



TO: President of the United States

FROM: Samreen Khan, Harry Liberman, Nicole Pavia, Daniel Strunk

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RE: To Infinity and Beyond: In Support of US-Proposed Space Principles of Conduct (SPoC)

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EXECUTIVE SUMMARY

US space assets, civilian and military, are operating in an increasingly dangerous environment. Space debris has grown rapidly in the last five years, as has the amount of functional satellites in space. The US recognizes that the status quo, where no code of conduct (CoC) for outer space behavior exists, is untenable. There is a need for international collaboration on these issues, but such collaboration must result in a CoC that best advances our national interest. The US could support the European Union's (EU's) proposed non-binding Code of Conduct (EUCoC), but agreeing to the EUCoC as it currently exists would require concessions on defensive uses of space that the US prefers to avoid. Rather, the US should take the lead in international negotiations and introduce its own CoC, entitled the Space Principles of Conduct (SPoC). This would establish norms for behavior in space while placing no limits on US defense capabilities in space. Such a code would protect US space assets and preempt any future CoC's that could limit US advantages in space as much or more than the EUCoC. Other nations, including the component nations of the EU, Russia, China, and India, would likely agree to SPoC, as they recognize the necessity of the world's largest space power in any efficacious treaty, and also have the same vested interest in the prevention of space debris and space collisions as the US does. In addition, they would benefit from the sharing of US Space Situational Awareness (SSA) data, data that would allow foreign space powers to operate more safely and efficiently than they previously could. The US should lead in the multilateral development of SPoC to ensure that the agreement protects not only current US capabilities, but future ones as well.

MEMO

Problem statement

Currently, there exists no agreed-upon international CoC to govern behavior in space, a huge problem for a sphere that, according to the US 2011 National Security Space Strategy (NSSS), “is becoming increasingly contested, congested, and competitive.” Indeed, there is a widely recognized need for multilateral collaboration in an era where more satellites and rapidly growing amounts of space debris pose threats to the space assets of all nations. Beyond that, however, contentious points remain. Though a code limiting the militarization and/or weaponization of space may seem to deter a potential space arms race, the US would have to sacrifice substantially more than other nations, and commitment mechanisms for a binding treaty may prove difficult.

President Obama’s space policy, briefly

President Obama’s 2010 National Space Policy (NSP) supports universal access to space, while also stressing that the use of space “for national and homeland security activities” be allowed. This was a source of tension when the proposed non-binding EUCoC required the registration and disclosure of military space assets, as these provisions could force the US to divulge private and sensitive security information. Nonetheless, the Department of Defense (DoD) signed off on the EUCoC in 2011. The Obama administration, however, rejected the code in 2012, signaling its continued objection to the limits placed on national security. Since then, both the DoD and Department of State (DoS) have declared the need for an international CoC, and Secretary Clinton communicated a plan to collaborate with the EU. The Obama administration has proposed no alternative to the EUCoC as of today.

Three potential options for the US

1. The US could maintain the status quo, agreeing to no space CoC. This would allow for total flexibility in military actions, but would also fail to address the vital issue of space debris and collision avoidance.
2. The US could agree to the EUCoC or collaborate on a revised EUCoC. The issue of protecting space assets from debris and collisions would be resolved, and its limits on militarization are substantially less than Russia and China's proposed ban on all space weapons (PPWT). However, the current EUCoC's requirements of the registration and disclosure of military assets and strategy adversely and disproportionately affect the US' space agenda. Additionally, a revised EUCoC would likely already lack support from several states, given the conditions under which the EUCoC was originally negotiated.
3. The US could submit its own CoC as a new starting point for international negotiations, stripped of any limitations on militarization (specifically the registration and disclosure of space assets). Negotiations would be a collaborative effort that includes the EU, Russia, China, Brazil, India, and other states, but the US would propose the first draft.

Recommendation

The US should advance non-binding international SPoC that would take the form of a Transparency and Confidence Building Measure (TCBM).

Four primary benefits of SPoC

1. By establishing uniform standards for behavior in space, SPoC would decrease debris, protect against collisions, and codify international norms for space behavior.
2. SPoC advances DoD space deterrence objectives by establishing international cooperation. If aggressors act, SPoC provides the basis for an international response.

3. By negotiating now when the US has an immense, but declining, advantage in space, the US can best preempt future treaties or CoCs that may constrain defense capabilities.

4. SPoC signals to the international community that the US is willing to cooperate on space initiatives, undercutting Russia and China's portrayal of the US as an aggressor. It gives the US greater political capital with which to advance or negotiate treaties in the future, including potential treaties concerning weaponization of space.

Transparency and confidence building measure details

In order to act as an effective TCBM, SPoC must address two key areas:

1. Codified Uniform Space Protocols:
 - i. States should mitigate space collisions and accidents when within their power.
 - ii. States should refrain from space activities that increase debris.
 - iii. States should communicate maneuvers in advance, allowing for collision avoidance.
2. General Principles:
 - i. Space should exist as a peaceful, conflict-free realm open to all states.
 - ii. States have a right to collective self-defense in space.
 - iii. States cannot make sovereign claims over space or celestial bodies.

Success of non-binding agreements

The non-binding Hague Code of Conduct against Ballistic Missiles Proliferation (HCoC) functions as an example of the successful use of soft law. The HCoC contains a series of TCBMs that restrict the use of ballistic missiles and regulate launch vehicles. To date, the HCoC has attracted over 130 signatories, including the US and Russia. The HCoC has also met with some success in creating the norm of pre-notification of launches. In 2009, the fraction of launches by signatory states that were voluntarily pre-notified grew to 13%. Though this is a small share, the

improvement signals that TCBMs do influence changes in state behavior. Furthermore, TCBMs can be advantageous even when adherence to the proposed provisions is low. They create norms of responsible behavior, single out defectors, reduce the threat of misunderstandings, reassure allies of our peaceful intentions, and facilitate partnerships with responsible nations.

Domestic political concerns

Since SPoC is not a formal treaty but a TCBM, the President can enact it without Congressional approval. Even so, given the absence of any restrictions on defense capabilities, there are few in Congress who would find SPoC objectionable. Furthermore, the DoD and the DoS have both declared the need for an international space CoC and thus would likely support SPoC.

Inclusive US code negotiations to increase likelihood of international support

China, India, South Africa and Brazil all turned away from the 2010 EUCoC, and may do so again when future drafts are presented. Though these nations have indicated support for a CoC, they felt slighted because they were not included in the initial negotiations. The US can take advantage of broad international interest by including these nations in SPoC negotiations.

