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by Walt Conrad, Justin Anderson, and Sarah Jacobs

Past U.S. Actions: Redlines in Space
by Jonathan Mazur

Space Crisis Management: Filling in the Gaps
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Publisher's Corner
by Ambassador Roger G. Harrison

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Space & Defense

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Editor's Note

After a one-year hiatus, *Space & Defense* is back with a fresh format. We still have the peer-reviewed feature articles. In this issue, a team from Science Applications International Corporation (SAIC)—Walt Conrad, Justin Anderson, and Sarah Jacobs—offers a framework for evaluating potential arms control agreements in space during a period when the domain is becoming more contested, competitive, and congested (the “three C’s”). Despite the need for greater cooperation between the United States and emerging space powers, the authors conclude that both the Chinese-Russian sanctuary proposal on the Prevention of the Placement of Weapons in Outer Space (PPWT) and the European Union Code of Conduct fall short of their criteria for a robust international agreement.

On the other side of the coin from pursuing the benefits of coordination, Jonathan Mazur examines U.S. policy documents and U.S. behavior to argue that a deterrence regime, structured by American redlines in space, may have already formed. Allies and adversaries have every reason to pay attention, and available data hints at a strong U.S. reaction should a foreign power interfere with command and control platforms or cause the permanent loss of American government payloads for navigation, communications, or remote sensing. Launch facilities, ground stations, and intentional creation of permanent orbital debris are also likely to be on “the other side” of U.S. redlines—though urgent questions remain for assets such as weather and scientific satellites as well as commercial platforms without U.S. Government payloads.

Again in keeping with the tradition of *Space & Defense*, we have published a report on a high-profile conference in the field—Space Security through the Transatlantic Partnership—co-organized by the European Space Policy Institute (ESPI) and the Prague Security Studies Institute (PSSI) during June 2011. Our reporters are Jana Robinson of ESPI and Michael Romancov of Charles’ University’s Department of Political Science at the Faculty of Social Sciences, Prague. Their article illustrates how both arms control and

deterrence are ascendant on the policy agenda of the international space community and that stakeholders are best served discussing and planning for these issues now, before the next major crisis involving outer space.

Finally, we have included two new features with this issue. Recent U.S. Air Force Academy graduates Fumiko Hedlund and Daniel Hughes produced outstanding papers in their Grand Strategy capstone course last spring. Their research on Afghanistan and Thailand reminds us of the connections between comparative political development on the one hand and both grand strategy and U.S. defense policy. It also occurs to us that policy makers or analysts who prefer to see international norms and standards of conduct in space emerge out of multilateral negotiations have an interest in how the next generation of leaders are updating the old country models for political stability and modernization. Our last addition—and in some ways the perfect dessert to cap all our articles—is Publisher’s Corner. The Eisenhower Center’s own Roger Harrison provides two very useful reviews, served with generous helpings of wit and wisdom, on important, recent contributions to the growing literature on *Space & Defense*.

Whether you are working in government, industry, consulting, or academe, we hope you enjoy this first issue of Volume 6 and that you consider capitalizing on your interest in space by sending us your thoughts—as an article for peer review, a report, or a critical essay. Until then, look for our next installment at the beginning of summer 2013!

Damon Coletta
USAFA
November 2011

Arms Control in the Third Space Age: Assessing International Efforts to Regulate Military Operations in Outer Space in the “3 C’s” Era

Walt Conrad, Ph.D., Justin Anderson, Ph.D., and Ms. Sarah Jacobs¹

Preserving and protecting the free and open use of outer space benefits all space-faring nations and is vital to U.S. national interests. U.S. military and civil space operations, however, face a number of growing challenges. Several countries possess or are developing means to disrupt or destroy space systems; space debris threatens the safe passage of spacecraft; and outer space is an environment where the United States now competes with a rapidly growing number of other space-faring nations. To remain the world’s preeminent military space power, the United States must consider a variety of means and strategies to address these challenges.

A number of foreign states and nongovernmental organizations have proposed addressing threats to the safe and secure use of outer space by drafting new international treaties, agreements, and codes of conduct. In public statements and international forums, major space powers such as Russia and China, and major multilateral organizations such as the European Union (EU), describe space as an increasingly dangerous, lawless frontier. These actors suggest that expanding rules and regulations for state use of outer space, to include negotiating and implementing new space arms control agreements, could prevent future accidents and armed conflicts in this domain.

Current U.S. space policy strongly supports developing multilateral mechanisms to address issues that represent common challenges to all space-faring nations, to include the potential negotiation of space arms control and confidence-

building measures. U.S. policy also clearly states, however, that it will only consider space arms control treaties and agreements that are “equitable, effectively verifiable, and enhance the national security of the United States and its allies.”² Obama administration officials have repeatedly stated that Washington will not accept any negotiations that fail to protect outer space as a free and open environment, or that will have a negative impact on current military space operations.

The present threat environment, U.S. policy imperatives, and the critical importance of the U.S. Armed Forces’ space assets, operations, and missions to U.S. national security are all factors highlighting the importance of providing a national security perspective on foreign and international proposals regarding outer space law and space arms control. This article suggests a possible framework for analyzing the potential impact of space arms control proposals on the U.S. armed forces. It also provides an international “state of play” for space arms control, briefly discussing the civilian and military space programs and policies of Russia, China, and the EU, and their proposals for addressing present challenges to the free and open state use of space. It concludes with an assessment of these proposals, which may reflect broader future trends in terms of multilateral efforts aimed at regulating the military use of space or promoting new space arms control agreements.

ARMS CONTROL AND THE THIRD SPACE AGE

During the first space age, the state use of outer space was dominated by the competition between the two Cold War superpowers, perhaps best

¹ This article is based on “Air Force Space Equities and Future International Space Agreements,” an Air Force Strategic Plans and Policy Divisions (AF/A5XP) “Emerging Issues” report completed by an SAIC contract support team comprised of Walt Conrad, Justin Anderson, Sarah Jacobs, Troy Wilds, and James Mazol. The views expressed in this article are solely those of the authors, and do not represent the views of SAIC, AF/A5XP, the Air Force, or any SAIC client.

² White House, *National Space Policy of the United States of America*, June 28, 2010, p. 7.

characterized by the race to the moon. Despite this fierce rivalry, however, Washington and Moscow were able to reach a remarkable degree of consensus on a number of founding principles forming the basis of an international legal framework for state use of outer space.³ The United States and Soviet Union, joined by other states concerned outer space might become a key battleground during the Cold War, worked through the United Nations to draft an accord that became known as the Outer Space Treaty (OST).

The OST entered into force in 1967 as the first major multilateral treaty on outer space. More than four decades later, it continues to represent the primary foundation of international space law. As of January 2011, 101 countries have ratified the OST, to include all major space-faring nations.⁴ The treaty articulated a number of fundamental principles regarding the state use of space, to include the inherent right of all states to freely access, use, and explore outer space.⁵ State Parties to the treaty also agreed that space, and all celestial bodies, cannot be claimed as the territory, property, or exclusive zone of any State.⁶

In addition to articulating key concepts establishing space as a global commons, the OST is the only international treaty containing provisions expressly addressing the military use of space. Significantly, instead of making broad statements attempting to regulate or restrict all

³ The treaty also discusses non-governmental activities in outer space within Articles VI, but the text specifies that any actions by a non-governmental entity in space are the responsibility of state governments. State parties are granted authority and oversight over all non-governmental activities in space: "State Parties to the Treaty shall bear international responsibility for national activities in outer space ... whether such activities are carried on by governmental agencies or by non-governmental entities ... [t]he activities of non-governmental entities in outer space, to include the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty."

⁴ Status of International Agreements relating to Activities in Outer Space. *United Nations Office for Outer Space Affairs*. <http://www.oosa.unvienna.org/oosa/SpaceLaw/treatystatus/index.html>, accessed 25 Sep 2012.

⁵ Outer Space Treaty [OST], Art I.

⁶ OST, Art II.

military activities in space, the military provisions of the OST take the form of specific, limited prohibitions of certain weapons and operations:

- No Weapons of Mass Destruction (WMD) in Orbit or on Celestial Bodies: The OST prohibits the placement of nuclear weapons or other WMD in orbit, on the moon, or on other celestial bodies.⁷ The treaty does not, however, expressly define the terms "weapon" or "WMD."
- Prohibitions of Certain Military Activities on Celestial Bodies: The treaty also prohibits the establishment of military bases, installations, or fortifications on any celestial body. State Parties to the treaty also agree to forego conducting military maneuvers, or testing any kind of weapon, on celestial bodies.⁸ The OST does not, however, prohibit any of the above military activities within outer space.

The OST does not prohibit the general military use of space. It does not limit or ban, for example, the placement of non-WMD military systems into orbit, nor does it prohibit members of the military from joining civilian crews for space missions.

The OST provided an international legal framework for outer space and marked an important rapprochement between the two Cold War superpowers, with the treaty's Preamble declaring "the exploration and use of outer space should be carried on for the benefit of all peoples."⁹ The OST also prevented either superpower – or any other space-faring nation – from seeking to control or claim areas of space or celestial bodies through use or occupation. Outer space was an arena for state competition during the Cold War, but as a result of the negotiation of the OST it was not an arena without boundaries or rules.

⁷ OST, Art. IV. The treaty does not preclude the transit of these types of weapons – or any weapons – through outer space.

⁸ Ibid.

⁹ OST, Preamble.

The collapse of the Soviet Union ushered in the second space age. The United States and the Soviet Union's successor, the Russian Federation, remained the world's two most significant space powers, but a number of areas formerly marked by hostile competition were replaced by mutual cooperation. Other technologically-advanced states, whose space initiatives often operated in the shadow of the massive American and Russian space programs during the Cold War, became increasingly important independent players in outer space. With space increasingly recognized as a critical domain for civil, commercial, and military operations, several states began devoting serious resources to the development of military space programs. Even as advanced militaries began using space for communications, surveillance, and other tasks, the prospects of any kind of conflict involving attacks upon (or from) assets, operations, or platforms in outer space appeared increasingly remote. Although there was little progress on building upon the foundation laid by the OST, and no successful multilateral initiatives were completed on space arms control, there were no major areas of disagreement between major space-faring states in regard to the state use of space.

China's successful test in January 2007 of an anti-satellite weapon, resulting in the destruction of a defunct Chinese satellite by a ground-based missile, marked the end of an era characterized by a lack of friction between space-faring nations and a general acceptance of norms governing the common use of space. The destruction of the satellite, and the creation of a hazardous debris field, confirmed the relative safety and security of the second space age was a thing of the past.¹⁰ The third space age features a number of serious

¹⁰ China is the third state to test an anti-satellite system in outer space. The United States and Soviet Union conducted anti-satellite tests in space during the Cold War. U.S. Congress Office of Technology Assessment, "Anti-Satellite Weapons, Countermeasures, and Arms Control," report, October 1985, pp. 5-7; Hunter, Maj. Roger C. "A US ASAT Policy for a Multipolar World," Air University thesis, 1992, pp. 21-22 and Grier, Peter "The Flying Tomato Can," *AirForce-Magazine.com*, February 2009, <http://www.airforce-magazine.com/MagazineArchive/Pages/2009/February%202009/0209tomato.aspx>

threats to the sustainable use of space. The 2011 U.S. National Security Space Strategy describes three major challenges to the free and open state use of space, stating space is increasingly **contested, competitive, and congested** (sometimes referred to as the 3 C's).¹¹ Described in further detail below, the 3 C's together encompass a range of pressing threats to the U.S. ability to maintain space primacy, and, more broadly, to the ability of all states to safely operate within the outer space domain. U.S. support for future space arms control agreements will depend heavily on how these accords propose to tackle the 3 C's.

In the third space age, outer space increasingly represents a contested domain where the free operation of national assets cannot be assumed. Potential adversaries in future conflicts may attempt to challenge or even overturn U.S. space superiority by attacking U.S. civilian or military space systems. Multiple states (including Iran and North Korea) have already carried disputes or conflicts into the space arena, covertly employing means to blind the satellites of opposing states and disrupt the information they transmit.¹² Russia, China, and India openly profess an interest in developing anti-satellite (ASAT) weapon systems, arguing they must field these weapons because future conflicts are likely to include military attacks physically destroying state assets in outer space.

The third space age is also characterized by the proliferation of outer space actors beyond technically-advanced states. For example, more than fifty nations now have a presence in space.¹³ Several states can now design and build, with little or no assistance from the traditional major space powers, satellites or space launch vehicles. International interest in space has spurred the

¹¹ Director of National Intelligence, *National Security Space Strategy*, 2011, p. 1.

¹² Ferster, Warren and Colin Clark, "NRO Confirm Chinese Laser Test Illuminated U.S. Spacecraft," *Space News*, October 3, 2006; Butler, Robert, "Statement ... Before the House Armed Services Committee Strategic Forces Subcommittee," April 21, 2010, p. 3, and; "N. Korea Stops Sending Out Jamming Signals to S. Korea: Source," *Korea Herald*, May 15, 2012.

¹³ "First time in History". *The Satellite Encyclopedia*.

growth of an international space industry, to include the marketing of launch capabilities. Globally, there are now twenty-two launch sites operated by eleven different countries.¹⁴ The recent successful launch, voyage to the International Space Station (ISS), and return to Earth of the SpaceX Dragon spacecraft also underlines the fact that corporations are increasingly important and independent actors in outer space, developing and fielding capabilities that were once the exclusive preserve of states. Whether measured in terms of state activities in outer space, the market for space assets and operations, or interest in exploiting the resources of outer space, space is a far more competitive environment in the 21st century.

The third space age has also observed the “shrinking” of outer space, once considered so vast that no number of space missions or space actors could possibly impede the ability of future generations to use and explore space. While the cosmos remain infinitely large, there is a growing realization that those parts of outer space most critical to state use are increasingly – and dangerously – congested. At present there are over 1,100 active systems in orbit and an additional 21,000 pieces of debris littering the skies. The 2007 Chinese ASAT test, for example, generated an estimated 3,500 pieces of space debris.¹⁵ The area of space near Earth is now so cluttered with debris that accidental collisions, such as the 2009 collision between the defunct Russian satellite *Cosmos 2251* and the U.S. commercial communications satellite *Iridium 33*, are increasingly likely.¹⁶ This condition could put certain orbital planes in jeopardy of becoming unusable for decades. Congestion will only increase in the future as more consortia, states, non-state actors, and commercial providers launch

and operate space objects, particularly in low Earth orbit.¹⁷

To date, the third space age has yet to see the major space powers reaching any significant consensus on how to address the common – but also complex – threats represented by the 3 C’s. As a result, whether this era will represent one of cooperation or competition remains to be seen.

ASSESSING SPACE ARMS CONTROL PROPOSALS: A DRAFT FRAMEWORK

Tackling the 3 C’s will likely require a range of creative solutions carried out by individual states and coalitions of space-faring states. A number of state governments and non-governmental organizations argue that military competition in space, and the threat of a possible armed conflict either spilling into space or being fought in the domain itself, represent pressing issues either causing or contributing to space as a contested, competitive, and congested environment. Countries such as China and Russia believe the time is ripe for negotiating new space arms control agreements, asserting the limited prohibitions on weapons and military operations found in the OST are out-of-date and cannot address present military developments in outer space.

As noted above, the U.S. government is prepared to consider space arms control proposals, but its support for any accord is conditional on the agreement: 1) meeting standards articulated by the 2010 National Space Policy (NSP) – the proposal must be “equitable, effectively verifiable, and enhance the national security of the United States and its allies;” and 2) addressing the challenges (the 3 C’s) identified by the 2011 National Security Space Strategy (NSSS). Using these concepts as initial building blocks, the authors developed an assessment framework of six questions for space arms control proposals presented in Figure 1 on page 20. The authors

¹⁴ Space Launch Sites Around the World. *Space Today Online*. <http://www.spacetoday.org/Rockets/Spaceports/LaunchSites.html>

¹⁵ Wright, David, “Debris in Brief,” *Physics Today*, October 2007, pp. 35-40.

¹⁶ “Satellite Collision Leaves Significant Debris Clouds,” *Orbital Debris Quarterly News*, April 2009, pp. 1, 2.

¹⁷ If current trends in the use of space continue, and no solution is reached for removing space debris, the Air Force assesses it may track upward of 60,000 individual space objects by 2030. Shelton, General William L., Address, 27th annual National Space Symposium, April 11, 2011.

view this draft framework as a possible point of departure for developing more detailed analyses of the potential impact of proposed space arms control agreements on specific branches of the Armed Services.

KEY SPACE-FARING STATE PERSPECTIVES ON THE MILITARY USE OF SPACE AND SPACE ARMS CONTROL

Outside of the United States the most significant space-faring actors – in terms of systems, operations, and space research and development – are Russia, China, and the European Union (EU).¹⁸ They also represent key players in recent efforts to amend international space law, to include discussions regarding bans on space weapons and establishing new norms for the military use of space. Russia and China's joint proposal of a draft treaty to ban the "weaponization" of space, and the European Union's proposal of a draft "Code of Conduct" for space-faring nations, represent two fundamentally different approaches to addressing several of the challenges embedded within the 3 C's. These differing approaches are strongly shaped by each actor's space policies, programs, and views on the potential development of space weapons.

Russia

For many years Russia and the United States represented the two space superpowers. Russia continues to play a central, albeit reduced, role in the outer space domain. With the suspension of the U.S. space shuttle program, Russia is currently the only state capable of transporting human passengers to the ISS. The Russian space program, however, currently faces a number of major structural challenges. Six Russian space launches have failed over the last two years, destroying a number of costly satellites and other

space hardware.¹⁹ Internal investigations and outside analysts have found the country's space programs hobbled by graft and corruption.²⁰ Russia's military space programs also appear to be in trouble, with Russian experts arguing the country's space defenses are obsolete. At a May 2010 air and space event in Moscow, former Russian Air Force commander Anatoly Kornukov stated Russia's military space programs were "25-30 years" behind the United States, an opinion echoed by a number of prominent Russian non-government military analysts.²¹

In an effort to shore up Russia's civil and military space programs, Russian President Vladimir Putin recently pledged approximately 150 billion rubles (\$4.6B USD) for the Russian 2012 space budget.²² Moscow has also announced plans to launch one hundred military satellites over the next ten years to boost the Russian military's global positioning, mapping, and missile detection capabilities.²³

Russia is reportedly working to develop anti-satellite capabilities to match similar efforts by other nations. Asked to comment on recent foreign ASAT tests, then-Deputy Defense Minister Vladimir Popovkin (now head of Roscosmos) told reporters in May 2009 "we can't sit back and quietly watch others doing that; such work is [also] being conducted in Russia." Popovkin did not, however, offer specific details about Russian research or testing of an ASAT weapon, or key components of such a weapon.²⁴ Russia developed a co-orbital ASAT during the Cold War and conducted several tests of the system in space, but declared a moratorium on

¹⁸ The United States and Russia, for example, possess over eighty percent of the world's payloads in orbit. Watts, Barry D., "The Implications of China's Military and Civil Space Programs," *CSBA Testimony*, May 11, 2011, p. 2.

¹⁹ Amos, Jonathan, "Phobos-Grunt," *BBC News*, January 15, 2012.

²⁰ Flintoff, Corey, "For Russia's Troubled Space Program, Mishaps Mount," *NPR*, March 12, 2012 and "Russian Space Program Brought Down by Embezzlement," *RT.com*, September 8, 2011.

²¹ Razbakov, S. And Belogurov, I., "Russia's Space Defenses in Shambles," *RIA Novosti*, May 13, 2010.

²² "Putin Calls for Space Launch Development Strategy," *RIA Novosti*, April 13, 2012.

²³ Zhitenev, A., "Russia to Launch 100 Military Satellites in Next Decade," *RIA Novosti*, February 22, 2012.

²⁴ "Russia Pursuing Anti-Satellite Capability," *Global Security Newswire*, March 6, 2009.

testing in 1983.²⁵ Moscow may have also investigated the use of lasers for ASAT applications.²⁶ It is unclear if Popovkin's 2009 comments were referencing research based on long-dormant Cold War programs, more recent space and missile defense programs, or some other technology or platform. Russia likely already fields systems capable of disrupting enemy satellites, to include jamming capabilities and "dazzling" lasers.²⁷

Some Russian officials believe their space systems have already faced direct foreign attacks. Following a failed February 2011 attempt to launch a military mapping satellite, news reports featured quotes from an unnamed Russian space official speculating a foreign power may have used an electromagnetic pulse to deliberately interfere with the rocket's controls.²⁸ In an interview after the November 2011 failure of a rocket intended to launch a satellite to the Martian moon of Phobos, Popovkin suggested deliberate interference from a foreign "device" might have caused the rocket to malfunction.²⁹

For decades, Russia has actively lobbied for a treaty prohibiting the deployment of "weapons" in space. Since 2004, Russia has publicly stated it will not be the first state to deploy space weapons, and has strongly encouraged other nations to make the same pledge.³⁰ In February 2008, China and Russia proposed the Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT), a draft treaty whose stated intent is to prevent arms races and the use of force in outer space (further PPWT discussion begins on

page 13). In the event another state chooses to place weapons in space, however, Russia reserves the right to take whatever measures are necessary to protect its space assets.³¹

Russia's current position in favor of space arms control may reflect its concerns regarding the costs of attempting to match the military space capabilities of other states. In addition, its willingness to consider a ban on space-based weapons and offensive operations in space may stem from its tests of ASAT systems, and studies of the potential consequences of a conflict in space, conducted during the Cold War. Moscow's decision in the 1980s to halt Soviet ASAT programs may have reflected a conclusion they lacked military utility. Beyond the considerable fiscal and technical hurdles associated with ASAT development, Soviet scientists and strategists studying the results of their ASAT tests likely recognized any attack using these systems could generate large amounts of debris potentially damaging or destroying its own critical space systems.

China

China believes the development of space technology is critical to the country's continued economic growth and future ability to compete with military powers such as the United States.³² Beijing has devoted considerable resources in recent years to building up its space program. China does not make its space budget public, but one estimate by a U.S. non-government expert in late 2011 placed the figure at upwards of \$5 billion.³³ A 2008 Congressional Research Service (CRS) overview of China's space program noted its rapid development over the course of the preceding decade, to include fifty consecutive

²⁵ "Anti-Satellite Weapons, Countermeasures, and Arms Control," pp. 5-7.

²⁶ Ibid. p. 6.

²⁷ Air University Space Primer, Chapter 18, *Rest of World Satellite Systems: Russian Satellite Systems*, 2003
http://space.au.af.mil/primer/rest_of_world_satellites.pdf.

²⁸ "Russia Says Foreign Power May Have Caused Spy Satellite Loss," AFP, February 14, 2011.

²⁹ Kramer, Andrew E. "Russian Official Suggests Weapons May Have Caused Spacecraft Failure," *New York Times*, January 10, 2012.

³⁰ Loshchinin, Ambassador Valery, "Peaceful Uses of Outer Space," Address, Geneva, November 11, 2010.

³¹ "Russia Issues Warning on Space-Based Weapons," *New York Times*, September 27, 2007.

³² Smith, Marcia S. "China's Space Program," Congressional Research Service (CRS) Report, October 18, 2005, and Watts, pp. 4-6.

³³ Hennigan, W.J. and Ralph Vartabedian, "Foreign Nations Push Into Space," *Los Angeles Times*, July 22, 2011.

successful space launches by the country's "Long March" family of SLVs.³⁴

China is moving forward with a broad range of sophisticated satellite and rocket programs, to include significantly expanding its space-based ISR, navigation, and communications satellite constellations.³⁵ China is scheduled to test its Long March-V SLV in 2014, a heavy-launch space platform with double the payload capacity of its current rocket fleet.³⁶ It has also developed a robust manned space program. China put its first *taikonaut* in space in 2003, and has started planning for a future manned mission to the moon.³⁷

China's military space programs also appear to be making steady progress. Efforts to match the United States and other advanced states in military space capabilities likely reflect the People's Liberation Army's (PLA) strategic assessment of the critical importance of space assets to recent U.S. and coalition military operations. At present Chinese strategists do not regard outer space as a distinct theater of conflict.³⁸ They emphasize, however, the critical inclusion of space assets and operations in plans for all other domains, and advocate taking steps to disable, seize, or destroy enemy satellites in order to gain the upper hand on a technically-advanced adversary.³⁹ The PLA is committed to establishing "space dominance" in future conflicts, with a particular focus on developing the capability to "sustain the uninterrupted operation of space information collection and

transmission systems."⁴⁰ Establishing the necessary conditions for "space dominance" requires a range of space assets to coordinate different branches of the military, and the PLA has organized many of its space operations around the achievement of three key missions – observations/intelligence, navigation/positioning, and communications.⁴¹

In addition to these enabling capabilities to boost the performance of its land, sea, and air forces, China has also invested in systems allowing it to carry future offensives into outer space itself. China is developing and fielding capabilities to jam, dazzle, and destroy satellites, to include both kinetic and directed-energy systems.⁴² On January 11, 2007, China destroyed a non-operational Fengyun-1C weather satellite with a ground-based ballistic missile.⁴³ Traveling at nearly 18,000 miles per hour, the missile functioned as a kinetic kill vehicle, striking and shattering the satellite. According to a U.S. National Security Council official, the Chinese ASAT weapon was a medium-range ballistic missile that destroyed the satellite at an altitude of 537 miles.⁴⁴ An April 2003 Congressional Research Service report, citing a range of government and media sources, stated the missile was an SC-19 fired from a transporter-erector-launcher operating near China's Xichang Space Center.⁴⁵ Launched without prior notification or warning, the test (which, as noted above, generated thousands of pieces of dangerous space debris), was immediately protested by the United States and a number of other space-faring nations.⁴⁶ Although China has not conducted

³⁴ Logan, Jeffrey, "China's Space Program," CRS Report, September 29, 2008, p. 1.

