming international digital communications market. Supporting Hays’ argument, Diane Steinour, of the US Department of Commerce, attributes forty percent of US productivity growth between 1995 and 2002 to Information and Communication Technology (ICT).¹⁴ Steinour adds that China’s ICT growth accounts for six percent of its GDP. The rapid expansion in the digital domain created a dependence on a global utility, and as demonstrated earlier, with dependence comes vulnerability. In the end, if space becomes the next battlefield, the US has the most at

stake; after all, it controls 80% of the global space budget.¹⁵

The Threat

The ever-increasing dependence on space as a common good makes it an attractive target to those who would like to harm US national interests. This view is verified by the 1998 National Air Intelligence (NAI) report, *Threats to US Access to Space* that suggests that there are three judgments that provide insight to the concern over US space assets' vulnerability:

- *The US military depends on national and commercial space systems of both domestic and foreign (or international consortia) origin. Offensive operations to disrupt or deny access to these systems could seriously affect US warfighting capabilities*
- *Space systems are potentially susceptible to offensive counterspace operations.*
- *Potential adversaries could challenge US access to space by taking advantage of a range of offensive counterspace capabilities within their technological means. These offensive capabilities could include: denial and deception, ground station attack and sabotage, electronic attack, and direct attack on the satellites themselves.*¹⁶

The threat becomes all the more real when one couples the potential counterspace activities described in the third point of the NAI segment above with the actual capabilities of two potential foes, China and North Korea.¹⁷

According to the latest DOD report on Chinese military capabilities, the People's Republic of China (PRC) views the need for counterspace capabilities as inevitable.¹⁸ The PRC, according to Theresa Hitchens, is the only other country in the world that is engaged in a political-military debate on the value of space weaponization.¹⁹ Part of what makes China the most likely near term competitor for the United States is the extreme uncertainty that surrounds the Chinese space program. According to the DOD's 2004 report on Chinese military capabilities, the PRC realizes that the US is so dependent on space and, thus, it remains interested in counterspace capabilities that can deny or degrade America's ability to react to a PRC-Taiwan conflict.²⁰ Paradoxically, the mystique of Chinese intentions makes space derived intelligence, surveillance, and reconnaissance (ISR) one of the few ways that the US can assess the progress of PRC space weapons.²¹ China recognizes this paradox and has taken steps to bolster its counterspace capabilities.²² A July 2000 article by Yang Hucheng, a Chinese defense analyst, supports this assertion. Hucheng suggests "for countries that can never win a war with the United States by using the method of tanks and planes, attacking the U.S. space system may be an irresistible and most tempting choice. Part of the reason is that the Pentagon is greatly dependent on space for its military action."²³