General negotiation strategy

Though all states stand to benefit from the provisions of SPoC that protect space assets from debris and collisions, the US will be perceived to gain the most due to its overwhelming space presence. Consequently, the US may face pressure to offer concessions in order to gain multilateral approval. The US should therefore be willing to share space situational awareness (SSA) data with SPoC signatories. The US is the established leader in SSA, so other states will benefit from superior US data, as it decreases the likelihood of collisions and debris creation that could harm other states' assets.

The European Union's willingness to accept SPoC

Three factors make it likely the EU will support SPoC, despite previous support of the EUCoC:

1. The EU realizes any CoC must have US backing, and has already expressed interest in collaborating with the US. Without the support of the world's pre-eminent space power, any such international TCBM would be crippled. The EU's desire for an effective international TCBM will lead it to support SPoC rather than continue to support a non-US-backed EUCoC.
2. Though it might wish SPoC went further in establishing registration and disclosure of space assets, there is no reason to believe the EU would object to the restrictions SPoC does contain. These measures are no more restrictive than those presented in the EUCoC.
3. The EU's bargaining power for the EUCoC has been reduced by the objections of states not originally included in negotiations (China, India, South Africa, and Brazil). China and Russia also have substantive objections to sharing information about their military space programs.

Chinese and Russian incentives to agree to SPoC

As primary international space powers, China and Russia's support is important and attainable:

1. China and Russia will benefit from US sharing of space situational awareness (SSA) data.
2. Chinese and Russian assets will benefit from decreased debris and collision avoidance.
3. SPoC would not force disclosure of space capabilities or assets to the international community. The proposed transparency in the EUCoC was a factor in China's refusal to sign.
4. China has expressed its commitment to multilateral efforts to resolve space debris issues. Russia has shown support of TCBMs in space and even administered unilateral TCBMs.

Conclusion

SPoC represents the best and most viable international agreement on norms of space behavior, and will promote the welfare of not only the US, but the entire global space-faring community.

APPENDICES

Appendix A. Current state of US capabilities and status quo in space

The US has an overwhelming presence in space compared to other states. Of 3,380 man-made satellites currently in orbit, 1,142 belong to the US (see Figure 1).¹ The US spent 39.5 billion USD on military and civilian space programs in 2009, nearly eighteen times its closest competitor China (2.2 billion USD) and over two times as much as the rest of the world combined (see Figure 2).²

The US has a distinct advantage in utilizing space for military force enhancement capabilities.³ From space, the US:^{4,5}

- tracks the activities of terrorists and terrorist organizations
- intercepts communications
- monitors potential foreign military deployments
- verifies compliance with arms control treaties
- detects proliferation of unconventional weapons
- utilizes global positioning systems (GPS) for targeting and tactical advantages
- employs spacecraft (civilian and military) to generate maps
- beams data across the world and from satellite to satellite

US space assets perform numerous civilian functions as well. From space, the US engages in scientific research, provides infrastructure for weather forecasting, and generates economic growth from an increasingly commercial space sector. American companies and

¹ "Orbital Debris Quarterly News," National Aeronautics and Space Administration, January 2011, orbitaldebris.jsc.nasa.gov/newsletter/pdfs/ODQNv15i1.pdf

² Michael Krepon and Samuel Black, "Space Security or Anti-Satellite Weapons?" Henry L. Stimson Center, May 2009

³ Morgan, Forrest (Space Policy Expert, RAND Corporation). Personal Interview. 16 November 2012.

⁴ Bolton, John, and John Yoo. "Hands Off the Heavens." *New York Times* [New York City] 08 March 2012, n. pag. Web. 2 Dec. 2012. <<http://www.nytimes.com/2012/03/09/opinion/hands-off-the-heavens.html>>.

⁵ United States. Department of Defense. *National Security Space Strategy Unclassified Summary*. Washington, D.C.: , 2011. Print. <http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf>.

civilians rely on GPS technology, telecommunications satellites, and radio frequency bandwidth every day. The US also has the ability to respond to natural and man-made disasters and monitor environmental trends.^{6,7}

That being said, space is becoming “increasingly congested, contested, and competitive.”⁸ The DoD has tracked approximately 22,000 man-made objects in orbit, 1,100 of which are active satellites (see Figure 3).⁹ Space debris more than doubled between 2000 and 2010.¹⁰ Moreover, there may be hundreds of thousands of space debris too small to track with DoD sensors but which might still pose a risk to US or other states’ assets¹¹ (as an example, a one-pound scrap of metal orbiting the earth at 17,000 miles per hour equals the force of a 60 mph travelling tank).¹² Approximately 60 nations and government consortia own and operate satellites, and this number does not account for commercial satellite operators (See Figure 4).¹³ Satellite launches are growing in frequency, with revenue from worldwide launches nearly doubling from 105.5 billion USD in 2006 to 177.3 billion USD in 2011.¹⁴ Finally, the relative advantage of US space capabilities is also declining as “market-entry barriers have lowered” eroding “the US’ technological lead...in several areas as expertise among other nations increases” (see Figure 5).¹⁵

Two defense-related conclusions can be drawn from this current status quo:

⁶ Kakaes, Konstantin. "CQ Global Researcher." *CQ Global Researcher*. 5.16 (2011): 397-420. Print.

⁷ United States. Department of Defense. *National Security Space Strategy Unclassified Summary*. Washington, D.C.: , 2011. Print. <http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf>.

⁸ Ibid.

⁹ Ibid.

¹⁰ Ibid.

¹¹ Ibid.

¹² Kakaes, Konstantin. "CQ Global Researcher." *CQ Global Researcher*. 5.16 (2011): 397-420. Print.

¹³ United States. Department of Defense. *National Security Space Strategy Unclassified Summary*. Washington, D.C.: , 2011. Print. <http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf>.

¹⁴ “State of the Satellite Industry Report,” Satellite Industry Association, September 2012, www.sia.org/IndustryReport.htm

¹⁵ United States. Department of Defense. *National Security Space Strategy Unclassified Summary*. Washington, D.C.: , 2011. Print. <http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf>.

1. Since space assets are extremely difficult to defend against terrestrial anti-satellite (ASAT) weapons, and since the US utilizes space more than any other country for military enhancement and commercial purposes, the US has the most to lose from a first strike scenario.¹⁶
2. Since the US utilizes space more than any other country, it benefits the most from advancing a space CoC as a TCBM that keeps space free from conflict.