³⁵ Ibid, p. 7.

³⁶ Office of the Secretary of Defense (OSD), *Military and Security Developments Involving the People's Republic of China*, 2011, p.5

³⁷ Smith, Marcia, "China's Space Program," CRS Report, October 21, 2003 and Kluger, Jeffrey, "China's Going to the Moon," *Time*, January 4, 2012.

³⁸ OSD, *Military and Security Developments*, 2011, pp. 23-24.

³⁹ OSD, *Military and Security Developments*, 2011, pp. 23-24 and Pillsbury, Michael, "An Assessment of China's Anti-Satellite and Space Warfare Programs, Policies, and Doctrines," U.S.-China Economic and Security Review Commission report, pp. 10-12.

⁴⁰ Cheng, Dean, "China's Military Role in Space," *Strategic Studies Quarterly* (Spring 2012): 68.

⁴¹ Smith, Lt Col Steven, "Chinese Space Superiority?," Air University paper, February 17, 2006, p. 3

⁴² OSD, *Military and Security Developments*, 2011, p. 37.

⁴³ Covault, Craig "Chinese Test Anti-Satellite Weapon," *Aviation Week*, January 17, 2007.

⁴⁴ Kaufman, Mark and Dayna Linzer, "China Criticized for Anti-Satellite Missile Test," *Washington Post*, January 19, 2007.

⁴⁵ Kan, Shirley, "China's Anti-Satellite Weapon Test," CRS report, April 23, 2007, p. 1.

⁴⁶ China labeled the test an "experiment" and asserted the event did not change its official position against the "weaponization of space and an arms race in space."

additional space tests of this ASAT weapon, it continues to improve this system and appears intent on including it as part of its arsenal.⁴⁷

While the Chinese military devotes resources to developing its space capabilities, Chinese diplomats call for an international agreement to ban the deployment of weapons in space. China joined Russia in 2008 in proposing the PPWT, and continues to advocate for its ratification. In a government-issued white paper released in 2011, China reaffirmed its commitment to the prevention of space weaponization, stating:

The Chinese government has advocated from the outset the peaceful use of outer space, and opposes any weaponization of outer space and any arms race in outer space. China believes that the best way for the international community to prevent any weaponization of an arms race in outer space is to negotiate and conclude a relevant international legally-binding instrument.⁴⁸

China is working assiduously to match – and in regard to its development of ASAT weapons, counter – the current military space capabilities of technologically-advanced states. Beijing’s interest in space arms control may reflect its concern the United States and other countries could remain ahead of China with next-generation military space systems, forcing the expenditure of considerable resources in order to keep up. As such, China may view space arms control as a means to put a “ceiling” on global military space capabilities and prohibit capabilities currently beyond China’s reach, while continuing to allow China to pursue parity in military space technologies – and, with the development of ground-based ASAT weapons, perhaps even gain a strategic edge.

Kahn, Joseph, “China Confirms Anti-Satellite Test,” *International Herald Tribune*, January 23, 2007.

⁴⁷ OSD, *Military and Security Developments*, 2011, p. 37.

⁴⁸ White Paper on Arms Control and Disarmament, *China’s National Defense in 2010*, March 31, 2011.

European Union

The European Union (EU) has increasingly sought to advance European space interests through harmonizing the space policies and programs of its twenty-seven member states. European states have long recognized no single space-faring nation in Europe can compete with the range of space programs fielded by countries such as the United States, Russia, or, in the 21st century, China. In recent years, however, concerns that Europe may be falling behind in space prompted EU member states to consider taking steps to more closely align their national space policies, strategies, and decision-making. In 2007 the EU’s Council (the EU’s guiding political body of member heads of state or government) jointly drafted a “Resolution on the European Space Policy” with the European Space Agency (ESA). The European Space Policy provides a common space policy framework and roadmap for the ESA, EU, and EU member states, coordinating their efforts to ensure Europe can “stay a major player [internationally], solve global problems and improve quality of life.”⁴⁹

Significantly, the European Space Policy also called for the EU to consider how to pursue civil-military “synergies” in space.⁵⁰ The language represented an important change from earlier European efforts to coordinate space activities, which did not involve national military space programs and were often deliberately focused on non-military applications.⁵¹ The European Space Policy was followed in July 2008 by the passage of a European Parliament resolution titled “Space and Security” calling for EU states to work together to develop a range of space programs focused on addressing current and future security needs, to include developing satellite capabilities for navigation, reconnaissance, surveillance, and

⁴⁹ Dordain, Jean-Jacques and the European Commission, *Resolution on the European Space Policy*, May 22, 2007, p. 9.

⁵⁰ *Ibid.*, p. 11.

⁵¹ The ESA’s mandate, for example, expressly limits cooperation between its members’ space programs to “exclusively peaceful purposes.” Article II, Convention of Establishment of a European Space Agency, SP-1271(E), 2003.

missile warning.⁵² Even as the Parliament called for the EU to forge “a common approach ... for defending European interests in space,” however, it also cautioned that the organization must simultaneously avoid taking any steps that might “contribute to the overall militarisation and weaponisation of space.”⁵³

Given these caveats, the EU’s Galileo satellite program may represent a model for the future pursuit of space capabilities meeting the political, policy, and strategy needs of an organization whose twenty-seven member states have widely varying national space and military capabilities.⁵⁴ Once Galileo is complete (currently two of the system’s four satellites are in orbit) it will provide the EU with satellite navigation/positioning capability similar to the U.S. Global Positioning System (GPS). As with GPS, Galileo will provide a capability with a host of potential civilian and military applications. The EU has decided the Galileo constellation of satellites represent “civilian systems under civilian control” but has also provided policy and institutional mechanisms to allow member state militaries to access and leverage the information provided by the system’s satellites.⁵⁵ This approach of developing a system that is civilian controlled but also provides vital capabilities to the militaries of EU member states may represent the organization’s long-term approach for equipping Europe with the means to address a range of space defense challenges through civilian/military partnerships.

The EU voices strong support for new multilateral initiatives to ensure space remains a domain free of armed conflict. The organization, however, has taken a different approach from Russia and China in attempting to address the potential security challenges and risks associated with the increasing use of – and competition over – outer space by

state militaries. Rather than propose a legally-binding space arms control treaty, the EU believes the first step toward addressing the security challenges currently facing space-faring states is the establishment of additional “rules of the road” for state conduct in outer space that build on the principles of the OST. As discussed on page 15, the EU’s Draft Code of Conduct for Outer Space Activities (EU CoC) suggests the best means for preventing provocative military actions in space is to embed guidelines and restrictions on the national military use of space within a broader framework that covers all state activities in outer space.

EVALUATING THE PPWT AND EU CoC

The United States has stated its official opposition to the PPWT and the EU CoC. U.S. officials have described the PPWT as “fundamentally flawed.”⁵⁶ The United States has consistently opposed the draft treaty at the UN Conference on Disarmament (CD) since its introduction by Russia and China in 2008. The United States has also rejected the EU CoC, stating in January 2012 that the text was “too restrictive.”⁵⁷ The United States, however, did not reject the EU CoC in its entirety, viewing the draft accord as a “good foundation” for a future agreement.⁵⁸ At the time of this writing, the United States, European Union, and other states are currently engaged in discussions regarding the development of an “International Code of Conduct” based on the EU text.

A thorough assessment and understanding of both proposals is important for national security practitioners, analysts, and scholars. The PPWT and EU CoC represent two poles bounding a range of proposals aimed at regulating the state and military use of outer space. The former is a legally-binding treaty attempting to ban weapons and the “use of force” in space; the latter is a

⁵² European Parliament, “Space and Security,” resolution, July 10, 2008, 2008/2030(INI)

⁵³ Ibid.

⁵⁴ Silvestri, Stefano, “Space and Security Policy in Europe,” EU Institute for National Security Studies, Occasional Paper no. 48, December 2003, pp. 5, 12-13 and Pasco, Xavier, “A European Approach to Space Security,” AAAS Reconsidering Rules of Space Paper Series, pp. 12-14.

⁵⁵ Dordain and the European Commission, p. 11 and Pasco, “A European Approach,” pp. 12-14.

⁵⁶ Kennedy, Ambassador Laura, Statement, UN Conference on Disarmament, February 8, 2011.

⁵⁷ Herb, Jeremy, “U.S. Won’t Sign EU Space Treaty,” *The Hill*, January 12, 2012.

⁵⁸ Rose, Frank, Deputy Assistant Secretary of State Address, 15th Annual FAA Commercial Space Transportation Conference, February 16, 2012.

politically-binding agreement that seeks to articulate normative standards for state conduct that will prevent actions or practices precipitating conflicts in outer space. As such, understanding the theoretical underpinnings and potential impact of these two agreements can provide valuable insights into broader efforts to apply arms control measures to outer space or otherwise regulate the military use of this strategic domain. In addition, evaluating the shortcomings of the PPWT and EU CoC can underscore the importance of existing U.S. Government (USG) and U.S. Armed Services' significant concerns in the area of space arms control, while also potentially raising new issues and questions that may prove valuable in future reviews of proposed agreements.

PPWT

In February 2008 China and Russia tabled a draft treaty at the United Nations CD titled the Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT).⁵⁹ The PPWT grew out of longstanding efforts by several states at the UN General Assembly to pass resolutions banning weapons from space, often under the title "Prevention of an Arms Race in Outer Space" (PAROS). The United States has consistently opposed PAROS resolutions in their various iterations and, as noted above, has also stated its firm opposition to the PPWT.⁶⁰

PPWT represents the most significant draft accord on weapons in outer space currently under consideration within international negotiating

⁵⁹ Loschinin, Ambassador Valery and Ambassador Wang Qun, letter, February 12, 2008, CD/1839. This official letter to the CD presented the Russian and Chinese delegation's draft text of the treaty (hereafter referred to as PPWT).

⁶⁰ In August 2008 the U.S. delegation to the CD provided a detailed analysis of U.S. concerns regarding the PPWT to other CD members. Rocca, Ambassador Christina B., CD/1847, August 26, 2008, pp. 3-4. U.S. officials have stated in subsequent CD sessions that this analysis continues to represent the USG's views on the PPWT. United States Mission to the UN and Other International Organizations, "Press Conference: Deputy Assistant Secretary of State Frank A. Rose," July 13, 2010.

forums. The stated intention of the PPWT is to prevent states from deploying weapons in outer space and ensure space remains a peaceful domain free from the use of force. The proposed treaty's major provisions include:

- Proposing the first international legal definition of the terms "weapon in outer space," "use of force" in outer space, and "threat of force" in outer space⁶¹
- Prohibiting the placement of weapons in outer space⁶²
- Prohibiting the threat or use of force against outer space objects⁶³

Analysis of the key provisions of the PPWT raises a number of issues and questions for the United States and, indeed, any space-faring nation whose military has interests or involvement in outer space.

The PPWT and the 3 C's: The PPWT purports to address concerns that space, as an increasingly contested domain, will someday become a battleground, with space-faring nations deploying and using weapons in outer space. Article VIII of the PPWT calls for the formation of an "executive organization" to address a range of issues related to implementation of, and compliance with, the treaty. The executive organization's responsibilities would include adjudication of disputes and addressing charges of noncompliance.⁶⁴ The structure and authority of the executive organization, however, is left for negotiation within a separate protocol. Neither the exact nature of the organization or its adjudication processes are specified; the PPWT does not discuss, for example, whether the executive organization would refer treaty enforcement issues pertaining to international peace and security to the UN Security Council. In the event of serious breaches, the executive organization can "take steps to put an end to the

⁶¹ PPWT, Art I (c).

⁶² PPWT, Art II.

⁶³ Ibid.

⁶⁴ PPWT's Article VII states that when a dispute arises between States Parties, the parties should attempt to resolve disputes through consultations. If there is no resolution, the situation may be referred to the executive organization. Article VIII discusses the executive organization.

violation”, but what these steps might entail is not specified.⁶⁵ The lack of description in regard to the executive organization also raises questions as to whether it is a permanent entity staffed by international civil servants (similar to the Comprehensive Test Ban Treaty Organization) or a joint commission bringing together diplomats and officials from participating states to address treaty matters (such as New START’s Bilateral Consultative Commission). With little offered in the text regarding the form and function of the executive organization, it is unclear what mandate – if any – it would have for investigating treaty violations or sanctioning member states failing to comply (or deliberately violating) key provisions of the treaty.⁶⁶

The draft PPWT thus provides no clear recourse for States Parties complying with its standards who discover a second State Party placing objects that are weapons – or, importantly, could be weapons – into orbit. Past experience with other arms control accords underscores the critical importance of providing a forum and process for addressing “suspect” objects that may fall under the restrictions of a treaty. Given that the introduction of even one “space weapon” into a space domain currently free of any weapons systems would represent an extremely destabilizing event, the PPWT’s failure to provide clear mechanisms or processes for adjudicating questions of compliance, disputes regarding potential violations, or for sanctioning violators, represents a major flaw within the draft treaty. The PPWT’s stated intent of addressing the particulars of the executive organization within an additional protocol to be negotiated at a later date is not an acceptable solution to this problem. Electing to leave an essential requirement of effective treaties to later negotiations will leave PPWT signatories with fundamental doubts about future implementation, and unanswered questions regarding whether the treaty ultimately serves their national interests. Furthermore, the history of treaty negotiations reveals that significant issues left unfinished at major negotiating rounds or within principal drafting sessions prove

difficult to impossible to resolve in later consultations.

Overall, the PPWT does little to change the assessments or incentives that might lead states to consider developing weapons – particularly ground-based weapons with space applications – or compete to develop offensive space systems. The PPWT is a flawed draft treaty that fails to clearly incentivize compliance or protect states acting in good faith from potential treaty violators. It does not address the challenges posed by outer space representing an increasingly contested and competitive environment.

Impact on U.S. Military Space Assets,

Operations, or Strategies: The PPWT seeks to ban the placement of weapons in space, with Article 1(c) advancing the following definition of “weapon in outer space”:

Any device placed in outer space, based on any physical principle, which has been specially produced or converted to destroy, damage or disrupt the normal functioning of objects in outer space, on the Earth or in the Earth’s atmosphere, or to eliminate a population or components of the biosphere which are important to human existence or inflict damage on them.

This definition, however, is not accompanied by any means to inspect or verify that a space object is (or is not) a “weapon.” As the properties of weapons and the effects of weapons purportedly covered by the treaty are extremely wide-ranging, States Parties could attempt to claim that a broad variety of non-kinetic military space systems would either be captured under this definition, or should at the very least be subject to some form of negotiation to prove that they were not covered by the treaty. The treaty’s lack of clarity could lead states to argue that U.S. space systems such as GPS satellites are “weapons,” because they are “devices placed in outer space” that are integral to guiding a range of land- and sea-based weapons to their targets (as the definition includes destruction of targets both in space and “on Earth”). Furthermore, the treaty completely fails to make any provision for *ground-based* weapons that can destroy objects in space. The PPWT would not,

⁶⁵ PPWT Article VIII

⁶⁶ Rocca, CD/1847, pp. 3-4.

for example, limit or ban the Chinese medium-range ballistic missile ASAT.⁶⁷

Another problem with the PPWT's definition of "weapon" is that it makes no distinction between offensive and defensive systems. While the PPWT's Article V acknowledges a State's inherent right to individual or collective self-defense, this language appears to be in tension with its Article II prohibition against the use of force in space. The draft treaty fails to address what actions a state is permitted to take, or what systems it is permitted to deploy (if any), to face a threat from an adversary's space systems.⁶⁸

In general, the experience of U.S. negotiators of arms control accords, and of delegations addressing questions of treaty compliance, demonstrates that treaty definitions of weapons or other military objects should be written in specific language that accurately defines the intended system(s) and clearly separates these systems from other objects. The treaty's vague definition of "weapon" does not meet either standard, and may provide a means by which other states could question, criticize, and even attempt to ban many U.S. military space systems.

Equitable, Verifiable, and in the Best Interests of the United States?: The PPWT fails each of the three tests provided by the 2010 NSP: it is not equitable, it is not verifiable, and it is not in the best interests of the United States. The draft treaty is not equitable, giving a free hand to states wishing to project power into space using ground-based systems, while potentially prohibiting the deployment of defensive systems – whether for land or space-based missions – in space. It thus favors a particular force posture and force structure for states interested in controlling or denying access to outer space. PPWT recognizes the importance of establishing an executive organization to address disputes that arise under the treaty, but fails to include vital implementation language necessary to create a body that could play a critical role in ensuring the fair application of treaty provisions to all participating parties.

⁶⁷ Kennedy, Ambassador Laura, Statement, UN Conference on Disarmament, February 8, 2011.

⁶⁸ Rocca, CD/1847, pp. 3-4.

The PPWT is also inherently unverifiable. Although the PPWT's text suggests States Parties could negotiate an additional protocol addressing verification and compliance issues, the treaty itself has no verification regime, only calling for participating states to engage in voluntary confidence building measures.⁶⁹ The PPWT does not provide a mechanism for authenticating the technical aspects of space systems to determine compliance with the treaty, leaving unanswered how signatories could "prove" to other states that equipment onboard objects such as satellites would not, or could not, be used as a weapon.

Overall, as detailed in Figure 2 on page 21, accession to the PPWT is not in the best interests of the United States. The United States, for example, would probably interpret a term such as "space weapon" within a space arms control agreement more narrowly than many other states. If the United States acceded to the PPWT, it would likely face repeated accusations of treaty violations for allegedly fielding and/or developing space-based weapons. Moreover, the treaty is flawed in its apparent focus on *space-based weapons* – a type of weapon that remains confined to the realm of science fiction. As a result, it fails to address ground-based systems, such as the ASAT capabilities currently under development by states like China and India, which appear more likely to either precipitate a regional or international arms race in weapons with space applications or be used in a potential future conflict in space.

European Union Code of Conduct for Outer Space Activities

In December 2008, the Council of the European Union officially released its Draft Code of Conduct (EU CoC) for Outer Space Activities.⁷⁰ Following a series of EU deliberations, the organization released a revised draft in October 2010, using this second text in its consultations with third-party states.⁷¹ In creating the EU CoC,

⁶⁹ PPWT, art VI.

⁷⁰ Council of the European Union, "European Union Draft Code of Conduct," December 17, 2008.

⁷¹ Council of the European Union, "Revised Draft Code of Conduct for Outer Space Activities," October

the EU had two goals: 1) to strengthen existing UN space treaties and agreements; and 2) to complement these agreements by codifying best practices for state use of outer space. The politically binding agreement seeks to “strengthen the safety, security and predictability of all space activities” by promoting norms of responsible conduct across the entire community of space-faring nations. The EU CoC also promotes means and mechanisms for improving communication and encouraging transparency within this community. In an attempt to build on key principles of space law found in the OST and provide more detailed “rules of the road” for state activities in outer space, the EU CoC includes provisions requesting Subscribing States:

- “Refrain” from “intentional” actions that damage or destroy outer space objects⁷²
- “Take reasonable measures” to prevent collisions in space⁷³
- Commit to not taking actions causing long-lived debris⁷⁴
- Commit to a wide range of notifications regarding state activities in space⁷⁵
- Commit to sharing national space policies and procedures⁷⁶

The EU CoC is not an arms control treaty; it does not attempt to balance the space military systems of states, nor does it feature provisions expressly limiting or banning either the placement or use of armaments in space. In articulating a “set of best practices aimed at ensuring security in outer space [that] could become a useful complement to international space law,”⁷⁷ however, it attempts to provide a framework providing guidelines for national security activities in space, to include the military use of space.

The 3 C’s: The EU CoC proposes to address the challenge of space representing an increasingly

contested environment by promoting norms of behavior that will preempt or reduce potential sources of friction between space-faring states. It does not provide means to encourage compliance with its suggested “rules” or sanction violators, preferring to promote dialogue to address disagreements. A potential weakness of the EU CoC is that all states that subscribe to its principles “resolve ... to take all appropriate measures to prevent outer space from becoming an area of conflict.”⁷⁸ The vagueness of this clause – found within the EU CoC’s “General Principles” – is a double-edged sword. On the one hand, the statement correctly recognizes the importance of states considering whether planned activities in outer space might be perceived as destabilizing or provocative by other space-faring nations. But the statement is so broad (using “conflict” rather than “armed conflict”, for example) that any state agreeing to abide by the EU CoC could be open to criticism for *any* level of military involvement in space. Some states, for example, might argue that outer space will only be a peaceful domain if it is “demilitarized” – that is, free of military systems of any kind – and that the placement of any military asset in space, even if its only role is communications or surveillance, is a potential catalyst for turning space into an “area of conflict.”

A related issue is the EU CoC’s choice of words within a clause asking subscribing states to commit to follow-on discussions regarding “security guarantees,” to include measures for the “prevention of an arms race in outer space.”⁷⁹ The choice of language in the latter clause is similar to that employed by PAROS initiatives proposed at the United Nations that the United States regularly opposes, and its lack of definition again opens a potential avenue for U.S. military space assets and operations to come under criticism. One state’s legitimate efforts to stay a step ahead of potential adversaries in military space capabilities – even if these capabilities do not include placing offensive

11, 2010. This article’s citations to the Code refer to the October 2010 revised text.

⁷² EU CoC, Article II, Section 4.2.

⁷³ EU CoC, Article II, Section 4.3.

⁷⁴ EU CoC, Article II, Section 5.

⁷⁵ EU CoC, Article III, Section 6.

⁷⁶ EU CoC, Article VIII, Section 8.1.

⁷⁷ EU CoC, Preamble.

⁷⁸ EU CoC, Article I, Section 2.

⁷⁹ EU CoC, Article II, Section 4.5.

weapons systems in orbit – may in the eyes of other states represent a dangerous desire to launch an “arms race” in the cosmos.

The EU CoC clearly recognizes the inherent right to self-defense with the UN Charter, and its voluntary nature would not preclude the United States or any space-faring state from taking the actions in space it deemed necessary to defend itself from aggression. The discussion of the clauses above, however, points to the current tension between space-faring states over what represents acceptable actions to undertake in space in promotion of national defense objectives. The EU CoC recognizes that this tension – and lack of consensus – is a problem, but it arguably fails to communicate a concept of what actions in terms of militaries or armaments are destabilizing or dangerous because of the threat they pose to space as a domain free and open to all states. Communicating this concept would not be a simple task, but it could create a point of departure for discussing possible norms regarding the military use of space. Including a discussion or understanding of the role of armaments, or more broadly, state militaries, in stabilizing (or destabilizing) the outer space environment within the text could lead to an agreement better equipped to address outer space as an increasingly contested environment.

The EU CoC is on firmer ground with its attempt to address the “congested” dimensions of the 3 C’s challenge. The problem of space debris is addressed in a number of ways by the EU CoC, which asks Subscribing States to commit to sharing information on debris-mitigating policies and procedures, and refrain from actions likely to generate debris. The Code frames actions destroying space objects as only acceptable in the context of national security or attempting to reduce debris.⁸⁰ If short on specifics, the EU CoC’s effort to address space debris as a multi-dimensional problem requiring information-sharing and the establishment of a norm that would prevent states from carrying out actions such as China’s 2007 ASAT test likely represents an approach that can be built on during the drafting of an International CoC.

⁸⁰ EU CoC, Art. II, Sec. 4.2.

Impact on U.S. Military Space Assets,

Operations, or Strategies: The EU CoC does not expressly limit or ban any military space systems or operations. The discussion regarding its attempt to address outer space as a contested environment, however, is relevant to U.S. military space operations. If the United States signed the EU CoC, it would need to internally address (and probably externally, in terms of responding to questions from other Subscribing States) the following questions, whose answers might impact its own conduct of space operations:

- What actions lead to space “becoming an area of conflict”?⁸¹
- What actions represent “harmful interference in outer space activities”?⁸²
- What actions enhance (or detract) from space security?⁸³
- Under what circumstances is it acceptable to destroy an outer space object?⁸⁴

The United States is a responsible state actor in outer space, and its military space assets, operations, and strategies are both vital to the country’s national defense and critical to international stability – on Earth and in outer space. This set of questions, directly linked to clauses within the EU CoC, brings forward important issues regarding the military use of space that are increasingly important for all space-faring states to address and answer. Given the EU CoC’s politically binding nature, and the fact that United States’ military operations in space adhere to both international space law and the law of war, a legal review of the EU CoC and any given U.S. military space operation would likely conclude that the action in question would be entirely compliant with the space security provisions of the Code. Nevertheless, similar to the PPWT, if the United States were to sign on to the EU CoC it would need to prepare to address a range of questions and demarches on the issues highlighted above; as the world’s largest space power, the United States would likely field both in the event it signed on to the EU CoC.

⁸¹ EU CoC, Art. I, Sec. 2.

⁸² Ibid.

⁸³ EU CoC, Art. II, Sec. 4.5.

⁸⁴ EU CoC, Art. II, Sec. 4.2.

The EU CoC's provisions regarding exchanges of information might have an impact on U.S. military space operations. The EU CoC seeks to cover "all outer space activities conducted by a Subscribing State", calls for information to be exchanged on activities "relevant for the purposes of the Code", and includes a broad range of examples of the types of activities that should generate notifications to other participating states.⁸⁵ This could lead to the interpretation that essentially all state activities in space should result in some type of notification being sent to all of the Code's Subscribing States.

