DECIPHERING AND DEFENDING THE EUROPEAN UNION'S NON-BINDING CODE OF CONDUCT FOR OUTER SPACE ACTIVITIES

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INTRODUCTION

In 2002, the United States' chief negotiator at the Conference on Disarmament asserted that the interests of all spacefaring states were sufficiently shielded by the "existing multilateral arms control regime."[1] Despite their "groundless" fears, he said, "[t]here simply is no problem in outer space for arms control to solve."[2] The U.S. representative to the United Nations General Assembly (U.N.G.A.) First Committee on Disarmament and International Security echoed the sentiment in 2006, adding that the real threat is "not some theoretical arms race in space, but [anything] that would deny peaceful access to and use of space."[3] And again, in 2007, the U.S. insisted that the "real threats" were "those to the nuclear nonproliferation regime," not a space-based arms-race, which certainly needed no "new agreements."[4]

This last assertion came months after China successfully tested a ground-based ballistic missile against one of its satellites.[5] Headlines such as "Star Wars' Missile Test Heralds New Arms Race in Space"[6] and "A

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1. Eric Javits, Ambassador, Conf. on Disarmament, Remarks on Outer Space at the Conference on Future Security in Space (May 29, 2002) (transcript available at http://www.acronym.org.uk/docs/0205/doc17.htm).

2. *Id.*

3. *U.S. Opposes Restrictions on Use of Space*, SPACE DAILY (Oct. 26, 2006), http://www.spacedaily.com/reports/US_Opposes_Restrictions_on_Use_Of_Space_999.html.

4. Robert Joseph, Under Sec'y of State for Arms Control & Int'l Sec., The George C. Marshall Institute, The U.S. National Space Policy, at The Washington Roundtable on Science and Public Policy (Dec. 13, 2006).

5. Peter Spiegel & James Gerstenzang, *Chinese Missile Strikes Satellite*, L.A. TIMES, Jan. 19, 2007, at A1.

6. Tim Reid & Jane Macartney, *'Star Wars' Missile Test Heralds New Arms Race in Space*,

New Arms Race in Space"[7] indicated that much of the world was unconvinced. But even in 2008, when China and Russia campaigned for a treaty to ban weapons from space, the U.S. staunchly "opposed any treaty that sought 'to prohibit or limit access to or use of space.'"[8]

This paper will analyze threats to satellites, such as cascading orbital debris and armed anti-satellite attacks, as well as solutions—primarily, the European Union's draft Code of Conduct for Outer Space Activities—proposed to allay them. It shall begin by noting the complexity of the orbital environment, the economic and strategic importance of that environment, and the natural and human threats to the orbital satellite infrastructure (primarily, that of the United States, unquestionably the nation most invested in and reliant upon outer space). After surveying the current legal and political playing field, this article will analyze the new Code of Conduct draft, its potential to minimize the risk of orbital catastrophe, and the United States' response to it. Finally, this article shall consider the Code's potential to change how nation-states treat the orbital environment—perhaps through slow crystallization into customary international law (CIL)—and then compare the non-binding Code to other proposed solutions.

II. THE FALLING SKY

A. Complexity and Importance

Around 1,100 active satellites currently orbit the Earth.[9] They travel endlessly through increasingly dense toroid clouds formed from 22,000 tracked objects[10] and "hundreds of thousands of additional objects too small to track" (but still big enough to seriously harm satellites or space stations).[11] "[T]he most useful orbits have also become the most congested."[12]

LONDON TIMES, Jan. 19, 2007, at 2.

7. *A New Arms Race in Space?*, THE ECONOMIST, Jan. 27, 2007, at 10.

8. Nick Cumming Bruce, *U.N. Weighs a Ban on Weapons in Space, but U.S. Still Objects*, N.Y. TIMES, Feb. 13, 2008, at A11.

9. BUREAU OF PUBLIC AFFAIRS, U.S. DEP'T OF STATE, AN INTERNATIONAL CODE OF CONDUCT FOR OUTER SPACE ACTIVITIES: STRENGTHENING LONG-TERM SUSTAINABILITY, STABILITY, SAFETY, AND SEC. IN SPACE (Jan. 17, 2012) [hereinafter FACT SHEET].

10. *See id.*; *see also AIAA Position Paper on Space Debris: 30 Years On*, ORBITAL DEBRIS QUARTERLY NEWS (NASA, Hous., Tex.), Oct. 2011, at 2.

11. FACT SHEET, *supra* note 9.

12. Michael W. Taylor, *Trashing the Solar System One Planet at a Time: Earth's Orbital Debris Problem*, 20 GEO. INT'L ENVTL. L. REV. 1, 5 (2007).

Many satellites share civilian and military functions.[13] These functions are often generated by the same physical technologies, which evolve quickly; for example, commercial satellites in 1997 possessed imaging resolution of 1 kilometer or greater—useful for environmental monitoring and scientific research, but less tactically potent than modern DigitalGlobe and GeoEye satellites, which, a decade later, possessed "resolutions as low as 0.5m."[14] Peaceful applications, which multiply as satellite technology develops, include "mapping, remote sensing, and natural disaster prevention"; the very same devices can be used, even simultaneously, for "targeting, surveillance, and operational communications relay."[15] These benefits "permeate almost every aspect" of modern civilian life—they augment street navigation, further scientific observation, multiply and reinforce communications, monitor emerging crises both human and natural, and "provid[e] global access to financial operations."[16] A single satellite's loss can cripple an entire communications technology and hamstring economic or government transmissions.[17] In short, "[s]pace is vital to protecting U.S. economic prosperity and . . . national security interests."[18]

Since the 1960s, the U.S. military has invested heavily in the strategic exploitation of outer space.[19] The Air Force developed satellite technologies to gather and organize military intelligence before and in reaction to armed conflict.[20] The United States initially built these programs with nuclear war in mind,[21] but Desert Storm and Desert Shield forced satellite technology to evolve.[22] "The seventy satellites that were

13. Cynthia Zhang, *Do As I Say, Not As I Do—Is Star Wars Inevitable? Exploring the Future of International Space Regime in the Context of the 2006 U.S. National Space Policy*, 34 RUTGERS COMPUTER & TECH. L.J. 422, 445-46 (2008); David A. Koplow, *ASAT-isfaction: Customary International Law and the Regulation of Anti-Satellite Weapons*, 30 MICH. J. INT'L L. 1187, 1194 (2009).

14. Michael J. Noble, *Export Controls and United States Space Power*, 6 ASTROPOLITICS 251, 253 (2008). GeoEye-2 will have a resolution of 25 cm. *Id.*

15. *See* Anand Mohan, *Legal Issues in the Deployment of a Dedicated Satellite for the Indian Navy*, 74 J. AIR L. & COM. 25, 45 (2009).

16. FACT SHEET, *supra* note 9.

17. *See* Zhang, *supra* note 13, at 443-44 (Pan Am satellite's malfunction "rendered 89% of the forty-five million beepers in use in America inoperative [and] delayed financial transactions and direct broadcast transmissions.")

18. FACT SHEET, *supra* note 9.

19. *See, e.g.*, CURTIS PEEBLES, HIGH FRONTIER: THE UNITED STATES AIR FORCE AND THE MILITARY SPACE PROGRAM 15-26 (1997).

20. *See, e.g.*, DANA J. JOHNSON ET AL., SPACE: EMERGING OPTIONS FOR NATIONAL POWER 38 (1997).

21. *Id.*

22. Craig Covault, *Desert Storm Reinforces Military Space Directions*, AVIATION WK. & SPACE

ultimately brought to bear against Iraq [in the first Gulf War] provided the United States . . . with ninety percent of its strategic intelligence and carried seventy percent of all transmitted data for coalition forces."[23] Since then, the Unites States has grown strategically dependent on a small number of crucial communications satellites. In 2011, then-Deputy Secretary of Defense William Lynn said:

> The willingness of states to interfere with satellites in orbit has serious implications for our national security. Space systems enable our modern way of war. They allow our warfighters to strike with precision, to navigate with accuracy, to communicate with certainty, and to see the battlefield with clarity. Without them, many of our most important military advantages evaporate.[24]

Consequently, satellites present hard-to-reach but tempting targets for would-be aggressors.[25]

B. The Threat

In March 2009, a chunk of debris travelling at 35,000 kilometers per hour menaced the International Space Station (ISS), forcing the crew to shelter in a Russian escape capsule.[26] The object, left from an U.S. rocket launched almost two decades before, missed,[27] but it was "the second time in less than a year that space debris threatened the ISS."[28] Countless collisions and near-misses to satellites, ballistic missiles, and orbiters demonstrate the scale of this problem.[29] Useful space, and the existing technological infrastructure that exploits it, is in constant danger from junk

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TECH., Apr. 8, 1991, at 42.

23. Dean Cheng, *China's Military Role in Space*, STRATEGIC STUD. Q., Spring 2012, at 55, 59.

24. William J. Lynn, III, *A Military Strategy for the New Space Environment*, WASH. Q., Summer 2011, at 7,7.

25. *See, e.g.*, James P. Finch & Shawn Steene, *Finding Space in Deterrence: Toward a General Framework for "Space Deterrence"*, STRATEGIC STUD. Q., Winter 2011, at 10, 12("This asymmetry creates an imbalance; the more a nation relies on space systems, the more tempted a potential adversary is to target those systems."); *see generally* Cheng, *supra* note 23. "[All] sides recognize that 'space has become the primary location for global and regional reconnaissance assets used for . . . intelligence gathering, and support of combat operations on the earth's surface.' It is therefore logical for [all] sides to try to exploit space for their own ends while denying it to opponents." *Id.* at 73 (quoting JOINT CHIEFS OF STAFF, JOINT OPERATIONAL ACCESS CONCEPT (2012)).

