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ABSTRACT: *A strategy to safeguard United States' space assets is needed. Deterrence strategies, like Cold War nuclear deterrence, are often recommended. Nuclear deterrence history reveals that deterrence through dominance is what early strategists employed. Both Cold War adversaries attempted repeatedly to gain the lead in nuclear weapons. Seeking short term advantages activated the security dilemma and both sides responded in kind, guaranteeing an arms race. The faulty logic of the security dilemma was that the next advantage would bring security. This did not happen and illustrated how mutual vulnerability resulted from long term and determined opposition. That condition exists to this day, made bearable by agreements and procedures that reduce fear through increased transparency and verification.*

The 2001 Space Commission Report identified the threat of a "Space Pearl Harbor" and called for military solutions, including denying space to adversaries. This set United States' space policy on a course to repeat the Cold War mistake of seeking deterrence through dominance.

The United States' best option is to abandon space deterrence through dominance strategies and accept the inevitable end state of mutual vulnerability and thereby avoid engaging in a space arms race. A cooperative legal framework with transparency to assuage fear is the best policy, not because of an idealistic view of benevolent human nature, but because that will be the end result in the long run even after great effort and expense to dominate space.

"I DO BELIEVE THAT MAN'S WISDOM IN AVOIDING WAR IS OFTEN SURPASSED BY HIS FOLLY IN PROMOTING IT."[1]

Space capabilities are vital to the United States. It is critical, therefore, for the United States to develop an effective long term strategy to safeguard assets in space. Deterrence strategies based on the Cold War example are often discussed as a model for space. Examining the evolution of nuclear deterrence reveals, however, that a deterrence model accepting long term vulnerability emerged after attempts at deterrence through dominance strategies failed. The Cold War experience with two determined adversaries illustrates how the security dilemma can spawn an arms race. In the long run, however, a situation of deterrence based on mutual vulnerability is the inevitable end state. The deterrence found in mutual vulnerability is based on both sides having the ability to inflict harm. It is deterrence from a position of reciprocal strength. While dominance in a

[1]Robert S. MacNamara, "The Dynamics of Nuclear Strategy," *Department of State Bulletin* 57, (9 October 1967), p. 450.

military capability can provide deterrence while it lasts, it also activates the security dilemma and any ensuing arms race negates the deterrent effect just recently enjoyed. In spite of the Cold War example of unsuccessful short term dominance strategies, the United States openly advocated steps toward a dominance strategy in space with the release of the *Report of the Commission to Assess United States National Security Space Management and Organization* published in 2001 (hereafter referred to as the Space Commission Report). While deterrence is cited as the goal for space, some of the actions called for by the Space Commission Report can be interpreted as steps toward a dominance strategy. A possible outcome of the military's pursuit of some of the more aggressive goals set out in the Space Commission Report is a costly arms race. History shows that new offensive capabilities are eventually negated by defensive countermeasures or countered with greater numbers of opposing capabilities. Once begun, arms race momentum is difficult to reign in. In a competitive global environment, there is little likelihood that the United States can maintain space dominance over the long run. Like the nuclear arms race of the Cold War, a space policy seeking deterrence through dominance will yield mutual vulnerability as the end state. The key to making deterrence under mutual vulnerability bearable is to increase transparency in order to ease fears and build trust. For space, this requires much better space situational awareness (SSA) for all concerned parties. Comprehensive and cooperative SSA will allow space faring nations to know what is actually happening in space instead of defaulting to worst case scenario assumptions. The best approach to space policy for the long run is a cooperative arrangement that accepts mutual vulnerability because that's the situation most likely to emerge even after great efforts to dominate space are made.

The Cold War

"WE DO NOT WANT A NUCLEAR ARMS RACE WITH THE SOVIET UNION—PRIMARILY BECAUSE THE ACTION-REACTION PHENOMENON MAKES IT FOOLISH AND FUTILE."[2]

The last chapters of the Cold War left an impression that nuclear deterrence was finally attained after years of effort. Mutually Assured Destruction (MAD) is the nuclear deterrent end state that the world became familiar with. It involves living under threat of annihilation because of the reserved capability to inflict equally unacceptable devastation upon the enemy.[3] This "delicate balance of terror" continues to keep both sides in check and is what we have come to know as nuclear deterrence.[4] This idea of nuclear deterrence—deterrence under mutual vulnerability—is a strategy that emerged after attempts at deterrence through dominance failed. Deterrence through nuclear dominance was embraced from the outset as illustrated by the U.S. reaction to the Soviets' first successful atomic detonation. The U.S. response was "to raise the nuclear stakes even higher by authorizing development of the hydrogen (thermonuclear) bomb."[5] This capability escalation in order to gain, maintain or regain an advantage continued throughout the Cold War. The ensuing arms race was enormously expensive to both sides and neither felt much more secure for the effort.