Although the form (and level of detail) of information to be exchanged is not specified, such an interpretation would raise issues for U.S. military space operations. While the voluntary nature of the agreement would always allow the United States to opt out of sharing sensitive information on its military space activities, this is a much more broad-brush approach to transparency than that employed by arms control agreements the United States has negotiated in the past. In general, the EU CoC's discussion of information exchanges lacks clarity on a number of key points, including: when, where, and how information is exchanged; whether these exchanges are similar to, or more expansive than, information exchanged under other outer space accords (and if so, whether duplication is necessary); and what exceptions, if any, are allowed, or whether the Code intends states to exchange information on all activities aside from occasional exceptions citing reasons of "national interest" or "force majeure".

Equitable, Verifiable, and in the Best Interests of the United States?: The EU CoC appears broadly equitable in regard to its treatment of space-faring states, although its stipulation that the agreement cover "all space activities" would place a larger reporting burden on major space powers. Some foreign critics of the draft accord, however, have advanced arguments that the EU CoC is unfairly biased toward European practices and space programs.⁸⁶

The EU CoC did not attempt to establish a verification regime; Subscribing States would have to rely on national assets and whatever information other governments chose to share under the auspices of the agreement's notification provisions to determine if participating states were complying with the Code. The EU CoC also does not establish a formal body to adjudicate disputes over compliance, or resolve other questions related to the agreement, suggesting that Subscribing States engage in consultations to address these types of issues.⁸⁷ Similar to the PPWT, this lack of an institutional mechanism (such as New START's Bilateral Consultative Commission) for addressing questions of compliance or disputes between participating states is a potential weakness of the accord.

As with all politically binding accords, the impact of an agreement like the EU CoC on the United States would vary depending on the diplomatic and political capital the USG wished to invest within it. The EU CoC articulates and attempts to address the 3 C's within a broad framework that seeks to add depth and fidelity to current international space law – law that, in many cases, was negotiated during a fundamentally different era for the state use of space. As such, it represents an important effort to rally governments behind a common approach to address the 3 C's as multilateral threats to all space-faring states. It is important to note that the EU CoC draws principles from the United Nations Debris Mitigation Guidelines, adopted in 2008. These guidelines outline space debris mitigation measures for the planning, design, manufacture, and operational phases of spacecraft and launch vehicles, and call for limiting the long-term presence of spacecraft in low Earth orbit at the end of their useful life. The EU CoC falls short, however, in regard to its execution, as it identifies challenges and proposes cooperative approaches without clearly specifying what state actions are negative or destabilizing, or what recourse good actors have for dealing with actors that violate (whether willfully or unintentionally) its provisions. As shown in Figure 3 on page 21, the

⁸⁵ EU CoC, Art I, Sec 2 and Art. III, Sec 6.

⁸⁶ Victoria Samson, "India and Space Security" May 9, 2011; Rajagopalan, "The Space Code of Conduct

Debate," *Strategic Studies Quarterly* (Spring 2012): 142-145.

⁸⁷ EU CoC, Art. III, Sec. 9.

EU CoC promotes the safe use of space. Since it is politically binding with no verification regime, it would have little direct impact on the current U.S. military space operations or damage U.S. national security interests in outer space. However, such a Code would do little to deter countries from pursuing weapons in space.

SPACE ARMS CONTROL IN THE 21st CENTURY: A NEW HOPE OR LOST IN SPACE?

The significant challenges faced by space-faring nations in the third space age are too large for any single state to fully address alone. The future safety of space will likely require state governments, international organizations, and the private sector to collaborate in exchanging information, respecting established procedures regarding navigation, and, in some cases, discussing the possible development of new norms or rules to address an increasingly competitive, contested, and congested space environment. These efforts must account for, and will impact, both the civilian and military use of space.

U.S. policymakers confronted with the 3 C's problem set have stated their interest in multilateral approaches, to include space arms control, to address the present reality that outer space is an area of military operations for multiple States and a possible theater of conflict in future wars. Space arms control long remained dormant in large part due to a lack of space arms or weapons deployed in other environments possessing an ability to strike space assets. However, with China testing ASAT systems and states such as India signaling an interest in developing these capabilities, in the near future multiple actors may field weapons capable of threatening objects in space. All of these developments open the possibility that a State or States may propose a future space arms control treaty or an agreement addressing some aspect of the military use of space that is in the best interests of the United States. The authors agree with the assessment of U.S. policy makers that neither the PPWT nor EU CoC enhances U.S. national security. Future progress in space arms control or confidence building measures (CBMs)

will require an agreement that can balance the significant space security needs of states against the legitimate threat posed by weapons (whether based on Earth or in space) that can range space systems.

In providing a draft framework for assessing the potential impact of space arms control proposals on the United States, the authors hope to shed light on several of the key military and strategic requirements that future arms control agreements or CBMs must address when attempting to resolve the challenges of the third space age.

Figure 1: Assessment Criteria for Space Treaties and Agreements	
Based on current USG guidance (e.g. 2010 NSP and 2011 NSSS), does the treaty or agreement under consideration ...	
Freedom of Action	<p><i>preserve or enhance space as an open, free, and safe operating environment?</i></p> <ul style="list-style-type: none"> • Maintaining space as a free domain for all states remains a core principle of USG space policy.
Access	<p><i>ensure the United States maintains access to space?</i></p> <ul style="list-style-type: none"> • U.S. access to space requires reliable, responsive, and cost-effective launch capability; access to data from space systems; and access to the radio frequency spectrum.
Transparency	<p><i>include acceptable transparency measures?</i></p> <ul style="list-style-type: none"> • Transparency measures should apply equitably to all space-faring nations, should not create onerous reporting requirements, and should not include the exchange of information with the potential to compromise the operational security of U.S. space systems.
Verification and Enforceability	<p><i>include means of verification and enforcement mechanisms?</i></p> <ul style="list-style-type: none"> • Agreements should include means/mechanisms for adjudicating and resolving disputes, and for referring violators whose actions threaten international peace and security to the UN Security Council.
Affordability	<p><i>impose (significant) monetary costs on the United States?</i></p> <ul style="list-style-type: none"> • Given current resource constraints, the possible costs of implementing and complying with any agreement must be carefully considered by the USG.
U.S. Military & Space	<p><i>negatively or positively impact U.S. military space assets, operations, or strategies?</i></p> <ul style="list-style-type: none"> • The United States must have the freedom to design, build, launch, operate, and maintain national security space assets.

Figure 2: Assessment of the PPWT	
Freedom of Action	The PPWT is overly restrictive of U.S. freedom of action. The lack of clarity in the PPWT could force the United States into providing lengthy explanations and justifications for many of the space assets and operations of the Armed Forces.
Access	The PPWT's ban on "weapons" in space could potentially complicate or preclude access to space by U.S. civil and military platforms.
Transparency	The PPWT would not enhance transparency. Although it does encourage States' Parties to implement transparency and confidence-building measures on a voluntary basis, these would be difficult to implement.
Verification and Enforceability	The current draft of the PPWT does not contain a verification regime. The United States would be forced to rely on something like national technical means (NTM) to determine compliance.
Affordability	The PPWT does not appear to levy any new requirements in terms of costs.
U.S. Military & Space	Treaty terms are vague, complicating questions of compliance/noncompliance. Treaty fails to address what actions a state is permitted to take, or what systems it is permitted to deploy (if any), to face a threat from an adversary's space systems. Other states could question, criticize, and even attempt to ban many U.S. military space systems.

Figure 3: Assessment of the Draft European Union Space Code of Conduct (EU CoC)	
Freedom of Action	The EU CoC would have little direct impact on current U.S. military space operations. The draft has no definition of weapons and does not prohibit placing military systems in space.
Access	The EU CoC endorses the principle of free access, stating it seeks to protect "the freedom of access [to space] without interference." ⁸⁸
Transparency	The EU CoC could marginally increase transparency regarding other state space programs depending on the type of information other governments elect to share. The information-sharing clauses, however, do not specify the level of detail of notifications exchanged under the Code. Strict adherence with the EU CoC's provisions on information sharing could raise issues regarding some military space operations. Much of the information requested by the EU CoC appears similar to information the United States exchanges due to other agreements.
Verification and Enforceability	The EU CoC does not have a verification regime. Signatories can request consultations to discuss possible violations. The United States would rely on existing capabilities to detect violations. The EU CoC does not have an enforcement mechanism.
Affordability	Little additional costs associated with the code. The United States is already meeting most EU CoC reporting and notification requirements through the OST.
U.S. Military & Space	The EU CoC would not damage U.S. national security interests in outer space or limit research and development of classified programs relating to outer space activities. It also includes a right to self-defense clause.

⁸⁸ EU CoC, Art. I, Sec. 2.

Past U.S. Actions: A Source for Foreign Perceptions of U.S. Redlines in Space

Jonathan Mazur

This paper examines the boundaries of possible United States redlines in space. A redline in space is a “marker” that when crossed would result in a military or strong diplomatic response—such as what might occur if a foreign actor temporarily or permanently interfered with any aspect of a U.S. space system. The United States has not published or possibly even defined its redlines in space—as recently noted during the 2010 U.S. Strategic Command (STRATCOM) Deterrence Symposium by the then Commander for STRATCOM’s Joint Functional Component Command (JFCC) for Space in reference to the Schriever 2010 Wargames.¹ The CDR JFCC Space noted the difficulties in addressing questions such as “How does an adversary understand what our redlines are....? Is jamming a satellite a redline? Is destroying a satellite a redline?” and further commenting that “There was a lot of debate that there was no loss of life when we lose a satellite, so what does that mean in terms of how the national policy apparatus would respond....?”

This paper attempts to define possible redlines by exploring public perception of U.S. investments and actions in space. The methodology of exploring these points of focus is used for two reasons. First, foreign actors’ military policies or decisions to disrupt or destroy U.S. space capabilities would almost certainly take into consideration *how the United States may respond to their actions*. Foreign national counterspace strategies, if they exist, or foreign judgments of U.S. reactions are almost certainly not publicly available information. Second, I would contend that the majority of U.S. adversaries that may be capable of disrupting or destroying a U.S. satellite rely on the abundance of publicly available

information discussing U.S. space policies, programs, capabilities, and mishaps to inform, if only partially, their decision-making calculus.

In support of this methodology, this paper introduces three high-level themes and summarizes a likely perception that could be derived from each theme. These summaries inform my assertion of what perceived U.S. redlines might look like to a foreign adversary that analyzes U.S. actions in space. The first theme examines U.S. investments in space, our reactions to losses and delays of these capabilities, and our reactions to foreign disruptions of U.S. space capabilities. This first theme attempts to provide some insight into how important space capabilities are to the United States and to scope what a U.S. reaction to losing a satellite may look like. The second theme looks at perceived U.S. counterspace capabilities, our reaction to foreign counterspace capabilities, and U.S. views of orbital debris that can result from some counterspace capabilities. This second theme provides some insight into what a foreign actor could interpret as what the U.S. views as acceptable norms of provocative actions in space. The last theme covers perceived U.S. space protection efforts, specifically examining U.S. space policy, protection priorities, and investments in attribution capabilities. Perceptions of U.S. space protection priorities could provide the most noteworthy insight into which satellites or space-enabled capabilities the United States considers most important, which if disrupted or destroyed may cross a U.S. redline in space.

The majority of publicly available data providing insight into the three themes noted above cover relative peaceful periods of time. A few data points were established during periods of crisis, and one example of counterspace capabilities used against the United States was during a time of war by a non-space faring nation. Because of the

¹ “2010 Strategic Deterrence Symposium”, *Panel 1 discussion regarding the Schriever 10 Wargame*, 4:50 into video, <http://www.youtube.com/watch?v=ooOwchbjezo>.

relatively small amount of data on U.S. reactions to foreign disruptions and the range of potential foreign actors that could disrupt or destroy U.S. space capabilities, I cannot make a confident argument with any fidelity about how a potential U.S. redline may change during a time of peace, crisis, or war. Or, how the U.S. may react to a disruption in space capabilities by different countries, such as China, Iran, or North Korea.

Therefore, my assertion of possible U.S. redlines in space could be used as a first reference for reaction during a scenario or a real loss of a U.S. space capabilities while the U.S. policy apparatus considers further dynamics such as our state-of-relations with the offending foreign nation or their space or military capabilities.

Finally, an important assertion for this research is that even though U.S. administrations have changed over the decades, and because our redlines are not stated, a foreign actor probably will view the totality of U.S. actions in and statements about space when analyzing how the United States may react to various situations such as the loss of its space capabilities or when engaging in space-related diplomatic exchanges.

U.S. INVESTMENTS IN SPACE CAPABILITIES

The United States has spent over one trillion dollars since the late 1950s on space-related issues, a staggering amount of money that has provided significant advantages to U.S. national security while benefiting the world economy, international relationships, and scientific research.² Our interest and use of space has not gone unnoticed or uncopied. Currently, there are over fifty nations and government consortia operating their own satellite capabilities.³ Having access to space capabilities has become more than a statement of national pride, it has evolved into a literal

² “The U.S. Government Space Budget by Paul Shawcross, October 14, 2008”, *Office of Management and Budget*.

³ “National Security Space Strategy”, http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf.

necessity; U.S. space investments provide some insight into U.S. redlines in space.

According to a 2011 report by the Government Accountability Office (GAO), over the past two decades, the Department of Defense (DoD) “has had difficulties with nearly every space acquisition program, with years of cost and schedule growth, technical and design problems, and oversight and management weaknesses. However...DoD continues to make progress on several of its programs and is expecting to deliver significant advances in capability as a result.”⁴ Despite persistent issues with cost, schedule, and complexity lasting decades, the United States continues to lean forward in its space investments, and successive administrations continue to fund new space capabilities.

One notable aspect of U.S. investments in space is the breadth and depth of different capabilities—which far surpass the capabilities of all other countries—and how they have affected practically every part of the United States Government, its policy makers, and its citizens. To say that space is very important to the United States is easily a true statement that has been reinforced over the years monetarily and emotionally, but the public interest has not been consistent. When Apollo 1 and the Challenger and Columbia Shuttles ended in failure, the United States mourned, and exhaustive investigations followed. When Apollo 13 suffered its failure in space, U.S. citizens watched on the edge of their seat. One will be hard pressed to find such an equal reaction by the U.S. Government or its citizens when an unmanned satellite goes out of service that affects the whole country, such as the 1998 PanAmSat’s Galaxy IV communication satellite failure that affected millions of users but resulted in press reactions such as “inconvenience” and “some people rejoiced...others bemoaned”.⁵

⁴ “SPACE ACQUISITIONS: DOD Delivering New Generations of Satellites, but Space System Acquisition Challenges Remain”, *GAO-11-590T*.

⁵ “Satellite Trouble Cuts Out Paggers; Millions Lose Remote Contact”, *Associated Press*, <http://www.thefreelibrary.com/SATELLITE+TROUBLE+CUTS+OUT+PAGERS%3B+MILLIONS+LOSE+REMOTE+CONTACT.-a083823092>; “Out of Touch; Millions Feel Isolated by Pager Loss”, *Daily News*,

Even though we relish our space capabilities, there may be certain satellites or space capabilities that the U.S. Government or its citizens might react to differently if lost or disrupted, and the public reaction to these failures may provide some insight into possible U.S. redlines in space.

U.S. REACTIONS TO LOSSES AND DELAYS

The U.S. Government has suffered a number of satellite losses since 1980, which did not appear to be reconstituted immediately.⁶ A core assumption is that these satellites would not have been planned and launched unless they were needed at some point in the near future. These losses, mostly due to launch failures, have crossed all major capabilities. The United States lost two missile early warning satellites, also known as Defense Support Program (DSP) satellites, which are vital to support our nuclear deterrence posture.⁷ The National Reconnaissance Office (NRO), generally perceived to launch the nation's intelligence, surveillance, and reconnaissance (ISR) satellites, has had multiple launch failures resulting in the loss of at least seven satellites.⁸

<http://www.thefreelibrary.com/OUT+OF+TOUCH%3b+MILLIONS+FEEL+ISOLATED+BY+PAGER+LOS+S.-a083823187>.

⁶ For this research, I assumed a thirty year time span of U.S. satellite launches would be an appropriate duration for an adequate representation of U.S. losses in space.

⁷ "US Still Probing Security Satellite Failure", *Reuters*, <http://www.reuters.com/article/2009/01/06/us-northrop-satellite-idUSTRE5055DW20090106>; "DSP", *Encyclopedia Astronautica*, <http://www.astronautix.com/craft/dsp.htm>.

⁸ "NOSS-1", *Gunter's Space Page*, http://space.skyrocket.de/doc_sdat/noss-1.htm; "KH-11", *Gunter's Space Page*, http://space.skyrocket.de/doc_sdat/kh-11.htm; "KH-9", *Gunter's Space Page*, http://space.skyrocket.de/doc_sdat/kh-9.htm; "Chalet", *Gunter's Space Page*, http://space.skyrocket.de/doc_sdat/chalet.htm; "SLDCOM", *Gunter's Space Page*, http://space.skyrocket.de/doc_sdat/sldcom.htm; "Mercury", *Gunter's Space Page*, http://space.skyrocket.de/doc_sdat/mercury.htm;

A number of military communications satellites have failed to provide services to include a military strategic and tactical relay (MILSTAR)⁹, an ultra-high frequency (UHF) satellite¹⁰, two fleet satellite communication (FLTSATCOM) satellites¹¹, and a NASA tracking and data relay satellite (TDRS)¹². Most recently, the new advanced extremely high frequency (AEHF) satellite, launched in 2010, had trouble getting to its intended orbit, delaying its anticipated use.¹³ These satellites provide communications support for a wide range of customers from the President to the warfighter to manned space missions.

Two global positioning system (GPS) satellites were lost during launch failures, and a recently launched GPS satellite is beset by a permanent signal problem.¹⁴ In addition to the vast commercial applications, GPS has revolutionized U.S. warfare, enabling such capabilities as precision guided weapons.¹⁵ Additionally, two NASA climate observation satellites were destroyed during launch in 2009 and 2011.¹⁶ Climate change is a significant global issue that

"NROL-21", *Gunter's Space Page*, http://space.skyrocket.de/doc_sdat/nrol-21.htm.

⁹ "Milstar", *Wikipedia*,

<http://en.wikipedia.org/wiki/Milstar>.

¹⁰ "Hughes Delays Naval UHF Satellite Launch", *Spacedaily*, <http://www.spacedaily.com/news/satcom-98g.html>.

¹¹ "Fleet Satellite Communications System", *Wikipedia*,

http://en.wikipedia.org/wiki/Fleet_Satellite_Communications_System.

¹² "TDRS-B", *Wikipedia*,

<http://en.wikipedia.org/wiki/TDRS-B>.

¹³ "ULA Atlas V Successfully Launches with AEHF Satellite", *Nasa Spaceflight*, www.nasaspaceflight.com/2010/08/ula-atlas-v-launch-with-aehf-gps-satellite/.

¹⁴ "List of GPS Satellite Launches", *Wikipedia*, http://en.wikipedia.org/wiki/List_of_GPS_satellite_launches; "GPS Satellite Beset by Permanent Signal Problem", *spaceflightnow*, <http://spaceflightnow.com/news/n0911/02gps/>.

¹⁵ "Information Operations", *Air Force*, Air Force Doctrine Document 2-5.

¹⁶ "Lost Satellite Deals Blow to Climate Research", *MSNBC*,

http://www.msnbc.msn.com/id/41895904/ns/technology_and_science-space/t/lost-satellite-deals-blow-to-climate-research/.

has divided citizens and politicians across the world, and the latest satellite contained advanced capabilities to provide new sources of data to climatologists.¹⁷

From an acquisition perspective, according to a 2011 GAO report, significant schedule delays of as much as nine years have resulted in potential capability gaps in missile warning, military communications, and weather monitoring. These problems persist, with other space acquisition programs still facing challenges in meeting their targets and aligning the delivery of assets with appropriate ground and user systems.¹⁸

Furthermore, according to a 2009 GAO report on GPS acquisition problems, there was an increased likelihood that GPS may fail to provide the level of service that the U.S. Government commits to by 2010.¹⁹

To those not aware of the large numbers of U.S. satellites—though always aging—already on orbit with similar capabilities, these losses or delays could appear quite detrimental. But I cannot find a sense of U.S. public anxiety or significant fallout, such as Congressional investigations or Presidential statements regarding degraded space capabilities, other than GAO reports on space acquisition problems or short news statements citing disappointment with a particular failure or problem. In fact, when the most recent NASA climate satellite was lost during launch, it did not even make the front page of *The Washington Post* or *The New York Times*.²⁰ Furthermore, the only investigation that I found was to evaluate the

cause of the rocket failure, not the effect of losing the satellite's capabilities for scientific research.²¹

There is mention of some redundancy in a few space systems which could explain some of the lack of reaction to losses. Around the time of the most recent DSP failure, experts estimated that the U.S. Government had twice the number of DSP satellites on orbit needed to watch the entire Earth.²² As for GPS, the same 2009 GAO report warning of possible failures of service also mentioned there are measures the Air Force and others can take to plan for and minimize possible GPS service impacts, which was further reiterated by the Air Force command lead for GPS.²³ As of 2009, there were seven more global positioning satellites on orbit than required for optimum operations.²⁴ It does not appear that GPS has failed to provide services resulting in a negative public reaction.

The losses of U.S. satellite capabilities noted above occurred because of actions taken by the United States. There would likely be a noteworthy negative public reaction if they had happened purposefully at the hand of another country, but there is no precedent for that. There is, however, a precedent of foreign disruption of U.S. satellites which, though U.S. reactions were inconsistent, may provide some insight into U.S. redlines in space.

¹⁷ "NASA's Glory Mission Will Study Key Pieces of the Climate Puzzle", *NASA*, http://www.nasa.gov/mission_pages/Glory/news/climate-puzzle.html.

¹⁸ "SPACE ACQUISITIONS: DOD Delivering New Generations of Satellites, but Space System Acquisition Challenges Remain", *GAO*, GAO-11-590T.

¹⁹ "Global Positioning System: Significant Challenges in Sustaining and Upgrading Widely Used Capabilities", *GAO*, GAO-09-670T.

²⁰ Based on a 4 through 10 March 2011 search of the *Washington Post* and *New York Times* and search of worldwide newspapers using ProQuest and Factiva.

²¹ "NASA Creates Glory Satellite Mishap Investigation Board", *NASA*, http://www.nasa.gov/home/hqnews/2011/mar/HQ_11-065_Glory_Board.html.

²² "US Still Probing Security Satellite Failure", *Reuters*, <http://www.reuters.com/article/2009/01/06/us-northrop-satellite-idUSTRE5055DW20090106>.

²³ "Global Positioning System: Significant Challenges in Sustaining and Upgrading Widely Used Capabilities", *GAO*, GAO-09-670T; "Air Force Responds to GPS Outage Concerns", *PCWorld*, http://www.pcworld.combusinesscenter/article/165305/air_force_reponds_to_gps_outage_concerns.html.

²⁴ "GPS Satellites Not Falling Out of the Sky: Air Force", *Physorg*, <http://phys.org/news162133400.html>.

U.S. REACTIONS TO FOREIGN DISRUPTION OF U.S. CAPABILITIES

In the 1970s, it was suspected that a U.S. maritime communications satellite was turned off by the Soviets when it was outside of the range of U.S. tracking stations.²⁵ There does not appear to be any documented U.S. reaction, and I suspect there was none. In the mid-1990s, satellite hackers in Brazil began hijacking U.S. military communication satellite signals to broadcast their own information, though it took until 2009 for Brazil to crack down on the illegal activity with the support of the DoD.²⁶ In 1998, a U.S.-German satellite known as ROSAT was rendered useless after it turned suddenly toward the sun. NASA investigators later determined the accident was possibly linked to a cyber-intrusion by Russia. The fallout? Though there was an ongoing criminal investigation as of 2008; NASA security officials have seemed determined to publicly minimize the seriousness of the threat.²⁷ In 2003, a signal originating from Cuba—later determined to be coming from Iranian embassy property—was jamming a U.S. communications satellite that was transmitting Voice of America programming over Iran, which was publicly referred to as an “act of war” by a U.S. official.²⁸ Press reporting indicates the U.S. administration was “paralyzed” about how to cope with the jamming that continued for at least a month, even after U.S. diplomatic protests to Cuba.²⁹ In 2005, U.S. diplomats protested to the Libyan government

²⁵ “U.S. favors stealthy anti-satellite strategy”, *MSNBC*, http://www.msnbc.msn.com/id/18023834/ns/technology_and_science-space/t/us-favors-stealthy-anti-satellite-strategy.

²⁶ “The Great Brazilian Sat-Hack Crackdown”, *Wired*, <http://www.wired.com/politics/security/news/2009/04/leetcom>.

²⁷ “The Taking of NASA’s Secrets”, *Businessweek*, http://www.businessweek.com/magazine/content/08_48/b4110072404167.htm.

²⁸ “Iran, Cuba Zap U.S. Satellites”, *WorldNetDaily*, http://www.wnd.com/news/article/asp?ARTICLE_ID=33957; “Cuba Blows the Whistle on Iranian Jamming”, *Asia Times*, http://www.atimes.com/atimes/Middle_East/EH22Ak03.html.

²⁹ “Iran, Cuba Zap U.S. Satellites”, *WorldNetDaily*, http://www.wnd.com/news/article/asp?ARTICLE_ID=33957.

after two international satellites were illegally jammed disrupting American diplomatic, military, and FBI communications.³⁰ In 2006, press reporting indicates that China hit a U.S. spy satellite with a ground-based laser. This action was acknowledged by the then director of the NRO, though the DoD remained tight lipped about the incident.³¹

“We’re at a point where the technology’s out there, and the capability for people to do things to our satellites is there. I’m focused on it beyond any single event.”