26. Traci Watson, *Space Junk Forces Crew to Scram: Astronauts Enter Escape Pod in Case Debris Hit Station*, USA TODAY, Mar. 13, 2009, at 2A.

27. *Id.*

28. Joseph S. Imburgia, *Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean Up the Junk*, 44 VAND. J. TRANSNAT'L L. 589, 595 (2011).

29. Mark J. Sundahl, *Unidentified Orbital Debris: The Case for a Market-Share Liability Regime*, 24 HASTINGS INT'L & COMP. L. REV. 125, 129-30 (2000); *see also* Koplow, *supra* note 13, at 1202-08.

in orbit, along with a host of other "man-made threats."[30] These can easily, and without warning, "deny, degrade, deceive, disrupt, or destroy" crucial satellite assets.[31] Critically, these threats linger. Objects in lower Earth orbit can remain for anywhere between a few months and tens of thousands of years.[32] Objects in geosynchronous Earth orbit, with a surprisingly limited number of optimal positions "highly coveted" by weather and communications satellites, can orbit "anywhere from one million to ten million years."[33] Worse, generally accepted scientific models warn that "the unhindered increase in space debris will, within ten to fifty years, create a cascade of collisions threatening sustainable space access."[34] The resulting destruction could cost billions of dollars[35] and completely block human access to orbit for centuries or longer.[36]

While most orbital collisions were unpredictable accidents, several nations have the power to intentionally destroy satellites in orbit—and they have. Since the 1960s, Russia and the United States have possessed anti-satellite (ASAT) weaponry, primarily in the form of "guided air-launched missiles."[37] Debris from a U.S. ASAT test in 1985 orbited the earth until 2002.[38] Since that test, the United States and the Soviet Union have both placed moratoria on ASAT tests, and have conducted none since.[39]

In 2006, President George Bush issued a National Space Policy that "reject[ed] any limitations on the fundamental right of the United States to operate in and acquire data from space," promised to defend the Unites States against any who would restrict it, and threatened to "deny, if necessary, adversaries the use of space capabilities hostile to U.S. national interests."[40] In January 2007, China responded[41] by testing an anti-satellite

30. FACT SHEET, *supra* note 9.

31. *See id.*

32. Taylor, *supra* note 12, at 6.

33. *Id.* at 6-7.

34. Imburgia, *supra* note 28, at 607; *see also, e.g.*, Taylor, *supra* note 12, at 18.

35. Imburgia, *supra* note 28, at 607.

36. Taylor, *supra* note 12, at 20.

37. Duncan Blake & Joseph S. Imburgia, *"Bloodless Weapons"? The Need to Conduct Legal Reviews of Certain Capabilities and the Implications of Defining Them as "Weapons,"* 66 A.F. L. REV. 157, 173 (2010).

38. *Id.* at 173-74.

39. *Id.* at 174.

40. EXEC. OFFICE OF THE PRESIDENT, U.S. NATIONAL SPACE POLICY (2006), at 1-2.

41. *See, e.g.*, Todd Barnet, *United States National Space Policy, 2006 & 2010*, 23 FLA. J. INT'L L. 277, 282 (2011); Zhang, *supra* note 13, at 430-31; *see also* Jacob M. Harper, *Technology, Politics, and the New Space Race: The Legality and Desirability of Bush's National Space Policy Under the Public and Customary International Law of Space*, 8 CHI. J. INT'L L. 681, 698-99 (2008) (acknowledging that while "the [2006 National Space Policy] may be legal, it may also incite extraterrestrial violence").

missile. In addition to breaking the two-decade ASAT-test cease-fire, this also created millions of pieces of orbital debris.[42] Three years later, China demonstrated the refinement of their ASAT capabilities and communication satellite sophistication by coordinating and observing—in real-time, but from space-based sensors: "two geographically separated missile launch events with an exo-atmospheric collision."[43] Later in 2010, they "deliberately maneuvered" two microsatellites into close proximity[44] and made them "bump[]" each other.[45] The United States showcased an ASAT weapon of its own, deploying an Aegis-LEAP SM-3 interceptor missile to neutralize a spy satellite's potentially hazardous contents.[46]

Though satellites do not bleed, ASAT warfare is not bloodless; ASAT attacks "may well leave a financial sector in ruins; seriously disrupt the provision of medical and emergency services to the sick and injured, or those in distress; endanger safe air, rail, and marine navigation; silence the press and provide misinformation; [and] undermine the government, including its national defense posture."[47]

C. Star Wars

While there is still "no legal barrier to placing conventional weapons in space,"[48] typical ASAT weapons strike from Earth—terrestrially based ASATs require far less technological infrastructure than orbital weapons and carry a correspondingly lower price tag.[49] The United States' rejection in 2008 of the Chinese/Russian orbital-weaponization-ban treaty draft represented one more U.S. step in the accelerating ASAT race.[50] Kinetic

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42. *See, e.g.*, Frank Morring, Jr., *Worst Ever; Chinese Anti-Satellite Test Boosted Space-Debris Population by 10% in an Instant*, AVIATION WK. & SPACE. TECH., Feb. 12, 2007, at 20,; Leonard David, *China's Antisatellite Test: Worrisome Debris Cloud Encircles Earth*, SPACE.COM, Feb. 2, 2007, *available at* http://www.space.com/3415-china-anti-satellite-test-worrisome-debris-cloud-encircles-earth.html.

43. *China: Missile Defense System Test Successful*, USA TODAY, Jan. 11, 2010, http://www.usatoday.com/news/world/2010-01-11-china-missile-defense_N.htm.

44. Cheng, *supra* note 23, at 64.

45. William Matthews, *Chinese Puzzle*, DEFENSE NEWS (Sept. 6, 2010, 6:00 AM), http://www.defensenews.com/article/20100906/DEFFEAT01/9060317/Chinese-Puzzle.

46. Blake & Imburgia, *supra* note 37, at 174-75.

47. *Id.* at 160-61.

48. Zhang, *supra* note 13, at 440 (citing PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY, POSTNOTE MILITARY USES OF SPACE, 2005-6, H.C. H.L. 273, *available at* http://www.parliament.uk/business/publications/research/briefing-papers/POST-PN-273 [hereinafter Military Uses of Space]).

49. *See* Phillip Saunders et al., *China's Space Capabilities and the Strategic Logic of Anti-Satellite Weapons*, JAMES MARTIN CENTER FOR NONPROLIFERATION STUDIES (Jul. 22, 2002), http://cns.miis.edu/stories/020722.htm.

50. Blake & Imburgia, *supra* note 37, at 192-94. The Conference on Disarmament, the draft

ASATs, also called mass-to-target weapons, employ "routine technology and materials to destroy targets through impact."[51] These need not generate incredible debris, as the 2007 Chinese ASAT test did[52]; the United States' 2008 emergency strike against its hazardous spy satellite was engineered by NASA and the Pentagon to burn all resulting debris in the atmosphere.[53] The scheme was successful, and the (minimal) debris was gone from orbit a year later[54]—most of it within one hour.[55] Alternatively, these weapons can be designed to *maximize* hazardous debris in certain orbits, turning crucial orbital toroids into kinetic minefields.[56] The resulting threat could produce widespread damage and would exist until the debris had fallen from orbit[57]—a period which could last for thousands of years or more.[58] ASAT attacks need not look like weapon strikes at all; co-orbital and microsatellite ASAT devices, possessed by Russia and possibly China as well, attack by maneuvering very close to their targets and either detonating powerfully, colliding at speed, or disrupting their targets' paths.[59] In some cases, co-orbital ASATs can cause satellite collisions without any party (other than the aggressor) truly knowing the attack was an attack.[60] However, traditional surface-to-orbit kinetic attacks produce visible thruster burns and inevitably leave tangible evidence.[61] Given such a strike's seriousness, a nation would probably only use an ASAT in self-defense or if it "anticipate[d] and accept[ed] a wartime response."[62]

Several nations are also developing non-kinetic directed energy weapons (DEWs).[63] The U.S. favors them over kinetic ASATS,[64] and

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treaty's recipient, requires consensus "even on agenda setting"; any American opposition scuttles it. Blake & Imburgia, *supra* note 37, at 194-95.

51. Zhang, *supra* note 13, at 450.

52. *See* Morring, Jr., *supra* note 42.

53. Blake & Imburgia, *supra* note 37, at 175.

54. Jim Wolf, *U.S. Satellite Shootdown Debris Said Gone From Space*, REUTERS (Feb. 27, 2009 1:38 PM), *available at* http://www.reuters.com/article/2009/02/27/us-space-usa-china-idUSTRE51Q2Q220090227.

55. *Satellite Breakups During First Quarter of 2008*, NASA ORBITAL DEBRIS QUARTERLY NEWS, April 2008, at 2.

56. Jan Kallberg, *Designer Satellite Collisions from Cover Cyber War*, STRATEGIC STUDIES QUARTERLY, Spring 2012, at 128-29.

57. *Id.* at 129.

58. *See supra* notes 32-34 and accompanying text.