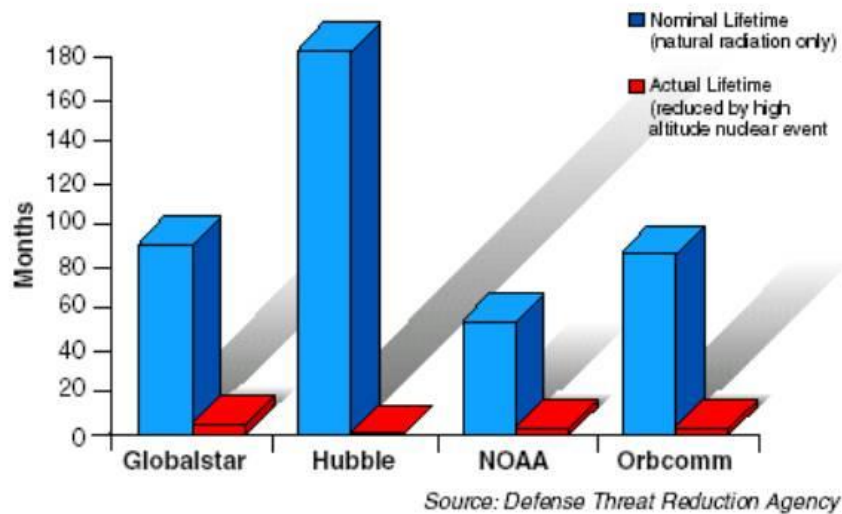


Figure 1. The impact of a 10-kiloton nuclear detonation in LEO²⁴

Although China appears to be the United States’ most likely foe in space, the threat from North Korea is often associated with a more dangerous counterspace scenario. According to the Space Commission Report, the most terrifying and potentially destructive scenario involves a nuclear detonation in Low-Earth-Orbit (LEO).²⁵ Figure 1 depicts the impact of a nuclear detonation on the lifetime of satellites. According to the Defense Threat Reduction Agency, such a detonation would impact satellite operations for months. The report adds, that North Korea possesses the capability to place a nuclear device in space. Although this scenario is without a doubt the most dangerous course of action for a number of opponents with similar capabilities to that of North Korea, it is also the least likely. This is primarily because of the widespread space destruction that would affect not only the US but also some governments that North Korea cannot afford to alienate, namely the PRC who is North Korea’s largest trading partner.²⁶

Recommended US Response to the Threat and the Dilemma of Space Weaponization

In space, as is the case with any other medium, the political object that drives military activities is the requirement to protect US national interests. Historically, the US is often unwilling to radically change established policies until a catastrophic event galvanizes public support that offsets the political aversion to take the political risks associated with change. According to the Space Commission Report, “whether at Pearl Harbor, the killing of 241 US Marines in their barracks in Lebanon or the attack on the USS Cole in Yemen—if the U.S. offers an inviting target, it may well pay the price of attack.”²⁷ The report goes on to suggest that US space assets present a lucrative target for a “Space Pearl Harbor.”²⁸ Although the report accurately assesses the threat and the potential consequences of inaction, it fails to differentiate between the political setting prior to and after a “Pearl Harbor” style attack, something that triggers a significant policy change.

A more recent example that demonstrates the different political landscaping prior to and after a trigger event is the September 11, 2001, al’Qaeda sponsored attacks on the World Trade Center

(WTC) and the Pentagon. Prior to 9/11, al'Qaeda had sponsored attacks on the WTC (1993), two US embassies in Africa (1998), and an attack that almost sank the *USS Cole* in Yemen (2000).²⁹ Although the US took some action against al'Qaeda in response to these attacks, it did not radically change its policy.³⁰ It remained reactive rather than preemptive until after al'Qaeda dealt an attack that dwarfed all of its previous actions. The attacks on 9/11 represented a 2001 version of the 1941 Japanese attack on Pearl Harbor. Although the President George W. Bush has adopted a more "preemptive" approach to national security than past administrations, Bush did not start his Presidency with preemption in mind. Most indications suggest that this shift in national policy did not occur until a trigger event, namely the 9/11 terrorist attacks, acted as a catalyst for change. The United States military participated in several interagency "vulnerability to terrorist attack" assessments prior to 9/11 but it lacked the political will to take action until after the trigger event.³¹ Similarly, regardless of what the Space Commission Report may warn, the US is not likely to breach the "sanctuary of space" until a "Space Pearl Harbor" occurs.

Until recently, the US had limited its space contribution to two mission areas: *space support* and *space force enhancement*.³² In other words, space assets have historically supported terrestrial warfighting activities. Today, or in the near future, space may still become the next battleground. It is suggested here that rather than considering a radical change to existing space policy—such as being the first country to put weapons in space—the US should pursue a space policy that seeks to counter the space threat by less extreme means. Such a policy cannot rely solely on the military to solve the space vulnerability conundrum. It is proposed that a new comprehensive national space policy is required to counter the threats presented by the Space Commission Report. Such a policy would need to harmonize the diplomatic, economic, informational, and military instruments of national power (IOPs).³³

The growing importance of commercial space activities emphasizes the need for a foreign policy that addresses US space concerns. This strategy must account for the economic realities of civil investment in space and employ a combination of economic incentives and diplomatic treaties that foster an environment of international good sense that, at minimum, delays the introduction of space weapons. In addition to promoting private sector activity in space (commerce), the US must also exercise world leadership in advancing a foreign policy that promotes the positive nature of peaceful, commercial activities in space.³⁴ This policy should also openly oppose and discourage the weaponization of space by building international consensus via a United Nations sponsored treaty that formalizes these initiatives. Such an endeavor would counter Chinese assertions, shared by other countries around the world, that the US is "a hegemonist [sic] with a tendency to bully others."³⁴

A good first step in this approach is President George W. Bush's announcement that promotes peaceful space exploration.³⁶ The President's comments on potential manned-missions to the moon and Mars received much coverage, but most reporters failed to notice the new space initiatives are also part of a diplomatic scheme to internationalizing space exploration.³⁷ The benefit of internationalizing this project is three-fold. First, it reaffirms the US commitment to the International Space Station (ISS), a symbol of international space cooperation. Second, it highlights the collateral, often unintended, advances that evolve from space technologies that every human on earth enjoys.³⁸ Finally, new initiatives targeting the space exploration of the Moon and Mars can provide the basis for international teamwork for the next decade, thus

continuing cooperation well beyond the ISS. While there may be collateral or even planned military benefits from the lunar and Mars missions, the most recent efforts highlight the spirit of international cooperation and peaceful exploration.