Satellites and Space Debris
(by country or organization, as of January 2011)

Country/organization	Satellites	Rocket bodies and debris	Total
China	100	3,388	3,488
Commonwealth of Independent States	1,406	4,646	6,052
European Space Agency	39	44	83
France	49	431	480
India	41	132	173
Japan	114	75	189
United States	1,142	3,691	4,833
Other	489	112	601
Total	3,380	12,519	15,899

Source: "Orbital Debris Quarterly News," National Aeronautics and Space Administration, January 2011, orbitaldebris.jsc.nasa.gov/newsletter/pdfs/ODQNv1511.pdf

Figure 1

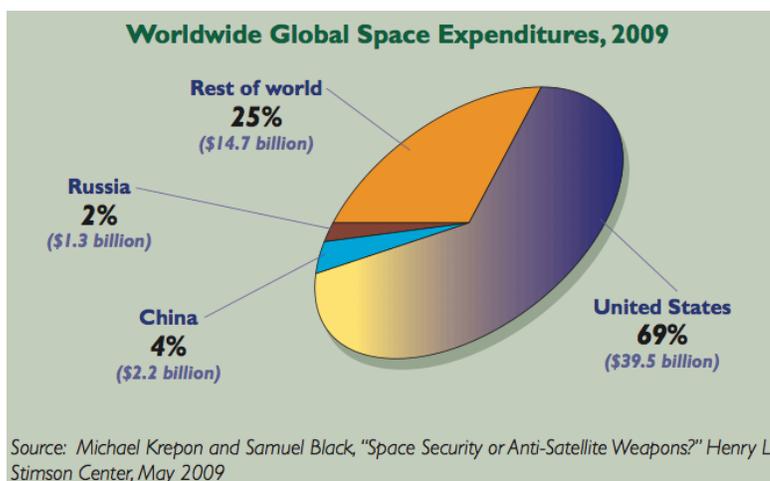


Figure 2

¹⁶ Morgan, Forrest (Space Policy Expert, RAND Corporation). Personal Interview. 16 November 2012.

Satellite Catalog Growth

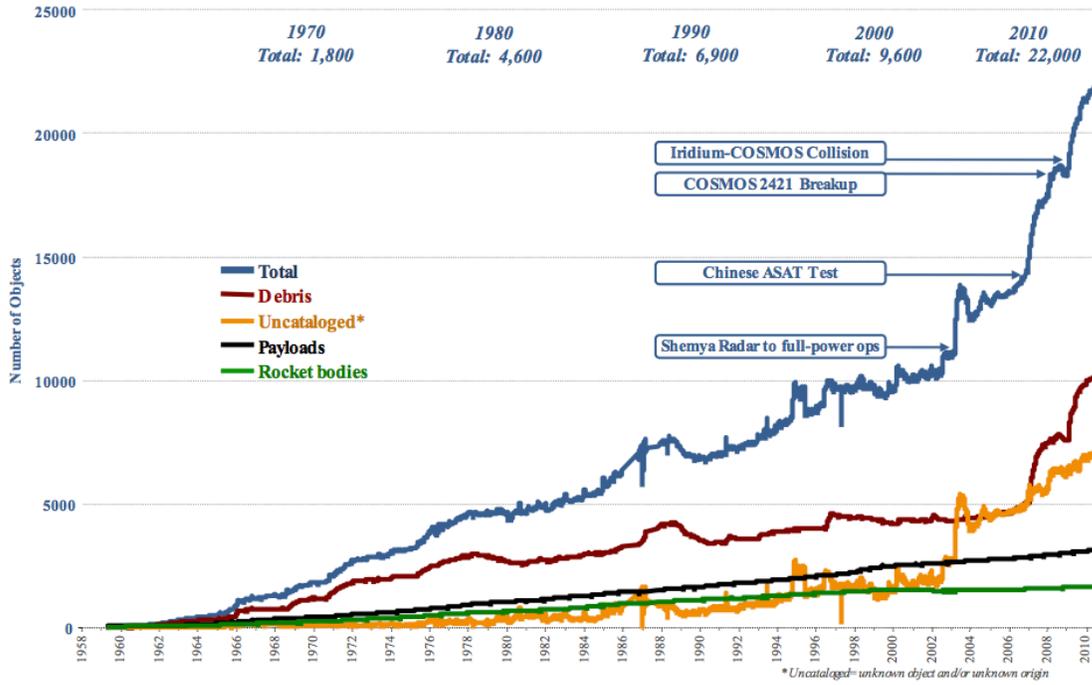


Figure 3 (Source: Joint Space Operations Center)