59. Blake & Imburgia, *supra* note 37, at 176.

60. *See id*. at 176.

61. Kallberg, *supra* note 56, at 128.

62. Blake & Imburgia, *supra* note 37, at 176.

63. *Id.* at 177.

64. *E.g.*, Koplow, *supra* note 13, at 1264. However, "when confronted in 2008 with the risks posed by the failing USA-193 satellite, the U.S. authorities responded by attacking it with a missile, not

Russia, China, Germany, and the United Kingdom likely have DEW capabilities as well.[65] DEWs can burn or irradiate their targets, but even low-energy laser DEWs can temporarily blind satellite sensors."[66] DEWs operate at the speed of light, can have an invisible beam, leave no munition fragments, and can be designed to generate no debris.[67] In short, a DEW's characteristics allow an attacker to "convincingly deny any involvement with the destruction it causes."[68]

Satellites are, like any complex, fragile, computer-driven communications machine, susceptible to electromagnetic pulses, uplink and downlink jamming,[69] and "cyber attacks[,] aimed at either satellite systems or their terrestrial control elements."[70] Cyber warfare has been employed meaningfully against civilian terrestrial targets in Estonia and Georgia, with results "potentially just as disastrous as a conventional attack."[71] "China has had a growing interest in building cyber warfare capabilities and is one of several nations that would have a sincere interest in degrading US space assets."[72] Of all known antisatellite tools, a cyber attack is the hardest to attribute to an individual attacker[73] and the most difficult to definitively classify as an armed attack (in order to unlock Article 51 rights of inherent self-defense).[74] "Yet, conceivably, a series of space and cyberspace attacks could render a military force and its individual units relatively blind, deaf, mute[,] and lost (without access to satellites for position, navigation[,] and timing) without using anything traditionally regarded as military 'arms.'"[75]

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a laser." *Id.* at 1264.

65. Blake & Imburgia, *supra* note 37, at 179 (citing Major General David Scott & Colonel David Robie, *Directed Energy: A Look to the Future*, AIR & SPACE POWER JOURNAL, Winter 2009, at 4).

66. *Id.* at 177.

67. *Id.* at 178-79.

68. David Hambling, *US Boasts of Laser Weapon's "Plausible Deniability*", NEWSCIENTIST.COM (Aug. 12, 2008 3:45 PM), http://www.newscientist.com/article/dn14520-us-boasts-of-laser-weapons-plausible-deniability.html. However, a ground-based laser would be quite hard to hide. Zhang, *supra* note 13, at 451.

69. Michel Bourbonniere, *Law of Armed Conflict (LOAC) and the Neutralisation of Satellites or* ius in bello satellitis*, in* SPACE LAW 528, 529-30 (Francis Lyall & Paul B. Larsen eds., 2007).

70. Cheng, *supra* note 23, at 67.

71. Scott J. Shackelford, *From Nuclear War to Netwat: Analogizing Cyber Attacks in International Law*, 27 BERKELEY J. INT'L L. 192, 193 (2009).

72. Kallberg, *supra* note 56, at 131) (citing Kim Zetter, *Hackers Targeted U.S. Government Satellites*, WIRED, Oct. 27, 2011, *available at* http://www.wired.com/threatlevel/2011/10/hackers-attack-satellites/) (other citations omitted).

73. Blake & Imburgia, *supra* note 37, at 183.

74. *Id.* at 187. *See infra* notes 86-91 and accompanying text.

75. Blake & Imburgia, *supra* note 37, at 183.

II. THE LAWS OF HEAVEN

Any international best-principles compact governing this area must lean heavily on existing "treaties, conventions, and other commitments relating to outer space activities."[76] Since 1958, the U.N.G.A. Committee on the Peaceful Uses of Outer Space (COPUOUS) has guided, drafted, and implemented the suite of legal instruments organizing orbit.[77] COPUOUS created the Outer Space Treaty,[78] the Liability Convention,[79] the Registration Convention,[80] the Moon Treaty,[81] and the Rescue Treaty.[82] "These five treaties . . . form the basis of international space law."[83]

A. The U.N. Charter

The U.N. Charter theoretically limits state behavior "on, under, and well above the planet"; it "knows no geographical limitations" and overrides obligations imposed by all other treaties.[84] Under the Charter, "without some valid justification such as self-defen[s]e under Article 51, or authorization by the Security Council pursuant to Chapter VII, first use of military power in outer space, like its counterpart on Earth, is per se illegal."[85] However, a subscribing state subjected to an armed attack may,

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76. 2010 Draft, *infra* note 196, at 6. The European Union's most recent Code of Conduct draft not only "reaffirmed [its drafters'] commitment to the existing legal framework," 2010 Draft, *infra* note 196, at 6, but outright strove "to promote universal adoption of, and full adherence to, [those] instruments." 2010 Draft, *infra* note 196, at 7.

77. Colby C. Nuttall, Comment, *Defining International Satellite Communications as Weapons of Mass Destruction: The First Step in a Compromise between National Sovereignty and the Free Flow of Ideas*, 27 HOUS. J. INT'L. L. 389, 394 (2005).

78. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter OST].

79. Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, T 961 U.N.T.S. 187 [hereinafter Liability Convention].

80. Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

81. Agreement Governing the Activities of States on the Moon & Other Celestial Bodies, Dec. 18, 1979, 18. I.L.M. 1434.

82. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue Treaty].

83. Zhang, *supra* note 13, at 434 (citing Andrew Park, *Incremental Steps for Achieving Space Security: The Need for a New Way of Thinking to Enhance the Legal Regime for Space*, 28 Hous. J. Int'l. L. 871, 876 (2006)).

84. THOMAS GRAHAM, *The Current Legal Regime Governing the Use of Outer Space*, *in* SAFEGUARDING SPACE FOR ALL: SECURITY AND PEACEFUL USES *87* (United Nations Institute for Disarmament Research ed., 2004).

85. *Id.* at 88 (referencing U.N. Charter art. 2, para. 4).

under Article 51, act in individual or collective self-defense.[86] "This may reasonably be seen as extending to the space-based military assets of a nation."[87] Obviously, such nations must observe the international principles imposed by the generally accepted Law of Armed Conflict,[88] Geneva Convention,[89] and Hague Convention,[90] which, in short, require "that the use of military force cannot be indiscriminate, but instead must be guided by the principles of necessity, discrimination, and proportionality."[91]

B. 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (OST)[92]

The Outer Space Treaty (OST) "remains the key legal framework governing space security. It has been ratified by over 100 states,"[93] including the U.N. "and all major space-faring countries."[94] Scholars regularly deem it the "Magna Carta" of space law.[95] The OST is permanent.[96] It requires States Parties exploring and using orbit and beyond to respect "the interests of all countries"[97] and conduct themselves accordingly, "undertak[ing] appropriate consultations before proceeding"[98] if they have reason to believe that their activities, or those of their nationals, would negatively interfere "with activities of other States Parties."[99] States Parties are "internationally liable for damage" that any part of their satellites cause to the property and persons of other States Parties, regardless of where that damage occurs.[100] The OST explicitly

86. U.N. Charter art. 51.

87. Mohan, *supra* note 15, at 43.

88. Bourbonniere, *supra* note 69, at 529.

89. Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflict, June 8, 1977, 1125 U.N.T.S. 3 [hereinafter Geneva Convention].

90. Convention Between the United States and Other Powers Respecting the Laws and Customs of War on Land, Oct. 18, 1907, 36 Stat. 2277 [hereinafter Hague Convention].

91. Mohan, *supra* note 15, at 44.

92. OST, *supra* note 78.

93. Zhang, *supra* note 13, at 435.

94. Graham, *supra* note 84, at 88.

95. *E.g.*, Detlev Wolter, *Common Security in Outer Space and International Law* 19 (2006); Major Robert A. Ramey, *Armed Conflict on the Final Frontier: The Law of War in Space*, 48 A.F. L. REV. 1, 74 (2000) (quoting N. Jasentuliyana, *The Role of Developing Countries in the Formation of Space Law*, XX:II ANNALS AIR & SPACE L. 95, 97 (1995).

96. Graham, *supra* note 84, at 88.

97. OST, *supra* note 78, art. I.

98. *Id.*

99. *Id.* art. IX.