On the economic front, the US should encourage the continued growth of US and foreign commercial space ventures but improve its commercial satellite launch capability. Although the US government has served as the primary launch mechanism for many US companies, it will have to compete with US and foreign civilian ventures in the near future.³⁹ Additionally, the military should join NASA and the commercial sector to develop mechanisms that protect against any tampering by potential foes. These initiatives should include US government subsidies for the fielding of satellite threat warning systems that detect laser, directed energy, or kinetic energy attacks as well as for the electronic hardening of commercial satellites.⁴⁰ Ultimately, the relationship between the space industry and the US military should be symbiotic. The military needs to help the commercial sector pay for some of the measures that will eventually protect commercial satellites in the near future. By shouldering part of the burden, the US government keeps the cost of putting a satellite in orbit.

Finally, the US military should focus on space control short of space weaponization.⁴¹ According to Benjamin Lambeth, “the initial requirement for developing such a capability is simply better space surveillance, the sine qua non of any would-be space control regime.”⁴² Based on earth- or space-based ISR platforms the US should develop a system of monitoring and identifying any potential enemy actions that threaten US space assets. Once identified, the political leaders will have to make the decision of whether or not to strike back. For now, the US will most likely have to depend on existing or near future USAF capabilities to achieve kinetic and/or non-kinetic effects against any would be adversary.⁴³ The point here is that the US can rely on earth to space or earth-to-earth counterspace capabilities for a fraction of the cost of weaponizing space.

In lieu of a race towards the weaponization of space the US should develop a space strategy that harmonizes all of the national instruments of power. Diplomacy, coupled with sound economic and military policies, will be able to secure US national objectives without having to spend an enormous amount of money on a project that will remain fiscally unapproachable until a Pearl Harbor-like-event can make it a political imperative. Once another country weaponizes space, the US will most likely have to put weapons in space, but if and when that happens, the US will be in a better economic position for not having pursued space weapons first.

Diplomatically, the US can claim the high moral high ground that it was not the first country to weaponize space. Economically, the close relationship between commercial and military industry, cultivated over years of cooperation and spurred by the mutual vulnerability to the external threat, will react quickly in accordance with the old adage: necessity is the mother of invention.⁴⁴ Finally, if adversaries develop, field, and employ weapons in space, it will not be for at least twenty years.⁴⁵ In the meantime, military space control measures and joint ventures with other agencies, such as NASA, the National Reconnaissance Office (NRO), civil missile and space industry, and scientific ventures with other governments can prepare the military to take small steps towards developing the technology required to take the huge leap of weaponizing space, but stopping short of taking the plunge. That most likely means that US terrestrial armed forces will be increasingly used in support of military space operations, but it does not mean that

the US needs to put weapons in space.

In the end, the question of whether or not to weaponize space is, at its most basic level, a political issue. Space evangelists who focus on the means—in this case, space weapons—without first considering the political ends are preaching a space *foolosophy* that is impractical and inappropriate. As the former Chief of Staff of the Air Force General Mike Ryan put it in a newspaper interview, “I don’t think you’ll see us moving real fast until some threat occurs—a huge threat, a threat that makes a big dollar difference. Then you’ll see a shift in policy.”⁴⁶ The US policy towards putting weapons in space will not change until *after* a “Space Pearl Harbor” occurs. Few would argue that, one-day, the US will put weapons in space. But with a sound space policy that properly prepares the US for the eventual transition to weaponizing space, the US will be ready for the challenge when it comes.