Number of Nations and Government Consortia Operating in Space

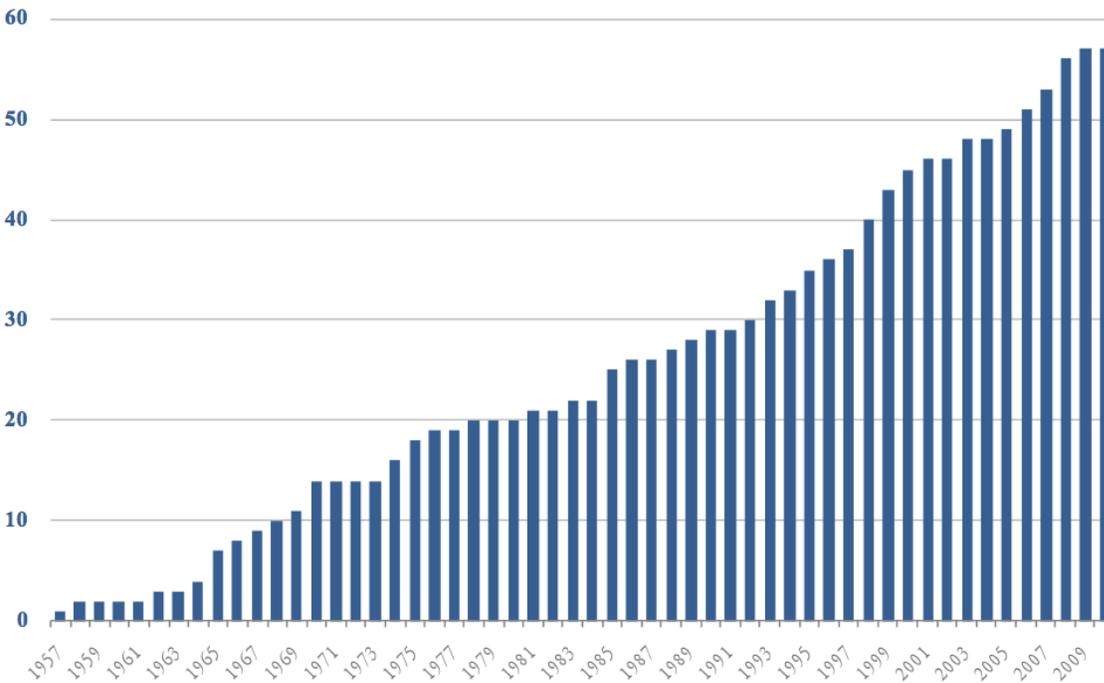
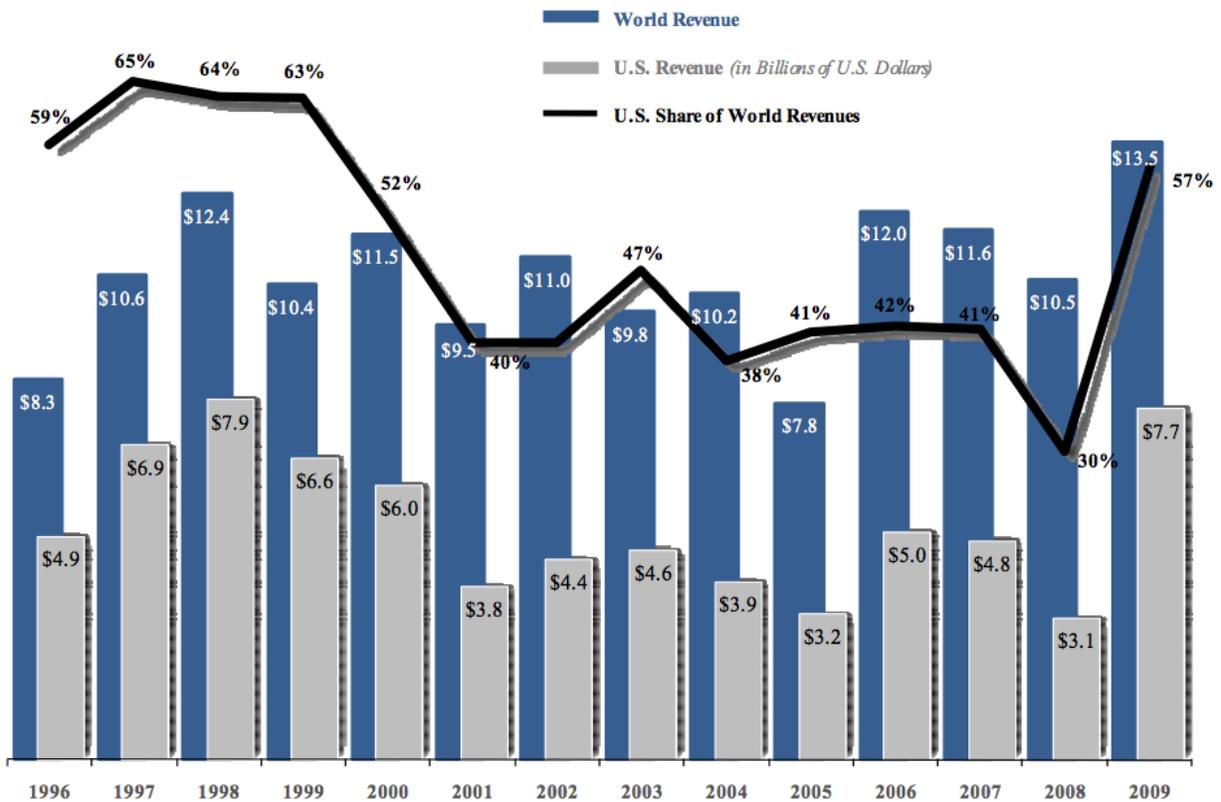


Figure 4 (Source: National Air and Space Intelligence Center)

U.S. versus World Satellite Manufacturing Revenues, 1996-2009



Notes: Revenue figures are in-year estimates, not adjusted for inflation over time. Satellite Manufacturing revenues are recorded in the year the satellite is delivered/launched, not when contract is awarded or interim payments are transacted. World revenue includes U.S. revenue.

Figure 5 (Source: Satellite Industry Association)

Appendix B. Recent space incidents and their significance in space relations

Increased activity and debris in space pose a tremendous risk to man-made space assets, underscoring the need for an international CoC.

In 2007, China used an ASAT missile to shoot down one of its weather satellites, starting an international uproar and increasing the number of trackable orbiting objects in space by 3000¹⁷ (10% of the total number)¹⁸. These new debris will take over a century to dissipate.¹⁹

¹⁷ United States. Department of Defense. *National Security Space Strategy Unclassified Summary*. Washington, D.C.: , 2011. Print. <http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf>.

¹⁸ Kakaes, Konstantin. "CQ Global Researcher." *CQ Global Researcher*. 5.16 (2011): 397-420. Print.

¹⁹ Ibid.

Second, in 2008, Defense Secretary Gates announced in advance the US' intention to shoot down a fuel-laden malfunctioning spy satellite with dangerous explosive potential. In spite of US arguments related to the action's necessity, China and others criticized the US' decision as a deliberate show of force.²⁰

Third, in 2009, the first-ever collision between two satellites occurred when a defunct Russian satellite collided with a US iridium telecommunications satellite 500 miles above earth, generating 1,500 new pieces of space debris.^{21, 22}

Finally, in January 2012, the Russian Phobos-Grunt rover crashed 700 miles off the coast of Chile. At 13 tons, it was one of the heaviest man-made objects yet to make an uncontrolled re-entry into earth's atmosphere.²³

Appendix C. Alternatives to SPoC

There currently exist two major alternatives to SPoC. They are the aforementioned EUCoC, and Russia and China's proposed "Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects" (PPPWT). A summary of both proposals follows.

EUCoC

The EU released the first draft of the EUCoC in 2010.²⁴ The code, like SPoC, is non-binding. It also recommends a set of general principles that are in line with the aims of SPoC,

²⁰ Ibid.

²¹ Ibid.

²² United States. Department of Defense. *National Security Space Strategy Unclassified Summary*. Washington, D.C.: , 2011. Print. <http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf>.

²³ Kramer, Andrew. "Russia's Failed Mars Probe Crashes Into Pacific." *New York Times* [New York City] 15 January 2012, n. pag. Web. 2 Dec. 2012. <<http://www.nytimes.com/2012/01/16/science/space/russias-phobos-grunt-mars-probe-crashes-into-pacific.html>>.

²⁴ Keith Moore. "EU Space Code of Conduct: The Solution to Space Debris?" *BBC*. N.p., 25 Mar. 2012. Web. <<http://www.bbc.co.uk/news/science-environment-17448173>>.

and may in fact serve as a good template for the language that would be present in SPoC. This includes, but is not limited to, the following language in the 2010 draft.