100. *Id.* art. VII.

forbids States Parties from denying access or use to other states[101] or claiming sovereignty over any portion of it.[102] Signatories must not install or test weapons on or fortify the Moon or other celestial bodies (which must remain usable "exclusively for peaceful purposes"), and must not put weapons of mass destruction into orbit at all.[103] (Most States Parties tend, of course, to interpret the "peaceful purposes" standard as meaning "non-aggressive," not "non-military.")[104]

The OST does not prohibit the orbital deployment of non-WMD weapons or armed spacecraft, habitats, or stations, much less their creation or maintenance on Earth.[105] It does not restrict the launch of nuclear-equipped devices that do not fully orbit the Earth or even forbid WMD testing in outer space, although subsequent treaties limit both of these activities.[106] One of the OST's prevailing themes is accountability; spacefaring nations, for better or for worse, forever "retain jurisdiction and control" over their satellites whose registry is carried [107] and remain "internationally liable for damage" they cause to other subscribing states.[108]

C. Convention on International Liability for Damage Caused by Space Objects (Liability Convention)[109]

The Liability Convention holds spacefaring states "absolutely liable to pay compensation for damage caused" by their satellites and their components, whether in heaven or on Earth.[110] The Convention "base[s liability] on a simple negligence standard"; States Parties are only liable for damage for which they, or those for whom they are responsible, are at fault.[111] If a subscribing state's satellite is damaged in space, it may "seek compensation through the [L]iability [C]onvention mechanism,"[112] which involves a compensation claim ground through the machinery of diplomacy to the offending state,[113] or "through the courts or administrative forums

101. *Id.* art. I.
102. *Id.* art. II.
103. *Id.* art. IV.
104. Graham, *supra* note 84, at 89.
105. *Id.* at 89-90.
106. *See id.* at 89-94.
107. OST, *supra* note 78, art. VIII.
108. *Id.* art. VII.
109. Liability Convention, *supra* note 79.
110. *Id.* art. II.
111. Craig A. Smith, *Legal Considerations of International Space Operations*, 6 HIGH FRONTIER No. 2, Feb. 2010, at 40 (citation omitted).
112. *Id.* at 42.
113. Liability Convention, *supra* note 79, art. IX.

available in the offending state."[114] Of course, in order to bring a claim under the Liability Convention, a state must identify the subscriber who caused damage.[115]

D. 1976 Convention on Registration of Objects Launched into Outer Space (Registration Convention)[116]

The Registration Convention "was based on the belief that a mandatory system of registering objects in space would assist in their identification."[117] The Convention helps document all objects launched into orbit by subscribing states.[118] In a timely fashion, signatories must submit reports announcing the general function of any object launched, its registration number, the "[d]ate and territory or location of launch," and the object's *initial* "basic orbital perimeters."[119] However, "[i]t is common practice for nations to 'kick boost' their satellites to different orbits and locations for any variety of reasons, including operational security [and] secrecy . . . . Moving satellites in such a manner does not conflict with the reporting requirements of the Registration Convention."[120] This practice greatly decreases the ability of hostile nations to target satellites, but for the same reason, badly muddles the quality of the registry's data, dramatically increasing the odds of accidental collision.[121]

E. Interpretation and Analysis of Satellite-Attack Law

If a satellite fails, whether due to collision caused by negligence or an intentional armed attack, to legitimately and effectively respond a nation must first be able to identify both the cause of the event and the entity responsible.[122] ASAT weapons can be incredibly subtle, so space situational awareness (SSA) is absolutely necessary to unlock either traditional diplomatic and legal remedies or Article 51 rights of self-defense.[123] Given the complexity of Earth's orbital environment,[124] this is easier said than done. Once the responsible state is identified, the wounded

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114. Smith, *supra* note 111, at 42 (citing Liability Convention, *supra* note 78, art. XI).

115. *See generally* Liability Convention, *supra* note 79.

116. *See* Registration Convention, *supra* note 80..

117. Smith, *supra* note 110, at 40 (citation omitted).

118. *See* Registration Convention, *supra* note 80, art. III, art. IV.

119. *Id.* art. IV.

120. Mohan, *supra* note 15, at 40.

121. *Id.*

122. *See* Smith, *supra* note 111, at 40-41.

123. *See id.* at 40 (quoting Air Force Doctrine Document 2-2.1, *Counterspace Operations*, Aug. 2, 2004, ch. 3, 19-20).

124. *See, e.g.*, *id.*; *see also supra* notes 9-18 and accompanying text.

party must overcome the next herculean obstacle: justifiably classifying the event as an armed attack, a negligent act, or a wholly blame-free collision.[125]

If the event was an intentional or hostile blow struck by another state,[126] the wounded party will likely deem it prudent to act through diplomatic or economic channels, possibly seeking compensation through the Liability Convention.[127] However, a military response, depending on the harm caused and a nation's standing rules of engagement and ability to conclusively identify the attacker, may be in order.[128] A direct kinetic attack (as opposed to a co-orbital kinetic strike or a cyber attack) would be comparatively easy to identify, likely turning international political will against the offender.[129] While the United States, China, and Russia are unlikely to ever agree on "punitive actions [the others] propose[] in the UN Security Council," a kinetic attack of any sort would inevitably provide the wounded state with *casus belli* sufficient to enable some sort of Article 51 response.[130] Given that spacefarers such as the United States, Russia, and China would be highly unlikely to employ indiscriminate kinetic weapons because of the harm they would deal to their own orbital infrastructures, and that rogue nations would also likely choose other options in order to avoid massive collateral damage to potential political allies, any unprovoked kinetic strike would invite fierce retribution. DEW attacks, if recognized at all, would necessarily include beams leading directly back toward the aggressor.[131] As with kinetics, DEW strikes would constitute acts of war, although the minimization of collateral debris damage might *slightly* reduce international outrage. Similarly, cyber attacks would not add clutter to orbit unless specifically engineered to cause collisions.[132] However, as most investigations into suspected cyber attacks "end with a set of spoofed innocent actors whose digital identities have been exploited in the attack rather than attribution to the real perpetrator,"[133] this is likely

125. Smith, *supra* note 110, at 41.

126. If, on the other hand, a non-state actor outside the wounded state's territory launched an armed attack, viable response options "are limited and attribution is even more difficult." Military action is, depending on the wounded party's LOAC analysis, sometimes possible. However, it is far more likely that the only plausible reaction is diplomatic pressure against the state from which the actor operated. *Id.* at 41-42.

127. Smith, *supra* note 111, at 40.

128. *Id.*

129. Kallberg, *supra* note 56, at 129.

130. *Id.* at 129-30.

131. *See* Blake & Imburgia, *supra* note 37, at 177-79.

132. Kallberg, *supra* note 56, at 130-32.

133. *Id.* at 131.

to be moot; most wounded nations would lack the evidentiary strength to respond in self-defense.

If a spacefaring state needed to target the satellite of another in self-defense (whether responding to an attack on its own satellite, making a terrestrial crisis zone more safe, or in anticipation of bloodshed), it must surely consider the principles of necessity, discrimination, and proportionality. If an ASAT attack fails this test, it must not be made.[134] First, because "[a] military attack in space that creates orbital debris has the potential to cause harm to the satellites of every state in the world," any attack that meets the discrimination prong must "be carefully planned to limit the amount of debris created."[135] Necessity might dictate choices between available ASAT weapons[136]—if the state has a perfectly satisfactory DEW, it needs not (and should not) opt for the damage potential of a kinetic kill device.

Proportionality requires consideration not only of the strike's damage, but of the target's loss.[137] DEWs and cyber weapons minimize damage from debris, but while "a purely military satellite is a legitimate target because it enhances an enemy's war fighting capability," many satellites are dual-use, and require significant analysis—their extraordinary military value could be outweighed by extraordinary civilian dependency.[138] Some scholars assert that, while dual-purpose satellites require graver consideration in the discrimination and proportionality analyses, they are legitimate targets nonetheless.[139] Others conclude that the nonmilitary functions of these targets mandate a balancing test, weighing a satellite's military "percentage capacity" against the civilian costs of "destruction or denial."[140] At least one scholar has compared dual-purpose satellites to "non-combatant hospital ship[s]," suggesting that both "aid[] a country's war fighting capability," both "provide[] a humanitarian service for persons hors d'combat,"[141] and both have military purposes "indistinguishable from or inextricably intertwined with [their] civilian role[s]."[142] The Law of Armed Conflict grants immunity to a hospital ship, and in this analogy, perhaps dual-purpose satellites should be immune to attack as well.[143]

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134. *See generally* Hague Convention, *supra* note 90; Bourbonniere, *supra* note 69, at 529.
135. Taylor, *supra* note 12, at 22.
136. Koplow, *supra* note 13, at 1248.
137. *Id.* at 1246-47.
138. Mohan, *supra* note 15, at 44; *see also* Koplow, *supra* note 13, at 1246-47.
139. Bourbonniere, *supra* note 69, at 532-33.
140. *See, e.g.*, Mohan, *supra* note 15, at 45.
141. *Id.* at n.96.
142. *Id.* at n.97.
143. *Id.* at 45.

III. SPACEFARERS

"[T]here are approximately sixty nations and government consortia that operate satellites, as well as numerous commercial and academic satellite operators"[144]; at least twelve spacefaring states have the "indigenous capacity" to launch them.[145] Many more nations, including Brazil, Egypt, Iran, North Korea, and South Africa, have made spacefaring capability a priority.[146] "In concert with this rapid growth in national space participation, there exists commensurate internationalization of the space industry."[147]

A. China

In the 21st Century alone, China created "an indigenous navigation system (Beidou)," sold "a Chinese-built satellite to a foreign buyer," and demonstrated to the rest of the world its innovation and reach.[148] At the same time, China successfully deployed a high-resolution imaging satellite, several manned spacecraft, a lunar probe, and, most controversially, fully functional anti-satellite weaponry.[149] Although both before and after its ASAT test China campaigned against the use of weapons in space,[150] "the military's role in China's space program should not be underestimated"; the People's Liberation army oversees and steers China's outer-space development.[151] New programs include space-debris tracking systems, debris shields for spacecraft, and improvements to space-debris collision simulations.[152]

China knows that disrupting U.S. satellite power neutralizes many otherwise overpowering military advantages.[153] China saw satellite use in the Gulf War as "a big step forward in both military theory and practice,"[154]

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144. Fact Sheet, *supra* note 9.