Notes

1. The Commission to Assess United States National Security Space Management and Organization, *Report of the Commission to Assess United States National Security Space Management and Organization*, 11 January 2004, accessed on 18 January 2004, available on line: <http://www.fas.org/spp/military/commission/report.htm>, p. 99. This document will be henceforth referred to as the Space Commission Report.
2. For the purposes of this essay, near future is defined as the next twenty years. This distinction parallels Joint Vision 2020 (Published by: US Government Printing Office, Washington DC, June 2000), in the sense that a twenty year timeframe represents the tangible near future.
3. The Space Commission Report, p. 18.
4. Clausewitz, Carl, Von, *On War*, edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), p. 87.
5. *Ibid.*
6. Hays, Peter, L., et al, “Spacepower for a New Millennium: Examining Current US Capabilities and Policies,” essay in *Spacepower for a New Millennium: Space and U.S. National Security*, edited by Peter L. Hays et al, (New York, McGraw-Hill, 2000), p. 7.
7. Worden, Simon, P., “Space Control for the 21st Century: A Space Navy Protecting the Commercial Basis of America’s Wealth,” essay in *Spacepower for a New Millennium: Space and US National Security*, p. 226.
8. GPS is an example of a project that originally arose out of military requirements but has grown to an important global utility. For information on the use of space see Worden, pp. 225-238.
9. An Electro-Magnetic Pulse, produced by a high altitude nuclear detonation, instantly could affect satellite operations at a global scale. Attack on specific satellites or jamming of satellite

signal can have significant regional impact.

10. *Ibid*, p. 228.

11. Rip, Michael R. and Hasik, James M., *The Precision Revolution: GPS and the Future of Aerial Warfare*, (Annapolis, Md: Naval Institute Press, 2002), p. 13. In terms of military uses of GPS see pp. 191-305 (particularly useful are the examples of GPS capabilities in actual combat: Operation Deny Flight, pp. 221-232; for GPS weapon systems particulars see pp. 233-275; for GPS and Electronic Warfare see pp. 276-305).

12. *The National Security Strategy of the United States of America*, September 2002, pp. 17-18, also available on line: <http://www.whitehouse.gov/nsc/nssall.html>. The National Security Strategy argues, “We will promote economic growth and economic freedom beyond America’s shores...we want our allies to have strong economies for their own sake, for the sake of the global economy, and for the sake of global security.” In other words, not only does the US recognize that commercial interests have international implications, it actively pursues a strategy of promoting and, in some cases, securing economic growth. Although this point is admittedly controversial when considering autocratic regimes such as North Korea, the author contests that North Korea is the exception rather than the rule among the community of nations with interests in space or with capabilities to reach space. More on North Korea later in the essay.

13. Inwegen, Earl, S. ,Van, “The Air Force Develops an Operations Organization for Space,” essay in *The US Air Force in Space: 1945 to the Twenty-first Century*, edited by R. Cargill Gall and Jacob Neufeld, 1995, quoted in Hays (2000), p. 11; The European Satellite Navigation System Galileo, news release, 10 May 2004, accessed 8 Aug 2004, available on line: http://www.space.eads.net/web1/press/press_release.asp?langue=en&id_tree=295&id_tree_nav=273. For example, just the European “Galileo” satellite constellation project (Europe’s answer to the US GPS constellation) is scheduled to add 30 satellites by 2008.

14. Diane E. V. Steinour, Trends in Telecom Development Globally: A Perspective From Washington, briefing, 10 Mar 2004, accessed on 9 August 2004, available on line: http://www.its.bldrdoc.gov/meetings/art/art04/slides04/ste_d/ste_d_slides.pdf.

15. Silverman, Shelly, “China Launches Manned Spacecraft,” article on *NewsHour with Jim Lehrer*, 15 October 2003, accessed on 19 January 2004, available on line: http://www.pbs.org/newshour/extra/features/july-dec03/china_10-15.html.

16. Air Force Space Command, *Strategic Master Plan FY04 and Beyond*, 5 November 02, accessed 18 January 2004, available on line: <http://www.peterson.af.mil/hqafspc/library/AFSPCPAOffice/Final%2004%20SMP—Signed!.pdf>, p. 5.

17. According to Air Force Doctrine Document (AFDD) 2-2, Space Operations, 27 November 2001, pp. 12-13, “counterspace operations consist of those operations conducted to attain and maintain a desired degree of space superiority by allowing friendly forces to exploit space capabilities while negating an adversary’s ability to do the same...Offensive counterspace

operations preclude an adversary from exploiting space to his advantage.... Defensive counterspace operations preserve US/allied ability to exploit space to its advantage via active and passive actions to protect friendly space-related capabilities from enemy attack or interference.”