“The Subscribing States resolve to abide by the following principles:

- the freedom for all States to access, to explore, and to use outer space and to exploit space objects for peaceful purposes without interference, fully respecting the security, safety and integrity of space objects in orbit consistent with international law and security, safety and integrity standards;
- the inherent right of individual or collective self-defense in accordance with the United Nations Charter;
- the responsibility of States to take all the appropriate measures and cooperate in good faith to prevent harmful interference in outer space activities; and
- the responsibility of States, in the conduct of scientific, commercial and military activities, to promote the peaceful exploration and use of outer space and to take all appropriate measures to prevent outer space from becoming an area of conflict.”²⁵

In addition, the EUCoC also takes several general measures to prevent damages due to collisions and space debris. Two examples are:

1. The EUCoC states that, “Subscribing States are committed to establishing and implementing their policies and procedures to minimize the possibility of accidents in space, [and] collisions between space objects.”² This is directly intertwined with the disclosure and registration of civilian space assets.

²⁵ Council of the European Union. *Code of Conduct for Outer Space Activities*. N.p.: n.d. 11 Oct. 2010. Web. <<http://www.consilium.europa.eu/uedocs/cmsUpload/st14455.en10.pdf>>.

2. The code requires a commitment to not engage in any actions that would “bring about, directly or indirectly, damage or destruction of outer space objects,” with a caveat being made for defense concerns. This would reduce any potential growth in space debris (EUCoC).²⁶

Both the general principles and the measures to prevent space debris and collisions are in line with the aims of the US, and will be reflected by similar clauses in SPoC. The largest objection to the 2010 draft of the EUCoC comes in Section 8, which deals with disclosure. It states, “The Subscribing States resolve to share, on an annual basis, where available and appropriate information on...their space policies and strategies, including basic objectives for security and defence related activities in outer space.”²⁷ It is this language that led to the rejection of the 2010 draft, due to fears that it would place unacceptable limits on US defense capabilities.²⁶

The US rejected the 2010 draft on January 12, 2012, but just five days later, on January 17, Secretary of State Hillary Clinton pledged to work with the EU on a new draft.²⁷ Importantly, this does not constitute nor signal an agreement to the new draft itself; the US was also involved in development of the 2010 draft, and later withdrew its support due to concerns about national security limitations.²⁸ China, Russia, and India have not yet agreed to work with the US and EU on a CoC. The EU committed a political faux pas by declining to include developing and established space powers during initial development of the code, including Russia, China, India, Brazil, and South Africa. This will make any subsequent EU-led proposals difficult.²⁹

²⁶ Weisgerber, Marcus. "US Won't Adopt EU Code of Conduct for Space." *Space News*. N.p., 12 Jan. 2012. Web. <<http://www.spacenews.com/article/us-wont-adopt-eu-code-conduct-space#.ULwNaNPjI7Q>>.

²⁷ Brown, Mark. "United States Joins EU to Create Outer Space 'code of Conduct'" *Wired*. N.p., 19 Jan. 2012. Web. <<http://www.wired.co.uk/news/archive/2012-01/19/us-joins-eu-space-code-of-conduct>>.

²⁸ Listner, Michael. "EU Takes the next Shot in the Battle of the Codes." *The Space Review*. N.p., 4 June 2012. Web. <<http://www.thespacereview.com/article/2092/1>>.

²⁹ Listner, Michael. "US Rebuffs Current Draft of EU Code of Conduct: Is There Something Waiting in the Wings?" *The Space Review*. N.p., 16 Jan. 2012. Web. <<http://thespacereview.com/article/2006/1>>.

PPWT

In 2008, China and Russia jointly presented the PPWT, a proposal that deals exclusively with the militarization and weaponization of space, ignoring issues of space debris and collisions. It would prohibit any placement of weapons into space, including, but not limited to, directed-energy weapons (e.g. lasers) and kinetic weapons. It also prohibits any actions by space-based objects that would either alter the orbital path of another space asset or temporarily impair the capabilities of said assets through means such as signal jamming. Crucially, it does not prevent any research and development of space weapons terrestrially, nor does it place any limitations on the use of any terrestrial weapons against space assets.³⁰

This treaty is problematic in several ways. For one, the treaty provides no means by which commitment can be verified. This could lead to the US being left behind by covert development of space weapons by global rivals. The US also worries that no limitations are placed on “breakout capabilities,” or the terrestrial development of space weapons by a nation currently complying with the PPWT.³¹ Such nations could then withdraw from the treaty and deploy those weapons to space. In addition to these worries about potential evasion of the clauses limiting space-based weapons, significant concerns have been raised about the lack of any limits on terrestrial ASAT weapons. After first using an ASAT in 2007 to shoot down a satellite, ostensibly as a demonstration of capabilities, China covertly tested an ASAT again in 2010, and rebuffed Defense Secretary Robert Gates’ efforts to explore a new arms control treaty in 2011.³² Both of these events suggest that the PPWT may be an act of political posturing, and not an earnest attempt to limit the weaponization of space. The United States, as the world’s

³⁰ USA. Council on Foreign Relations. N.p., 2008. Web. <<http://www.cfr.org/space/treaty-prevention-placement-weapons-outer-space-threat-use-force-against-outer-space-objects-ppwt/p26678>>.

³¹ Taylor, Andrew. "US Problems With the Draft PPWT." Weblog post. *Res Communis*. N.p., 24 July 2012. Web. <<http://rescommunis.olemiss.edu/2012/07/24/u-s-problems-with-the-draft-ppwt/>>.

³² Listner, Michael. "Is China Committed to the Prevention of an Arms Race in Outer Space?" *The Examiner*. N.p., 2 Apr. 2011. Web. <<http://www.examiner.com/article/is-china-committed-to-the-prevention-of-an-arms-race-outer-space>>.

leader in space weaponry and technology, could not agree to a measure that would cut down on its comparative advantage while placing no limitations on China and Russia's development and use of ASAT weaponry. In an interview with Forrest Morgan, space policy expert at RAND, he confirmed these suspicions, stating that China and Russia were aware of the US' conundrum, knowledgeable that the US could not sign this seemingly pacifist measure. By not agreeing to the PPWT, the US appeared to be a space aggressor that refused to give up weaponry or stop weapons development. Advancing SPoC will help alleviate this perception.

Appendix D. US-Russia and US-China space relations

Two nations, Russia and China, have historically been the US' closest rivals in space. While US space spending comprises approximately 70% of the world's total space spending, China and Russia's comprises 4% and 2% respectively. These three nations are the only ones to have successfully launched manned missions to space, and this capability speaks to the advanced nature of these space programs as compared to those of other nations.³³ Though the US' spending currently outstrips that of Russia and China combined, the relations that the US shapes with these nations now will mold the future of space weaponization as Russia and China inevitably advance their technologies, space spending, and capabilities. This is why it is of importance to the US to spearhead SPoC and develop understandings with Russia and China now while it is in a position of immense power. It is vital to US national security that its interests remain protected for years to come, in the face of increasing competition.