145. Noble, *supra* note 14, at 253; FACT SHEET, *supra* note 9.

146. Imburgia, *supra* note 28, at 606. Others include Algeria, Chile, Malaysia, Nigeria, and Thailand. *Id.*

147. *Id.*

148. Matthew D. Burris, *Tilting at Windmills? The Counterposing Policy Interests Driving the U.S. Commercial Satellite Export Control Reform Debate*, 66 A.F. L. REV. 255, 304-05 (2010).

149. *Id.* at 304.

150. *See, e.g.*, Cumming-Bruce, *supra* note 8, at A11.

151. Cheng, *supra* note 23, at 64.

152. *Id.* at 65.

153. *See, e.g.*, Ashley J. Tellis, *China's Military Space Strategy*, 49:3 Survival 41, 45 (2007); Cheng, *supra* note 23, at 58-59; *see generally* Frank M. Walsh, *Forging a Diplomatic Shield for American Satellites: The Case for Reevaluating the 2006 Space Policy in Light of a Chinese Anti-Satellite System*, 72 J. AIR L. & COM. 759 (2007) (predicting satellite-warfare roles in legal and military conflicts with China).

154. Shi Yukun, *Lt. Gen. Li. Jijun Answers Questions on Nuclear Deterrence, Nation-State, and*

and by 2002 determined, perhaps witnessing the NATO's use of satellites in the Balkans, that the "space battlefield" would impact all others.[155] Over the next ten years, the importance of controlling outer space and disrupting opponents' satellite infrastructure to gain "information superiority" became internalized in Chinese military strategy.[156] "[M]ilitary space operations are often discussed in the context of the need to obtain information or to deny it to an opponent."[157] Once, the United States attempted to check the growth of China's space program through export controls and other information restrictions.[158] The Chinese program has matured to the point where that sort of coercion is no longer possible.[159]

B. India

India watched the Chinese ASAT test intently, and in 2008 announced "plans to develop a military space program" to protect its satellites.[160] G. Madhavan Nair, chair of the Indian Space Research Organization (ISRO), "labeled the test 'unethical' because it created debris that endanger[ed] other satellites."[161] He also maintained that while India was committed to "peaceful use of outer space," it had ASAT capabilities as well.[162] Certainly, India is developing its ASAT capability; it openly seeks "to deny the enemy access to its space assets" and "eliminate enemy satellites operating in low-earth orbits."[163] The Indian Navy and the ISRO have had satellite launch capabilities since 1982 and are limited more by their budget than technological barriers.[164] Currently, the ISRO struggles to deploy Rohini, a dedicated military communications satellite capable of "real-time surveillance and targeting."[165] Though Rohini is critical to the Navy's tactical vision,[166] ongoing equipment failures have delayed the satellite's

Information Age, CHINA MILITARY SCIENCE 3 (1995).

155. Cheng, *supra* note 23, at 60.

156. *Id.* at 62.

157. *Id.* at 66.

158. *See generally* CHRIS COX, THE COX REPORT: THE UNANIMOUS AND BIPARTISAN REPORT OF THE HOUSE SELECT COMMITTEE ON U.S. NATIONAL SECURITY AND MILITARY COMMERCIAL CONCERNS WITH THE PEOPLE'S REPUBLIC OF CHINA (Kenneth de Graffenreid ed., 1999).

159. Cheng, *supra* note 23, at 72.

160. David R. Sands, *China, India Hasten Arms Race in Space*, WASH. TIMES (June 25, 2008), http://www.washingtontimes.com/news/2008/jun/25/china-india-hasten-arms-race-in-space/?page=all.

161. Koplow, *supra* note 13, at 1241.

162. *Id.*

163. *India's "Satellite Killer" to Take on China*, MSN NEWS (Jan. 4, 2010) http://news.in.msn.com/national/article.aspx?cp-documentid=3517606.

164. Mohan, *supra* note 15, at 29-30.

165. *Id.*

166. *Id.*

"much-awaited launch" until the end of 2012 at the earliest.[167] Since 1975, India has complied with the typical suite of outer-space treaties and shows every indication of continuing.[168] Additionally, India is part of the Inter-Agency Space Debris Coordination Committee (IADC), "an international forum of governmental bodies for the coordination of activities related to the issues of man-made and natural debris in space."[169]

C. Japan

In 2008, Japan "br[oke] a decades old ban on the use of the nation's space assets for military purposes."[170] Previously, scholars supposed that Japan's "constitutional prohibition against offensive military capabilities" and tight defense budget would have kept it from the outer-space arena.[171] Japan has, however, created and applied orbital debris mitigation and minimization policies.[172] Moreover, Japan's Prime Minister was the only official to condemn outright China's 2008 ASAT test.[173]

D. Russia

Russia condemned the United States' 2006 National Space Policy, decrying its challenge to other nations' access to orbit and deeming it "the first step toward a serious deepening of the military confrontation in space."[174] This stance reflected decades of Russian foreign policy. "The former Soviet Union had originally sought to completely demilitarize outer

167. Rajat Pandit, *Military Satellite Delayed Again by a Year*, TIMES OF INDIA (Oct. 13, 2011, 4:47 AM), http://articles.timesofindia.indiatimes.com/2011-10-13/india/30274617_1_gsat-7-satellite-indian-space-research-organization.

168. Mohan, *supra* note 15, at 40.

169. INTER-AGENCY SPACE DEBRIS COORDINATION COMM., IADC SPACE DEBRIS MITIGATION GUIDELINES, IADC-02-01 (Oct. 15, 2002), *available at* http://www.iadc-online.org/docs_pub/IADC-101502.Mit.Guidelines.pdf [hereinafter IADC Guidelines]. The Guidelines reiterate many of the principles and practices expressed by the Code of Conduct, *see infra* note 196 , and recommend standardized Space Debris Mitigation Plans as well as risk-minimizing spacecraft designs; Mohan, *supra* note 15, at 46-47.

170. Barnet, *supra* note 41, at 281 (citing Koplow, *supra* note 13, at 1193); *see also* Yomiuri Shimbun, *Japan: Ban Lifted on Use of Space for Defense*, DAILY YOMIURI, Aug. 29, 2008, *available at* http://www.fourwinds10.com/siterun_data/space/space_exploration/news.php?q=1220217912 ("Under the ban, the use of space by the Self-Defense Forces was limited to technologies for a missile-defense system and information-gathering satellites.").

171. *E.g.*, Nina Tannenwald, *Law Versus Power on the High Frontier: The Case for a Rule-Based Regime for Outer Space*, 29 YALE J. INT'L L. 363, 384 (2004).

172. Taylor, *supra* note 12, at 36-37.

173. Koplow, *supra* note 13, at 1241.

174. *Russian Official Sharply Criticizes Assertive New U.S. Space Policy*, ASSOCIATED PRESS, Nov. 29, 2006.

space,"[175] and in 1981 attempted to "impose a blanket ban on stationing weapons in space."[176] In recent years, it has allied itself with the Chinese campaign against outer-space weaponization,[177] domestically forbidden "the creation of orbital debris," enacted a debris-mitigation policy, and developed the second-best debris-tracking system in the world.[178] Regardless of its attitude, Russia certainly possesses dedicated ASAT capabilities, which may include the ability to "maneuver[] one satellite into the orbital path of another in an attempt to cause a collision."[179]

E. United States

"The radical concentration of the world's defense industrial sector . . . allows the United States a powerful role within the larger international system."[180] Accordingly, less than an hour after inauguration, President Barack Obama released a new national defense policy which promised to "restore American leadership on space issues" and prohibit ASATs worldwide.[181] His 2010 National Space Policy echoed that purpose, seeking to strengthen the commercial space sector and "assure the use of space for all responsible parties."[182] It outlined six goals: (1) "[e]nergize competitive domestic industries" to collaboratively improve U.S. spacefaring capabilities; (2) "[e]xpand international cooperation" by fostering a peaceful international spirit of discovery and information exchange; (3) "[s]trengthen stability in space" with clear domestic and international enforcement mechanisms for safe, clean, transparent outer-space operations; (4) "[i]ncrease assurance and resilience of mission essential functions" by fortifying every sort of U.S. outer-space instrumentality against "disruption, degradation, and destruction," regardless of cause; (5) "[p]ursue human and robotic initiatives" to advance scientific understanding of the cosmos; and (6) "[i]mprove space-based Earth and solar observation" to sharpen weather, climate, and disaster monitoring and

175. Zhang, *supra* note 13, at 427 n.24 (citing Wolter, *supra* note 95, at 11.)

176. *Id.* (citing S. Neil Hosenball, *Present and Prospective Military Technologies and Space Law: Implications of the 1967 Outer Space Treaty, in* INT'L SEC. DIMENSIONS OF SPACE 219 (Uri Ra'anan & Robert L. Pfaltzgraff, Jr. eds., 1984)).

177. *See, e.g.*, Cumming-Bruce, *supra* note 8.

178. Taylor, *supra* note 12, at 36.

179. Blake & Imburgia, *supra* note 37, at 176.

180. Stephanie G. Neuman, *Power, Influence, and Hierarchy: Defense Industries in a Unipolar World*, 21 DEFENCE AND PEACE ECONOMICS 105, 127 (2010).

181. THE WHITE HOUSE, THE AGENDA: DEFENSE (Jan. 30, 2009), http://web.archive.org/web/20090130030931/http://www.whitehouse.gov/agenda/defense/.