18. US Department of Defense, “Report to Congress Pursuant to the FY2000 National Defense Authorization Act, Annual Report On The Military Power Of The People’s Republic Of China,” July 28, 2003, p. 32. quoted in Theresa Hitchens, *Developments in Military Space: Movement toward space weapons?*, October 2003, accessed 17 January 2004, available on line: <http://www.cdi.org/pdfs/space-weapons.pdf>, p. 7. Referenced hence forth as Annual Report on Chinese Military Power); and *FY 04 Report to Congress on PRC Military Power*, 2004, accessed 10 Aug 2004, available on line: <http://www.globalsecurity.org/military/library/report/2004/d20040528prc.pdf>.

19. *Ibid.* For an analysis of the political reasons behind a Sino-US conflict see William C. Martel and Toshi Yohsihara, “Averting a Sino-US Space Race,” article in *The Washington Quarterly*, Vol. 26, No. 4, Autumn 2003.

20. 2004 Report on PRC Military Capabilities, p. 14.

21. China is a closed society that makes intelligence gathering a difficult proposition. The US depends on space and airborne asset intelligence to make its intelligence assessment of the Chinese orders of battle (air, land, sea, electronic, and space). Chinese sensitivity and aversion towards US intelligence gathering efforts was evident by the handling of the 1 April 2001 intercept of a US EP-3 by a Chinese F-8 fighter off the coast of Hainan island. The mid-air collision resulted in an international incident, which was resolved with the release of the 24-person crew of the US reconnaissance aircraft. Of note, the Chinese used the incident as an excuse to request an increase in the PLA defense budget. For more on the incident see Carter M. Yang, “To Support and Defend 100 Days: Foreign Policy and National Defense,” report presented on *ABC Nightline*, 24 April 2001, accessed on 17 January 2004, available on line: http://abcnews.go.com/sections/nightline/DailyNews/100days_foreign.html. For information on the increase in the budget, see Richard Sale, “Analysis: PLA Drives Crisis,” United Press International, 10 April 2001, available on line: <http://www.globalsecurity.org/org/news/2001/010410-aries5.htm>. For more on closed society see Paula Wolfson, “Congress-Defense-China,” report on ABC Dateline, 6 September 1999, accessed on 17 January 2004, available on line: <http://www.globalsecurity.org/wmd/library/news/china/1999/990609-prc1.htm>.

22. For more on China’s counterspace capabilities see Mark A. Stokes, *Chinese Strategic Modernization: Implications for the United States*, research paper (Carlisle, Pa: Strategic Studies Institute, 1999), accessed 11 January 2004, available on line: <http://www.fas.org/nuke/guide/china/doctrine/chinamod.pdf>.

23. Wang Hucheng, “The US Military’s ‘Soft Ribs’ and Strategic Weaknesses,” Beijing Xinhua Hong King Service, 5 July 2000, quoted in Hitchens, p. 7.

24. *Ibid.*

25. The Space Commission Report, p. 21.

26. Snyder, Scott, and Kim, Ah-Young, Comparative Connections, paper prepared for the Pacific Forum of the Center for Strategic International Studies (CSIS), July 2003, accessed on 19 January 2004, available on line: http://www.csis.org/pacfor/annual/2003_report.pdf, especially pp. 8-9. Snyder and Kim report that China is believed to provide over 70% of North Korea's energy needs and accounts for 30% of North Korea's total trade which is estimated at \$2.23 billion.

27. The Space Commission Report, p. 22.

28. *Ibid.*

29. Schulz, Richard, H, Jr., "Nine reasons why we never sent our Special Operations Forces after al Qaeda before 9/11," article found in *The Weekly Standard*, 26 January 2004, Vol. 9, issue 19, accessed 18 January 2004, available on line: <http://24.104.35.12/Content/Public/Articles/000/000/003/613twavk.asp>.

30. The author considers the post-9/11 invasion of Afghanistan, Iraq, and launch of the Global War on Terrorism (GWOT) as "radical changes" to US national policy.

31. Koskinas, Ioannis, Major, USAF, 20 January 2004. The author speaks from personal experience as a Special Operations planner for 12 years. Admittedly, the human toll of the 9/11 attacks, almost 3,000 people, had a significant influence on the President's decision to shift to a preemptive US National Security policy. The loss of a satellite or satellite system, although hugely expensive, it will not cause the same visceral reaction as the 9/11 attacks. Nonetheless, such an act may cause the US administration to reconsider its position on placing weapons in space, something that most would consider an act of preemption.

