

ARTICLE

Eve of Destruction:
Implementing Arms Control Treaty Obligations to Dismantle Weaponry

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Abstract

The corpus of arms control treaties now includes dozens of diverse instruments regulating the possession, deployment, testing, and use of nuclear, chemical, biological, conventional, and other weapons in various ways. One aspect of these vital national security tools that has not received sufficient scholarly and practitioner attention concerns the provisions—contained in some, but not all, of the agreements—that require the parties to destroy, denature, convert, or otherwise dispose of the now-excess armaments. These various provisions have represented very different legal and political strategies regarding the specific requirements, standards, and timetables for accomplishing and verifying the physical task of weapons elimination. The usual balancing act in these provisions attempts to reconcile the benefits of certainty (by crafting precise legal obligations that specify dismantling procedures and timetables in detail) versus the benefits of flexibility (by allowing reasonable accommodation for changed circumstances or legitimate difficulties in accomplishing the destruction). In three prominent instances—concerning chemical weapons, nuclear weapons, and anti-personnel land mines—that balancing process has gone badly awry, and widespread, long-term treaty violations or evasions have arisen without adequate remedy or enforcement. This Article provides the first systematic examination of that diverse state practice, scrutinizing the successes and failures, summarizing the lessons learned, and presenting recommendations for future arms control efforts. It thus sheds light on the “back end” of the disarmament process: the mechanisms through which countries go from a high-level agreement about the numbers and types of weapons they will eliminate from their respective arsenals toward the practical phase of accomplishing destruction.

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*“You tell me over and over and over again my friend,
You don't believe we're on the eve of destruction.”¹*

Introduction

Disarmament—at least the version relying upon consensually negotiated, voluntarily assumed, and legally binding commitments—is a relatively new phenomenon in international law. Of course, countries through the centuries have routinely discarded selected surplus weapons; they have likewise compelled vanquished adversaries to surrender their swords or beat them into plowshares; and they have occasionally decided, unilaterally or collectively, that particular devices or whole categories of armaments were no longer worth retaining. But undertaking significant reductions of currently useful arms through a peacetime treaty between peers, especially via an accord that specifies in detail what is to be destroyed, when, and how, is mostly an artifact with roots only in the second half of the twentieth century.

In the intervening decades, however, multiple such flowers have bloomed. Treaties and other accords² addressing a vast array of weapons—nuclear, chemical, biological, missiles, tanks, helicopters, land mines, and many more—have emerged. These diverse agreements represent very different legal and political strategies regarding the specific requirements, standards, and timetables for accomplishing and verifying the physical tasks of weapons elimination.

The usual balancing act in such disarmament provisions attempts to reconcile the benefits of certainty (by crafting precise legal obligations that specify dismantling procedures in detail and provide little wiggle room for delay or modification) versus the benefits of flexibility (by allowing reasonable accommodation for changed circumstances, unforeseen costs, or legitimate difficulties in accomplishing the destruction). In three prominent instances—concerning chemical weapons, nuclear weapons, and anti-personnel land mines—that balancing process has gone badly awry, and widespread, long-term treaty violations or evasions have arisen without adequate remedy or enforcement.

This Article provides the first systematic examination of that diverse state practice, scrutinizing the successes and failures, summarizing the lessons learned, and presenting recommendations for future arms control efforts. It thus sheds rarely-focused light on the “back end” of the disarmament process: the mechanisms through which countries go from a high-level agreement about the numbers and types of weapons they will eliminate from their respective arsenals toward the more nitty-gritty phase of accomplishing the destruction task.

¹ BARRY MCGUIRE, *EVE OF DESTRUCTION* (Dunhill Records 1965).

² Under international law, the name of the document is immaterial; instruments designated as treaties, conventions, agreements, etc., may all fulfill the same purposes, and those labels are used interchangeably. See Vienna Convention on the Law of Treaties art. 2.1(a), May 23, 1969, 1155 U.N.T.S. 331.