– Air Force Space Command Commander, General Chilton, 2006³²

In 2009, a U.S. commercial Iridium communications satellite—extensively used by the DoD—was accidentally destroyed by a collision with a dead Russian satellite.³³ The U.S. company, Iridium, was able to minimize any loss of service by implementing a network solution within a few days.³⁴ As of early 2011, no legal action had been taken by the company either because it is not clear who was at fault or because it might be politically problematic for the United States, which is trying to enter into bi-lateral

³⁰ “Protests to Libya After Satellites Jammed”, *The Guardian*, <http://www.guardian.co.uk/uk/2005/dec/03/politics.libya>.

³¹ “China Jamming Test Sparks US Satellite Concerns”, *USA Today*, http://www.usatoday.com/tech/news/2006-10-05-satellite-laser_x.htm.

³² “China Jamming Test Sparks US Satellite Concerns”, *USA Today*, http://www.usatoday.com/tech/news/2006-10-05-satellite-laser_x.htm.

³³ “DISA Establishes Portal for Telecom Satellite System”, *GCN*, <http://gcn.com/articles/1998/11/09/disa-establishes-portal-for-telecom-satellite-system.aspx>; “Iridium Says Space Collision Risk Low”, *Reuters*, <http://www.reuters.com/article/2011/09/09/us-arms-aero-summit-iridium-idUSTRE78809J20110909>; “US Satellite Destroyed in Space Collision”, *Space.com*, <http://www.space.com/5542-satellite-destroyed-space-collision.html>.

³⁴ “US Satellite Destroyed in Space Collision”, *Space.com*, <http://www.space.com/5542-satellite-destroyed-space-collision.html>.

transparency and confidence-building measures (TCBM) with Russia regarding space activities.³⁵ Since August of 2010, North Korea has been intermittently using GPS jamming equipment, which reportedly has been interfering with U.S. and South Korean military operations and civilian use south of the North Korean border.³⁶ Reportedly, only South Korea and the United Nations International Telecommunications Union—at the request of South Korea—have issued letters to Pyongyang demanding the cessation of disruptive communications signals in South Korea.³⁷

It appears that the only time the U.S. military has responded with force to a disruption in U.S. space capabilities was in 2003, a few days after the start of the Iraq war.³⁸ According to U.S. officials, Iraq was using multiple GPS jammers—which supposedly did not affect military GPS functionality. However, the U.S. military bombed the jammers anyway after a diplomatic complaint to Russia.³⁹ The use of military force against the GPS jamming threat was possibly because the

United States was already intervening in Iraq, and the bombing probably would not have occurred if the United States was not at war.

A foreign actor researching U.S. investments in space and observing that (a) failed U.S. satellites appeared not to be reconstituted immediately, (b) U.S. public reaction to the losses was minimal, and (c) U.S. reactions to foreign disruptions were inconsistent could come to the judgment that **there appears to be some redundancy in capability in the U.S. space architecture and/or a tolerance of loss within the U.S. Government.** The President is still making his phone calls, missiles are still finding their targets, and satellites are still taking pictures of North Korea's nefarious efforts.⁴⁰

U.S. INVESTMENTS IN COUNTERSPACE

According to my review of publicly available information, the United States has *tested* and/or *deployed* a number of counterspace capabilities over the years that could incapacitate or destroy a satellite (see Figure 1). These capabilities go back to the start of the U.S. space program and range from high-altitude nuclear explosions,⁴¹ direct-ascent anti-satellite (ASAT) tests,⁴² directed energy ASAT tests,⁴³ rendezvous operations,⁴⁴ electronic negation,⁴⁵ to radio-frequency

³⁵ "Iridium Satellite Collision: Are Legal Consequences Forthcoming?", *Examiner.com*, <http://www.examiner.com/space-policy-international/iridium-satellite-collision-are-legal-consequences-forthcoming>.

³⁶ "S. Korea Blames North for GPS, Phone Jamming", *Defense News*, <http://www.defensenews.com/story.php?i=5883068>; "North Korea Upgrades its Military Jamming Devices", *MSN*, <http://www.arabia.msn.com/Technology/News/DS/2011/September/8985162.aspx>.

³⁷ "North Korea Upgrades its Military Jamming Devices", *MSN*, <http://www.arabia.msn.com/Technology/News/DS/2011/September/8985162.aspx>; "DPRK Attempts to Block ROK GPS Signals", *North Korean Economy Watch*, <http://www.nkeconwatch.com/2011/03/20/dprk-attempts-to-block-rok-gps-signals/>.

³⁸ "Russian Dealers Provide Iraq with Supplies, Electronics", *Fox News*, <http://www.foxnews.com/story/0,2933,81917,00.html>.

³⁹ "CENTCOM Charts Operation Iraqi Freedom Progress", *Defense.gov*, <http://www.defense.gov/news/newsarticle/asp?id=29230>; "In Iraq, GPS Is Surviving Jamming Threat, Pentagon Says" *Aviation Week*, http://www.aviationweek.com/aw/jsp_includes/articlePrint.jsp?headline=null&storyID=news/gps.xml.

⁴⁰ "Satellite images fuel intrigue over North Korea Intentions", *CNN*, http://articles.cnn.com/2010-11-18/world/north.korea.nuclear_1_yongbyon-siegfried-hecker-new-nuclear-reactor?_s=PM:WORLD.

⁴¹ "High-altitude nuclear explosion", *Wikipedia*, http://en.wikipedia.org/wiki/High_altitude_nuclear_explosion.

⁴² "Bold Orion", *Encyclopedia Astronautica*, www.astronautix.com/lvs/bolorion.htm; "ASM-135 ASAT", *Wikipedia*, http://en.wikipedia.org/wiki/ASM-135_ASAT.

⁴³ Secretary of Defense Approves Laser Experiment to Improve Satellite Protection, US DoD, <http://www.defense.gov/releases/release.aspx?releaseid=1431>.

⁴⁴ "AFRL Space Vehicles Directorate, Fact Sheet", *US Air Force*, http://www.kirtland.af.mil/library/factsheets/factsheet_print.asp?fsID=7873&page=1.

⁴⁵ "U.S. favors stealthy anti-satellite strategy", *MSNBC*, <http://www.msnbc.msn.com/id/18023834/ns/technolog>

jamming.⁴⁶ In 2004, the U.S. Air Force even published its doctrine on counterspace operations that states it will take any action necessary to achieve space superiority to include operations to deceive, disrupt, deny, degrade, or destroy any adversary's capabilities.⁴⁷ This doctrine which is very clear in its intentions certainly comes across as dominating in tone and potentially unpalatable for a U.S. administration in office during peacetime. Additionally, I have yet to see how it has been applied to the previous section's discussion of disruptions of U.S. satellites, except in substance when the United States was at war with Iraq. Furthermore, I would contend that the way the U.S. Air Force implements its counterspace doctrine appears to be influenced by the U.S. Congress, which has publicly expressed its discontent about U.S. efforts to build ASAT weapons.⁴⁸ Additionally, it has been reiterated multiple times by U.S. officials that the United States is focusing its counterspace efforts on reversible capabilities such as jamming. The United States admits to possessing such

capabilities, and they run counter to the Air Force doctrine's concept of destruction.⁴⁹

Though the United States appears to be moving towards less destructive perhaps more reversible counterspace capabilities, the precedent has been set for foreign countries that counterspace capabilities are acceptable to possess.

REACTIONS TO U.S. AND FOREIGN COUNTERSPACE ACTIVITIES

According to open source information, China tested a direct-ascent ASAT multiple times, but the United States did not formally protest until China intercepted a satellite and created the single worst contamination of orbital debris in fifty years, threatening U.S. satellites.⁵⁰ Also, according to press reporting, China, Iran, Libya, Turkey, and non-government organizations (NGO) have used jamming against non-U.S. communication satellites. Taiwan claims to have the ability, and China has proliferated communication jamming technology to other countries, but I could not identify any U.S. official protests.⁵¹ Hackers in England reportedly took

y_and_science-space/t/us-favors-stealthy-anti-satellite-strategy.

⁴⁶ "4th Space Control Squadron, fact sheet", *US Air Force*,

<http://www.peterson.af.mil/library/factsheets/factsheet.asp?id=4707>; "US Deploys Warfare Unite to Jam Enemy Satellites", *Washington Times*, <http://www.washingtontimes.com/news/2005/sep/21/20050921-102706-1524r>.

⁴⁷ "Counterspace Operations", *Air Force*, Air Force Doctrine Document 2-2.1.

⁴⁸ "China Jamming Test Sparks US Satellite Concerns", *USA Today*,

http://www.usatoday.com/tech/news/2006-10-05-satellite-laser_x.htm; "Near Field Infrared Experiment", *Wikipedia*,

<http://en.wikipedia.org/wiki/NFIRE>; "All's Fair in Space War", *Wired*,

<http://www.wired.com/science/space/news/2004/10/65151?currentPage=2>; "China's Satellite Jamming test Creates International Concerns", *Aviation Today*,

http://www.aviationtoday.com/regions.usa/Chinas-Satellite-Jamming-Test_Creates-International-Concerns; "A history of anti-satellite programs "Congress banned ASAT testing December 1985"", *Union of Concerned Scientists*,

http://www.ucsusa.org/assets/documents/nwgs/a-history-of-ASAT-programs_lo-res.pdf.

⁴⁹ "All's Fair in Space War", *Wired*,

<http://www.wired.com/science/space/news/2004/10/65151?currentPage=2>; "US Deploys Warfare Unite to Jam Enemy Satellites", *Washington Times*, <http://www.washingtontimes.com/news/2005/sep/21/20050921-102706-1524r>.

⁵⁰ "China's Anti-Satellite Weapon Test", *CRS Report for Congress RS22652*,

<http://opencrs.com/document/RS22652/>; "Satellite Kill Likely to Have Equal Impact on Terra Firma", *Financial Times*, www.ft.com/cms/s/0/9a943dac-a82a-11db-b448-0000779e2340.html; "China's AntiSatellite Test: One Year Later – Troubling Aftermath", *Newswise*, <http://www.newswise.com/articles/chinas-anti-satellite-test-one-year-later-troubling-aftermath>.

⁵¹ "Firedrake – The Source of China's Radio Jammer Found on Chinasat 6B", *satdirectory*,

<http://www.satdirectory.com/firedrake.html>; "Iran Government Jamming Exile Satellite TV", *Iran News Focus News and Analysis*,

http://www.iranfocust.com/en/?option=com_content&task=view&id=2852; "Protests to Libya After Satellites Jammed", *The Guardian*,

<http://www.guardian.co.uk/uk/2005/dec/03/politics.libya>; "China to Launch its First Anti-jamming Satellite Next Year", *People Daily*,

control of a British military communication satellite in 1999. Though the British Government denied it, they supposedly investigated, with the help of the U.S. Government, to make arrests.⁵² In 2008, Russia used satellite communications jamming during the Russo-Georgian war and reportedly has proliferated GPS jamming equipment to North Korea and Iraq.⁵³

The 2010 U.S. National Space Policy (NSP) states the United States will adhere to a number of principles to include considering the space systems of all nations to have the rights of passage through space without interference and that purposeful interference is an infringement on a nation's rights.⁵⁴ The NSP also promises to "demonstrate U.S. leadership in space-related fora and activities..." so why is there little U.S.

reaction greater than U.S. officials expressing "concerns" over foreign counterspace actions? Either these actions do not meet the threshold for a U.S. diplomatic or military response, or a U.S. reaction may come across as hypocritical with respect to current U.S. counterspace actions.

The public perception of U.S. counterspace capabilities and U.S. *reactions* to foreign counterspace activities is important when considering possible U.S. redlines in space; however, perceptions of the United States using these capabilities *against other countries* is even more insightful. According to my review, the United States has only *used* reversible counterspace capabilities against foreign satellites, specifically jamming, and it appears to have avoided using counterspace capability resulting in the permanent loss of a foreign satellite.⁵⁵

A foreign country following U.S. actions in space may perceive that U.S. counterspace actions are within acceptable norms and, having noted an inconsistent U.S. response to foreign counterspace activities, may come to the judgment that **U.S. actions suggest a foreign adversary could safely test a counterspace system, deploy it and use it, possibly denying some U.S. space capabilities temporarily, but not cause permanent loss of a U.S. satellite.** It should be noted that this perception of a possible U.S. redline runs counter to the 2011 National Security Space Strategy (NSSS), which states that "We seek to enhance our national capability to dissuade and deter the development, testing, and employment of counterspace systems and prevent and deter aggression against space systems...that support U.S. national security."⁵⁶

It is further noted that more recent U.S. counterspace capabilities, the 2010 NSP, and the U.S.A-193 shoot-down appear to emphasize minimizing orbital debris. The U.S. reaction to China's ASAT test only after it created an orbital

http://english.peopledaily.com.cn/200403/04/eng20040304_136475.shtml; "Roj TV, Kurdish Satellite Television in Turkey Signal Blocked by Turkey", *Zimbio*,

<http://www.zimbio.com/World+Politics/articles/-UxEYTATmej/Roj+TV+Kurdish+Satellite+Television+Turkey>; "Military Says That it Can jam China's Signals, but Won't", *Taipei Times*,

<http://www.taipeitimes.com/News/taiwan/archives/2002/10/02/0000170369>; "Ethiopian Satellite Television (ESAT) Accuses China of Complicity in Jamming Signals", *ECADF News*,

<http://ecadforum.comethiopian-news/8661/>.

⁵² "SkyNet Satellite Hacked?", *dailywireless.org*, <http://www.dailywireless.org/2007/05/08/skynet-satellite-hacked/>; "Security: British "Skynet" Satellite Hacked!!!", *Black Falcon Software Technical News*, <http://blackfalconsoftware.wordpress.com/2007/05/09/security-british-military-satellite-hacked/>; "Satellite Hack Raises Security Questions", *CNET News*, http://news.cnet.com/Satellite-hack-raises-security-questions/2100-1033_3-222516.html.

⁵³ "S. Korea Blames North for GPS, Phone Jamming", *Defense News*,

<http://www.defensenews.com/story.php?i=5883068>; "GPS Jammers in Action", *Strategy Page*,

<http://www.strategypage.com/htmlw/hetcm/articles/20110913.aspx>; "Georgia Eager to Rebuild Its Defeated Armed Forces", *The New York Times*, <http://www.nytimes.com/2008/09/03/world/europe/03georgia.html>.

⁵⁴ "National Space Policy of the United States of America", *USG*, http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.

⁵⁵ "Army Official Says U.S. Is Blocking Terrorist Signals", *Space News*,

http://www.spacenews.com/archive/archive07/campbell_1_0827.html.

⁵⁶ "National Security Space Strategy", http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf.

mess, creates the perception of a possible U.S. redline that a foreign actor should not create extensive, permanent debris in orbit.

U.S. INVESTMENTS IN SPACE PROTECTION

Protecting U.S. space capabilities has been a concern since almost as long as the first satellites were orbited, with early investments being made in anti-jamming for communications and later in nuclear hardening.⁵⁷ Many statements can be found throughout the decades by U.S. officials expressing concern over the vulnerabilities of U.S. satellite capabilities, and a number of U.S. Government organizations have been created to research or implement solutions.⁵⁸ But the overarching issue of protecting the U.S. space architecture has not risen to the highest levels of sustained attention until more recently with the proliferation and use of foreign anti-satellite capabilities, the increasingly visible reliance of the U.S. Government and its citizens on space systems, and the mounting warnings of a coming “space Pearl Harbor”, as noted by the incoming Secretary of Defense in 2001.⁵⁹

⁵⁷ “Thirty Years of Space Communication Research and Development at Lincoln Laboratory, Chapter 8”, NASA, <http://history.nasa.gov/SP-4217/ch8.htm>; “Can You Hear Me Now?”, *Talking Shop, US Army*, [http://www.smdc-](http://www.smdc-armyforces.army.mil/Pic_Archive/ASJ_PDFs/ASJ_VO_L_10_NO_2_011.pdf)

[armyforces.army.mil/Pic_Archive/ASJ_PDFs/ASJ_VO_L_10_NO_2_011.pdf](http://www.smdc-armyforces.army.mil/Pic_Archive/ASJ_PDFs/ASJ_VO_L_10_NO_2_011.pdf).

⁵⁸ “C41 For the Warrior – Global Command and Control System”, US Army; “Rumsfeld Commission Warns Against “Space Pearl Harbor””, *Spacedaily*, <http://www.spacedaily.com/news/bmdo-01b.html>; “US Space System Survivability”, *Robert B. Giffen*, National Defense University; “16th Space Control Squadron, Factsheet”, US Air Force, <http://www.peterson.af.mil/library/factsheets/factsheet.asp?id=8403>; “76th Space Control Squadron, Factsheet, US Air Force,

<http://www.peterson.af.mil/library/factsheets/factsheet.asp?id=4808>; “US Air Force, Spy Agency team up for Space Protection”, *Space.com*, <http://www.space.com/5224-air-force-spy-agency-team-space-protection.html>.

⁵⁹ “Rumsfeld Commission Warns Against “Space Pearl Harbor””, *Spacedaily*, <http://www.spacedaily.com/news/bmdo-01b.html>.

U.S. SPACE POLICIES AND PROTECTION PRIORITIES

In 2008, the U.S. Government created a joint DoD/Intelligence Community National Space Protection Program (SPP) to protect all defense, intelligence, civil, commercial, and allied space systems and articulate vulnerabilities and recommend solutions.⁶⁰ This program appears to have recommended funding and tasks according to an FY11 SPP Program Element, which is designed to convey key information about a budget request.⁶¹ The technical assessment study tasks listed in the funding request provide insight into possible high-priority space-related capabilities that the U.S. Government wants to protect.

The tasks were listed as follows:

SPP TASK A

- PNT Recommendations⁶²
- Assured C2 Study Protection⁶³
- Assured C2 Cyber Assessment
- Critical Infrastructure Protection Assessments
- Hosted Payloads on Commercial Satellites Study⁶⁴

⁶⁰ “RDT&E Budget Justification Item, PE 0603830F Space Protection Program”, *DoD*, http://www.dtic.mil/descriptivesum/Y2011/AirForce/0603830F_PB_2011.pdf; “US Air Force, Spy Agency team up for Space Protection”, *Space.com*, <http://www.space.com/5224-air-force-spy-agency-team-space-protection.html>.

⁶¹ “RDT&E Budget Justification Item, PE 0603830F Space Protection Program”, *DoD*, http://www.dtic.mil/descriptivesum/Y2011/AirForce/0603830F_PB_2011.pdf.

⁶² I assume PNT to mean positioning, navigation, and timing, which is usually related to GPS satellites and related systems

⁶³ I assume C2 to mean command and control of U.S. nuclear strategic deterrence capabilities.

⁶⁴ I assume a hosted payload is the *capability* to support secondary payloads to potentially support back-up capabilities for other sensors on orbit as opposed to the commercial satellite itself.

“We’re not trying to save satellites. We’re trying to preserve our national space... imagery, communications networks, and positioning signals the U.S....rely on.”

– Director, Space Protection Program, 2008 ⁶⁵

Additionally, a review of the 2010 NSP provides guidance and key concepts that could provide foreign actors insight into which space capabilities the United States considers most important. The only satellite system specifically noted is GPS, but other capabilities are alluded to such as communications and national security systems—which could appear to be almost any type of satellite. The absence of specific space systems is further noted in the NSP with statements such as “ensure...survivability of space capabilities”, instead of stating something like *ensure the survivability of satellite X*. ⁶⁶

The NSP provides guidelines on how to implement its goals, which are written into different sections. The section header does not provide a description of what it means, so I have provided my own comments (after the *) of what could be interpreted based on what the heading and its section discuss. The following are the most relevant examples of those guidelines relating to possible U.S. redlines in space from the NSP. ⁶⁷

- Foundational Capabilities (**ensure basic capability?*)
 - Mitigate and increase resiliency to harmful interference to GPS...and implement...redundant and back-up systems

⁶⁵ “U.S. space protection strategy emphasizes cooperation”, *Defensenews*, <http://www.defensenews.com/print/article/20081002/C4ISR01/810020301/U-S-space-protection-strategy-emphasizes-cooperation>.

⁶⁶ “National Space Policy of the United States of America”, *USG*, http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.

⁶⁷ “National Space Policy of the United States of America”, *USG*, http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.

- RF...Interference Protection (**appears related to communications*)
 - Identify, locate, and attribute sources of RF interference...sustain the RF environment in which critical U.S. space systems operate
- ...Mission-Essential Functions (**are there any missions that can only be done from space?*)
 - Assure space-enabled mission-essential functions
- National Security Space Guidelines (**could be anything but I assume communications, ISR, or weather satellites because allied, foreign, and/or commercial capabilities are limited to only those capabilities.*)
 - ...operate space systems...to support...defense and intelligence operations during peace, crisis, and conflict...ensure... survivability of space capabilities...and the availability of other means to perform the mission...options may include...leveraging ...allied, foreign, and/or commercial...capabilities

Furthermore, the 2011 NSSS states that the United States needs to “fight through a degraded environment...ensure the timely continuity of services...strengthen the resilience of our architectures...achieved in a variety of ways, to include...cross-domain solutions, hosting payloads on a mix of platforms...international and commercial partners, and developing...responsive space capabilities.”⁶⁸

A foreign actor examining U.S. space policies and researching U.S. investments in satellite protection may conclude that the **temporary loss of C2 or the permanent denial or loss of communication capabilities, commercial satellites hosting U.S. Government payloads, GPS, launch facilities and ground stations, and possibly ISR and weather capabilities may represent U.S. redlines**. Both the NSP and the NSSS appear to concede the probable loss of satellites by stating, “ensure... other means to

⁶⁸ “National Security Space Strategy”, http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf.

perform the mission” or “fight through a degraded environment...in a variety of ways.”⁶⁹ It appears the United States may accept the permanent loss of some individual U.S. satellites but not the capabilities they provide.

ATTRIBUTION

There would be little use for the United States to have redlines in space if it cannot attribute an attack. U.S. investments in space situational awareness (SSA) indicate an interest in threat attribution and may add credibility to support possible U.S. redlines in space.

The 2011 NSSS notes that “SSA and foundational intelligence will continue to be top priorities, as they underpin our ability to maintain awareness of natural disturbances and the capabilities, activities, and intentions of others.”⁷⁰

The 2010 NSP also acknowledges the need for attribution, as stated by “...develop...use space situational awareness information...to detect, identify, and attribute actions in space”.⁷¹

Furthermore, the U.S. Government appears to be acting on its policy statements by investing in attribution, increasing funding for SSA capabilities (see Figure 2).

Guidance in current space policy documents plus investments in U.S. SSA capabilities indicate an interest in threat attribution, and U.S. investments in attribution may yet add credibility for possible U.S. redlines in space.

⁶⁹ “National Space Policy of the United States of America”, *USG*, http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf; “National Security Space Strategy”, http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf.

⁷⁰ “National Security Space Strategy”, http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf.

⁷¹ “National Space Policy of the United States of America”, *USG*, http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.

CONCLUSION: PERCEIVED U.S. REDLINES?

The majority of examples that I cite of U.S. investments, policies, or statements about space, counterspace, and space protection, as well as U.S. reactions to foreign counterspace actions have occurred during relatively peaceful times. As such, redlines based on prior U.S. actions may quickly change in a wartime scenario as suggested by the relatively quick response to GPS jamming during the Iraq war. Additionally, perceived redlines for each type of space capability may become more clear as more incidents and U.S. reactions are able to be analyzed. Based on my research of publicly available data and judging what may be perceived by a foreign actor that analyzes U.S. actions, I would suggest the following possible U.S. redlines in space.

The United States may be tolerant of deployed foreign counterspace capabilities and temporary loss of most types of U.S. space capabilities—except C2—but not tolerant of the permanent loss of GPS; commercial satellites hosting U.S. Government payloads; communications and possibly ISR or weather capabilities; launch facilities and ground stations; or intentional creation of permanent orbital debris.

SUGGESTIONS FOR FURTHER RESEARCH

Some important and perhaps urgent questions remain after this review of open source information. For example, what about missile early warning capabilities? DSP is usually thought of as an important strategic asset, but where is it in current space policy doctrine? Does the United States believe early warning enhances stability – is that well known? Is it just assumed that DSP will only be targeted before nuclear war?

How long is a “temporary” degradation of U.S. space capabilities? Satellite hackers in Brazil illegally used a U.S. military communications satellite for years without attribution, but diplomatic protests were quickly delivered to Cuba after the 2003 jamming incident. The United States may react differently to temporary disruptions if they happen during a military crisis.

Foreign disruptions of GPS were very quickly resolved at the start of the Iraq war, but that was only one capability and the threat was ground-based. How would the United States react if multiple space capabilities were temporarily lost from a space-based threat?

Also, what about commercial satellites without U.S. Government hosted payloads? They appear to be part of the backup plan for the possible loss of national space capabilities, but how will the United States react if a farmer cannot get an overhead picture of his crops; Google Earth cannot be updated in a timely fashion; or U.S. citizens are denied the ability to watch the Super Bowl?

Finally, what about scientific and weather satellites? They generally have low visibility despite how much money has been spent on these capabilities throughout the decades. One notable aspect these satellites have is their unfortunate selection as past ASAT targets for the United States and China.⁷² Have military agencies inadvertently supported the perception that these capabilities are disposable and could be used as ASAT targets for strategic warning?

⁷² “ASM-135 ASAT”, *Wikipedia*, http://en.wikipedia.org/wiki/ASM-135_ASAT; “China’s Anti-Satellite Weapon Test”, *CRS Report for Congress RS22652*, <http://opencrs.com/document/RS22652/>.