32. Lambeth, p. 97. Lambeth defines space support as "the launching of satellites and day-to-day management of on-orbit assets that underpin military space operations." To Lambeth, space force enhancement incorporates all space operations aimed at increasing the effectiveness of terrestrial military operations.

33. This essay does not address the "informational" instrument of power individually, but rather incorporates it within the other IOPs.

34. DeBlois suggests that "the leading countries of the world ... would be the most credible advocates of a space compact to ban space weapons as a first step toward perpetual peace." Found in DeBlois, p. 50.

35. Bin, Yu, *United States—China Relations and Regional Security After September 11*, paper prepared for the Pacific Forum-CSIS, April 2002, Issues and Insights No. 2-02, accessed 18 January 2004, available on line: http://www.csis.org/pacfor/issues/0202_full.pdf, p. 3.

36. For specifics see the White House press release, accessed on 18 January 2004, available on

line: <http://history.nasa.gov/SEP%20Press%20Release.htm>.

37. *Ibid*, also see the 17 January 2004 comments made by Shawn O’Keefe, accessed on 19 January 2004, available on line: <http://www.uspolicy.be/Article.asp?ID=1051A3A2-0E5B-4EF3-BBCC-5D8A3A3A0194>. Mr. O’Keefe is the NASA Administrator. According to this article, O’Keefe argues that space exploration offers an opportunity for cooperation between countries such the US, Russia.

38. *Ibid*, the POTUS used a number of examples to illustrate his point. Some of these technologies are: the image processing used in CAT Scanners and MRI technology in hospitals worldwide came from technology developed to computer-enhanced pictures of the Moon for the Apollo programs and Fetal heart monitors were developed from technology originally used to measure airflow over aircraft wings. For more examples see original press release.

39. Some examples of such ventures: Ariadne 5 (Europe), Sea-Launch system (Boeing, USA), Christmas Island Launch Facility (Australia). For more on this another similar initiatives see: Space Technology, available on line: <http://www.space-technology.com/projects/index.html>.

40. The commercial sector, whose profit margins often outweigh or at least justify the risk, are often not willing to invest in protection technology, even if the military demonstrates the danger. A good example of this is presented in Michael V. Smith, “Ten Propositions Regarding Spacepower,” thesis, (Maxwell AFB: School of Advanced Airpower Studies, June 2001), p. 24. Major Smith comments on a conversation between Major General Lance Smith and a satellite company executive during Exercise Schreiber 2000. The executive is quoted saying: “protection? That’s what insurance for.” Also see Lambeth, p. 104.

41. According to JP 1-02, space control refers to: combat, combat support, and combat service support operations to ensure freedom of action in space for the United States and its allies and, when directed, deny an adversary freedom of action in space. The space control mission area includes: surveillance of space; protection of US and friendly space systems; prevention of an adversary's ability to use space systems and services for purposes hostile to US national security interests; negation of space systems and services used for purposes hostile to US national security interests; and directly supporting battle management, command, control, communications, and intelligence. See also combat service support; combat support; negation; space; space systems.

42. Lambeth, p. 109.

43. The options available include bombing of uplink/downlink or relay stations, computer network attack of the same, etc. *Ibid*, pp. 110-112. In particular pay attention to p. 111. Lambeth discusses the “negation” mission area.

44. A good example of this adage is the evolution of the P-51 Mustang during WWII. The changes from the P-51A in 1941, an aircraft that would not perform well at high altitude (above 11,800 ft), to the P-51D in 1944, the aircraft that won the air war over Europe, were nothing short of extraordinary. Again, necessity was the mother of invention but to be fair, one could

argue that WWI is full of examples of when this adage does not work. Years of trench warfare (necessity) did not bring about any speedy inventions that stopped the slaughter. Courtesy of SAASS 627, with Dr. David Mets.

45. Lambeth, p. 119. Also see Karl P. Mueller, Totem and Taboo: Depolarizing the Space Weaponization Debate, 8 May 2002, accessed on 16 January 2004, available on line: <http://www.gwu.edu/~spi/spaceforum/TotemandTabooGWUpaperRevised%5B1%5D.pdf>.

46. "If Ordered, AF Ready to Arm Space," San Antonio Express-News, 11 May 2001, quoted in Lambeth, p. 119.

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