Following this Introduction, Part I presents, as background, a typology of arms control instruments, categorizing the array of precedential experiences in three ways. First, it differentiates the spectrum of functions that an arms control accord can play. In general, these agreements intend to reduce the probability of war, the devastation that war would inflict, and the financial and other costs of preparing for war, but a variety of approaches to those goals can be discerned. Part I also surveys a range of operational and structural features that an arms control accord may incorporate. The negotiators and drafters of a treaty have to make hard decisions about these various points, for they are pregnant with meaning for the disarmament process, as for other aspects of the treaty's life. Finally, this Part summarizes the distinct operational standards or criteria that the weapons dismantling process might be required to meet.

Next, Part II presents the encyclopedia of global experiences with arms control documents, highlighting the provisions mandating actual destruction of the devices now declared to be excess or otherwise prohibited. This Part constitutes the bulk of the Article, as it collates a century or more of experience, summarized both chronologically and categorically according to the subject matter and the ambitious level of detail of the treaty.

Part III steps back from the empiricism to offer observations and conclusions about "lessons learned" or "best practices." It notes what has gone wrong in the perverse cases, what has generated success in other instances, and where we simply do not know what the true results of treaty implementation have been. Finally, Part IV offers some concluding thoughts.

A word about vocabulary is in order at the outset. The literature about weapons restrictions sometimes differentiates the concept of "arms control" (measures that limit or reduce participating states' armed forces or armaments) from the companion concept of "disarmament" (agreements to ban an entire category of weaponry altogether). Frequently, and for present purposes, those two terms can be used almost interchangeably.³ Less attention has been paid, however, to the related notion of actually dismantling, destroying, converting, denaturing, or otherwise eliminating the now-superfluous arms. As international diplomacy becomes more ambitious, treaties are likely to continue to demonstrate increasing exactitude about the dismantling processes, specifying the required procedures, standards, and timetables for rendering the weapons useless, and demanding external corroboration of compliance with the mandates.

³ THOMAS GRAHAM JR., *DISARMAMENT SKETCHES* xiii (2002); Richard Dean Burns, *An Introduction to Arms Control and Disarmament*, in 1 *ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT* 1, 2–3 (Richard Dean Burns ed., 1993). As an example of the linguistic inexactitude, it may be observed that an agreement to abolish an entire subcategory of weaponry could be characterized alternatively as complete "disarmament" of that subcategory, or as "arms control" of the larger category of which it is a part.

To assist this evaluation, this Article introduces the concept of “responsibility to disarm,” abbreviated as R2D,⁴ to address those physical eradication commitments. This new term refers to a treaty’s panoply of substantive and procedural standards governing the final stages of the arms control and disarmament process. In that sense, the world is already well past the “eve” of destruction, and has repeatedly progressed into the operation of those exacting functions. But there is likely much more to come. It is time, therefore, to scrutinize, learn from, and improve upon those legal, technical, diplomatic, military, and other procedures, and to apply them in a more organized fashion to future disarmament efforts.

I. The Typology of Arms Control

There are now dozens of arms control and related agreements, consuming hundreds of pages and organizing behaviors on, under, and over every region of the planet.⁵ Some of these documents are familiar to the general public; others are obscure even to those immersed in the national security community. This Part attempts to organize that canon in three ways. First, it sketches a series of eight

⁴ This abbreviation is obviously derived from the term R2P, for “responsibility to protect,” referring to states’ emerging legal and ethical obligations to prevent and respond to large-scale human rights abuses. See Int’l Comm’n on Intervention and State Sovereignty, *The Responsibility to Protect* (Dec. 2001) (Gareth Evans et al. eds.), <http://responsibilitytoprotect.org/ICISS%20Report.pdf>; INT’L COAL. FOR THE RESPONSIBILITY TO PROTECT, *An Introduction to the Responsibility to Protect*, <http://responsibilitytoprotect.org/index.php/about-rtop> (last visited Oct. 26, 2016); GLOBAL CTR. FOR THE RESPONSIBILITY TO PROTECT, *About Us*, http://www.global2p.org/about_us (last visited Oct. 26, 2016).