Space Crisis Management: Filling the Gaps

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The geopolitical influence of countries is most often measured by their economic strength, government stability, technological achievements, defense capabilities and overall international standing. For the United States and other select countries, space offers major strategic advantages and many nations are now competing to derive greater civilian, commercial, and military benefits from their presence in space. Protection of space assets and ensuring a stable and safe space environment are the responsibility of those that operate them, as well as those that formulate space policies. The quest for a workable space regime is appearing more often on the agendas of national and international security gatherings, and misconduct in space could have profound implications for terrestrial geopolitics. The reverse is also true, and the most likely threats to space, at least in our time, will be connected to heightened terrestrial tensions or conflict.

One of the operational and political challenges is the ability to assess accurately situations in space, and to respond effectively to emergencies and disruptive activities there. In this sense, space presents a unique challenge for crisis management. This article will explore the status of the security debate as it pertains to collaborative space crisis prevention and management as well as specific actions to avoid disruptive incidents or conflicts in space. It will first seek to define space crisis management, review potential causes or catalysts, compare the approaches of the United States and the EU, and provide achievable policy recommendations. This conceptual analysis of the fundamental issues at play will hopefully contribute to ever-more effective space crisis management.

This paper stems from cooperation between the European Space Policy Institute (ESPI) and the

Department of Political Science at the Faculty of Social Sciences' Institute of Political Studies (IPS) at Charles University in Prague. It is part of a broader ESPI project on Space Crisis Management, which, in turn, originated from a major international conference entitled "Space Security through the Transatlantic Partnership", co-organized by ESPI and the Prague Security Studies Institute (PSSI) in June 2011.¹ As part of the Space Crisis Management project, ESPI convened a roundtable in March 2012 to: 1) identify available tools for space crisis prevention; 2) delineate essential ingredients of effective space crisis management; and 3) provide realistic scenarios that could trigger crisis management responses.²

THE SPACE CRISIS MANAGEMENT REQUIREMENT

The growing volume of orbital debris, increasing number of space-faring nations and aspirants, new and emerging space technologies, and their proliferation to a large number of state and non-state actors all point to an increasing potential for a space-related crises. At the same time, management of such a crisis is a complex endeavor requiring a well-crafted vision and architecture for global space security as well as a

¹ More information about the conference can be found at the following link: <http://www.pssi.cz/conferences-and-roundtables/1> .

² More information about the roundtable can be found at the following link: http://www.espi.or.at/index.php?option=com_content&view=article&id=797:29-march-2012-space-crisis-management-roundtable-convened-at-espi&catid=39:news-archive&Itemid=37 .

strategic approach to contextualizing and responding to challenges in this environment.

It is useful to note that there are two broad categories of space-related crises: natural and man-made. The public perception of the negative effects caused by the first type of crisis would likely be fundamentally different than the second. While the public response to a terrestrial natural catastrophe is generally positive and generous, the reaction in case of man-made space trauma would probably be swift and harsh, especially as the harmful knock-on effects were calculated. Such complex and uncertain situations could be manipulated, rather than controlled, by certain political elites and public opinion. The unexpected outbreak of World War I in 1914, in reaction to a political crisis, serves as a sober reminder of unintended escalatory spirals.

Beyond natural hazards (e.g., space debris, space weather), the growing dependence on space assets and the limited capability to protect them, compounded by the problem of verifying activities in space, all present daunting challenges to managing a space crisis. The high level of integration of space assets into military operations, particularly in the cases of the United States and Russia, make these assets tempting targets. Indeed, any meaningful disruption of essential space functions or operations would likely require extensive political and technical damage control.

While the United States is, without question, the most advanced space power, several other space-faring nations are seeking to increase their influence in world affairs via space. This competitive, and increasingly contested, environment is not particularly conducive to efforts to establish rules of the road for space and new forms of cooperation. In short, space is still perceived as an ideal arena for demonstrating a nation's pride, independence, and capabilities.

Accordingly, the ability of Washington and its allies (e.g., the EU) to be accepted as the "rule-maker" is diminished and often regarded as suspect by those space actors that view space as a sphere of opportunity to enhance their strength and even challenge U.S. primacy. Communication among these actors, and achieving consensus among them, under such circumstances is difficult, if not impossible.

In tackling these challenges, it is helpful to examine some of the key causes of a possible space crisis. Patrick Lin, Associate Professor at the California Polytechnic State University, for example, reflected on a seemingly remote aspect of a potential space crisis. In his 2006 article on "space ethics", he pointed out: "... relevant lessons from history may include our recent development of cyberspace, or the Internet frontier. Without planning ahead for related intellectual property issues as well as online sales tax, Internet crimes, and other areas, the rush into cyberspace has been messy at best."³

With regard to space exploration and exploitation he added: "What is to prevent problems on Earth from following us into outer space, if we have not evolved the attitudes, and ethics, which have contributed to those problems? ... We have already littered the orbital environment in space with floating debris that we need to track so that spacecraft and satellites navigate around, not to mention abandoned equipment on the Moon and Mars."⁴ The intention of several countries to exploit lunar elements and minerals may also one day lead to a crisis should the legal status of the celestial bodies not be adequately clarified.⁵

In the United States, the Department of Defense (DOD) views the space environment as having fundamentally changed and describes it with the so-called "three Cs" (i.e. congested, contested and competitive). Space is increasingly congested due primarily to space debris, contested by a growing array of foreign counterspace capabilities, and competitive as more and more countries and companies operate in space.

If one accepts that the space backdrop is shaped by the "3 Cs", an issue becomes how to best delineate the "international relations" arena where all actors in a potential conflict should be involved in its resolution. Another well-known category of "3 Cs" -- cooperative, competitive and

³ Patrick Lin, "Viewpoint: Look before Taking another Leap for Mankind – Ethical and Social Considerations in Rebuilding Society in Space," *Astropolitics* Vol. 4 (2006): 281-294.

⁴ *Ibid.*: 285.

⁵ Andrew Brearley, "Mining the Moon: Owning the Night Sky?" *Astropolitics* Vol. 4 (2006): 43-67.

confrontational -- has also been used to describe world affairs more generally and assumes that each stage of a potential conflict involves different behavior on the part of rational actors. That said, it is currently difficult to anticipate the reactions of many members of the international community to a crisis in space, as different actors attach varying levels of importance to space capabilities.

Terrestrial Crisis Management

The concept of terrestrial crisis management has largely been associated with the U.S. – USSR Cold War competition and prominently involved ensuring the non-use of nuclear weapons and supporting technologies (e.g. strategic bombers, ballistic missiles, etc.). “Nuclear” crisis management consists of structuring nuclear forces to provide a sufficient deterrent against their use by a rival (including via arms control arrangements) as well as advancing strict control of nuclear forces in a crisis to prevent unauthorized or accidental use of nuclear weaponry.

The 1962 Cuban Missile Crisis is considered one of the most acute Cold War clashes that involved intense interaction between the two powers and careful policy decision-making. This crisis represented “a period of acute tension between states that threatened the prospect of major war”.⁶ Three conceptual models of Graham Allison from the 1960s, using the Cuban Missile Crisis as a case study, have been widely applied to address terrestrial crisis management solutions. These models were “rational policy” (I), “organizational process” (II), and “bureaucratic politics” (III). Model I portrays a state as a single rational policy decision-maker. According to Model II, the sub-units of the government follow established procedures and produce a policy option consistent with these pre-determined steps. In Model III, a policy decision is a negotiated bargain between individuals in charge of various responsibilities within the Executive Branch of government (e.g.

Secretary of State, Secretary of Defense, etc.) which often concentrate on different angles of the same issue.⁷

After the Cuban Missile Crisis, unilateral and bilateral measures were adopted to assist in streamlining political processes and prevent a dangerous escalatory spiral between the two powers that could ultimately result in a large-scale military conflict. These measures included, for example, improved nuclear command and control arrangements, the U.S. – Soviet Hotline, and the 1972 Agreements on Measures to Reduce the Risks of Nuclear War.

Today, crisis management focuses on strategic questions involving a variety of international actors. Accordingly, the connection between a crisis and the use of force is more subtle. In this environment, the term “crisis” can be defined as “a perception by the highest level decision-makers of a threat to one or more basic values, along with an awareness of finite time for response to the value threat, and a heightened probability of involvement in military hostilities”.⁸

In the post-Cold War era, an example of crisis prevention was the June 2000 Memorandum of Agreement between the United States and the Russian Federation on the Establishment of a Joint Center for the Exchange of Data from Early Warning Systems and Notifications of Missile Launches. In the Memorandum, the United States and Russia agreed, for the first time, to a permanent joint operation involving U.S. and Russian military personnel to enhance strategic stability between the two countries. It established a Joint Data Exchange Center (JDEC) in Moscow for the sharing of information derived from each side’s missile launch warning systems on the launches of ballistic missiles and space launch vehicles. In December 2000, the United States and USSR signed a Memorandum of Understanding establishing a Pre- and Post-Launch Notification System (PLNS) for ballistic and space launch vehicles launches. It is envisioned to be an Internet-based system operated as part of the JDEC. Both JDEC and PLNS make provisions for

⁶ Carnes Lord, “Crisis Management : A Primer,” Institute for Advanced Strategic and Political Studies, IASPS Research Papers in Strategy No.7 (August 1998): <http://www.iasps.org/strategic7/crisis.htm>.

⁷ Graham Allison, “Conceptual models and the Cuban Missile Crisis.” *American Political Science Review* Vol. 63, No. 3 (September 1969): 689-718.

⁸ Lord (1998).

voluntary notifications of satellites diverted from their orbit and space experiments that could adversely influence the operation of early warning radars. These agreements represent a rare example of detailed and comprehensive space-related confidence-building measures designed to enhance stability through transparency.⁹

In a crisis, difficult trade-offs between various response options need to be made at the highest-levels of government. Crisis management considerations involve, besides diplomacy and use of force, the adequacy of available intelligence and how much is secret versus public. This calculus can have both important domestic and international implications, including economic, financial, legal and command and control dimensions. Successful crisis management seeks to minimize damage/costs and maximize stability/benefits. The challenge lies in the ability to react correctly and quickly when the crisis arrives.

Defining Space Crisis Management

In defining space crisis management, the main focus is on efforts to identify those situations that are produced by threats to space assets and related services. In this sense, the goal of space crisis management is to preserve a peaceful and stable space environment. There are clear space-related implications stemming from heightened terrestrial tensions or mishaps. Those terrestrial circumstances that can result in damage to, or disruption of, space-based and ground-based assets have not been fully explored. For example, many satellites are dual use, making it difficult to differentiate between friend and foe.¹⁰ Unlike space safety and sustainability, which have received significant attention in various venues,

⁹ Peter Hays, "Military Space Cooperation: Opportunities and Challenges." *Monterey Institute of International Studies* (July 2002): 37.

¹⁰ An interesting question is, for example, who would be responsible for space tourists – citizens of certain states – if those individuals would be forced to stay in space for a longer period of time because a commercial spaceport, located for example in the United Arab Emirates, would be unable to receive them back due to political/military crisis tensions or conflict in the Persian Gulf.

including the United Nations Committee on the Peaceful Use of Outer Space (UNCOPUOS), space stability and deterrence is a more sensitive challenge and requires closer examination.

In an actual crisis, it is unlikely that Allison's above-mentioned Model I alone, where happenings are a result of "purposive acts of unified national government"¹¹, will apply. Model II, where a multiplicity of organizations follow standard operating procedures (SOP) appears to be the best solution. However, the limited number of incidents and crises involving space has not yet catalyzed the establishment of such procedures, perhaps with the exception of the U.S.-Russian relationship. It may well take a future crisis to persuade the international community to implement suitable processes, organizations and understandings regarding space security. Accordingly, Model III may also apply, as was the case during the Cuban Missile crisis, and individuals within the involved governments will divine the outcome.

In addition to obstacles connected with configuring domestic space crisis decision-making procedures, crisis prevention on an international level represents an even more challenging task given the limited exercise of space "rules of engagement". This undertaking should involve the promotion of behavior that maximizes the utility and stability of space and minimizes the prospects for misconduct and misperceptions. This process has been underway via seeking to advance codes of conduct/rules of the road, debris mitigation, transparency and confidence-building measures (TCBMs), and other modalities. Reducing the incentives and stepping up the disincentives associated with space-faring nations taking destabilizing actions is the proverbial "name of the game".

This task is becoming increasingly complex with the growing number of space-faring nations and the nature of their ambitions. As democratic countries face periodic changes of leadership, it is crucial that well-defined national priorities and procedures are firmly in place to achieve successful international negotiation and/or action (military or otherwise). This has proven elusive

¹¹ Allison (1969: 690).

even among allies, much less all active members of space community. The connectivity between terrestrial military hostilities and space is likely the most problematic (e.g., GPS signals jamming during the Iraqi conflict and other such circumstances).

To conclude, there is a marked difference in behavioral norms when dealing with peacetime versus crisis and conflict. A key objective of an effective space crisis management regime should be preventing crises before they mature, in part through the ability to gain international agreement on a set of rules governing responsible space behavior, along with effective verification and enforcement measures.

POTENTIAL SPACE CRISES

Crisis in space could be triggered by natural causes (e.g., space weather and debris), technical issues (e.g., satellite malfunction, unintentional interference, inaccurate orbital prediction) or intentional disruption of satellite services and even the attack of space assets. Space Situational Awareness (SSA), a fundamental element of space operations, is required to detect various anomalies, including those connected with a satellite's designated flight path. Due to the gaps in SSA capabilities, it can be difficult to detect and attribute potentially irresponsible or hostile actions in space. This makes space crisis management more complex than the terrestrial variety. Although space crises caused by natural hazards or technical issues are of high concern, the intentional disruption of, or damage to, space assets will generally involve larger – sometimes far larger – geopolitical stakes.

Natural Hazards, Uncontrolled Re-Entries, Collisions and Unintentional Radiofrequency Interference

Space debris, the main contributor to “congested space”, has received substantial attention from the space community at national as well as international levels. A number of space-faring nations have adopted strict space debris mitigation guidelines, including the United States, Russia, Japan, and a number of European nations. The

need for steps beyond debris mitigation, such as active debris removal (ADR), have also been acknowledged and pursued. Large damage to, or destruction of, a significant space asset (e.g., the International Space Station) would not only trigger an immediate need for crisis management steps, but would also have a potentially debilitating effect on the near-term pursuit of human space exploration.

Effects from space weather (i.e., the Sun and the solar wind) are also considered significant threats to space operations. Although satellite components are partially protected against high total doses of radiation, it is nearly impossible (and costly) to design and manufacture a satellite completely immune from space weather variations. Solar activity, occurring during all phases of the solar cycle, needs proper monitoring and assessment, especially given the lack of an ability to predict accurately space weather.

The re-entry of shut-down or malfunctioning satellites, such as the U.S. Upper Atmosphere Research Satellite (UARS), Germany's ROentgen SATellite (ROSAT), or Russia's Phobos-Grunt, have not been considered high-level risk events, but have drawn attention to the need for better communication between all involved parties, as well as with the public.

The UARS, decommissioned in 2005, re-entered the atmosphere while tracked by the U.S. Joint Space Operations Center (JSpOC). The process was managed by the National Aeronautics and Space Administration (NASA). Besides the United States, other space-faring nations were also monitoring the satellite's descent in the last two hours as the natural forces affecting the satellite made the prediction of re-entry difficult.¹² The ROSAT's re-entry, handled by the German Space Agency (DLR), followed a similar re-entry procedure and ROSAT underwent an uncontrolled re-entry into the atmosphere in October 2011.

The case of Russia's Mars probe, Phobos-Grunt, was somewhat different from the previous two examples as Russia failed to provide timely information concerning issues it was experiencing with the satellite. After the Russian side finally

¹² http://www.nasa.gov/mission_pages/uars/index.html.

announced technical problems, the United States set up a task force to assist the management of the re-entry. The whole process, as well as the Russian explanation of the cause of the failure, lacked the desired level of accuracy and transparency.¹³

Although thus far the only one of its kind, the 2009 collision between Iridium 33 and Cosmos 2251 also demonstrated the existence of a real threat of collision between two intact satellites. In short, although there have not, as yet, been any serious injuries (i.e., at least confirmed reports) resulting from the re-entries of the above-mentioned satellites, or other space objects, these events have highlighted the need for not only establishing domestic, national procedures, but also diplomatic processes that would facilitate the smooth and efficient management of these types of events internationally, including adequate public reporting.

Radiofrequency interference can undermine key functions of a satellite (i.e., telemetry, tracking, and command information, or TT&C) and compromise the satellite's altitude control system and propulsion system, leading to deterioration of orbit, loss of core mission capability, or complete loss of communication. Unintentional radio frequency interference can originate from faulty equipment, the reduction of orbital spacing between satellites, and the unauthorized use of satellite space segments by carriers. Intelsat's Chief Technical Officer, Thierry Guillemin, noted: "in our experience, episodes of signals from unauthorized carriers and of cross-polarization make up 70 percent to 75 percent of radio frequency interference cases plaguing satellite operations...to this number you should add a 15 percent to 20 percent of cases caused by adjacent satellite interference."¹⁴

Intentional Disruption/Attack

As satellites (travelling in predictable orbits) collect, transport and deliver critical information and services to users on Earth, including national militaries, intentional disruption of the information/services they provide is an attractive option to some. Add to that the physical disruption of space infrastructure (e.g., satellites or ground-based facilities).

Intentional jamming (e.g., active jamming of radar imaging satellites, GPS location and timing information, etc.) could bring damaging military implications as well as potential political estrangement. Jamming the uplink for commercial and communications satellites is easier than military satellites due to their tendency to receive a broad range of signals for multitudes of users over a large geographic area. As commercial communications satellites are used heavily by the U.S. military (as well as the militaries of some other countries), this vulnerability is relevant to the security community and allied collaboration efforts.

Besides the challenge of GEO-locating the source of interference in an area covering hundreds of thousands of kilometers, satellite operators are sometimes confronted with a policy challenge, such as the case of the jamming of a Eutelsat satellite by a source located on Iranian territory. In 2009, several major broadcast stations were jammed for many months by systems based in Iran, raising significantly the costs to the broadcasters and satellite owner-operators involved. Although formal complaints were filed with the International Telecommunication Union (ITU), the situation has not been resolved, and the Government of Iran has made no acknowledgement of this issue.

The incidence of intentional jamming has increased in recent years due to its utility in accomplishing military, political, and even social objectives. As state-sponsored jamming becomes increasingly prevalent, there is likely to be increased interest internationally in scripting appropriate responses to these kinds of "temporary" actions. At present, this is an underdeveloped area of security policy as well as economic policy and diplomacy.

¹³ James Oberg, "Open Issues with the Official Phobos-Grunt Accident Report," *The Space Review* (February 27, 2012):

<http://www.thespaceview.com/article/2035/1>.

¹⁴ Giovanni Verlini, "New Efforts to Mitigate Satellite Interference," *Satellite Today* (March 1, 2010).

A crisis could also be caused by: directed energy (laser or microwave) attack (e.g., using an Earth-based laser to dazzle the optical arrays of an electro-optical imaging reconnaissance satellite; or use of satellites with active, high-powered radars to degrade the electronics of an adversary satellite); kinetic energy anti-satellite (ASAT) attack (e.g., direct-ascent, co-orbital); or cyber attacks (e.g., capturing or corrupting the data streams to or from a competitor's satellite).

Cyber attacks against satellites and ground stations are a growing problem and stand out as a key vulnerability that can be added to the current array of political and budgetary obstacles to enhanced cyber security and space security. Cyber attacks permit anonymity and can be far lower cost with regard to spying, denial of service, or otherwise incapacitating an adversary's satellites. There are already a number of known examples of cyber attacks against satellites resulting in degradation or loss of control.

COMPARATIVE ASSESSMENT: THE UNITED STATES AND THE EU

United States

The United States is the leading space power and, arguably, the most reliant on highly-integrated space capabilities. Given the vulnerability of these assets, the country is active both in promoting the responsible use of space (e.g., collision prevention, engagement in International Space Code of Conduct negotiations, etc.), and in research and development related to the protection of these assets (including counterspace measures). The U.S. Air Force (USAF) is responsible for military space activities and charged with ensuring "freedom of action and from action in space" as well as denying, if necessary, those same freedoms to an adversary.¹⁵

Beyond promoting norms of responsible behavior, the United States pursues other deterrence-related efforts. They include: the threat of retaliatory measures (although not limited to a response in kind); escalation; redundancy and quick

¹⁵ Maj. Wallace Turnbull, "Moving Beyond SSA: An Attribution Architecture for Space Control," *High Frontier* Vol. 5, No. 1 (November 2008): 25-27.

replacement capability; ability to operate in a degraded environment/resilience; robust Space Situational Awareness (SSA) and space-related intelligence capabilities that enhance attribution¹⁶; and a healthy level of strategic ambiguity over its response to any intentional disruption/attack on U.S. or allied space capabilities. Declaratory policies also come into play, when deemed appropriate (e.g., an attack on U.S. space assets as part of a regional conflict is declared to be a broader attack on the United States).

The National Security Space Strategy (NSSS), published by the Obama Administration in January 2011, forthrightly acknowledges the relevance of a contested space operating environment, not only to the security of the United States, but also to U.S. relations with key allies and partners. In addition, the National Space Policy, issued in June 2010, instructed the Secretary of Defense and Director of National Intelligence to "assure critical national security space-enabled missions" through options, such as "leveraging allied, foreign, and/or commercial space and non-space capabilities to help perform the mission" and augmenting "U.S. capabilities by leveraging [the] existing and planned space capabilities of allies and space partners."¹⁷

The outreach of the United States to the international community on these issues includes participation in negotiations on an International Code of Conduct for Outer Space Activities, meetings with a UN-established Group of Government Experts on Outer Space Transparency and Confidence-Building Measures (TCBMs)¹⁸, and work with the Scientific and Technical Subcommittee of the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS) on the "Long Term Sustainability of Outer Space Activities." These and other efforts seek to mitigate space debris, reduce the likelihood of

¹⁶ In a military engagement, the less that is known about the identity, motives, and scale of the threat (due primarily to the inability to detect and classify), the greater freedom of action that is required to protect the force/assets involved.

¹⁷ "National Space Policy of the United States of America," President of the United States of America, June 28, 2010.

¹⁸ The GGE on Outer Space TCBMs was established by UN General Assembly Resolution 65/68.

collisions, prevent incidents, minimize the risks of potentially harmful interference, and develop “best practices guidelines” for space activities.¹⁹

SSA is essential to managing space traffic, identifying out-of-the-ordinary activities, irresponsible behavior, and any attack on space assets. The United States collects its SSA data through the Space Surveillance Network (SSN). The SSN, however, cannot continuously track every space object, and it uses the computed orbit to predict an object’s future position, which is periodically updated. Still, an object can be unexpectedly “lost” between the updates, and it can take days, or even weeks, to re-establish contact. This operational constraint could be exploited by potential adversaries.²⁰ Accordingly, the United States seeks to build a more robust SSA capability in coordination with its allies.

In its 2011 NSSS, the United States asserted, as a leader in the SSA field, it “can use its knowledge to foster cooperative SSA relationships, support safe space operations, and protect U.S. and allied space capabilities and operations”.²¹ The partnerships are to be “consistent with U.S. policy and international commitments and consider cost, protection of sources and methods, and effects on the U.S. industrial base.”²² The United States has shared SSA information since the late 1950s through NASA’s Orbital Information Group (OIG). SSA data-sharing data outside of the U.S. government (USG) was originally administered by a pilot program of the USAF Space Command, the Commercial and Foreign Entities (CFE) Pilot Program (launched in 2004). There now exists a permanent SSA Sharing Program operated by the U.S. Strategic Command (USSTRATCOM).²³

¹⁹ Frank Rose, “2012 Will Be a Defining Year for Space Security,” Remarks at the 15th Annual FFA Commercial Space Transportation Conference, Washington DC (16 Feb 2012): <http://geneva.usmission.gov/2012/02/17/space-security-2/>, accessed October 23, 2012.

²⁰ Turnbull (2008).

²¹ U.S. Department of Defense, *National Security Space Strategy* (January 2011): 6.

²² *Ibid.*: 8.

²³ Jana Robinson, “The Role of Transparency and Confidence-Building Measures in Advancing Space Security.” *ESPI Report* No. 28 (27 March 2011).

Standing agreements with commercial partners enable cooperation with these entities on a day-to-day basis as well as in case of emergencies. The United States also seeks cooperative partnerships with foreign governments. Besides SSA collaboration with Australia and Canada, the United States has held discussions on SSA with the European Space Agency (ESA), the EU, and individual countries (mainly France and Germany), as well as in Asia (e.g., Japan).

Another partnering potential is represented by the U.S. Air Force’s Wideband Global Satellite Communication system in which five allies already participate (i.e., Canada, Denmark, Luxembourg, the Netherlands, and New Zealand). The system currently involves three satellites in orbit and six additional satellites are planned to be launched in the period 2012 -2018. The United States carries the burden of the development, fielding, and operational aspects of eight satellites. The ninth will be a product of this consortium and will be launched and operated by the United States.²⁴

Moreover, the U.S. Strategic Command (USSTRATCOM) is in the process of reconfiguring the Joint Space Operations Center at Vandenberg Air Force Base to become a Combined Space Operations Center with the goal of also integrating the capabilities of its allies to better leverage shared information.