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[2] Ibid., p. 447.
[3] Fred Iklé, "Can Nuclear Deterrence Last Out the Century," *Foreign Affairs* 51, no. 2 (January 1973), p. 268.
[4] Albert Wohlstetter, "The Delicate Balance of Terror," *RAND P-1472*, (Santa Monica: RAND Corporation, 6 November 1958).
[5] Lawrence Freedman, "The First Two Generations of Nuclear Strategists," in *Makers of Modern Strategy: from Machiavelli to the Nuclear Age*, edited by Peter Paret (Princeton: Princeton University Press, 1986), 738. Walter A. McDougal, *...the Heavens and the Earth* (Baltimore: Basic Books, 1985), p. 50.

Competitiveness and seeking advantage are part of human nature. Nowhere is this more evident than in military organizations. Military leaders are charged with fighting and winning the nation's wars. They are archetypal advantage seekers, an essential trait their fellow citizens demand of them. It should come as no surprise that military thinkers advocate dominance strategies. There are negative consequences to always seeking the advantage, however. The most significant is the "security dilemma" (originally "security and power dilemma") which describes a situation where one nation's effort to attain more security, normally through armaments, serves to threaten the security of another nation.[6] The security dilemma is the foundation for an arms race—essentially an action-reaction model. "Country A is stimulated by B's arms accumulation, and what A does by way of reaction serves as a further stimulus to B…."[7] This can become a never ending cycle when resolute adversaries confront one another, each apprehensive of the other and determined to protect itself. It seems a logical choice to try to attain or maintain an advantage over an adversary. Unfortunately, the very act of deterring through military advantages is a dominance strategy and practically guarantees an arms race when a determined adversary exists and has the means to compete. The irony of the security dilemma and subsequent arms race is that, despite the incredible effort and expense, there is little added security in the long run due to the heightened danger caused by high levels of armament.

The Cold War illustrates the security dilemma and resulting arms race very well. At the close of the Second World War (WWII), the United States sought to offset Soviet conventional force superiority by using its relative advantage, atomic weapons. The Soviet Union, threatened by this, countered the U.S. advantage by developing atomic weapons of its own. The U.S. advantage eroded under this concerted opposition, so it stayed competitive by developing the hydrogen bomb. It did not occur immediately to advocates of the hydrogen bomb that an arms race would be the result. The thermonuclear bomb was a way to stay in the race and hopefully win.[8] This is the problematic logic of the security dilemma, that the next advantage will provide the security desired—the fallacy of the last move. An arms race is a short sighted plan to garner security through the "immediate benefits that temporary superiority might afford."[9] After embarking down this path, it proved impossible for either to change course.

When there were 100 nuclear warheads, deterrence was thought to hold. When there were 1000, the same was true. At 10,000, people probably felt about as safe as they had at 100, and yet the sides continued to build to more than 30,000. It is estimated that between 1945 and 2000, the United States built 70,000 nuclear warheads and the Soviet Union/Russia 55,000.[10]

As the security dilemma predicts, both countries increased their capabilities in a cycle of action and reaction. By the end of the Cold War both sides had spent an enormous amount of money with neither feeling much safer for the expense.

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[6] John H. Herz, *Political Realism and Political Idealism: A Study in Theories and Realities*, (Chicago: University of Chicago Press, 1951).

[7] James E. Dougherty and Robert L. Pfaltzgraff, Jr., *Contending Theories of International Relations: A Comprehensive Survey*, (New York: Longman, 2001), p. 292.

[8] Richard Rhodes, *The Making of the Atomic Bomb* (New York: Simon & Shuster, 1986), p. 768.

[9] Freedman, "Nuclear Strategists," p. 739.

[10] Edward Ifft, "Deterrence, Blackmail, Friendly Persuasion," *Defense & Security Analysis* 23, no. 3, (September 2007), p. 240.