182. THE WHITE HOUSE, NATIONAL SPACE POLICY OF THE UNITED STATES 3 (June 28, 2010), *available at* http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.]

management.[183] The 2010 National Space Policy strode toward international consonance, replacing "the forceful and nationalistic tone" of President Bush's 2006 National Space Policy with a stance that acknowledged "the fundamental importance of cooperation and trust."[184]

In January 2011, the Secretary of Defense and the Director of National Intelligence incorporated the tenets of the National Space Policy into the National Security Space Strategy.[185] The unclassified summary outlined several Strategic Approaches to meet U.S. "national security space objectives," and committed the United States to developing and following internationally recognized standards and practices[186]; improving space-program efficiency, redundancy, resilience, and communication[187]; bolstering relationships with "responsible nations, international organizations, and commercial firms" and building upon their existing technological platforms when possible[188]; relying on diplomacy, redundancy protections, and intelligence collection to avoid and deter attacks[189]; and "develop[ing] mission-effective alternatives . . . for critical capabilities currently delivered primarily through space-based platforms."[190]

The United States continues to impose strict strategic export controls "which treat commercial satellite technologies, related technical data, and defense services as munitions subject to the strictest export control criteria."[191] These restrictions were born in the Cold War,[192] but U.S. policymakers remain fearful that development of comparable satellite technology by other nations could drive "a whole new frontier in global terrorism"[193] and eventually feed satellite-destruction capability to nations such as Iran.[194] However, the United States' position within the defense sector "affords the U.S., the most prodigious defense spender in the world, a tremendously large carrot with which to dangle before potential

183. *Id.* at 4.

184. Barnet, *supra* note 41, at 285-86.

185. U.S. Dep't. of Def. & U.S. Office of the Dir. of Nat'l Intelligence, NATIONAL SECURITY SPACE STRATEGY UNCLASSIFIED SUMMARY (Jan. 2011).

186. *Id.* at 5-6.

187. *Id.* at 6-7.

188. *Id.* at 8-9.

189. *Id.* at 10.

190. *Id.* at 11.

191. Burris, *supra* note 147, at 257.

192. *See, e.g.*, *id.* at 259.

193. *The Export Administration Act: A Review of Outstanding Policy Considerations, Hearing Before the H. Subcomm. on Terrorism, Nonproliferation and Trade of the H. Comm. on Foreign Affairs*, 111th Cong. 7 (2009) (statement of Rep. Michael E. McMahon).

194. *See, e.g.*, Burris, *supra* note 147, at 282.

antagonists to U.S. export control policy."[195] As outer space grows increasingly multipolar, the United States seems to be, "at least with regard to [satellites], opting for a conciliatory approach—forging consensus through concession"[196] instead of returning to its Bush-era unipolar stance.

IV. SCOPE AND EVOLUTION OF THE PROPOSED CODE OF CONDUCT

A. Purpose

In 2010, the Council of the European Union released an updated draft Code of Conduct for outer space activities.[197] These guidelines, revising a 2008 draft,[198] "aim[ed] to strengthen[] the security of activities in outer space."[199] Rather than controversially decrying an orbital arms race, the Code's effects-based approach sought the minimization of harmful debris, regardless of source.[200] Many powers collaborated and consulted in the Code's creation—the EU prioritized acceptance by as many states as possible.[201] The United States involved itself heavily, seeking "to reduce the potential threat to U.S. space assets by endorsing nonbinding best practices and transparency and confidence-building measures."[202]

In its first sentence, the Code admonishes that "all States should actively contribute to the promotion and strengthening of international cooperation relating to the activities in the exploration and use of outer space for peaceful purposes."[203] Its very next statement, highlighting the global importance of outer-space activities, represented a major shift from the 2008 draft: where two years earlier the EU was only convinced that outer space activities had "important consequences" inbound,[204] the 2010 drafters proclaimed that the importance of these activities could now be

195. *Id.* at 288.

196. *See, e.g.*, *id.* at 289.

197. Council Conclusions of 27 September 2010 Concerning the Revised Draft Code of Conduct for Outer Space Activities (EC) No. 14455/101, *available at* http://www.consilium.europa.eu/uedocs/cmsUpload/st14455.en10.pdf [hereinafter 2010 Draft].

198. Council Conclusions on the Draft Code of Conduct for Outer Space Activities as Approved by the Council on 8-9 December 2008 (EC) No. 17175/08, *available at* http://register.consilium.europa.eu/pdf/en/08/st17/st17175.en08.pdf [hereinafter 2008 Draft].

199. 2010 Draft, *supra* note 196, at 2.

200. Blake & Imburgia, *supra* note 37, at 193-94.

201. *See id.*

202. Rose Gottemoeller, *A Code for Outer Space, as Seen from the State Dept.*, N.Y. TIMES, Mar. 15, 2012, at A26. At the time, Ms. Gottemoeller was Acting Under Secretary of State for Arms Control and International Security.

203. 2008 Draft, *supra* note 197, at 3; 2010 Draft, *supra* note 196, at 3.

204. 2008 Draft, *supra* note 197, at 3.

observed, measured, and felt[205]—they were no longer theoretical, and neither was the need to maximize and protect them. Though it repeated the goals and priorities of its predecessor, the 2010 draft unambiguously confirmed that debris "*constitutes*" a major danger, adding language recognizing "the need for greater transparency and better information exchange" and a coherent, security-oriented code of "best practices" to be adopted by all spacefarers for "all types of outer space activities."[206] It reiterated longstanding treaties and scientific and legal principles, then promised to protect "freedom of access to space for peaceful purposes" (as the OST guaranteed), the continued well-being of "objects in orbit," and states' "legitimate defense interests."[207]

Neither draft's "purpose, scope, and core principles" contains any real surprises—both are voluntary mechanisms which aspire to commit their subscribers to security, safety, and transparency.[208] Their differences are more interesting. Where the 2008 draft would codify, 2010 simply endorses; where 2008 hopes for predictability, 2010 strives for sustainability; where 2008 seeks to benefit all *spacefarers*, 2010 focuses on their *activities*.[209] In short, the 2008 draft begins with a wish for a better tomorrow; the 2010 draft takes a distinctly less ethereal stance and moves to organize *today*.

B. Principles and General Measures

The Code's subscribers pledge to prioritize and promote the standards and practices perpetuated by a number of high-profile treaties. These include, of course, the OST, the Liability Convention, and the Registration Convention.[210] The Code also demands "reaffirmed commitment to" a host of other treaties and principles.[211] Interestingly, the 2010 draft presents a loftier goal than the Code did in 2008; where before its drafters sought "universal adherence to"[212] these treaties, the 2010 draft prioritized not only adherence to but "universal *adoption*" of them as well.[213] The invocation of these agreements reinforces themes that reverberate throughout the Code's General Measures and beyond. Again and again, the Code stresses the

205. *See* 2010 Draft, *supra* note 196, at 3.
206. *Id.* at 4.
207. *Id.*
208. *Id.* at 5.
209. *Compare* 2008 Draft, *supra* note 197, at 5, *with* 2010 Draft, *supra* note 196, at 5.
210. 2010 Draft, *supra* note 196, at 6.
211. *Id.*
212. 2008 Draft, *supra* note 197, at 8.
213. 2010 Draft, *supra* note 196, at 7 (emphasis added).

importance of "tak[ing] all reasonable measures" to ensure safety, transparency, and sustainability.[214] Because accidents of a kinetic nature are the likeliest, most destructive, and have the longest-enduring consequences, the Code prioritizes minimization of collision risk.[215] Even more dramatically, at some point between 2008 and 2010, drafters decided that subscribing states' self-imposed ban on "intentional destruction" of satellites warranted its own section—the Space Debris Mitigation Guidelines of COPUOUS, previously squeezed between the other driving principles,[216] received special attention and emphasis in the 2010 draft.[217]

But the 2010 draft's most explicit updates came in the sections describing cooperation mechanisms and organizational aspects. Echoing the increasingly corporeal preamble, 2010's Code of Conduct presented simple but specific standards for its subscribing states to adopt: information-sharing and notification of—now, to both subscribers and non-subscribers—space-object launch, potentially risky maneuvers, "high-risk reentry events" and the malfunctions that could cause them, and imminent or contemporaneous "collisions, break-ups in orbit, and any other destruction of space objects generating measurable orbital debris."[218] Subscribing states would biennially meet, nominate a "central point of contact," centralize relevant data in a subscriber-only "electronic database and communications system," annually share strategies and objectives, be obligated to consult with any subscribing state potentially impacted by their activities, and commit to eliminating risk and mitigating damage; additionally, they could create a "reliable and objective" legal mechanism to investigate accidents.[219] Consultation and information-sharing through these policies and procedures would minimize accidents and maximize accountability. Most substantially, the Code's subscribers must pledge not to directly or indirectly destroy or damage any objects in outer space unless for "imperative safety considerations" or "debris mitigation."[220] However, the 2010 draft added to these justifications "the inherent right of individual or collective self-defence in accordance with the United Nations Charter."[221]

214. *Id.* at 5-8.
215. *See id.* at 7-8.
216. 2008 Draft, *supra* note 197, at 8.
217. 2010 Draft, *supra* note 196, at 8.
218. *Id.* at 9-10.
219. *Id.* at 9-12.
220. 2008 Draft, *supra* note 197, at 8; 2010 Draft, *supra* note 196, at 7.
221. 2010 Draft, *supra* note 196, at 7.