The United States has a tumultuous past with Russia on space policy. Cold War tensions were exemplified by the Space Race, a tense competition in technological space capability

³³ Moskowitz, Clara. "US & China: Space Race or Cosmic Cooperation?" *Space.com*. Space.com, 27 September 2011. Web. <<http://www.space.com/13100-china-space-program-nasa-space-race.html>>.

between the US and USSR that lasted for nearly two decades. Although the competition resulted in the greatest achievements in space yet known (among them, the Soviet launching of the first satellite, *Sputnik*, in 1957, and the US moon landing in 1969), Soviet-US relations on earth made collaboration in space impossible for much of this period. In 1975, the two powers collaborated for the first time during an Apollo-Soyuz test project, signaling a period of détente and an improvement in relations.³⁴ This cooperation continued into the 1990s and the 2000s during the joint use of the MIR space station and International Space Station (ISS). Today, the US remains dependent on Russian Soyuz rockets to shuttle US astronauts to the ISS after cancelling its shuttle program in 2011.³⁵ The ISS in particular has been a project that both nations value and intend to improve through collaboration; in 2003, President Bush and President Putin jointly praised the mutual desire of their nations to continue manned spaceflight and maintenance of the ISS.³⁶ Further, in January 2012, the US and Russia orchestrated a debris avoidance maneuver of the ISS in order to avoid collision threats posed by debris created by the 2007 Chinese ASAT weapons test.³⁷ Hopefully, the signing of SPoC by both nations will have a positive impact on strengthening these collaborations by reducing redundancies when the two nations cooperate, as with the US' use of Soyuz rockets.

While space relations between the US and Russia have undoubtedly improved since the Space Race, tensions can run high. As historical foes, these nations carefully monitor each other. Russia recognizes the supremacy of the United States in space, and has taken action with China to limit the US space hegemony and progress in developing space weaponry. This move serves

³⁴ Hogenboom, Melissa. "America and Russia: Uneasy partners in space." *BBC News: Science and Environment*. BBC, 20 February 2012. Web. <<http://www.bbc.co.uk/news/science-environment-17074388>>.

³⁵ Verschuuren, Pim. "Space Policies in 2011: an overview." *Analyse du Jour. affaires-strategiques.info*, 9 2012. Web. <<http://www.affaires-strategiques.info/spip.php?article6033>>.

³⁶ Pifer, Steven. "The U.S. and Russia: Space Cooperation and Export Controls." Testimony Before the House Science Committee, Subcommittee on Space and Aeronautics. 11 June 2003. Washington, D.C. <http://www.fas.org/asmp/resources/govern/The%20U_S_%20and%20Russia%20Space%20Cooperation%20and%20Export%20Controls.htm>.

³⁷ Rose, Frank. "Space Sustainability Through International Cooperation." *U.S. Department of State*. United States Department of State, 1 2012. Web. <<http://www.state.gov/t/avc/rls/184897.htm>>.

to advance Russia's own interest in competing on a more even playing field with the US in the future. The US has stated that it would never sign on to such restrictions on its power; this difference of opinion on what the US' role in space should be illustrates the sensitive nature of US-Russia space relations. However, there is common interest in creating space TCBMs between the two nations – Russia has been a key sponsor of space TCBMs in the United Nations, and has frequently proposed its own TCBMs calling for the creation of rules for space protocol.³⁸ Though these measures were shot down by the United States and other nations due to Russia's persistent support of the PPWT, it is clear that Russia and the US have a fundamental desire to establish space norms. SPoC could serve as a promising middle ground for these two nations, especially considering the US' willingness to share SSA data with signatories.

While space has been an important part of US-Russia relations since the 1950s, China has only recently emerged as an important space power. In 2010, it carried out 15 space launches, just as many as the US did.³⁹ Despite these advancements in space, space relations between the US and China are quite poor. The Chinese government has kept the development of its programs secretive, and its space agenda does not meet international standards for transparency.⁴⁰

Because much of the Chinese space program is private, the US can determine the extent of China's capabilities and its concern for respectful space behavior by the observable actions China engages in. China did not notify any members of the international community prior to conducting its 2007 ASAT weapons test. This displayed a lack of regard for international space

³⁸ Hitchens, Theresa. *Transparency and Confidence Building in Outer Space*. Federation of American Scientists. pp. 2,3. Web. <<https://www.fas.org/pubs/pir/2011winter/2011Winter-Transparency.pdf>>.

³⁹ Logsdon, John. "Enhancing US-China Relations in Space." *China-U.S. Focus*. China-United States Exchange Foundation, 22 2011. Web. <<http://www.chinausfocus.com/slider/enhancing-us-china-relations-in-space/>>.

⁴⁰ Ibid.

norms. Chinese analysts justified the ASAT test as a counter to US hegemony in space and to demonstrate a first strike capability against vulnerable US satellites.⁴¹

Despite the current state of US-China relations, there is potential for future improvement that SPoC could foster. In 2005, before China's launch of its *Shenzhou VI* manned spacecraft, the US provided China with SSA technology to protect the spacecraft from unnecessary hazards.⁴² SSA provides locations for and data on existing space objects in orbit. The United States has the most advanced SSA capability in the world, as it must monitor the largest number of satellites and investments in space technology of any nation.⁴³ These SSA tools are valuable to other countries, specifically to Russia and China; tracking capability is increasingly important as a nation's ventures and investments in space increase. SSA could serve to be valuable leverage for the United States in terms of establishing more comprehensive relations with other space-faring nations through SPoC.

Appendix E. SPoC's comportment with current DoD strategy and policy

SPoC directly advances the objectives of the DoD Space Policy, DoD Strategy for Deterrence in Space, and the NSSS, the last of which was signed directly by Secretary Gates and Director of National Intelligence James Clapper.

All three documents explicitly endorse the use of TCBMs to establish norms of responsible behavior in space.^{44,45,46} This protects US space assets (and therefore our force

⁴¹ Listner, Michael. "An exercise in the Art of War: China's National Defense white paper, outer space, and the PPWT." *The Space Review*. The Space Review, 25 2011. Web. <<http://www.thespacereview.com/article/1828/1>>

⁴² Moltz, James Clay. *The Politics of Space Security: Strategic Restraint and the Pursuit of National Interests*. p. 355. Stanford, CA: Stanford Univ., 2011. Print.

⁴³ Weeden, Brian. "Space Situational Awareness Bigger than U.S. Military." *DefenseNews*. Gannett, 30 2012. Web. <<http://www.defensenews.com/article/20120930/DEFFEAT05/309300008/Space-Situational-Awareness-Bigger-Than-U-S-Military/>>.

⁴⁴ United States. Department of Defense. *Fact Sheet on DoD Space Policy*. Washington, D.C.: , Web. <[http://www.defense.gov/home/features/2011/0111_nsss/docs/Fact Sheet DoD Space Policy.pdf](http://www.defense.gov/home/features/2011/0111_nsss/docs/Fact_Sheet_DoD_Space_Policy.pdf)>.