In addition to matching offensive capabilities, defensive measures are an important part of the competition too. In an arms race, each new offensive capability is offset by defensive countermeasures which, in turn, spur the next round of offensive capabilities.[11] The Cold War illustrates this "iron law of weapons development" which says that any new capability is countered over time with technology and procedures to defeat it.[12] The sword was met with armor and shields. German bombers were identified with British radar. Submarines spawned sonar and depth charges. Tanks were attacked with bazookas. Radio communications were foiled by jammers. The list is long and the point behind it paramount. Where a determined adversary exists, the security dilemma dictates that there is seldom more than ephemeral advantages. To avert an arms race, a way must be found to avoid short term dominance strategies. The Cold War illustrates the intoxicating logic of seeking advantage as a way to attain deterrence, then embracing as rational the arms race and insecurity it produces.

Nuclear policy began to shift from deterrence via dominance to deterrence under mutual vulnerability with the introduction of Intercontinental Ballistic Missiles (ICBMs). ICBMs represented, in some ways, the culmination of the offense-defense duel. They were a relatively safe offensive weapon due to mobility and hardened facilities and nearly impossible to defend against because of their flight path and speed.[13] As a result of these characteristics, ICBMs were fielded with the knowledge that populations on both sides would be vulnerable.[14] The nuclear arms race ran its logical course and mutual vulnerability was the end result. With the realization of mutual vulnerability came strategies that were more purely deterrent in nature.[15] This is not to say that deterrence wasn't sought all along. It was. However, much Cold War deterrence was sought through advantage or dominance strategies, not from positions of equality or mutual vulnerability. Unlike deterrence strategies based on some level of dominance, the new deterrence introduced by ICBMs accepted the reality of the other side's capabilities and sought to manage the situation somewhere short of conflict. Since deterrence seeks security through maintaining capabilities to dissuade aggressive behavior from the other side, the ideal situation is to keep that level of military capability at the lowest possible level. This reduces overall costs and the inherent danger of large weapons stockpiles. The huge buildup of weapons during the Cold War illustrates that the longer it takes to transition from deterrence via dominance to deterrence accepting mutual vulnerability, the more costly and potentially dangerous the arms race.

Arresting the momentum of the arms race during the Cold War was difficult to do. Greater transparency was essential to disrupt the cycle of fear. This was because military leaders' desire for more weapons was often motivated by the unknown capabilities of their adversary. Military leaders must plan for the worst case scenario. Lack of real knowledge of Soviet capabilities led to more U.S. weapon acquisitions that fueled the "mad momentum" of the arms race.[16] The Cold War saw bomber gaps, missile gaps and every other conceivable capabilities gap which required more weapons to fill. Closing all of these perceived gaps gave momentum to the arms race until, after significant effort and great expense, "both

[11] Freedman, "Nuclear Strategists," p. 755.
[12] Benjamin S. Lambeth, "Air Power, Space Power and Geography," *Journal of Strategic Studies* 2, no. 2/3, (June/Sept 1999), p. 72.
[13] Warren Amster, "Design for Deterrence," *Bulletin of the Atomic Scientists*, (May 1956), p. 165.
[14] Freedman, "Nuclear Strategists," p. 757.
[15] Amster, "Design for Deterrence," p. 165.
[16] MacNamara, "Dynamics of Nuclear Strategy," p. 450.

sides gradually came to understand that transparency…could improve their security."[17] Transparency permitted planning for real threats, not imagined ones, and allowed the upward trajectory of the arms race to finally subside. Arms control agreements were negotiated and verification procedures provided the necessary transparency to gradually ease fears. The end result was a way out of the arms race with transparency making the uncomfortable feeling of mutual vulnerability a bit more bearable.

This is a narrow review of just some of the dynamics of the Cold War that are applicable to future space policy. It is not intended as a complete analysis of the myriad dynamics of Cold War strategy, policy or decision making. It is clear, however, that in spite of difficult debates and agonizing decisions over Cold War military strategy, both the United States and former Soviet Union did, in fact, develop nuclear weapons in the tens of thousands only to work toward their destruction after the Cold War thawed.[18] Space policy practitioners can learn some lessons from Cold War deterrence practices. First, deterrence through dominance (advantage seeking) is a short term strategy if a capable and determined adversary exists. The long term situation will be deterrence under mutual vulnerability and acceptance of other nations' capabilities. Second, policy makers should recall that the security dilemma, once activated, can lead to an arms race which is very difficult to reign in. Finally, transparency is required to assuage fears, whether to prevent an arms race or to end one. These lessons are important to remember because the United States indebted future generations with the cost of "winning" the Cold War and the Soviet Union ceased to be.