C. The United States' Response

On January 17, 2012, in press-statement form, Secretary of State Hillary Rodham Clinton announced the United States' alignment with the principles of the Code of Conduct.[222] She recognized the danger debris posed to "the long-term sustainability of [the] space environment," attempted to rally the international community in response, and endorsed the Code of Conduct as a mechanism that would "help maintain the long-term sustainability, safety, stability, and security of space."[223] This reception reflected President Obama's 2008 campaign suggestion that "a Code of Conduct for responsible space-faring nations" was an expedient alternative to a formal treaty, which would, at the very least, "take a long time to negotiate."[224] But while the United States would both comply with the draft Code and help develop it further, it would not allow its space-based military power to be meaningfully constrained "in any way."[225] The same day, the Department of State issued a fact sheet to explain its role and response.[226] Like the Code's preamble,[227] it stressed the importance of the outer-space environment, the great threat posed by irresponsible conduct, and the necessity of international cooperation in outer space activities.[228]

Dissent was inevitable. Soon, a hawkish conservative bloc publicly expressed its outrage over President Obama's decision to abide by and help develop the draft Code of Conduct.[229] In an editorial for the New York Times, John Bolton and John Yoo called the move "a transparent end run around the constitutional requirement that the Senate ratify all treaties."[230] Bolton and Yoo clearly did not want such a treaty; it would, they alleged, trade "American security . . . for the false promise of global governance."[231] At any rate, they saw a treaty as "unlikely."[232] While their objections returned frequently to the President's "eliminat[ion] of the

222. Press Release, Hillary Rodham Clinton, Secretary of State, U.S. Department of State, International Code of Conduct for Outer Space Activities (Jan. 17, 2012).

223. *Id.*

224. Senator Barack Obama, *Response to Policy Questionnaire*, Council for a Livable World, *available at* http://livableworld.org/assets/pdfs/2008_presidential_candidates_questionnaire_responses.pdf.

225. *Id.*

226. *See* Fact Sheet *supra* note 9, and accompanying text.

227. *See* 2010 Draft, *supra* note 196, at 3.

228. FACT SHEET, *supra* note 9.

229. John R. Bolton & John C. Yoo, *Hands off the Heavens*, N.Y. TIMES, Mar. 8, 2012, *available at* http://www.nytimes.com/2012/03/09/opinion/hands-off-the-heavens.html.

230. *Id.*

231. *Id.*

232. *Id.* They asserted that "Congress recognize[s] the national security threats," but would "realize that America must not commit to military limitations in a rapidly changing field." *Id.*

Senate's important constitutional role," Bolton and Yoo perceived a more far-reaching danger: the Code "would substantially impede advances in space technology because such innovations could also be labeled as military."[233] Some activities with which the Code of Conduct could potentially interfere would be of an inarguably martial nature; the United States might have difficulty "develop[ing] antiballistic missile systems in space, test[ing] antisatellite weapons[,] and gather[ing] intelligence."[234] But, they added, debris-mitigation standards would limit not just "military activities in space," but "some peaceful dual-use technologies, like the multistage rockets used to launch commercial satellites," as well.[235] Furthermore, the U.S. "shouldn't expect China to voluntarily accept limits on its space strategy."[236] Finally, they predicted that the United States' numerous enemies would "exploit [the] ambiguity" in the Code's self-defense exception "to prevent legitimate American actions," allowing the nation to respond only to "cross-border attacks."[237] For these reasons, they concluded that, instead of permitting the United States to comply with the Code, "[t]he Senate [should] defend its constitutional prerogatives by aggressively financing programs to advance [the American] lead in space and refusing to follow the administration's foreign-policy lead."[238] In short, a strong return to Bush-era unipolarity in outer space would maximize American safety while "consensus through concession" would weaken it.[239]

Wearily, the State Department submitted a letter to the New York Times editor, attempting to clarify some issues but failing to respond to most of Bolton's and Yoo's assertions.[240] The letter ignored their better-placed fears: incongruent behavior by foreign spacefaring powers, namely China; impediments to technological and scientific progress; and dramatic restrictions on military operations.[241] Readers might infer from the State Department's reference to the non-binding nature of the Code that other states' ability to narrowly construe the self-defense exception was totally

233. *Id.* However, Messrs. Bolton and Yoo explicitly disagree with my analysis, asserting that "the more far-reaching danger is," in fact, "that Mr. Obama is eroding American sovereignty on the sly." *Id.*

234. *Id.*

235. *Id.* Distressingly, these standards are "drafted by Europeans who do not bear America's global responsibilities. . . . [T]here is little our little friends across the pond don't want to regulate . . . ." *Id.*

236. *Id.* Bolton and Yoo offer no explanation for this suspicion, but noted China's successful deployment of an antisatellite weapon in 2007, and also that "it is deploying its own GPS system[, and i]n a war, China could potentially destroy [U.S.] satellites and still retain its own GPS capabilities." *Id.*

237. *Id.*

238. *Id.*

239. *See* Burris, *supra* note 147, at 289.

240. Gottemoeller, *supra* note 201.

241. *See id.*

unchanged by it, but this, too, was not directly stated.[242] In fact, the State Department letter only directly addressed the constitutional claims; it then attempted to raise awareness of the orbital-debris threat.[243] It hinted at the dangers of a truly unipolar outer-space attitude, but still hedged, "Maintaining American leadership is absolutely critical."[244] But despite their bombastic rhetoric, Bolton and Yoo acknowledged problems that the State Department did not address—multistage rockets, for example, are generally regarded as the most economically efficient way to deliver objects to orbit, but "most of America's space debris 'comes from the upper stages of [satellite] launch vehicles.'"[245] Regardless, the Department of State letter clearly reiterated the administration's stance: the Code was "under development," the U.S. would not sign on unless national security were to be "protect[ed] and enhance[d]," and, most importantly, "the code would not be legally binding."[246] But would it? Bolton and Yoo claimed that President Obama's advisors and colleagues had, as academics, suggested that signing on to or complying with these types of codified best practices could "help[] form binding 'customary international law.'"[247] In fact, this is perhaps the safest, strongest, and even likeliest solution to the problem of outer-space security.

V. HOW THEN SHALL WE LIVE? THE CODE'S POTENTIAL TO CRYSTALLIZE INTO CUSTOMARY INTERNATIONAL LAW (CIL)

If states recognize an international norm as an extensive, settled, and uniform practice, such that they—particularly where especially affected or burdened by it—treat it as obligatory, it becomes binding international law.[248] Scholars theorize "that in the absence of a new outer space disarmament treaty, the world can productively turn to [CIL] as a viable alternative pathway."[249] Binding CIL has two primary elements: the objective "widespread, longstanding pattern of concordant state practice" and the subjective "attribut[ion of] that pattern of practice to a 'sense of obligation,' rather than merely to habit, courtesy, indifference, or political

242. *See id.*

243. *See id.*

244. *See id.*

245. Imburgia, *supra* note 28, at 605 (quoting Carl Hoffman, *Battlefield Space*, POPULAR MECHANICS, July 2007, at 81).

246. Bolton & Yoo, *supra* note 228

247. *Id.*

248. Taylor, *supra* note 12, at 28.

249. Koplow, *supra* note 13, at 1189; *see, e.g.*, Taylor, *supra* note 12, at 28-30; Tannenwald, *supra* note 170, at 378-79, 404-05.

expediency."[250] Bolton and Yoo asserted that the president's compliance with the Code of Conduct was in furtherance of CIL crystallization, though they concluded that "[t]he Constitution's framers [had] sought to preclude such schemes through the treaty process."[251]

Since the 1950s, the outer-space "CIL avenue" evolved "more rapidly than the [corresponding] treaty mechanism."[252] No nation has ever attacked another using a kinetic ASAT.[253] Before the Chinese ASAT test, even skeptics saw the moratorium on the use of weapons in outer space as "a widely supported norm of the international community."[254] Since then, the U.N.G.A. sought to promote peaceful use of, and prevent an arms race in, outer space, "bespeak[ing] a widespread consensus on the issue."[255] A number of states and NGOs have created guidelines and policies restricting unnecessary or intentional debris creation, high-risk maneuvers, simulated attacks, and DEW and kinetic ASAT use.[256] These entities tend to prioritize international communication, consultation, registry, and enforcement standards.[257] However, the use of ASATs since 2008 indicates "that consistent state practice has not yet solidified."[258] While many nations protested China's ASAT test, only Japan actually called it illegal.[259] Therefore, "because of the lack of opinio juris, the emerging norm is not yet a binding obligation."[260]

Absent binding treaties or crystallized CIL explicitly forbidding destructive orbital activities, general CIL implicates broader principles, such as restraints on military activities that excessively or unnecessarily damage the environment.[261] While war inevitably harms the environment,

250. Koplow, *supra* note 13, at 1223.

251. Bolton & Yoo, *supra* note 228.

252. Koplow, *supra* note 13, at 1233-34. "Remarkably, the CIL version of the law of outer space would achieve even more comprehensive geographic coverage than the treaty version." *Id.* at 1234.

253. *Id.* at 1235. Furthermore, many states could have pursued ASAT technology but did not. *Id.* at 1236.

254. Tannenwald, *supra* note 170, at 414.

255. GRAHAM, *supra* note 84, at 95.

256. *See, e.g.*, Paul B. Larsen, Guidelines for Military Activities in Outer Space, IISL-07-E6.5 (2007); *see also* Taylor, *supra* note 12, at 32-41 (analyzing numerous sets of governmental guidelines and policies).