The primary venue for advanced collaboration with allies has been the Schriever Wargame, coordinated by the United States annually or bi-annually. The Schriever Wargame consists of a series of exercises that starts with an attack on critical space assets and/or cyber infrastructure. The seventh Schriever Wargame for space, which took place in April 2012, was the first international game to combine the regular participation of Australia, Canada, and the United Kingdom with other NATO allies. The war game, involving combined space operations, focused on ways to boost SSA, improve intelligence-gathering, enhance surveillance and

²⁴ Tech. Sgt. Chris Powell, “U.S. Coalition Nations Form Wideband Global Satellite Partnership”. U.S. Airforce Website, <http://www.af.mil/news/story.asp?id=123286621>, accessed August 23, 2012.

reconnaissance, and increase communications bandwidth while countering space-related challenges, including debris and the anti-satellite capabilities of adversaries.²⁵

In sum, the United States, guided by its 2011 National Security Space Strategy (NSSS), focuses on how the changing space environment can influence national security. Strengthening safety, stability, and security in space is one of three broad objectives clearly defined in the NSSS. Crises could not only reduce the ability to protect benefits that countries derive from space; the stability of the domain itself could be adversely affected. Accordingly, the United States seeks to anticipate the actions and reaction of actors to prevent negative contingencies or crises, as well as promote the responsible use of space via building international partnerships and putting in place effective deterrence measures.

The European Union (EU)

The structure responsible for the EU's Common Foreign and Security Policy (CFSP) is the European External Action Service (EEAS), established by the Lisbon Treaty in December 2009. The EU has a "terrestrial" Crisis Platform under its EEAS, involving various crisis response/management mechanisms (i.e., Crisis Management and Planning Directorate, Crisis Response Department, EU Military Staff, Civilian Planning and Conduct Capability, Situation Centre, EU Situation Room and other relevant EEAS Departments), the EU Military Committee (EUMC), and relevant European Commission services (see Figure 1).

The development and utilization of space assets for terrestrial crisis management is being supervised by the European Commission (EC), in close collaboration with the Member States, the

EU and ESA. The EEAS, which defines the coordination and resourcing mechanisms associated with the use of space for terrestrial crisis management and "external action", has not, as yet, systematically integrated space crisis management into its operations.

Institutions that coordinate European space policy include the Space Council (periodic meetings of the Council of the EU and the Council of ESA at the ministerial level), the Joint Secretariat, and the High-Level Space Policy Group (the two latter of which assist the Space Council). The EU's security-related space activities are primarily managed by the European Commission (EC), the European Defence Agency (EDA), and the European Union Satellite Centre (EUSC). The European Space Agency (ESA) acts as the program coordinator and procurement authority for most of these projects.²⁶ The EU's principal security-related programs, all dual-use in nature, are the Galileo global navigation and positioning satellite constellation, the Global Monitoring for Environment and Security (GMES) and the Space Situational Awareness (SSA) project.

In 2007, the 4th Space Council endorsed unanimously the European Space Policy, demonstrating support for a comprehensive, common way forward. The Fifth Space Council named "space security" among its four priority areas. The EU recognizes its increasing reliance on space-based systems as well as the proliferation of threats to these systems and aims at developing a "European space monitoring capability".²⁷ The 2008 Space Council resolution, as well as subsequent resolutions, emphasized the need for "a European capability for the monitoring and surveillance of its space infrastructure and of space debris".²⁸ To develop a pan-European SSA system, the EU recognizes the need to cooperate with ESA and Member States,

²⁵ Amb. Gregory Schulte, "Protecting Global Security in Space," Presentation at the S. Rajaratnam School of International Studies, Nanyang Technological University, Singapore (9 May 2012), http://www.defense.gov/home/features/2011/0111_nsss/docs/Rajaratnam%20School%20of%20International%20Studies%20on%20Protecting%20Global%20Security%20in%20Space.%20May%209,%202012.pdf, accessed October 23, 2012.

²⁶ Kai-Uwe Schrogl, et al., *Yearbook on Space Policy – 2009/2010: Space for Society* (Vienna, Austria: SpringerWienNewYork, 2011), pp. 100-101.

²⁷ http://ec.europa.eu/enterprise/policies/space/esp/security/assets/index_en.htm

²⁸ 5th Space Council Resolution (September 26, 2008): <http://register.consilium.europa.eu/pdf/en/08/st13/st13569.en08.pdf>, p. 13.

as well as develop proper governance and data policy to manage highly sensitive SSA data.²⁹

The EC's most recent space strategy document entitled "Toward a Space Strategy of the European Union that Benefits its Citizens", acknowledged that space infrastructure is both "an instrument" which can serve the EU's security and defense needs (e.g., GMES, MUSIS), but also as "an asset" requiring protection. The main threats outlined in the document were natural phenomena, collision, and electromagnetic interference.³⁰

The current European agenda on space security is dominated by the discussion, debate and diplomacy associated with the proposed Space Code of Conduct referenced above. The Code has also attracted priority attention internationally over the past few years. Although the EU is a relatively recent space actor at a global level, it is striving to establish policies and procedures that protect Europe's space assets, especially at a time when current EU policy heavily emphasizes the development of independent European access to, and use of, space (including Europe's next-generation launching capability, Galileo, space-based crisis response infrastructure, and SSA).

The implications of increasingly sophisticated counterspace systems in the hands of less-responsible actors have not been acted upon to a sufficient degree in Europe. There exists an obstinate political and cultural barrier that, often mistakenly, confuses the defense of space assets with the debates on space "weaponization". Accordingly, the individual Member States are currently better positioned to contribute actual capability as well as political value-added with regard to space crisis management planning. Politically, there are also fewer obstacles to making security-oriented decisions with regard to cooperation in militarily-sensitive space situations. Among them, France is a leader in developing national critical space capabilities, including communications, Earth observation, and space debris detection.

²⁹http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/intm/122342.pdf.

³⁰http://ec.europa.eu/enterprise/policies/space/files/policy/comm_pdf_com_2011_0152_f_communication_en.pdf, p. 5.

In short, the public space security (sometimes labeled "security of space") debate in a European setting consistently gravitates back toward the challenges posed by incidental or naturally-occurring phenomena, which are less challenging issues to grapple with politically. Movement away from these non-intentional issues as the central agenda items on space security continues to prove difficult, demonstrating the pushback over more formalized and deeper discussions between the United States and Europe on the intentional acts that could jeopardize space stability systemically.

COLLABORATIVE SPACE CRISIS PREVENTION AND MANAGEMENT

The purposeful loss of important space capabilities (both civilian and military) could have a debilitating impact on the world economy and global security as well as exacerbate various terrestrial crises, whether they be humanitarian or military. Advancing the responsible and safe use of space should be the foundation of a more cooperative, predictable environment which enhances national security and discourages destabilizing behavior.

TCBMs, introduced in various venues (e.g., UN General Assembly resolutions; the U.S. 2010 National Space Policy; the draft International Code of Conduct for Outer Space Activities, etc.) are an important element of this effort. They include the sharing of data and information relevant for conjunction analysis, pre-notification of launches, building international partnerships, and creating a common understanding of what constitutes "responsible behavior." While acknowledging their various limitations, including the issue of verification and compliance, TCBMs, in the right circumstances, can go a long way towards preventing space-related crisis. TCBM-related space diplomacy needs to be underpinned by an advanced understanding and commitment to international law.

With the development of sophisticated counterspace capabilities by some countries, the concept of deterrence has also gained traction in debates related to space crisis management. As referenced in the previous section, the U.S.

Defense Department includes the following four objectives in its deterrence strategy: the development of responsible norms of behavior; the establishment of international partnerships; increasing the resilience and capacity to operate in a degraded environment; and the readiness and capability to respond in self-defense (not necessarily in kind). It has yet to be thoroughly tested how a robust space posture can deter terrestrial conflict and, conversely, how vulnerabilities in space can cause instability in a terrestrial crisis.

SSA is an important contributor to advancing the responsible use of space and there are broader discussions underway on the need to create a more comprehensive SSA picture and share data and information internationally. With regard to America's SSA, although it is the largest system with comprehensive coverage of traceable items in low Earth orbit (LEO), it does have coverage gaps, especially in equatorial orbits.³¹ Europe has only one dedicated radar system for space surveillance, but has reasonably well-developed optical coverage in medium to high orbits. A multilateral system of sharing the burden of tracking space objects would offer improved performance (i.e., higher detection frequency, reduced workload for a single system, and better geographical diversity for better coverage), reduced costs for additional surveillance capabilities, superior management of existing redundancies, and improved collision warning against multiple sources.³²

Should preventive measures fail, the response to any particular crisis will depend on what type of space asset is involved and whether the crisis is connected to military activities. It will also be important to understand if the asset is part of an international partnership (or is supporting coalition activities) and whether the crisis is isolated or occurring among a number of assets. All of these factors will affect how a crisis is

managed, by whom, and through what institutional mechanisms. Naturally, the dual-use nature of satellites, and the use of civilian and commercial assets for military operations (thus making them important for national security purposes) compounds the difficulty in configuring the right kind of response.

Not surprisingly, contingency planning is fundamental to effective management of a space crisis. As with responses to major natural disasters, terrestrial accidents (e.g., toxic spills, etc.), or terrorist incidents, allies will need to be able to react flexibly in space. Commercial and military operators deal regularly with space environment-related contingencies involving practical operational procedures. Space crisis procedures are best developed when concentrating on realistic scenarios and case studies.

The U.S. Schriever Wargame described above, or similar allied wargames, could improve understanding with regard to how institutions and technologies will interact in a crisis that requires quick decision-making and to possible interaction of groups that have not worked together before. The 2012 Schriever Wargame, the first international exercise in this series (including some nine NATO nations and Australia, as well as representatives of the commercial space industry) was a step in this direction. Information-sharing has been identified as a critical area for effective combined operations in space.³³ As with terrestrial military exercises, practicing reactions to a crisis scenario should be accompanied by TCBM formulation to prevent dangerous misperceptions.

The U.S. Combined Space Operations Centre is positioning itself to share operational command and control (C2) of space forces with allies, including accepting data from a wide variety of sources, processing it in an environment that enables maximum foreign participation, and providing SSA and command and control products to a select international community.³⁴

³¹ The Russian Space Surveillance System is well-developed for LEO but is strictly military. Higher orbits are covered by the Russian-sponsored ISON network that relies on collaborative sharing among scientific telescopes around the world (source: www.emmetfletcher.com).

³² Emmet Fletcher at www.emmetfletcher.com.

³³ For more information, see http://www.act.nato.int/images/stories/events/2012/sw12i/sw12i_report.pdf.

³⁴ Maj. Michael Morton and Timothy Roberts, "Joint Space Operations Center (JSpOC) Mission System (JSM)," Technical Paper introduced at the 2011 AMOS Conference,

The establishment of such a Centre, however, will likely prove challenging as governments are concerned about the inappropriate release of data. Nonetheless, it would facilitate crisis management as allied governments and the commercial sector would share basic information on space object location and potential interference to prevent, or manage, a crisis.

and rather require a tailor-made solution by those actors and individuals involved. That said, there is far more that can be done in the area of pre-crisis planning and closer, more security-minded discussions among key allies. Space, in its many facets, has simply become too important for day-to-day life on Earth; it merits nothing less than the sustained engagement of the highest levels of government, NGOs, and the private sector.

CONCLUSION

The asymmetric advantages and vulnerabilities of space stand out: Even a small satellite off course or an incident of neglect/misconduct -- let alone intentional disruption of, or an attack on, space assets -- can cause disproportionate damage. Space crisis management needs to be underpinned by strong and persistent diplomacy aimed at preventing crises, encouraging the accelerated development of the operational and technical capabilities to manage a crisis already underway, and ensuring the availability of effective organizational structures to facilitate sound crisis management. Indeed, it is not difficult to imagine a time when a number of responsible space-faring nations appoint their own Ambassador-at-Large for Space to reinforce this new and more urgent brand of space diplomacy.

Collaborative space crisis management needs to embody several methods of crisis prevention; rapid detection and reporting of a threat/attack; accurate assessments of the threat; and high-tempo policy responses. Political will is an essential component of this task at an international level. Present discussions concerning the expansion of coordinated allied counterspace defense arrangements, for example, are still at a fairly early stage of development.

Accordingly, the next few years will be especially important in not only establishing responsible norms of space behavior, but also gaining agreement on clear procedures to deal with escalatory spirals and other unexpected contingencies, particularly of the man-made variety. An actual space crisis will likely elude abstract models and even a set of universal rules,

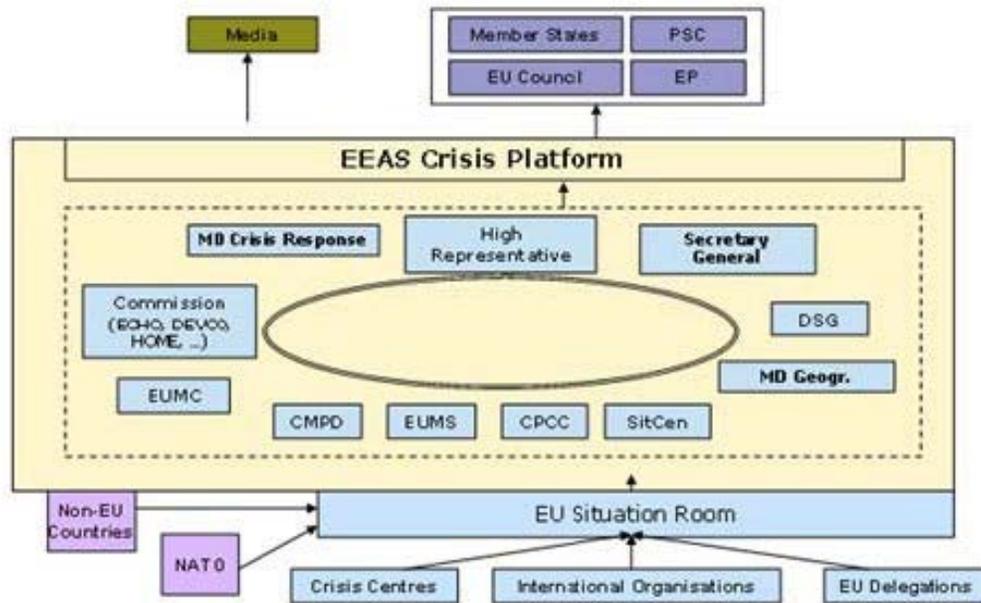


Figure 1: the EEAS Crisis Platform (source: EEAS website)³⁵

³⁵ “The EEAS Crisis Platform.” EEAS website, <http://www.consilium.europa.eu/eeas/foreign-policy/crisis-response/eeas-crisis-platform>, accessed August 23, 2012.

Afghan State Survival: How Education Influences Political Development

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The United States poured over fifty-two billion dollars of aid, ten years of operations, and 1,854 military members' lives into war-torn Afghanistan, but these investments did not create a stable state.¹ The successful recovery of the country and its long-term stability depend on the Afghan state's ability to mature in capability and permanency. Although many factors influence political development, education remains a dynamic part of long-term development, and in Afghanistan's case, can reduce the populace's support of radicalism. Education allows political participation, increasing political development and improving the probability of state survival.

Lack of political development and continued state instability would force the United States to continue to provide financial and military aid long after the official transfer of responsibility to the Afghan government, and would arguably prevent the region from further progress. Instability in Afghanistan translates to unaffordable regional volatility, exacerbated by neighbor states like Pakistan and Iran. Their real or potential nuclear capabilities paired with insurgency create a perilous possibility in an already unsteady region. In order to avoid such a bleak outcome to over a decade of conflict and aid, it is in the United States' interest to understand what kind of political development is realistic in Afghanistan, how education affects that development, and consequently what changes to enact in its approach to Afghan education.

Although foreign aid from the United States, United Kingdom, and others has been the primary source of state funding since 2001, only nine

percent of that aid is used for education.² However, nine percent is an improvement from a nonexistent formal educational system under the Taliban.³ Since the fall of the Taliban in 2001, over 600 schools have been built, upwards of 50,000 teachers have been trained, and literacy programs are being implemented nation-wide.⁴ These improvements are consistent with the Western democratic ideal of a population reaching the highest level of education possible, but are they truly conducive to Afghanistan's further political development? If education in general is not the answer, then how much and what kind of education will influence political development?

Should the ideal type and method of education be determined for Afghanistan, and political development advance as a result of achieving it, the United States could safely and confidently withdraw from Afghanistan, leaving an improved country and more stable region as a consequence. In order to determine these specifics concerning education, the end state of political development must be clearly defined and understood.

THE DEBATE ON POLITICAL DEVELOPMENT

In his article "An Idea of Political Development: From Dignity to Efficiency," Harry Eckstein outlines a list of questions that address the idea of political development. For the purpose of this paper, only three of his six questions will be addressed. First, what conception of continuous

¹Tarnoff, Curt. "Afghanistan: U.S. Foreign Assistance," *Congressional Research Service* (August, 2010). <http://www.fas.org/sgp/crs/row/R40699.pdf> (accessed 23 April 2012).

² Integrated Regional Information Networks. "AFGHANISTAN: Money well spent?". IRIN. <http://www.irinnews.org/Report/88502/AFGHANISTAN-Money-well-spent> (accessed 23 April 2012).

³ School is Open. "Afghanistan Education History". http://www.schoolisopen.org/sio/index.php?option=com_content&view=article&id=53&Itemid=62 (accessed 23 April 2012).

⁴ Tarnoff

growth plausibly describes the passage from primal to advanced polities?

Eckstein points out that the concept of democratization has only recently become the explicit goal of political development.⁵ He suggests that the best way to characterize the continuum of political development is through the growth of the political domain of society.⁶ This is interpreted to mean that more political actions begin to take the place of nonpolitical actions. Eckstein proposes that one end of the spectrum is “social polity”, and the other is “political society”.⁷

“Social polity” refers to a “princely domain” in which there is an institution of headship, but the society is dominant, while the polity remains negligible.⁸ On the other hand, “political society” refers to the society in which private relations have been preempted by public institutions which permeate social life.⁹ The movement from social polity to political society is induced by the power holders of a social polity realizing their power resources and converting their headship to primacy, then to actual power.¹⁰ This process creates momentum, which blurs the line between polity and society.¹¹ Eckstein stresses that, “[This state is not an end], but itself a stage in the continuing process.”¹²

The second question Eckstein poses is this: what is the essential nature of polity in its “primitive and simple” form? He begins by asserting that a society’s occupants and practices are built around the concept of society.¹³ The symbolic politics of primal societies does not stand for real politics, but instead for society itself. Eckstein cites the example of sub-Saharan tribes identifying almost

solely with their chief, rather than with territory or kinship. These tribes saw the chief as their mouthpiece and as the exemplification of their personal and social identity.¹⁴ He extends this model of primitive and simple polity to Anglo-Saxon society. The transition from the king independently making decisions concerning war, to the incorporation of increasingly large councils to aid him, show the arrangement of the king embodying the society, and the council protecting the society’s moral customs.¹⁵

Eckstein’s final question concerning political development asks what forces make the advancement of primal polities toward higher forms highly probable. Making a society real and tangible in order to fulfill the needs of personal identity, safety, and the satisfaction of material needs is key in moving a primal polity towards a higher form.¹⁶ In addition, in order “to exist, and to carry out collective enterprises, societies must...be harmonious in some degree”.¹⁷ The natural desire for justice is a function instinctively attributed to society, linking justice to chieftaincy.¹⁸ Eckstein argues that the domain that stands for society itself has the potential to become a monopoly of legitimate power.¹⁹

He details the process of moving through the iterative stages of political development by outlining distinct stages that societies have historically demonstrated. These stages are the politics of primacy, the “prophylactic” polity, the polity of interests, and the polity of incorporation and of incumbency.²⁰ Eckstein maintains that each stage is a precondition for those that follow, and the force that propels a society from stage to stage is primarily the desire to reap the direct and indirect benefits of social elevation and primacy.²¹ In addition to desire for primacy, the force of greed and the “forces generated by collective functional needs” influence the progression of political development. These forces stem from the

⁵ Eckstein, Harry. “The Idea of Political Development: From Dignity to Efficiency,” *World Politics* XXXIV 4 (Jul, 1982): 451-486.

<http://www.jstor.org/stable/2010330> (accessed 18 January 2012), 469.

⁶ Eckstein, 469.

⁷ Eckstein, 470.

⁸ Eckstein, 470.

⁹ Eckstein, 470.

¹⁰ Eckstein, 471.

¹¹ Eckstein, 471.

¹² Eckstein, 471.

¹³ Eckstein, 472.

¹⁴ Eckstein, 473.

¹⁵ Eckstein, 474.

¹⁶ Eckstein, 474.

¹⁷ Eckstein, 475.

¹⁸ Eckstein, 475.

¹⁹ Eckstein, 476.

²⁰ Eckstein, 482.

²¹ Eckstein, 484.

need to efficiently manage the “machinery of the government”.²² “These themes of politics – primacy-seeking, power-seeking, greed, and integration – are familiar,” Eckstein writes. “What is not familiar is the special roles they play at different stages of political development.” If movement along Eckstein’s spectrum of development is driven by primacy-seeking and desire for social elevation, then because education allows for social elevation, it consequently affects political development. However, the specific way that education interacts with development is still unclear.

Samuel Huntington clarifies the mechanics of political development. In his article, “Political Development and Political Decay,” he uses the phrase, “the art of associating together,” to refer to the idea of nurturing political institutions in order to spur political development.²³ Huntington makes certain to differentiate between political development and modernization because, he argues, rapid modernization actually produces political decay.²⁴ He lists rationalization, integration, and democratization as commonly used terms in defining political development, but maintains that mobilization and participation remain the most emphasized aspects of such development.²⁵ Karl Deutsch argues that,

“Increases in literacy, urbanization, exposure to mass media, industrialization, and per capita income expand the ‘politically relevant strata of the population’, multiply the demands for government services, and thus stimulate an increased political participation, and shifts in attention from the local level to the national level”.

Daniel Lerner, a scholar who studies the effect of education on development, echoes Deutsch’s thesis by asserting that participation distinguishes modern politics from traditional politics.²⁶ While Huntington credits all definitions of political

development, he points out three issues with given approaches. First, the causal relationship between modernization and political development limits the applicability of the concept. Development should be a quality rather than a certain type of system.²⁷ This elimination of stark limitation would allow the concept to reach beyond its “limited identification...with the Western, constitutional, democratic nation-state”.²⁸

Second, Huntington points out the flaw in associating political development with all “good things” like literacy, urbanization, media participation, and political participation. This flaw differs from the first because it does not peg political development on modernization, but instead on all positive but possibly unrelated factors. Huntington critiques this view for its vague nature. “Development becomes an omnipresent first cause,” he writes, “which explains everything but distinguishes nothing.”²⁹

Third, Huntington reviews the opinion that all events taking place in “developing” areas are in fact intertwined with current or future political development. This kind of wishful thinking blurs the line between actuality and aspiration.³⁰

Huntington’s final assertion is that rationalization, competitiveness, and nation-building are all unrealistic, and only the concept of mobilization and participation are relevant to a timeless definition of political development. He also calls attention to the fact that people can be demobilized out of politics just as they are mobilized into politics.³¹ Thus, the idea of political development is reversible, and he calls the reverse “political decay”.

Huntington goes on to address the idea of political development as institutionalism. He argues that the longer an organization has been in existence, the higher the level of institutionalism, and the older an organization is, the more likely it will continue to exist into the future.³² Additionally, the peaceful succession of organizational leadership generations indicates high

²² Eckstein, 485.

²³ Huntington, Samuel P. “Political Development and Political Decay,” *World Politics* XVII 3 (Apr, 1965): 386-430. <http://www.jstor.org/stable/2009286> (accessed 18 January 2012), 386.

²⁴ Huntington, 386.

²⁵ Huntington, 388.

²⁶ Huntington, 388.

²⁷ Huntington, 389.

²⁸ Huntington, 390.

²⁹ Huntington, 390.

³⁰ Huntington, 391.

³¹ Huntington, 392.

³² Huntington, 395.

institutionalization.³³ Finally, the ability of an organization to adapt its functions to changing demands is highly institutionalized. More complicated or multi-institutional political systems are more likely to survive than simple ones.³⁴ Plato and Aristotle, for example, believed that a polity combining the institutions of democracy and oligarchy was most practical.³⁵ Complex institutions lend themselves to survival.

According to Huntington, institutions must also have integrity and thus be somewhat autonomous from outside influences.³⁶ Political groups cannot be the instrument of the social group if they mean to maintain their autonomy and institutionalization.³⁷ Coherence also plays a part in autonomy, since “autonomy becomes a means to coherence... [And] prevents the intrusion of disruptive external forces...”³⁸ Coherence also translates to the capacity for coordination and discipline, and by extension, to war and politics. Huntington says that societies that have been proficient at one have proved to be adept at the other. Thus, “discipline and development go hand in hand”.³⁹

While Eckstein and Huntington do not define the end goal of political development as political freedom, many scholars do. In his article “On the Decline of Contemporary Political Development Studies”, Robert Bartlett decries the view that liberal democracy trumps all other forms of government.⁴⁰ He argues that the purpose of government is to maximize people’s freedom, and suggests that comparative politics focus on describing rather than prescribing as its principal task.⁴¹ Bartlett agrees with Huntington’s assertions in his article on political development

concerning the differentiation between modernization and development.⁴²

Prominent economist Amartya Sen addresses the goals of political development in his article “Development as Freedom: An Indian Perspective”. He argues that freedom (economic empowerment, political freedoms, social opportunities, protective security, and transparency) is the primary objective and principle means of development.⁴³ While Sen’s economically centered discussion on development as a whole is compelling, he focuses only on democracy as the goal of development.