The Space Commission Report

"BUT WE SHOULD BEAR IN MIND THAT IT IS MONEY SPENT BECAUSE OF THE ACTION-REACTION PHENOMENON."[19]

Fear of losing a vital capability can drive the security dilemma in the same way as fear of another's capabilities. Relative capabilities and advantages matter most for security concerns since one nation's strengths are important mostly as compared to the strengths of others. The United States publicly announced fear of a "Space Pearl Harbor" in the Space Commission Report.[20] This fear has some parallels to the situation at the close of WWII. Then, as now, the United States actually had the advantage. The fear then, as now, was of losing it. The perceived threat to U.S. space dominance spurred the United States to action. According to the Union of Concerned Scientists database, as of 1 January 2010 there were 926 satellites in orbit. Of those, 422 were solely U.S. satellites with another 20 having the United States as a cooperating partner. This means the United States operates solely, or has a stake in, 48 percent of all satellites in orbit.[21] In spite of this substantial numerical advantage, the commission expressed concern. This concern is founded on one belief in particular. "We know from history that every medium—air, land, and sea—has seen conflict; reality indicates that space will be no different."[22] This logic is similar to the logic that led to the

[17] William C. Martel and Toshi Yoshihara, "Averting a Sino-U.S. Space Race," *The Washington Quarterly*, (Autumn 2003), p. 28.
[18] Robert Norris and Hans Kristensen, "Global Nuclear Stockpiles, 1945-2006," *Bulletin of the Atomic Scientists*, (July/August 2006), pp. 64-66.
[19] MacNamara, "The Dynamics of Nuclear Strategy," 448.
[20] *Report of the Commission to Assess United States National Security Space Management and Organization*, (11 January 2001), p. 22.
[21] "UCS Satellite Database," *Union of Concerned Scientists*, http://www.ucsusa.org/nuclear_weapons_and_global_security/space_weapons/technical_issues/ucs-satellite-database.html.
[22] *Report of the Commission*, p. 100.

Cold War arms race. The United States expected the former Soviet Union to advance conflict in every way possible, and the Soviets expected the same. Due largely to this pessimistic and uncooperative view of human nature, both nations' fears were realized in the arms race that followed. While the commission's assessment of conflict in every medium is accurate, history reveals another important factor that the commission did not address. To borrow from the commission's statement about history: we know from history that every *military capability*—whether in air, land, or sea—has seen *countermeasures*; reality indicates that space will be no different. This is also an "iron law" from history and warns of an arms race to follow if determined opposition exists.[23] Policy makers must deal with both these realities or risk activating the security dilemma.

The foundational beliefs of the 2001 Space Commission Report were incorporated into the 2006 National Space Policy. The commission's recommendations set the stage for a more assertive space policy. The specific language of the 2006 National Space Policy that received a great deal of attention is that of denying space capabilities to potential adversaries. Joan Johnson-Freese writes that "although the words 'space weapons' are never uttered, they can be heard if one listens closely."[24] The assumption is that denying a space capability to an adversary will require some type of space weapon, something the Space Commission Report advocates outright.[25] Whether or not the policy explicitly calls for weapons in space, its tone promotes the image of space superiority. The second paragraph of the policy states that "those who effectively utilize space…will hold a substantial advantage over those who do not."[26] This is the language of competition and dominance like that of the early Cold War. An arms race in space could emerge if a determined adversary with the means to compete chooses to do so.

An alternative to the aggressive approach suggested in these two documents seems unlikely to come from military leadership. The military is charged with ensuring that if the nation "calls its sons and daughters to arms…that they have every advantage in the field so that they prevail."[27] Gaining and maintaining capability advantages is what the military does. Space will be no different.