⁴⁵ United States. Department of Defense. *Fact Sheet on DoD Strategy for Deterrence in Space*. Washington, D.C.: , Web. <http://www.defense.gov/home/features/2011/0111_nsss/docs/DoD%20Strategy%20for%20Deterrence%20in%20Space.pdf>.

enhancement capabilities) from debris, collisions, and offensive attacks from other states.⁴⁷ From a deterrence standpoint, such TCBMs can “help the international community identify and isolate aggressors” and “complicate a potential aggressor’s decision-making processes and provide the basis for an international response.”⁴⁸

All three documents also endorse the pursuit of international coalitions and cooperation. The DoD Space Policy backs the sharing of SSA information and “emphasizes expanded international partnerships for building and sharing space capabilities.”⁴⁹ International coalitions also “expand the scope of a conflict and reduce the odds that a potential aggressor can achieve their desired outcome at an acceptable cost,” thus increasing deterrence.⁵⁰

Finally, the DoD has expressed the need for a space CoC, stating that “an international CoC can enhance US national security” by encouraging responsible space behavior, singling out those who act otherwise, and decreasing debris and collisions.⁵¹ Commander of United States Strategic Command, General Kehler, has publicly endorsed pursuing an international CoC in testimony, stating he sees it as directly “consistent with strategy and plans.”⁵²

⁴⁶ United States. Department of Defense. *Fact Sheet on National Security Space Strategy*. Washington, D.C.: , Web. <http://www.defense.gov/home/features/2011/0111_nsss/docs/2011_01_19_NSSS_Fact_Sheet_FINAL.pdf>.

⁴⁷ United States. Department of Defense. *Fact Sheet on DoD Space Policy*. Washington, D.C.: , Web. <http://www.defense.gov/home/features/2011/0111_nsss/docs/Fact_Sheet_DoD_Space_Policy.pdf>.

⁴⁸ United States. Department of Defense. *Fact Sheet on DoD Strategy for Deterrence in Space*. Washington, D.C.: , Web. <http://www.defense.gov/home/features/2011/0111_nsss/docs/DoD%20Strategy%20for%20Deterrence%20in%20Space.pdf>.

⁴⁹ United States. Department of Defense. *Fact Sheet on DoD Space Policy*. Washington, D.C.: , Web. <http://www.defense.gov/home/features/2011/0111_nsss/docs/Fact_Sheet_DoD_Space_Policy.pdf>.

⁵⁰ United States. Department of Defense. *Fact Sheet on DoD Strategy for Deterrence in Space*. Washington, D.C.: , Web. <http://www.defense.gov/home/features/2011/0111_nsss/docs/DoD%20Strategy%20for%20Deterrence%20in%20Space.pdf>.

⁵¹ United States. Department of Defense. *Fact Sheet on International Code of Conduct for Outer Space Activities*. Washington, D.C.: , Web. <http://www.defense.gov/home/features/2011/0111_nsss/docs/FINAL_DoD_Fact_Sheet_International_Code-2012_1-17-12.pdf>.

⁵² *Ibid.*

Appendix F. SPoC's comportment with the 2010 US National Space Policy

Though the 2010 US National Space Policy (NSP) is primarily domestic and civilian in nature relative to the more defensive and international oriented SPoC and NSSS, SPoC still directly promotes the NSP's Principles, Goals, Intersector Guidelines, and Sector Guidelines.⁵³

The greatest overlap between SPoC and the NSP occurs in their shared advancement of space principles. Both SPoC and the NSP advocate for:⁵⁴

1. a shared responsibility in space to prevent accidents
2. the right of all states to explore and use space for peaceful purposes
3. improved awareness through openness and transparency
4. the right to collective self defense in space
5. no national claims of sovereignty over space or celestial bodies

Additionally, SPoC advances two of the six outlined NSP goals, "expanding international cooperation" and "strengthening stability in space." Among the details of these two goals, both SPoC and the NSP call for:⁵⁵

1. furthering the peaceful use of space
2. enhancing collection and partnership in sharing of space-derived information
3. improving information collection and sharing for space object collision avoidance
4. strengthening measures to mitigate orbital debris

Finally, in both the Intersector and Sector Guidelines, SPoC and the NSP advance the same objectives of:⁵⁶

1. strengthening US space leadership

⁵³ United States. The White House. *National Space Policy of the United States of America*. Washington, D.C.: Web. <http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf>.

⁵⁴ Ibid.

⁵⁵ Ibid.

⁵⁶ Ibid.

2. identifying areas for international cooperation
3. developing TCBMs

In short, SPoC is a natural extension of NSP policies and guidelines into an international CoC. It does not contradict any existing policy outlined in the NSP, but it in fact directly advances several of the NSP's primary objectives.

Appendix G. President's relations with Congress

Though the President does not need formal approval from Congress to ratify a TCBM, it would be in the President's best political interest to discuss such measures with the legislature before approval. Failure to communicate with the legislature on this issue could be detrimental to President-Congress relations. Republicans and some Democrats take issue with US participation in multilateral agreements in general – the use of executive privilege to involve the United States in such an agreement without Congressional input or review could upset these representatives. This can harm the President's ability to garner widespread support in Congress when he attempts to pass pressing legislation in the future.

Upon consulting the Congress on SPoC, the President would find support for the measure. In 2011, when the United States was still considering ratifying the EU CoC, 37 Republican senators wrote to the State Department criticizing the EU code for restricting the US' R&D capabilities in space technology.⁵⁷ However, the new US-proposed SPoC removes such limitations on US space technology development and frees US space-related defense operations from international prying, which assuages the concerns of these Senators and other Congressional Republicans. Additionally, after the November election, the environment for

⁵⁷ Lake, Eli. "Republicans wary of EU code for space activity." *Washington Times* [Washington, D.C.] 03 FEB 2011. <<http://www.washingtontimes.com/news/2011/feb/3/republicans-wary-of-eu-code-for-space-activity/?page=all#pagebreak>>

ratifying multilateral measures is friendlier than it was before. Democrats added to their majority in the Senate, and are traditionally more willing to consider US involvement in international agreements.