THE DEBATE ON EDUCATION

Huntington suggests that rapid economic growth breeds political instability, and political mobilization results from a “revolution of rising frustrations” instigated by increased communication. He writes, “Increases in literacy and education may bring more political instability”.⁴⁴ Calling on the examples of Burma, Ceylon, and the Republic of Korea, he refers to their high literacy rates and concurrent political instability. Daniel Lerner argues that “[literacy] may be dysfunctional – indeed a serious impediment – to modernization in societies now seeking (all too rapidly) to transform their institutions”.⁴⁵

Rapid embracing of communication may in fact produce a return to traditional or anti-modern sentiments. Huntington warns that such a movement may “mobilize minority ethnic groups who have been indifferent to politics but who now acquire self-consciousness and divide the political system along ethnic lines.” This concept of communication and education leading to a disintegration of the body politic is possible with respect to voting as well. Huntington refers to America’s experience in the 1930’s with allowing

³³ Huntington, 396.

³⁴ Huntington, 400.

³⁵ Huntington, 400.

³⁶ Huntington, 401.

³⁷ Huntington, 401.

³⁸ Huntington, 403.

³⁹ Huntington, 404.

⁴⁰ Bartlett, Robert C. “On the Decline of Contemporary Political Development Studies,” *The Review of Politics* LVIII 2 (Spring, 1996): 269-298.

<http://www.jstor.org/stable/1408431> (accessed 18 January 2012), 269.

⁴¹ Bartlett, 274.

⁴² Bartlett, 278.

⁴³ Sen, Amartya. “Development as Freedom: An India Perspective,” *Indian Journal of Industrial Relations* XLII 2 (Oct, 2006): 157-169.

<http://www.jstor.org/stable/27768063> (accessed 23 April 2012), 157.

⁴⁴ Huntington, 406.

⁴⁵ Huntington, 406.

unschooled millions to vote. He writes that their rapid and uncontrolled integration into the political system resulted in political parties' inability to absorb them, and their own lack of knowledge about the existing system deterring them from interacting in it.⁴⁶ It is important to distinguish between education in terms of spreading knowledge of just political rights and that of spreading literacy. Most scholars agree that literacy has a distinct positive effect on political participation and development. The following scholars confirm the relationship between education and political development.

In his article "A Critique of Recent Models for the Improvement of Education in Developing Countries", John Chilcott evaluates how educational systems are implemented and run in third-world countries. He explains that it is important to examine why an organization wants to educate a population. They could hope to create literate soldiers, participating political party members, or a more productive economy.⁴⁷ How education is approached is important as well. Who writes the curriculum, how teachers are trained, and what they say about the curriculum to motivate students to become literate is key in understanding how a population perceives education.⁴⁸ Chilcott indicates his disappointment in most developing nations' educational systems due to their seeming disinterest in developing, maintaining, and evaluating educational systems.⁴⁹

Evaluating the state's approach is key, but sometimes formal education is not the answer. Michelle Kuenzi examines the effect of nonformal education on political participation in her article "Nonformal Education, Political Participation, and Democracy: Findings from Senegal." Her research found that nonformal education had a positive

impact on political participation.⁵⁰ Nonformal education refers to basic literacy and numeracy skills. Kuenzi suggests that education in general leads to greater participation in organizations, which in turn affects civic skills.⁵¹ Her study also found that nonformal education increases community involvement and leadership.⁵²

Supporting the theory of increased education leads to political participation and political development, Cindy Kam and Carl Palmer determine that education does positively affect political participation in the United States but only until the college level. They suggest an alternative to the conventional view that education is a causal agent for political participation by proposing that education confers participation-enhancing benefits to the individual.⁵³ They assert that the relationship between education past the high school level and political participation "might not reflect higher education conveying participation-enhancing benefits, but rather, higher education serving as a proxy for pre-adult characteristics."⁵⁴ However, these findings do not discount the theory that lower level education does imply political participation.

Finally, the Council on Foreign Relations report "Evaluating U.S. Foreign Aid to Afghanistan", published in 2011, points out the influence of education on reducing radicalism. "In a recent study of the drivers of political violence," the report states, "USAID found limited evidence linking poverty and low education to support for radical groups."⁵⁵ The Council criticizes the

⁴⁶ Huntington, 407.

⁴⁷ Chilcott, John H. "A Critique of Recent Models for the Improvement of Education in Developing Countries," *Anthropology & Education Quarterly* XVIII 3 (Sep, 1987): 241-245. <http://www.jstor.org/stable/3216593> (accessed 23 April 2012), 244.

⁴⁸ Chilcott, 244.

⁴⁹ Chilcott, 245.

⁵⁰ Kuenzi, Michelle T. "Nonformal Education, Political Participation, and Democracy: Findings From Senegal," *Political Behavior* XXVIII 1 (Mar, 2006): 1-31. <http://www.jstor.org/stable/4500208> (accessed 23 April 2012), 1.

⁵¹ Kuenzi, 3.

⁵² Keunzi, 12.

⁵³ Kam, Cindy D. and Palmer, Carl L. "Reconsidering the Effects of Education on Political Participation," *The Journal of Politics* (Jul, 2008): 612-631. <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=1927220> (accessed 23 April 2012), 613.

⁵⁴ Kam, 614.

⁵⁵ Committee on Foreign Relations. "Evaluating U.S. Foreign Assistance to Afghanistan". U.S. Senate.

tendency of donors to hire advisors to complete jobs for exorbitant prices rather than invest in higher education and vocational training for Afghan people.⁵⁶ Donors' aid strategies are frustrating for the government when applied to education. Each donor wants to begin their own program, which means many separate projects fail, rather than working together to create one successful project.⁵⁷

COMPARATIVE CASE STUDY

Because the relationship between education and political participation, and by extension, political development, has been determined to be positive, a qualitative assessment of Afghanistan's educational system as compared with Bangladesh will be conducted. Bangladesh was chosen as the comparative case study for its similarity to Afghanistan in violent and relatively short histories, a colonial experience, a Muslim society, aid-assisted hamlet societies, corruption, domestic terrorism, tense relations with neighbors, and poverty.

In an article written shortly after Bangladesh's independence in 1972, Brian Arthur and Geoffrey McNicoll outlined Bangladesh's challenges to growth and suggested actions to encourage future development.⁵⁸ Less than 15% of its population was literate and over half of Bangladeshis were living on insufficient nutrition.⁵⁹ Inflation, political instability, and labor unrest threatened to compromise the nascent state's survival.⁶⁰ Arthur and McNicoll pointed out the mobilizing effect of education by allowing any person to escape traditional hierarchical systems through knowledge.⁶¹ They proposed that the creation of a

strong local administrative system was integral in generating any lasting political change in Bangladesh.⁶²

Much like Afghanistan, aid donors questioned the recoverability of the Bangladeshi state. Poor accountability, transparency, and responsibility on all levels threatened to topple the fragile polity.⁶³ Bangladesh's current parliamentary representative democratic republic is a product of a series of various political frameworks and coups.

Bangladesh has become a kind of development success story, due to its quick recovery from a turbulent independence, and its subsequent economic and political development. The Bangladeshi government made education a priority from its inception. By 1986, the literacy rate was 23.8%.⁶⁴ Bangladesh now has a 47.9% literacy rate while just 28.1% Afghans are literate.⁶⁵ Bangladesh has three levels of education, totaling 12 years, as well as offered vocational and technical courses. As a predominantly Muslim culture, madrasah education was introduced centuries ago in 1780, and is still offered in conjunction with general education.⁶⁶ This madrasah and general education combination calls to mind the American Catholic school model of religious education paired with general education. Such a system offered in Afghanistan

<http://www.gpoaccess.gov/congress/index.html> (accessed 23 April 2012), 9.

⁵⁶ Committee on Foreign Relations, 21.

⁵⁷ Committee on Foreign Relations, 28.

⁵⁸ Arthur, W. Brian and McNicoll, Geoffrey. "An Analytical Survey of Population and Development in Bangladesh," *Population and Development Review* IV 1 (Mar, 1978): 23-80.

<http://www.jstor.org/stable/1972147> (accessed 23 April 2012), 24.

⁵⁹ Arthur, 24.

⁶⁰ Arthur, 33.

⁶¹ Arthur, 62.

⁶² Arthur, 65.

⁶³ Kochanek, Stanley A. "Governance, Patronage Politics, and Democratic Transition in Bangladesh," *Asian Survey* XL 3 (May-June, 2000): 530-550. <http://www.jstor.org/stable/3021160> (accessed 13 February 2012), 530.

⁶⁴ Wallace, Ben J. and Harris, Michael. "Anthropology And Development In Bangladesh," *Urban Anthropology and Studies of Cultural Systems and World Economic Development*, XVIII 3/4, (FALL-WINTER, 1989): 241-264.

<http://www.jstor.org/stable/40553163> (accessed 23 April 2012), 246.

⁶⁵ CIA World Factbook. "Afghanistan: People and Society" and "Bangladesh: People and Society". Central Intelligence Agency.

<https://www.cia.gov/library/publications/the-world-factbook/geos/af.html> (accessed 23 April 2012).

⁶⁶ Bangladesh Bureau of Educational Information and Statistics. "Description of the Current Educational System in Bangladesh".

http://www.banbeis.gov.bd/es_bd.htm (accessed 23 April 2012).

would likely be met with more acceptance than a strictly secular educational system. In addition to religious accommodations, Bangladesh made education a constitutional right.

Bangladesh's constitution guarantees children to free and compulsory primary education. This commitment means that the government is committed to providing a mass-oriented system of education, relating that need to the requirements of society, and eradicating literacy.⁶⁷ Systematic change took place over the course of years, as the government moved to fully implement a quality educational system. Creating a long-term, iterative plan for continued improvement was a key factor in Bangladesh's education reform.⁶⁸ Another factor of progress was the involvement of non-governmental organizations in the growth of nonformal education. By investing in nonformal education at all levels, NGO's helped socially prepare the population for formal education.⁶⁹

CONCLUSION

Afghanistan is moving along Eckstein's spectrum of political development, making its way from social polity to political society. In order to become a more mature state, Afghanistan must become a state that stands for society itself. If a desire for primacy and social elevation propels a society to move further along the spectrum of development, then education can only help in this process. Additionally, distinguishing between modernization and political development, mobilization and participation remain the goal of political development, and education encourages political participation.

While Huntington would argue that literacy – or education – should not be correlated with political development due to the unrelated nature of all “good things”, and too much education in an under-developed society can cause political decay, the positive effects of education on economic, social, and political development cannot be overlooked. Examining the government's

approach to education is important to understanding the effectiveness and availability of education. Additionally, carefully monitoring aid and supporting nonformal education have proven to be vital in the advancement of educational systems. Such educational advancement in a developing state can be seen in Bangladesh's example.

Bangladesh is a valuable example of a state's successful transition from social polity to political society through the lens of education. The similarities between Bangladesh and Afghanistan make it an appropriate comparison. Afghanistan can learn from Bangladesh's process of educational reform through a systematic, iterative process that sought to educate its population through formal and nonformal education. A direct mentorship relationship between Bangladesh and Afghanistan could be beneficial to Afghanistan's further development. Focusing NGO aid to appropriate areas was a key factor in Bangladesh's educational jumpstart. Afghanistan should pay attention to how it directs the educational aid it receives and make a concerted effort to develop its nonformal education program.

Overcoming many challenges to political development like insurgency, corruption, drug trade, ethnic fractionalization, and widespread poverty will not be an easy task for the Afghan state, but encouraging the progression of its educational system will increase political participation and political development in the pursuit of a stable Afghanistan.

This assessment of the relationship between education and political development is limited by a lack of quantitative analysis and data. Qualitative relationships are valuable but not conclusive. More quantitative research should be conducted on the factors that influence state/regime survival in Afghanistan.

⁶⁷ Ibrahim, Muhammad. *Providing Education for Out-Of-School Youth in Bangladesh*. London, U.K.: Commonwealth Secretariat, 2002, 2.

⁶⁸ Ibrahim, 3.

⁶⁹ Ibrahim, 4.

Thailand Post King Bhumibol Adulyadej: An Uncertain Future

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If tourism were proportional to political stability in the sense that more people would want to travel to destinations in which they are ensured some semblance of security, then Thailand would indeed be one of the most stable and secure countries in the world, particularly in 2011 according to Forbes and Lonely Planet travel blogs. The truth, however, is that Thailand is simply a country that has done well to mask its political turmoil with the exception of the Bangkok riots of 2006. In reality, Thailand is a whirlpool of political deception, monarchical clandestine operations, and military intervention. Stability is the appealing white sheet draped over these problems by none other than Thailand's beloved King, Bhumibol Adulyadej, the world's longest reigning, living monarch, ascending to the throne in 1946. With his death comes the risk of political disorder in Thailand should its political trajectory remain so uncertain.

The political trajectory of Thailand is important not only to the United States, but to its Southeast Asian neighbors. Thailand is one of the wealthiest countries in the region and boasts one of the strongest militaries, and therefore, its stability is integral in maintaining security in the region. With the rising threat of China in areas such as the South China Sea, the Association of South East Asian Nations (ASEAN) must stand united and strong, which would be difficult should its leader succumb to domestic turmoil. Since 2009, Thailand's king has been hospitalized and the hollow stability he had constructed through a network of officials, be they political or military, is crumbling, along with his country. What will happen following King Adulyadej's inevitable passing, and who are the actors that will decide the future of the country? The purpose of this paper is to predict the political outcome of this scenario while identifying the key variables. These variables will be derived from historical background and used to create four separate

scenarios, the second of which will be proven the most likely to occur.

The second scenario describes the death of King Adulyadej and the rise of his son, the Crown Prince Maha Vajiralongkorn, who will be unable to maintain his father's growing amount of authority, resulting in a power vacuum that the military will position itself to fill. The constitutional government, to include the prime minister, her cabinet, and the national assembly, will not be able to assume democratic control due to its lack of support from Thai citizens which has resulted from mismanagement, inefficiencies, and monarchical intervention throughout the king's rule. The military will, therefore, be able to use the remaining legitimacy of the monarchy to operate autonomously against the democratic government without provoking resistance from Thai citizens who will continue to recognize the power of the monarchy.

BACKGROUND

In order to look forward, one must first look back: to identify the actors who will determine Thailand's future, one must establish who has been influential in the past. Until 1932, Thailand had been an absolute monarchy which was characterized by drastic fluctuations in the quality and competency of royal leadership. This cycle reached its lowest point in the 1930s and change was deemed necessary to ensure Thailand's growth and prosperity. As a result, Thailand's monarch was captured and exiled, though not eliminated, and a constitutional monarchy was established. Unfortunately for this newly formed quasi-democratic system, those that executed the revolution held tight military bonds that resulted in strong military leadership over the coming decades, making the new system feel more like a junta than a constitutionally bound parliamentary system. However, this alternative worked well for

the Thai people, who rioted approximately once a decade until the military held elections and a civilian military-friendly prime minister was elected. Thai citizens had lived under a monarchical system for hundreds of years and with little education on democratic ideals, an individually led military junta did not seem much different.¹

Everything changed in 1953 when the newly crowned king of Thailand returned after eight years of ruling from afar. The military junta in charge of Thailand at the time was led by Field Marshal Sarit Thanarat, who was experiencing yet another period of civilian opposition to military oppression. Thanarat, in a tactful political move, decided to end the king's banishment and promote him as the spiritual and national figurehead of Thailand who would then give Thanarat's regime a sense of legitimacy.² For the first two decades, his plan worked marvelously. King Adulyadej was sent to almost every province in Thailand and even abroad to promote his beautiful nation. He became shrouded in rituals to give the appearance of spiritual knowledge and power. Unfortunately for Thanarat, both the King Adulyadej and the people began believing in the king's spiritual wisdom to the point where the king was able to remove Thanarat's regime from power in 1973.³ The king's power was cemented after another intervention between civilian and military forces in 1992, when he quietly reprimanded each party, telling them to stop the senseless violence between them which, shortly after his demand, came to an abrupt end.

It was later discovered that the King Adulyadej had been constructing a network monarchy since his ascension to the throne, comprised of political and military officials that could protect the king from any negative publicity and step aside in

order to allow him to solidify his divine image.⁴ Children were taught from a very young age to revere the king and love him for the sacrifices he had made. In the eyes of the Thais, he was a dhammaraja, one who has reached enlightenment but has chosen to remain on the earthly plain and use his wisdom for the benefit of all.⁵ For this reason, the king never smiles; to smile or frown shows signs of earthly attachments, humanizing a divine being.⁶ To the Thai people, their king is perfect, wise, intelligent, kind, and on his deathbed. His son, Crown Prince Maha Vajiralongkorn, does not share the qualities of his father and even practices the opposite. He is arrogant, misogynistic, and ruthless.⁷ Since 1974, Thailand's constitution has held that a female may become monarch, which would allow the much loved and popular Princess Chakkri Sirinthon to take the thrown; however, the crown title has not shifted hands thus far.⁸

King Adulyadej's network monarchy's success can be attributed to Harry Eckstein's stages of political time, primarily the fourth step of incorporation and incumbency. While his network monarchy exploited the discontents in society and usurped power from both the military and constitutional government, King Adulyadej's network remained open, allowing military officers and government officials to become a part of his privileged group and enjoy its spoils, increasing the monarchy's authority over the government and its legitimacy among the people.⁹

King Adulyadej used the military to create instability within Thailand's political institutions so that he could intervene and act the people's

¹ Baker, Christopher John, and Pasuk Phongpaichit, 2005, *A History of Thailand*, New York: Cambridge University Press, 231.

² Sakuna, Saeree, "Military Intervention and the Return of Absolute Monarchy: An Impediment to Political Security in Thailand," *Peace & Conflict Monitor* (November 2010): 5.

³ Baker, 188.

⁴ McCargo, Duncan, "Network Monarchy and Legitimacy Crises in Thailand," *Pacific Review* 18, no. 4: 2005, 503-504.

⁵ Handley, Paul M, *The King Never Smiles: A Biography of Thailand's Bhumibol Adulyadej*, New Haven: Yale University Press, 2006, 8.

⁶ *Ibid.*, 5.

⁷ "As Father Fades, His Children Fight," *Economist* 394, no. 8674 (March 20, 2010): 26, *MasterFILE Complete*, EBSCOhost (accessed May 2, 2012), 26.

⁸ "As Father Fades...", 26.

⁹ Eckstein, Harry, "The Idea of Political Development: From Dignity to Efficiency," *World Politics* 34, no. 4 (July 1982): 482.

hero.¹⁰ The most recent example of the King's interventions is the military led coup of Thaksin Shinawatra in 2006, which resulted in his banishment and riots in the streets of Bangkok between the red and yellow shirts. The red shirts supported Thaksin and his social policies that redistributed the wealth in favor of the poorer Northeastern provinces, overlooking his corrupt tendencies that made him billions of dollars while in office.¹¹ The yellow shirts supported the Bangkokian middle and upper classes, and the royal family (yellow being the monarchy's color). When tensions were at their highest in 2008, the King stepped in and called for an end to the violence, remaining publicly neutral. Needless to say, this only enhanced his profile among Thai citizens.

Over the past decades, Thailand has undoubtedly undergone a non-democratization process. Since the 1950s, the monarchy increased its legitimacy over every other aspect of Thailand's government, utilizing not only its constitutional powers but its authority among the people. According to many political scientists, after the Cold War, global democratization could be characterized by the rational choice model: if the political elite of a country deemed it in their best interest to establish a democracy, they would, whether or not they believed in democratic principles.¹² This can be used to explain King Adulyadej's behavior during his reign. Democracy was not in his best interests because it took away power and authority from the monarchy; he therefore spent his entire period as king attempting to undermine the democratic institutions in Thailand and revert power back to the throne, which he did with much success. Since he and his network monarchy became the political elite in the 1970s, the king had the power to influence this transition.

¹⁰ Ockey, James, "Monarch, Monarchy, Succession and Stability in Thailand," *Asia Pacific Viewpoint* 46, no. 2: 2005, 116.

¹¹ Chachavalpongpun, Pavin, "Diplomacy under Siege: Thailand's Political Crisis and the Impact on Foreign Policy," *Contemporary Southeast Asia* 31, no. 3 (September 2009): 453.

¹² Drogus, Carol Ann, and Stephen Walter Orvis, *Introducing Comparative Politics: Concepts and Cases in Context*, Washington, D.C.: CQ Press, 2009, 360.

SCENARIOS

Based on this brief historical background, four primary variables stand out as the ones most likely to influence Thailand's trajectory after King Adulyadej's death: the constitutional government, the monarchy, the military, and the people. Using these variables, four possible scenarios can be constructed for post-Bhumibol Adulyadej Thailand; each will be described and considered as potential outcomes.

In the first scenario, the Crown Prince, Maha Vajiralongkorn, will assume the throne and be rejected by the people, thus ruining the intricate network monarchy his father spent decades constructing. In this scenario, the monarchy will be eliminated as a future actor in Thailand's political spectrum, leaving a bipolar feud between the democratic government with constitutional authority (however illegitimate) and the military, whose authority comes from brute strength and historical precedence. Since Thaksin's sister, Yingluck Shinawatra, was elected as Prime Minister in November of 2011, the people in this scenario will have to choose between a Shinawatra-led regime and the historically pro-Bangkokian military, which will inevitably result in riots similar to those between the red and yellow shirts. One group of Thais will support the constitutional government and demand the return of Thaksin since there is no longer a monarch to prevent his return. The other group will support the military who will maintain the previous system with the support of the wealthy upper class centered in Bangkok. This scenario would conclude in the military violently displacing the Shinawatra regime and forcibly holding elections until a military friendly Prime Minister is voted into office. Riots would continue until the country essentially collapses into chaos and martial law is instated. In this scenario, the centripetal forces holding the country together will weaken to the point where the country falls apart according to the Hartshorne Functional Theory.¹³

This is the worst case scenario and also follows the typical democratization models: an

¹³ Gallaher, Carolyn, *Key Concepts in Political Geography*, London: SAGE, 2009, 95.

authoritarian based regime against political liberalization advocates. According to Samuel Huntington, these types of conflicts usually resulted in soft-liners and moderates on each side making concessions until a pact was created allowing for a limited democracy to be constructed, entering the nation into a transitional democratic period.¹⁴ This, however, is not the case of Thailand due to the third actor present in the conflict: the monarchy, which holds much of the legitimacy in the country and, in all likelihood, will not see its demise following the king's death, leading to the second scenario.

In the second scenario, the Crown Prince will assume power and the people, who have grown accustomed to a strong monarchy, will support him. The newly crowned king will not be able to maintain the network monarchy his father created and will, instead, drag the monarchy back into the role from which it had grown: a figurehead sustained only as a source of legitimacy for the military. A slight variation of this model would be the Princess, Sirinthon, assuming power over her brother. Similarly, however, she will not be able to hold together the monarchical regime, and the royal family will again become simply a source of legitimacy. The military, who had strong ties to the network monarchy before King Adulyadej's passing, will assume control over the former king's network while nominally accepting the monarchy's superiority to prevent public outcry. The monarchy and military will remain united against the democratic government and the Shinawatra regime, much like the current alliance.

Third, the princess, Sirinthon, will assume power over her brother and take her place as head of the network monarchy. The people will undoubtedly support her reign since she currently commands an immense amount of respect among Thai citizens. In this scenario, the Princess will maintain her father's network and take it through a reformation in which ties to the military would be severed and new ones would be made with the Shinawatra regime in attempts to bridge the financial and developmental gap between

Bangkok citizens and Thais from the Northeastern Provinces. This scenario would not occur with the Crown Prince as head of the network due to the Prince's strong military ties.¹⁵ The military will see its budget significantly reduced along with its influence over Thai policies. In this scenario, power will transfer from the network monarchy to the parliamentary government in Princess Sirinthon's attempt to democratize Thailand to prevent further instability.

Fourth, the Crown Prince or the Princess will assume power, maintain the network monarchy, garner the people's support, and continue their father's policies of expanding Thailand's monarchical power. In this scenario, very little would change and Thailand's political trajectory would follow its current path. This scenario, however, is not likely.

ANALYSES

So which of these four is most probable? For the remainder of the paper, scenario two with the Crown Prince assuming power will be argued as the most likely to occur. To prove this, let us again examine the four variables. First, the government: Due to the constitutional restrictions of the parliamentary system, the government of Thailand can do very little following the king's death in terms of positioning itself into a more powerful and influential position. To strengthen his network monarchy, King Adulyadej has taken every opportunity to enervate the political institutions established in Thailand's political system. Under Thailand's constitutional monarchy, it has had fourteen different constitutions and tens of re-elections of prime ministers. Thailand's government is comprised of dozens of political parties and new ones are created almost every year. Parties join and break from coalitions to win important governmental positions resulting in compromises and inefficiencies that have created a bureaucratic nightmare for Thai citizens. The people have little faith in the political system and turn to their king, who has outlived all previous constitutions and prime ministers, for solidarity and efficiency.¹⁶

¹⁴ Huntington, Samuel P., *The Third Wave: Democratization in the Late Twentieth Century*, Norman: University of Oklahoma Press, 1991.

¹⁵ "As Father Fades...", 26.

¹⁶ Sakuna, 3.

The current Prime Minister, Yingluck Shinawatra, has yet to prove herself and has even weakened the government's image in the eyes of the Thais after poor governmental oversight and mismanagement during the November flooding in 2011.¹⁷ Perhaps someday the Shinawatra administration will command enough authority and legitimacy to influence the makeup of Thailand's political spectrum; however, this increase in legitimacy is not conceivably attainable before King Adulyadej's death. Therefore, the government is negligible as a variable in predicting the future of Thailand's political trajectory.