Indeed, three months after the release of the Space Commission's report, General Eberhart indicated that Air Force Space Command had supported the commission's recommendations "in every respect." He also noted that the Air Force chief of staff, General Ryan, had moved promptly to cut off any nonconcurring groups within the Air Force to telegraph clearly that the Air Force had accepted the commission's recommendations in principle and was now deep in the process of trying to determine how best to comply with them.[28]

A survey of 75 space professionals attending classes at the National Security Space Institute (NSSI) in March 2010 confirms that the military has internalized the space commission's assessment. Of those surveyed, 92 percent believe that space will see conflict, with 81 percent identifying China as the primary competitor. An almost unanimous 97

[23] Lambeth, "Air Power, Space Power and Geography," p. 72.
[24] Joan Johnson-Freese, "The New U.S. Space Policy: A Turn Toward Militancy?," *Perspectives,* (Winter 2007), p. 34.
[25] *Report of the Commission*, p. 17.
[26] "U.S. National Space Policy," The White House, August 31, 2006, p. 1. http://www.whitehouse.gov/sites/default/files/microsites/ostp/national-space-policy-2006.pdf
[27] John Hyten and Robert Uy, "Moral and Ethical Decisions Regarding Space Warfare," *Air & Space Power Journal*, (Summer 2004), p. 55.
[28] Benjamin S. Lambeth, *Mastering the Ultimate High Ground: Next Steps in the Military Uses of Space*, (Santa Monica: RAND, 2003), p. 80.

percent believe the United States should attempt to maintain its current advantage in space.[29] These views represent space professionals dedicated to a dominance strategy in space. This was the approach followed at the start of the Cold War as well—trying to stay ahead. Predicting what lies ahead, 69 percent of those surveyed also think an arms race in space is likely.[30] In light of the near unanimous call to maintain U.S. advantages in space, this indicates that the current group of space professionals has embraced the concept of an arms race to stay ahead—space dominance.

There is a time to engage in an arms race, but that time is not now. Participating in an arms race makes sense if an adversary builds military capabilities that represent an existential threat to national survival. During the Cold War, both the United States and the former Soviet Union built nuclear arsenals that could almost completely destroy the other. Faced with the threat of destruction, it did make sense for both sides to offset the capabilities of the other. The faulty logic was in endlessly pursuing dominance rather than accepting deterrence and the mutual vulnerability it implied. Neither the United States nor the former Soviet Union was satisfied to stop the arms race unless they were in the lead. This focus on short term advantage even when long term mutual vulnerability was evident is why the arms race took on such a "mad momentum."[31] All this effort was ultimately unnecessary since the condition of mutual vulnerability, once established, did not change throughout the Cold War. It is the condition that remains today. To some extent, the problem early in the Cold War was unmitigated fear of the unknown. Lack of real knowledge about Soviet capabilities and intentions certainly motivated the United States to participate in the arms race. After all, national survival was at stake. Soviet apprehension about the United States motivated them in the same way.

Representative of the military dominance approach to space, Everett C. Dolman, professor at the Air Force's School of Advanced Air and Space Studies, writes that "the United States should seize control of outer space and become the shepherd (or perhaps watchdog) for all who would venture there, for if any one state must do it, it is the most likely to establish a benign hegemony."[32] The rest of the world seems not to agree with this assessment of the United States as an unthreatening power. The European Union is developing its own version of the Global Positioning System (GPS), called Galileo, illustrating its doubt about the enduring benevolence of the United States.[33] Russia and China are developing and improving their own space based navigation systems as well. This in spite of U.S. assurances that the GPS signal would never be denied to worldwide users. China feels that "the United States' self-appointed guardianship of space is presumptuous and represents a genuine challenge to China's national security concerns."[34] Rather than speak with words that the United States might not hear, China demonstrated an anti-satellite (ASAT) weapon in January 2007, destroying one of its own satellites in a possible "shot across the bow of

[29] Author's survey of students attending National Security Space Institute (NSSI) classes, March 2010.
[30] Ibid.
[31] MacNamara, "The Dynamics of Nuclear Strategy," p. 450.
[32] Everett C. Dolman, *Astropolitik: Classical Geopolitics in the Space Age*, (Portland: Frank Cass, 2002), p. 157.
[33] Simon P. Worden and Joan Johnson-Freese, "Globalizing Space Security," *Joint Forces Quarterly*, (Winter 2002-2003), pp. 65-66.
[34] Martel and Yoshihara, "Averting a Sino-U.S. Space Race," p. 19.

U.S. military power."[35] Uncontested hegemony in space is as unlikely as earlier attempts at nuclear hegemony—opposition is evident.