Appendix H. Lessons learned from the Hague Code of Conduct

The HCoC aims to restrain ballistic missile (BM) proliferation worldwide and strictly monitor the spread of BMs. It does not require states to destroy their existing BMs, but establishes a CoC on how to use and test these missiles in the future.⁵⁸ It is a voluntary pledge by states to provide pre-launch notifications on BM launches, space-launch vehicle (SLV) launches, and test flights. Annually, member states are required to submit a report on their policies on BMs and SLVs.⁵⁹ The HCoC garnered unprecedented support from a large number of nations and increased the number of pre-notified space launches. Despite these successes, it faced significant roadblocks that limited its effective implementation. These downfalls can serve as learning opportunities for SPoC. Most importantly, non-signatories such as Iran, China, Brazil, Mexico, and Saudi Arabia undermined the HCoC's effectiveness. Nations have stated two main reasons for not signing the HCoC:⁶⁰

1. States perceived the HCoC as not going far enough to support peaceful use of space. Emerging actors in space are especially concerned about their freedom to explore and develop space technology and SLVs. Given the similarities between BMs and civilian rockets, as well as

⁵⁸ "Hague Code of Conduct Against Ballistic Missile Proliferation (HCOC) | Treaties & Regimes | NTI." *NTI: Nuclear Threat Initiative*. N.p., n.d. Web. 03 Dec. 2012. <<http://www.nti.org/treaties-and-regimes/hague-code-conduct-against-ballistic-missile-proliferation-hcoc/>>.

⁵⁹ "Hague Code of Conduct against Ballistic Missile Proliferation (HCOC)." *Austrian Foreign Ministry*. Federal Ministry for European and International Affairs, n.d. Web. 03 Dec. 2012. <<http://www.bmeia.gv.at/index.php?id=64664>>.

⁶⁰ Marta, Lucia. *The Hague Code of Conduct Against Ballistic Missile Proliferation: "Lessons Learned" for the European Union Draft Code of Conduct for Outer Space Activities*. Rep. no. 34. European Space Policy Institute, n.d. Web. 1 Dec. 2012. <<http://www.isn.ethz.ch/isn/Digital-Library/Publications/Detail/?ots591=0c54e3b3-1e9c-be1e-2c24-a6a8c7060233&lng=en&id=124687>>.

the HCoC requiring the close monitoring of this technology, these states fear that these capabilities will be restricted.⁶¹

2. Many countries that face a pressing security situation are developing BM and SLV programs for defensive purposes. They are reluctant to hinder their defensive advantages unless there are reciprocal actions. India and Pakistan, for example, have their own bilateral commitment. Such states will only give up their defensive BM and SLV development if they can be ensured that their regional and international threats are also partaking in such actions. They feel that the HCoC does not provide this insurance due to a lack of enforcement mechanisms.⁶²

Although SPoC is much broader in application than the HCoC, it functions similarly in that both codes are not legally binding. In addition to the loss of signatories, the effectiveness of the HCoC was diminished because adherence to it was lower than expected.⁶³ Russia and the US, the two most important signatories, had not pre-notified any of their launches in 2009, and only a small portion of other nations did.⁶⁴

Thus, the three important lessons that have been taken into account in drafting the principles of SPoC are:

1. Nations must feel that their right to explore and use space for peaceful and civilian purposes is respected.
2. SPoC allows states to continue to develop their defensive space technology. SPoC only restricts defensive R&D to the extent that states cannot partake in harmful activities in order to develop this technology.

⁶¹ "Hague Code of Conduct Against Ballistic Missile Proliferation (HCoC) | Treaties & Regimes | NTI." *NTI: Nuclear Threat Initiative*. N.p., n.d. Web. 03 Dec. 2012. <<http://www.nti.org/treaties-and-regimes/hague-code-conduct-against-ballistic-missile-proliferation-hcoc/>>.

⁶² Marta, Lucia. *The Hague Code of Conduct Against Ballistic Missile Proliferation: "Lessons Learned" for the European Union Draft Code of Conduct for Outer Space Activities*. Rep. no. 34. European Space Policy Institute, n.d. Web. 1 Dec. 2012. <<http://www.isn.ethz.ch/isn/Digital-Library/Publications/Detail/?ots591=0c54e3b3-1e9c-be1e-2c24-a6a8c7060233&lng=en&id=124687>>.

⁶³ Lele, Ajeay. "Space Code of Conduct: The Challenges Ahead." *The Space Review*. N.p., 16 July 2012. Web. 1 Dec. 2012. <<http://www.thespacereview.com/article/2119/1>>.

⁶⁴ Marta, Lucia. *The Hague Code of Conduct Against Ballistic Missile Proliferation: "Lessons Learned" for the European Union Draft Code of Conduct for Outer Space Activities*. Rep. no. 34. European Space Policy Institute, n.d. Web. 1 Dec. 2012. <<http://www.isn.ethz.ch/isn/Digital-Library/Publications/Detail/?ots591=0c54e3b3-1e9c-be1e-2c24-a6a8c7060233&lng=en&id=124687>>.

3. SPoC will garner support from important signatories such as China, Russia, Iran, and the BRIC countries. Signatories must express a willingness to adhere to the provisions in the code and set an example for each other.

In order to address the third concern, the US will work to ensure that China and Russia agree to the code. The defense concerns here are not as acute as with missile launches, so there is good reason to believe the US will conform more to the codes of SPoC. The provisions of SPoC will be drafted such that the likelihood of their approval is maximized, and the US is willing to discuss and negotiate some terms of SPoC to mitigate Chinese and Russian concerns. The US will include emerging space actors in these discussions and allow them the opportunity to be involved in the negotiating process from the beginning. Involving them early, reassuring them of their rights, and considering them as equal space actors will increase the likelihood that these nations will sign and later adhere to SPoC.⁶⁵ Since the US will take the lead in drafting SPoC, it will also set an example by adhering to the provisions. This creates political pressure for Russia and China to follow suit and abide by the agreed-upon rules. Compliance by primary countries such as the US, Russia, and China and involvement of emerging space actors will lead to more effective implementation of SPoC as compared to the HCoC.

⁶⁵ Listner, Michael. "Geopolitical Challenges to Implementing the Code of Conduct for Outer Space Activities." *E-International Relations*. N.p., 26 June 2012. Web. 2 Dec. 2012. <<http://www.e-ir.info/2012/06/26/geopolitical-challenges-to-implementing-the-code-of-conduct-for-outer-space-activities/>>.

GLOSSARY

Abbreviations and Acronyms (in alphabetical order)

ASAT	Anti-Satellite
BM	Ballistic Missile
CoC	Code of Conduct
DoD	United States Department of Defense
DoS	United States Department of State
EU	European Union
EUCoC	European Union Code of Conduct
GPS	Global Positioning System
HCoC	Hague Code of Conduct
IAEA	International Atomic Energy Agency
ISS	International Space Station
NPT	Nuclear Non-Proliferation Treaty
NSSS	National Security Space Strategy
PPWT	Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects
SLV	Space-Launch Vehicle
SPoC	Space Principles of Conduct
TCBM	Transparency and Confidence Building Measures
US	United States