The second variable to consider is the monarchy. The first issue to address with regards to this variable is succession: Will the Crown Prince or the beloved princess take control after their father's death? While a law was passed allowing for a female monarch, there has yet to be any evidence to suggest this law would be executed and enforced before the king's death. As a result, the most likely scenarios would be those in which the Crown Prince will assume power, which include numbers one, two, and four. The second issue to address within this variable would be the effectiveness of Prince Vajiralongkorn's accession. Will he acquire the people's support and maintain his father's powerful network, or will he become a figurehead for the military? Both of these potential outcomes depend on the remaining two variables: the military and the people.

The military and the Thai people have shared an interesting relationship due to the military's constant political involvement in Thailand. As previously stated, the military junta of the 1930s, 40s and 50s seemed to be an easy transition from an absolute monarchy for the under-educated Thai populace. Since the 1970's, however, the military has been denied absolute control because of the increased authority of King Adulyadej, which may pose problems for the military if it attempts to regain power after the king's death. The coup d'état of Thaksin Shinawatra in 2006 provided the military an opportunity to determine the level of support it could expect from the Thai people

should it decide to pursue an aggressive stance against the democratic government. The coup revealed that the military still garnered support should it be guided under the monarchical umbrella in the eyes of Thailand's citizens due to the overwhelming support and legitimacy the King received from his people.¹⁸

However, is a dictatorship over Thailand the military's objective? Historical data shows otherwise and instead suggests that the military's overall goal in terms of political power is autonomy: the ability to act without restrictions should it feel obliged to do so and to remain free from budget or legal restrictions from the government. At every stage of military rule in Thailand's history, control was always given back to the people and the constitutional government even after years of direct military control. Whenever a prime minister threatened the military's autonomy, whether it was through budgetary or legal measures, a coup was launched until a military-friendly prime minister was elected.¹⁹ This behavior aligns closely with the predictions of Morris Janowitz, a prominent sociologist that worked extensively with Samuel Huntington in the area of civil-military relations. He hypothesized that when civilian governments do not sufficiently consider the military's needs, the military may choose to interfere in an attempt to better their own position.²⁰ Examples of this behavior abound in Thailand's modern history, such as the election of Thanom Kittikhachon after the death of Field Marshall Sarit Thanarat in 1963, the election of Anand Panyarachanand after a military coup removing Chatichai Choonhavan in 1991, and even the election of Thaksin Shinawatra in 2001.²¹ The relationship between civilian and military officials can be characterized as an alliance of convenience: so long as the constitutional government supported the military,

¹⁷ "Thailand's Floods: Rising Damp," *The Economist*, (Nov 5, 2011), Accessed May 2, 2012, <<http://www.economist.com/node/21536652>>.

¹⁸ Chambers, Paul, "Thailand on the Brink: Resurgent Military, Eroded Democracy," *Asian Survey* 50, no. 5 (September 1, 2010): 841.

¹⁹ Sakuna, 3.

²⁰ Janowitz, Morris, *The Military in the Political Development of New Nations: An Essay in Comparative Analysis*, Chicago: University of Chicago Press, 1964.

²¹ Baker, xvii.

peace was maintained.²² As support for King Adulyadej grew over the last six decades, however, Thailand's military gradually lost this autonomy until its actions could only be legitimized by the King, himself.

If the military were to receive the King's approval for direct military action (or intervention), Thai citizens would perceive it as necessary for preserving national unity and monarchical glory; such is the love for their king. Should monarchical legitimacy in the eyes of the Thai people transfer to the Crown Prince, the military could use it as a source for their autonomy while shedding the chains of the monarch's authority. It is therefore in the military's best interest to pursue scenario two in terms of restoring and maintaining their historical autonomy. However, it all comes down to the final variable.

The Thai people control the fate of Thailand's political trajectory primarily because they determine who has legitimacy of rule between the government, the monarchy, and the military. Historically, they have allowed the military to intervene and replace prime ministers so long as direct military control was never too long or aggressive; however, much has changed since the 1930s, and Thais now are far more educated in democratic ideals than previous generations and may not stand for a junta as they once did.²³ The contemporary monarchy has also changed significantly, wielding the greatest amount of legitimacy; however, is that legitimacy centered on the institution or the individual? As previously stated, the government has done very little in garnering Thai support and has been repeatedly undermined by the king and the military, leaving the conflict for political power in Thailand between the military and monarchy in which only the people can decide the victor.

Thailand's monarchy is in no threat of extermination following the king's death for two reasons: first, democracy in Thailand is not strong enough to warrant the complete rejection of a

monarch, as proven by the coup in 2006 where a majority of Thais sided with the king and military than with the constitutional government. Satisfaction for democracy in Thailand has actually decreased in recent years, leaving the monarchy to fill the vacuum.²⁴ This dissatisfaction can be attributed to the numerous coups and constitutions Thai people have seen come and go in the past century as opposed to the single king that has maneuvered himself as a beacon of efficiency and stability.²⁵ According to Gabriel Almond and Sidney Verba, democracy can only thrive in countries where its citizens participate and are willing to defer to elected officials to effectively govern while in office.²⁶ This does not happen in Thailand as a result of the king's interventions which have caused Thai citizens to instead defer to him instead of the prime minister. So long as the monarchy maintains "efficiency primacy" over the military and government, it will continue to have the people's support.²⁷ Second, the monarchy in Thailand is a historic institution dating back almost a thousand years with important ceremonial functions. Under King Adulyadej, the institution has flourished into a political actor that holds the largest portion of legitimacy in the perceptions of Thai citizens as seen during the king's public interventions in 1973, 1992, and 2006. What separates the monarch from the monarchy is the distinction between authority and legitimacy, terms which have been distinguished throughout this paper. King Adulyadej's network monarchy not only possesses legitimacy, but astounding amounts of authority over the military and government that the king has surreptitiously acquired during his rule. With the death of the king comes the death of that authority, but not the legitimacy the king has gained in the eyes of Thai citizens. Due to the enforcement of the *lese majeste* laws in Thailand that prevent any and all criticisms of the monarch, no surveys have been conducted to measure the legitimacy and support

²² Chambers, 840.

²³ "The 2010 National Survey of the Thai Electorate," *The Asia Foundation*, 2011, Accessed May 2, 2012, <<http://asiafoundation.org/resources/pdfs/ThailandNationalSurvey2010.pdf>>, 35, 130.

²⁴ "The 2010 National Survey...", 41.

²⁵ Ockey, 116.

²⁶ Almond, Gabriel A., and Sidney Verba, *The Civic Culture: Political Attitudes and Democracy in Five Nations*, Princeton, N.J.: Princeton University Press, 1963.

²⁷ Eckstein, 484.

the monarch has. It is safe to say, however, that the Crown Prince will lose a large portion of it after his father's death. Prince Vajiralongkorn is despised by the Thai people and seen as arrogant, selfish, and immoral.²⁸ It is likely, then, to see a decline in monarchical support, but not an end.

The military has seen an increase in support from the Thai people due to the fact that it has been used for decades as an instrument for the king. Thai people do not wish to see the size of the military reduced and, in general, have perceived it as an important institution that helps to stabilize and safeguard the country.²⁹ However, a military junta or dictatorship will not be well received by the people due to their increased understanding and desire for democratic ideals such as freedom of speech and opinion, fairness, and unity, expressed not only since the 1930s but even as recently as 2010.³⁰ Should the military in their efforts to protect their autonomy choose to establish a junta or dictatorship following the king's death, renouncing monarchical authority and competing directly with the constitutional government for power, the people would become divided and scenario one would ensue.

Samuel Huntington argues that in the absence of traditional institutions, neither military juntas nor charismatic leaders can effectively build a sustainable, modern, political institution and that the only political entity that can do so is the political party.³¹ Why are Thailand's political parties unsuccessful in doing this and military juntas so effective? The key lies in the monarchy, Thailand's most traditional and increasingly powerful institution. According to Huntington, "the importance of the political party in providing legitimacy and stability in a modernizing political system varies inversely with the institutional inheritance of the system from traditional society."³² Therefore, through the highly legitimate yet authority weakened monarchy, the military will be able to rule.

²⁸ "As Father Fades...", 26.

²⁹ "The 2010 National Survey...", 95-96.

³⁰ *Ibid.*, 37.

³¹ Huntington, Samuel P., "Political Development and Political Decay," *World Politics* 17, no. 3 (April 1965): 424.

³² Huntington, "Political Development...", 424.

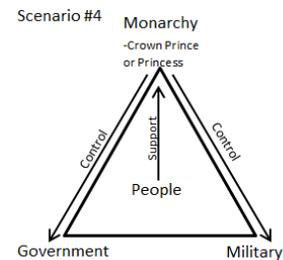
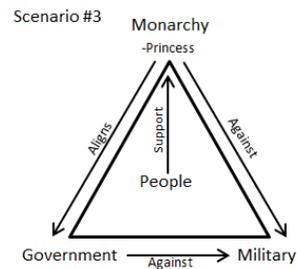
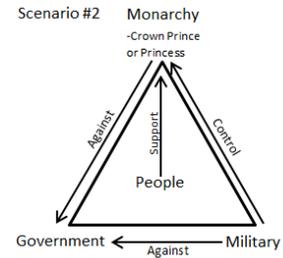
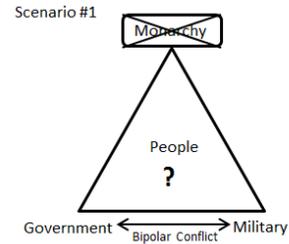
Taking into consideration all of the variables—government, monarchy, military, and people—the most likely scenario in Thailand following the king's death must be the second: the monarchy will remain an influential institution with Prince Vajiralongkorn at its head and used by the military as a tool for legitimacy in its efforts to maintain its autonomy. The government will continue to act in accordance with the military's objectives under threat of a coup to replace an uncooperative regime. This scenario is most likely for the following reasons: the prince cannot inherit his father's authority over the military and government due to his inexperience and poor reputation but will still maintain some legitimacy as a result of his father's efforts in increasing appeal and reverence of the monarchical institution as a whole.³³ The military will respect the monarchy's legitimacy publicly and build up the hated prince's image much like it did to King Adulyadej in the 1950s; the difference would be that the poor existing image the prince has with the public would allow the military to check the prince's popularity growth to prevent him from reconstructing his father's authority. As a result, the nation's power will fall in the hands of the military, who can act under the legitimacy umbrella of the monarchy against the constitutional government should it act against military interests. The people will continue to acknowledge the ceremonial importance of the monarchy as a tool for national unity while recognizing its decline in authority and will, therefore allowing if not actively promoting autonomy of the military through the monarchy. The transition will appear smooth to the public while the struggle for authority rages behind the clouded curtain of the *lese majeste* laws, much like it does now.

CONCLUSION

A military controlled government would not mean the end for Thailand. The land of a thousand smiles has fared well under previous military authorities, experiencing enormous amounts of

³³ Fong, Jack, "Sacred Nationalism: The Thai Monarchy and Primordial Nation Construction," *Journal Of Contemporary Asia* 39, no. 4: 2009, 679.

economic growth and increased political freedoms of its citizens. Scenario two provides the greatest amount of stability because it panders to the military's desires for autonomy. Should the military become truly threatened by an alliance between the monarchy and the government, it may react in a way that would destabilize the country, whether through coups or assassinations. One of the keys to King Adulyadej's success was his ability to work with the military until his power was great enough to circumvent it, and even still, he kept military officials in his close circle. With the rise of China's influence in Southeast Asia, particularly regarding the Spratly Islands in the South China Sea, the Association of Southeast Asian Nations and the United States need a strong Thailand to act as a shield against Chinese expansion. While a military run constitutional government is not the most ideal in terms of democracy, it is a necessary evil for the time being for purposes of the stability it offers.



Publisher's Corner

Roger G. Harrison
Eisenhower Center Director

Kalic, Sean, N. *U.S. Presidents and the Militarization of Space, 1946-1967*. College Station, TX: Texas A&M University Press, 2012, 182pp., \$40.00.

Natalie Bormann and Michael Sheehan. *Securing Outer Space: International Relations Theory and the Politics of Space*. Abingdon, UK: Routledge, c2009, 2012 (pbk), 272 pp., \$44.95 (pbk).

Sean N. Kalic has provided a useful history of U.S. militarization of space under Presidents Eisenhower, Kennedy, and Johnson and the combination of ideals, bureaucratic jostling, and Cold War tensions that formed the foundations of U.S. space policy. His theme is the continuity through the administrations of these three presidents of a space policy built around the “non-aggressive military uses of space,” a policy which effectively ruled out weapons in orbit. There were, of course, many in the military and scientific community with a more hawkish view on weaponization, and space policy has vacillated between an altruistic *Ying* and atavistic *Yang* ever since. The fact that the bulk of resources were devoted in these early years to peaceful striving rather than weaponization (to Apollo rather than a Fractional Orbital Bombardment System) was due, Kalic convincingly argues, to decisions made by the three Presidents whose administrations he describes. Thanks to them, prudence, the desire for the world's admiration, and scientific curiosity carried the day.

Fans of bureaucratic politics will find much to admire in Kalic's description of how the Air Force maneuvered, usually without success, to outflank NASA, the Army, and the Navy to become the principle agent for space. Part of this effort involved a narrative of space as a simple continuation of the atmosphere, part of an “indivisible field of operation” and therefore an extension of the responsibilities a newly independent Air Force should naturally assume. Space emerges in this campaign for the first time as the “high ground” which must be seized (by the Air Force) to prevail in the military confrontation with the Soviet Union. The Army, Navy, and

NASA all had a different idea, and the Air Force push was frustrated (as it has been frustrated many times since) not just by technical failures and cost overruns in key programs but by its own tendency to focus resources on airplanes (strategic bombers then, air superiority fighters now) rather than things that fly invisibly through the cosmos.

Kalic recites a long list of unsuccessful space weapons projects, like SAINT (an early orbiting ASAT concept), BAMBI and SPAD (both orbiting boost phase ICBM interceptors), and FOBS, or fractional orbital bombardment system, a version of which was actually tested by the Soviet Union. The nuclear warheads in the FOBS concept would circle the Earth in low Earth orbit and then be deorbited over the intended target. That would have allowed orbiting Soviet warheads to approach the United States from the south, bypassing defenses oriented northward toward Soviet land-based missile fields. Soviet moves toward an operational FOBS system were the impetus, the author argues, for President Kennedy's authorizing the development of a U.S. ASAT interceptor; but Kennedy's aversion to weapons in space ensured that the ASAT system would be ground- rather than space-based. Both the Soviet and the United States eventually (and unilaterally) abandoned ground-based ASAT systems, although the Chinese broke that norm with an ASAT test in 2007, a test that, fortunately, has not been repeated.

Kalic's book also traces the rise of partisan political divisions on space policy, initially caused, he argues, by concerns among Republican lawmakers about resources being devoted to peaceful rather than military uses of outer space. The success of Apollo silenced the partisan

criticism, which is now largely forgotten. But Kalic's book reminds us that among the achievements of the Apollo program, and the Cold War competition to be first on the moon, was to help prevent a military arms race in space by starving it of resources.

This is a short book, made shorter still by a host of redundancies. The initial chapters are summarized again at the end, perhaps to flesh out what would have been a longish journal article to book length. The author is not a master of style. Still, it is very useful to be reminded that successive presidents favored the "non-aggressive military use of space" and shared what seems to have been an instinctual aversion to orbiting space weapons. Weapons programs seldom die. Usually they return every generation or so in a new form. German imaginings, in the 1920's, of an orbiting "sun gun" morphed into orbiting laser platforms, nuclear missile platforms, and finally "rods from gods." But these have remained on the level of *Popular Mechanics* cover art rather than becoming weapons in orbit.

The common sense of Eisenhower, Kennedy, and Johnson, particularly regarding weapons in space, turned out not to be as common as one might have hoped. This is one lesson to be drawn from *Securing Outer Space*, the reissue in paperback of a 2009 compendium of essays by social scientists about space. One question always raised by compendia like this is why certain essays were included and others not. The title does not help; only some of these essays concern themselves directly with space security. The introduction does not help much either. The editors tell us their goal was to "articulate an understanding of, and critically engage with, the effects of particular manifestations of space policies." This is hardly a sentence to whet the intellectual appetite, but it does prepare the reader for a tendency toward the obscurantist in many of the articles that follow. It may well be, as one of these authors claims, that the U.S. space policy discourse is based on, "...important performances of gendered identity construction specific, tacitly gendered, rationalizations of exploration and colonization in particular ways..." On the other hand, it may not be. It is hard to tell. Still, what the collection lacks in coherence, and some of the authors in elegance or clarity of language, is made up for in

part by variety, and a degree of heterodoxy – both good things when much contemporary writing about space tends toward the stale, the clichéd, and the self-interested.

Names which appear often in these pages are Everett Dolman, Steven Lambakis, Alfred Thayer Mahan and – oddly enough – the French philosopher Michael Foucault (who is mentioned as often as Eisenhower, Kennedy, and Johnson together). The former two are the chief proponents of the concept of space as an inevitable theater of war and the consequent need for the United States to weaponize and dominate the space domain. Mahan is present in these articles mostly to solidify the analogy of space control to control of sea lines of communication (in spite of obvious differences between the two realms), and also because any anthology with even a hint of geo-politics is bound to include him. But what is Foucault doing here?

It turns out that "discourse analysis" (the exploration of how power relationships are reflected in language) is a very useful tool in unpacking space discourse, the often feckless, self-interested, posturing combination of sweeping generalizations, misplaced metaphors, empty slogans, bureaucratic point-scoring and magical thinking that has characterized official and semi-official proclamations about space since Werner Van Braun announced that human destiny lay in the cosmos. None of our great spiritual or philosophical traditions (if one excludes Scientology) had noticed this, but suddenly it seemed persuasive. In the event, while human beings have been rare and transient visitors to space, ideologues have virtually colonized the cosmos, creating what David Grodin ("The Power Politics of Space") describes in these pages as a "strategic discourse that hinders the possibilities of cooperation and increases the likelihood of conflicts in space." Space, as Van Braun knew, is all about narrative (about the sizzle rather than the steak), and that narrative has been, and to a degree still is, dominated by the devotees of "inevitable war" and space control. Common sense hasn't much appeal for ideologues, especially when their blood is up – as it always seems to be. After all, if ideology did not contradict common sense, what would be the point?

There are also articles here on space from the perspective of small powers, particularly Canada (by Wade Huntley), and the impact of science fiction on space policy by Mark Hamilton. The latter contains the mother of all power point slides which I am still puzzling through. But it is fun to consider how science fiction allows us to examine our follies by bestowing them on aliens who turn out to be anything but alien.

In sum, those looking for novel and creative thinking about space, and willing to plough through some head-scratching prose to find it, need look no further. What they will also find, unfortunately, is a certain datedness of material. This is the editors' rather than the authors' fault. A lot has happened in the decade or so since many of these articles were written, and a more fastidious editor would have asked for rewrites or epilogues. This is not a problem for more theoretical and/or historical chapters, like C. Peoples' exploration of what might be called the original sin of space – that later pioneers stood, willingly or not, on shoulders of Nazi scientists who were, at the very least, morally obtuse, and often much worse than that. But it is a serious issue in more prosaic articles like David Webb's on space weaponry. This seems to have been written in the middle of the last decade (no copyright date is given), before some of the weapon programs Dr. Webb describes were abandoned and also before the Chinese ASAT test of 2007. In this same vein, the specter of orbiting weapons platforms haunts the imagination of some of these authors. Such platforms receded in the interim even further into the realm of improbability. Talk of "space control" was once robustly cutting edge, but the technological and budgetary obstacles proved formidable, and the accompanying rhetoric, with its fatal tendency to strut off the page, alienated allies whose cooperation would have been a necessary ingredient. That trust once lost has been hard to regain. Likewise, the debate about the implications for space of a "unipolar world" (the subject of I.R. Ballantyne Bolton's chapter) now seems as quaint as debates about world government. The unipolar interlude in space, if it ever existed, was brief and has yielded to hand-wringing about America's decline, to talk of an eroding space infrastructure, and to worries about

an aging space workforce. The new catch phrase is the "three C's" – competitive, congested, and contested space. It is not yet clear what "contested" space is but it is certainly not space control. Meanwhile, commercial satellite operators are forcing the pace toward a more regulated and transparent space environment; China is on the rise; and private space launch is now a reality. The space policy of the Obama Administration differs sharply in both tone and substance from its Bush-era predecessor, with more emphasis on cooperation and only a residual mention of space control. And cyber might now be a more likely vector of attack on space capabilities than a crushingly expensive armada of space or even ground-based engines of space war. None of this is reflected in these pages.

Although *Securing Outer Space* is, therefore, less up to date than might be wished, there are some very good things in it. My personal favorite is the aforesaid piece by David Grodin. The writing is awkward in places, but the core idea – that space policy is informed by narrative, which actively produces imaginary future problems that self-interested bureaucracies then compete for resources to solve – is a valuable insight. The Air Force professes that space will inevitably become not only a battlefield but the *central* battlefield of future war. This vision, not incidentally, makes the Air Force itself the most important line of defense. Unfortunately, it turns the actual situation on its head. Space has no strategic value apart from the services it supplies to warfighters within the atmosphere, where power is denominated and battles are lost or won. The Air Force does acknowledge this – in fact if not in theory – by regularly shorting space of resources in favor of air-breathing systems like the F-22, the F-35, and more recently (when they became unavoidable) remotely piloted vehicles. If you want to know what bureaucracies really think, don't read their vision statements; read their budget submissions.

Space, to be sure, is important – even vital – in the same way that communications and logistics are. But when we speak of winning the war of logistics, or of communications, or of space, we are speaking metaphorically. Mistaking metaphor for reality has been characteristic of space strategy from the beginning, exemplified by phrases like

“high ground” and “high frontier.” Taken together, the articles in *Securing Outer Space* remind us of how hollow this rhetoric can be.

Notes for Contributors to *Space & Defense*

Space & Defense seeks submissions that will contribute to the intellectual foundation for the integration of space policy into overall security studies. The collaboration of soldiers, scholars, and scientists studying nuclear deterrence in the 1950s led to a robust evolution of doctrine that shaped national and international policy for the succeeding forty years. Our goal as a Center is to create this same robust dialogue with a research agenda that focuses on the integration of space policy and security studies.

Indeed, the emergence of space as a unique and critical element in national security, economic security, homeland security, cyber security, environmental security, and even human security has persuaded us that this line of inquiry is vital to the future of international security.

Contributions are welcome from academic scholars and policy analysts at think tanks and research institutes; senior management and policy officials from international and governmental agencies and departments relevant to space and security issues; senior management and policy officials from organizations responsible for critical national and international infrastructures that rely upon space; major aerospace corporations; scientists and engineers interested or involved in space and security policy issues; military officers and operators in relevant units, commands, and in staff colleges and service academies.

The journal welcomes submissions of scholarly, independent research articles and viewpoint essays. There is no standard length for articles, but 7,500 to 10,000 words, including notes and references, is a useful target for research articles, and viewpoint essays should be in the range of 2,500 to 5,000 words. The opinions, conclusions, and recommendations expressed or implied within *Space & Defense* are those of the contributors and do not reflect those of the Eisenhower Center for Space and Defense Studies, the Air Force Academy, the Air Force, the Department of Defense, or any other agency of the United States Government.

Articles submitted to *Space & Defense* should be original contributions and not under consideration for any other publication at the same time. If another version of the article is under consideration by another publication, or will be published elsewhere in whatever format, authors should clearly indicate this at the time of submission. When appropriate, all articles are required to have a separate abstract of up to 250 words that describes the main arguments and conclusions of the article.

Details of the author's institutional affiliation, full address, and other contact information should be included in a separate file or cover sheet.

FOOTNOTES

Footnotes need to be numbered consecutively with a raised numeral in the text. Please make use of the Insert-Preference-Footer function of Word.

Contributors are required to submit all articles electronically by email attachment as a Microsoft word file (.doc or .docx format).

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or 719-333-8251.**

On the basis of the peer reviews for research articles, the academic editors will make a final decision for publication. If required, the author(s) will be required to make additional changes and corrections as a result of the external peer review.

TABLES AND FIGURES

All maps, diagrams, charts, and graphs should be referred to as figures and consecutively numbered and given appropriate captions. Captions for each figure should be submitted on the same page as the figure to avoid confusion. Tables should be kept to a minimum and contain only essential data. Each figure and table must be given an Arabic numeral, followed by a heading, and be referred to in the text. Figures and tables are not to be embedded in the text. Each table and figure should be clearly labeled. In the text, make sure and clearly explain all aspects of any figures or tables used.

STYLE

Authors are responsible for ensuring that their manuscripts conform to the style of *Space & Defense*. The editors will not undertake retyping of manuscripts before publication. Please follow the Chicago Manual of Style.

Listed below are some additional style and writing guides:

- Dates in the form: 1 January 2009.
- Headings (bold, ALL CAPS, title case and centered).
- Subheadings (bold, italic, title case and centered).
- Acronyms/abbreviations should always be spelled out in full on first use in the text.
- The 24-hour clock is used for time, e.g., 0800, 1300, 1800.
- Use percent rather than % except in figures and tables.
- For numbers, spell out numbers less than 10.
- Make use of 21st style where appropriate
- Keep capitalization to a minimum.
- Concise paragraphs and sentences are desirable.
- Avoid a paper that is just descriptive; rather engage in analytical rigor and assessment.
- Avoid policy recommendations in the analysis part of paper; leave this, if applicable, for a separate section at the end of the paper.
- Define all new terms used in paper.
- Avoid hyphenated words when possible (e.g. low Earth orbit).
- Avoid the use of passive voice when possible.

Please do not use endnote style or scientific notation. Footnotes should be in full bibliographic style with first name, last name format for author.