257. *See generally* Larsen, *supra* note 254.

258. Taylor, *supra* note 12, at 29 ("[N]o specific customary international law governs orbital debris.").

259. Koplow, *supra* note 13, at 1237-42.

260. Taylor, *supra* note 12, at 37.

261. *See, e.g.*, Tare Brisibe, *Customary International Law, Arms Control, and the Environment in Outer Space*, 8 CHINESE J. INT'L L. 375, 391-92 (2009).

and "[o]uter space is no exception,"[262] the International Court of Justice (ICJ) opined that states' necessity-and-proportionality calculations must include "environmental considerations."[263] The radioactivity of dozens of orbiting satellites, which could seriously contaminate the earth if struck, must surely factor into this equation.[264] While the ICJ report considered not ASATs but nuclear weapons[265]—which, despite decades of international condemnation, are not banned under CIL[266]—and while the ICJ does not apply stare decisis, the Court does defer to definite CIL wherever found.[267] At any rate, this report reflects the same international sensibilities that forbid high-seas missile testing that interferes with navigation, fishing, or the environment,[268] manifested most clearly in the "precautionary principle" of the Rio Declaration: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."[269]

Opponents of the CIL crystallization theory assert that, because the Code is nonbinding, and states may, when it matters most, ignore even their own best practices, "[c]ustomary international law on space debris is never likely to develop."[270] Without a formal obligation, individual practices will probably not become uniform and settled, and states will probably not internalize a sense of obligation regarding the international standard.[271] Even before the Chinese ASAT test, scholars wondered at the practical strength of states' "tradition of restraint."[272] Moreover, they worry that when followed, the Code would inappropriately interfere with "state[s'] legitimate rights and interests," and when ignored, it would do nothing. China might subscribe, and then "flout[] the provisions" or otherwise

262. *Id.* at 380.

263. Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226, 242, ¶ 30 ("Respect for the environment is one of the elements that go to assessing whether an action is . . . necess[ar]y and proportiona[te].") [hereinafter ICJ Advisory Opinion].

264. *See* Taylor, *supra* note 12, at 23.

265. *See generally* ICJ Advisory Opinion, *supra* note 261.

266. Koplow, *supra* note 13, at 1228.

267. *Id.* at 1222.

268. *See* Tannenwald, *supra* note 170, at 397.

269. U.N. Conference on Env't and Dev., *Report of the United Nations Conference on Environment and Development*, at principle 15, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I) (1992). "The UNGA has also flatly asserted that 'destruction of the environment, not justified by military necessity and carried out wantonly, is clearly contrary to existing international law.'"; *see also* Koplow, *supra* note 13, at 1251.

270. Imburgia, *supra* note 28, at 624-25.

271. *See id.*

272. *E.g.*, Tannenwald, *supra* note 170, at 414.

"cheat on the arrangements," perhaps inspiring Russia or India to follow suit. At any rate, the Code lacks the legal framework and enforcement mechanisms to regulate its constituents or influence the numerous troublesome entities not yet on board.[273] Other commentators fear *successful* Code crystallization, positing that CIL here inevitably "becomes the product of the will of one or two states."[274]

Instead, many advocate creation of a clear, binding international treaty, pursued by America and all spacefaring powers, and boasting "space situational awareness provisions" and "sound enforcement mechanisms" such as an international tribunal and Security Council participation.[275] Even some American conservatives support what has traditionally been a left-wing solution, arguing that "an ASAT treaty best safeguards the United States' national security."[276] Most voices, regardless of political affiliation, seek a treaty that forbids space-based weapons and "interference with space assets."[277] (Alternatively, some suggest banning offensive weapons in outer space, but not defensive weapons, in order to let states "protect their investment and interests . . . without spurring a dangerous arms build-up."[278] However, these commentators' attempts to draw the necessary line between the two weapon types have been heretofore unconvincing.)[279] Although such a treaty would require the bilateral advice and consent of the Senate, a difficult and politically charged process at the best of times,[280] "both NASA and [the Department of Defense] are already required to minimize space debris, [and] the United States' interests would be better served if an international agreement required other nations to do the same."[281] The greatest advantage of a binding treaty would be

273. Rajeswari Rajagopalan, *The Space Code of Conduct Debate: A View from Delhi*, STRATEGIC STUDIES QUARTERLY, Spring 2012, at 137, 141-45 (describing "potential problem areas in the EU Code"). "China [might] pursue a public policy of condemning space weapons while secretly pursuing ASAT technologies." Walsh, *supra* note 152, at 765.

274. Zhang, *supra* note 13, at 455.

275. *E.g.*, Imburgia, *supra* note 28, at 631-34; *see also* Tannenwald, *supra* note 170, at 409, 417-19.

276. Walsh, *supra* note 152, at 764. "The United States should neutralize th[e ASAT] threat, even if it means signing a treaty that limits 'its rights, capabilities, and freedom of action in space.'" *Id.* at 798 (quoting U.S. OFFICE OF SCI. & TECH. POL'Y, EXEC. OFFICE OF THE PRESIDENT, U.S. NATIONAL SPACE POLICY ¶ 2 (2006), THE WHITE HOUSE, *available at* http://www.whitehouse.gov/sites/default/files/microsites/ostp/national-space-policy-2006.pdf.

277. Tannenwald, *supra* note 170, at 416.

278. Barnet, *supra* note 41, at 289.

279. *See id.* at 290 (discussing the necessity and difficulty of basing this distinction on a state's intent and suggesting technical limitations on defensive weapons); *see also* Zhang, *supra* note 13, at 448-49 (considering the offensive/defensive distinction).

280. *See* U.S. CONST. art. II, § 2, cl. 2.

281. Imburgia, *supra* note 28, at 631.

institutionalized "monitoring, verification, and enforcement" systems. On-site pre-launch verification regimes built on a rebuilt Registration Convention, for example, could limit ex ante nations' chances to break the rules rather than punishing them ex post.[282] Even if the most powerful spacefaring states somehow accepted a treaty, that treaty "would require many years to approach universality." By contrast, the crystallized CIL would impact everyone the moment that it were recognized.[283]

One last proposal: if the United States remained the only spacefaring power resistant to a binding treaty, the other states could create their own organization or treaty framework independent of the U.N.[284] Such an alliance might "over-represent the interest of those with space capabilities at the expense of those without," but it would grant legitimacy, efficiency, and enforcement to an area in dire need of all three.[285] Even against the wishes of the United States, it might provide the lasting consensus—alternatively, the "continuing pattern of self-restraint"—needed to incubate states' individually voluntary practices into CIL.[286] And if such a regime existed, the progressive public adoption of its standards by a single U.S. president might provide opinio juris such that anti-ASAT, anti-debris CIL would irreversibly crystallize.[287]

CONCLUSION

Even if states followed the Code of Conduct to the letter, creating a pattern of obligation that eventually crystallized into CIL, there is no mechanism for removing existing debris from orbit and heading off an increasingly likely cascade effect.[288] At present, the international community has neither the willpower nor the technology to reverse the damage.[289]

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282. *See* Tannenwald, *supra* note 170, at 418-19 (discussing the advantages of a compliance regime over a deterrence regime); *see also* Walsh, *supra* note 152, at 787-93 (suggesting reliable, realistic treaty-based verification mechanisms); *contra* Rajagopalan, *supra* note 271, at 145 ("There is no good way to verify space technologies, given that they are inherently dual-use in nature.").

283. Koplow, *supra* note 13, at 1267.

284. *See* Zhang, *supra* note 13, at 457 (suggesting a "private organization of space powers" that does not include the United States for the purpose of monitoring each other and developing an "international framework for the use of outer space").

285. *Id.*

286. *See* Koplow, *supra* note 13, at 1270-71.

287. *See id.* at 1269-70 (describing how one U.S. president's acceptance of anti-ASAT CIL would effectively bind his or her predecessors regardless of their stance on the issue).

288. *See* Imburgia, *supra* note 28, at 625-26 (stating that the U.N. General Assembly's nonbinding debris mitigation guidelines do not address the challenge of debris removal).

289. *See generally supra* notes 34-36 and accompanying text (describing myriad dangers of outer space debris accumulation); *see also* Taylor, *supra* note 12, at 19 ("[R]emediation measures are

But satellites are, if nothing else, expensive and hard to do without. The world's great spacefaring powers do not want to risk theirs. While the Bush-era outer-space policy may have indeed inspired an arms race, it also turned international eyes toward the importance and the fragility of outer-space assets. The same faltering globalized economy and resulting multipolarity that preclude actual armed attacks may inspire new heights of cooperative debris mitigation and information-sharing, or perhaps red balance sheets will keep nations focused on the down-to-earth until it is too late to prepare for tomorrow. Regardless, the Code of Conduct, voluntary or not, is a step toward consensus. It does not need to shout to succeed; it can be a reference point for treaties or crystallizing CIL or perpetually non-binding best practices. But the Code must not be all that there is. At best, it must be, like the OST, or the U.N. Charter, or the Magna Carta, one more agreed-upon step toward necessity.

currently economically or technologically unfeasible."); Imburgia, *supra* note 28, at 628("The only cost-effective option is to move defunct GEO satellites into 'graveyard orbits' . . . . [Even] this solution fails to offer long-term relief; it only rearranges the chairs on the deck of the titanic space debris problem.").