Mutual Vulnerability

"FOR IT IS A PROFITLESS WASTE OF RESOURCES, PROVIDED WE AND THE SOVIETS CAN COME TO A REALISTIC STRATEGIC ARMS LIMITATION AGREEMENT."[36]

The long term end state in space will be deterrence under mutual vulnerability, as with nuclear weapons before. In a competitive strategic environment, there are essentially three alternatives to this end state over the long run. The United States could fight a preventive war to eliminate an adversary's space capabilities so they cannot threaten U.S. space assets. Absent war, a unique situation could arise where no competitor emerges to challenge U.S. dominance in space—a forfeit win. The final alternative is to compete in an arms race and win, maintaining the dominance sought. An examination of each alternative reveals that, for a variety of reasons, mutual vulnerability will be the long term end state.

Preventive war is striking a country without provocation for the purpose of maintaining a power advantage. This is the most violent side of dominance strategies where it is deemed acceptable to wage war rather than accept a potential threat sometime in the future. Preventive war is something that liberal democracies are averse to do since justification for it usually fails to cross the political and moral imperative thresholds. China is the country most often mentioned as the next potential threat to the United States. Absent a state of hostilities, it is difficult to imagine U.S. civilian decision-makers authorizing a U.S. first strike on China for the morally indefensible goal of staying in the lead in space. China and the United States are also intimately connected through trade and financial transactions, with China holding a large stake in U.S. debt. This, and the fact that the American people are unlikely to tolerate a preventive conflict to stay ahead in space, makes preventive war highly improbable.

Another alternative to mutual vulnerability is the fortuitous situation where no adversary emerges to challenge U.S. space dominance. This thinking often accompanies dominance strategies. It suggests that U.S. space capabilities will not be challenged due to the enormous effort required to catch up. As previously discussed, the former Soviet Union's actions early in the Cold War when its atomic detonation ended the U.S. nuclear monopoly undermine this kind of thinking. An unchallenged position in space today is as unlikely as an unchallenged position in nuclear arms was after WWII. China, Russia, and the EU have signaled various degrees of dissatisfaction with unchecked U.S. dominance and, if history is a guide, that position will not go uncontested over the long run.

The final alternative to mutual vulnerability in space is to engage in, and win, a space arms race. Winning an arms race means the U.S .maintains space dominance and does not have to accept mutual vulnerability as the end state. Winning is not just participating in an arms race and surviving. Winning means attaining the goal—dominance. If mutual vulnerability lies at the end of the arms race then nothing has been won.

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[35] Bates Gill and Martin Kleiber, "China's Space Odyssey: What the Antisatellite Test Reveals About Decision-Making in Beijing," *Foreign Affairs* 86, no. 3, (May/June 2007), p. 2.
[36] MacNamara, "The Dynamics of Nuclear Strategy," p. 448.

The Cold War illustrates that true deterrence is a strategy that accepts mutual vulnerability, not dominance. It is certainly true that dominant military capabilities have a profound deterrent effect *while they last*. But deterrence based on dominance is fleeting. A stable deterrent end state is based on mutual vulnerability after the competition subsides. However, mutual vulnerability doesn't mean defenseless. Nor is it a position of weakness. It is simply the condition that emerges when neither side can dominate the other, but each maintains a capacity to inflict harm. This concept of mutually vulnerable deterrence already applies to space. Satellites are practically the definition of vulnerable, flying predictable orbits with few defenses. Due to this orbit predictability, lack of defenses and an inadequate space object identification and characterization capability, the offense has the advantage over the defense in space such that taking out a satellite is relatively much less difficult than defending one.[37] This means that mutual vulnerability is the condition that exists in space today. Combined with the knowledge of ready space competitors and demonstrated countermeasures, the likely end state is clear. Deterrence based on mutual vulnerability, not dominance, is the future of space.

An important step toward making deterrence under mutual vulnerability politically and militarily tolerable is to increase transparency. Cooperation between space faring nations will require agreed upon procedures that establish the transparency necessary to solidify trust.[38] Verification of the conditions of an agreement serves to lower tensions in a de-escalating cycle opposite that of the escalating cycle of the security dilemma. As the dominant space power, increasing transparency will pose difficulties for the United States. A verification study conducted by the Eisenhower Center for Space and Defense Studies points out that "[i]ncreasing the openness of space operations…involves inequity for the United States. Because we can see more and see further, others stand to gain more in the short run than we do. A political judgment will be needed as to whether the long term gain in stability and predictability outweighs this short term, relative disadvantage."[39] As discussed so far, the Cold War example strongly suggests that long term stability is preferable to short term advantage. When the United States feared the unknown nuclear capabilities of the former Soviet Union during the Cold War, the introduction of reconnaissance satellites helped lower anxiety levels. Real information was far more useful than the imagined worst case scenarios in military planners' minds. Once arms control agreements where negotiated and in place, transparency made them bearable and helped them stick.