⁵ For collections of arms control treaties and narrative histories about them, see generally THOMAS GRAHAM, JR. & DAMIEN J. LAVERA, *CORNERSTONES OF SECURITY: ARMS CONTROL TREATIES IN THE NUCLEAR ERA* (2003); *ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT*, *supra* note 3; STUART CROFT, *STRATEGIES OF ARMS CONTROL: A HISTORY AND TYPOLOGY* xi, 15 (1996) (noting prior collections of arms control documents and classifying five types of arms control); WILLIAM H. BOOTHBY, *WEAPONS AND THE LAW OF ARMED CONFLICT* (2d ed. 2016); AMY F. WOOLF, CONG. RESEARCH SERV., RL33865, *ARMS CONTROL AND NONPROLIFERATION: A CATALOG OF TREATIES AND AGREEMENTS* (2016). Arms control may also be pursued through tools of international lawmaking other than treaties, such as customary international law and binding resolutions of the U.N. Security Council. Each of those techniques has its advantages and disadvantages, but it is unlikely that a norm of customary international law, for example, would carry the precision necessary to institute weapons elimination specifications of the detailed sort considered here. See Paul Dean, *The Role of Negotiation in International Arms Control Law*, 45 *ARMS CONTROL TODAY*, no. 7, Sept. 2, 2015, at 22; CROFT, *supra* note 5, at 54–58 (surveying disarmament efforts by the United Nations and prior international organizations); INT’L COMM. OF THE RED CROSS (ICRC), *Customary IHL*, <https://www.icrc.org/customary-ihl/eng/docs/home> (last visited Oct. 25, 2016) (comprehensive study of customary international law related to armed conflict, including provisions regarding the prohibition of particular weapons); GUIDO DEN DEKKER, *THE LAW OF ARMS CONTROL: INTERNATIONAL SUPERVISION AND ENFORCEMENT* 23–27 (2001) (discussing the evolving purposes of arms control); *id.* at 62 (discussing customary international law and arms control); Jack M. Beard, *Soft Law’s Failure on the Horizon: The International Code of Conduct for Outer Space Activities*, 38 *U. PA. J. INT’L L.* 47–51 (forthcoming 2016) (discussing non-legally binding and customary international law norms for arms control).

different functions that a disarmament agreement could play, and provides illustrations of each. Second, it identifies eight variables that treaty makers need to resolve to effectuate their agreement, and again, cites relevant examples. Finally, it presents four distinct tasks or conditions that the dismantling process might be obligated to accomplish. In each case, the choices carry critical implications for the operation of the eventual R2D processes.

A. *Functions of Arms Control Treaties*

The first axis for analysis of disarmament treaties concerns the question of exactly what behaviors are to be regulated, limited, or prohibited: it directs attention to the operative verbs in the document. Eight variations are worthy of identification, although it is important to note that some (or most) treaties perform more than one of these functions simultaneously, so the analysis can profitably focus on complementary provisions of the various agreements. The categories are presented here in roughly increasing order of restrictiveness, although that dimension is measurable only inexactly.⁶

1. Non-use provisions

First, a treaty might contain simply a commitment not to use a particular weapon, or not to use it against specified opponents or absent particular circumstances. Such a provision does not restrict the continued possession of the weapon or inhibit the ability to deploy, prepare, brandish, and be capable of using the suspect weapon if conditions warrant.

A prototypical example is the 1925 Geneva Protocol,⁷ which condemned “the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices.”⁸ This treaty is still in force, although largely superseded;⁹ it has been narrowly interpreted to apply only to conflicts between its parties, and to block only a “first use” of the weapons, not to impede retaliation in kind if some other state violates the ban first.¹⁰ Accordingly, while it stigmatized reliance upon one of the most horrific innovations of World War I, it did little to impede its parties’ continued construction of massive new inventories of ever-more-deadly chemical weapons. Similar provisions are found in the 1899 Hague Convention, prohibiting the use in international conflict of expanding (dum-dum) bullets¹¹ and more recently in the 1981 Convention on Certain

⁶ Burns, *supra* note 3, at 1, 4–5 (categorizing an array of arms control treaties).