U.S. de facto dominance in space means that the United States has the most to lose there. In order to keep an arms race at bay, the United States needs to improve its information about what is happening in space in an accurate and timely manner. Like reconnaissance satellites during the Cold War, better SSA can provide real information and alleviate tension. SSA is the ability to assess the big picture in space through detection, characterization and tracking. It is who, what, where, and why for all things in space. But the capability to accomplish this in a timely manner at the level of fidelity required for accurate characterization of both capability

[37] Robert Giffen (General, USAF retired, PhD) in discussion with the author, March 2010.
[38] Martel and Yoshihara, "Averting a Sino-U.S. Space Race," pp. 27-28.
[39] Roger G. Harrison, *Space and Verification*, "Volume I: Policy Implications," (Eisenhower Center for Space and Defense Studies, 2009), p. 13.

and intent does not currently exist.[40] As Dr. David Finkleman points out, "the United States Air Force Space Surveillance Network (SSN) cannot gather data sufficient for complete collision avoidance" of objects in space.[41] In light of the vital nature of space assets to U.S. national security, this knowledge gap serves to aggravate U.S. fears and gives credence to calls for dominance strategies. One step toward improving SSA could be the incorporation of "Persistent Technical Means for ground-based space situational awareness."[42] This method would employ the many civil and commercial means of space surveillance already in place, providing more timely and accurate SSA than is possible utilizing just the Air Force Space Surveillance Network (SSN). One unique benefit of this approach, from a cooperative legal framework perspective, is that "[n]o single authority or stakeholder could prevent the collective perception."[43] In other words, a degree of transparency is implied in the collaborative process itself, partially relieving the problem of trusting no verification means but your own. This approach has the added benefit of including those with the least technical means in cooperative arrangements since they can attain the information required for verification from outside resources. However it evolves, an improved, reliable and comprehensive SSA capability is a critical step toward accepting the relative security of deterrence within a legal framework of verifiable mutual vulnerability.

[40] Robert Giffen (General, USAF retired, PhD) in discussion with the author, March 2010.
[41] David Finkleman, *Space and Verification*, "Volume II: Technical Assessment," (Eisenhower Center for Space and Defense Studies, 2009), p. 6.
[42] Ibid., p. 16.
[43] Ibid., p. 1.

Deterrence or Dominance?

"WHAT MADE WAR INEVITABLE WAS THE GROWTH OF ATHENIAN POWER AND THE FEAR WHICH THIS CAUSED IN SPARTA."[44]

The Cold War illustrates how nuclear deterrence under mutual vulnerability emerged after deterrence through dominance, pursued by both sides, failed. Faced with a determined adversary, there are only short term advantages. The security dilemma guarantees a response by the other side and the action-reaction cycle ensures that neither gains any lasting security. The Cold War experience shows that, in spite of enormous effort and expense, two competitors can remain nearly as vulnerable in the end as when they started. There was evidence early in the Cold War that the long term reality would not be dominance for either side, but rather managed cooperation due to the de facto condition of mutual vulnerability. The same will likely be true of space. Space assets are vulnerable today and will remain so in spite of all the effort and money the United States can muster. The difference now is that the United States can work to implement that long term reality before spending large amounts of money trying to ward off the inevitable vulnerability. There is an opportunity to avoid a space arms race entirely. In light of the current financial troubles in the United States and elsewhere, it is in the United States best interests that an arms competition in space never occurs.

The latest National Space Policy published by the Obama administration in June 2010 is a small step in the right direction. It uses more cooperative language than the previous space policy and avoids the dominance rhetoric, but

[44] Thucydides,"*History of the Peloponnesian War,"* translated by Rex Warner (New York: Penguin Books, 1954), p. 49.

does not go far enough.[45] The next iteration should include specific steps required to move toward long term cooperation with a workable verification regime. Political leadership from the highest levels is required both to guide military efforts and to garner international cooperation and commitment. The effort will not be easy, but it's much better to do it now than to wait for a space arms race to put a further drain on national coffers.

[45] "National Space Policy of the United States of America," The White House, June 28, 2010, pp. 2-7.