⁷ Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, June 17, 1925, 26 U.S.T. 571, 94 L.N.T.S. 65 [hereinafter Geneva Protocol] (entered into force Feb. 8, 1928).

⁸ *Id.*

⁹ See GRAHAM & LAVERA, *supra* note 5, at 7–10.

¹⁰ See ROBERT MATHEWS, CHEMICAL AND BIOLOGICAL WEAPONS 6 (2015) (to be published in ROUTLEDGE HANDBOOK OF THE LAW OF ARMED CONFLICT (Rain Liivoja & Tim McCormack eds., forthcoming 2016)).

¹¹ Declaration Respecting the Prohibition of the Use of Expanding Bullets, July 29, 1899, *English version in* 1 AM. J. INTL’L L. SUPP. 155, http://avalon.law.yale.edu/19th_century/dec99-03.asp;

Conventional Weapons,¹² in which Protocol IV bans the use of blinding lasers¹³ and Protocol II prohibits booby traps attached to items such as food, drink, and children's toys.¹⁴

2. Non-proliferation restrictions

An agreement might be focused on restricting the spread of a designated weapon or capability to additional countries (and non-state actors). As such, it does little to inhibit a country's indigenous production and continued possession of the weapon, but aims to interdict or at least retard the dissemination.¹⁵

The most important illustration of this concept is the 1968 Nuclear Non-Proliferation Treaty,¹⁶ which classifies five of its parties (China, France, Russia, the United Kingdom, and the United States) as "nuclear-weapon states" (NWS) and the other 186 parties as "non-nuclear weapon states" (NNWS).¹⁷ The NWS promise "not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly or indirectly."¹⁸ The NNWS reciprocally undertake "not to receive the transfer from any transferor whatsoever...not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture"¹⁹ of those arms.

A variety of export control regimes can also serve a non-proliferation objective. The Australia Group, for example, is a coalition of developed countries who have agreed to align their policies regarding the international sale of potentially weapons-relevant chemical and biological substances and equipment.²⁰

reprinted in THE HAGUE CONVENTIONS AND DECLARATIONS OF 1899 AND 1907 (James Brown Scott ed., 3d ed. 1918) [hereinafter 1899 Hague IV].

¹² Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed To Be Excessively Injurious or To Have Indiscriminate Effects, Oct. 10, 1980, 1342 U.N.T.S. 137 [hereinafter Convention on Certain Conventional Weapons, or CCW] (entered into force Dec. 2, 1983; entered into force for the United States Sept. 24, 1995).

¹³ *Id.*, Protocol IV.

¹⁴ *Id.*, Protocol II.

¹⁵ See CROFT, *supra* note 5, at 30 (discussing the 1919 Convention for the Control of the Trade in Arms and Ammunition and the 1925 Convention for the Supervision of the International Trade in Arms and Ammunition and in Implements of War, intended to restrict exports of a wide array of weapons to most of Africa and the Middle East); *id.* at 50–54 (discussing a variety of non-proliferation measures).

¹⁶ Treaty on the Non-Proliferation of Nuclear Weapons, July 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161 [hereinafter Non-Proliferation Treaty or NPT].

¹⁷ *Id.*, art. IX.3; see UNITED NATIONS OFFICE FOR DISARMAMENT AFFAIRS, *Treaty on the Non-Proliferation of Nuclear Weapons*, <http://disarmament.un.org/treaties/t/npt> (last visited Oct. 26, 2016) (listing 191 parties to NPT).

¹⁸ NPT, *supra* note 16, art. I.

¹⁹ *Id.*, art. II.

²⁰ MATHEWS, *supra* note 10, at 16–17; THE AUSTRALIA GROUP, *Fighting the Spread of Chemical and Biological Weapons, Strengthening Global Security*, <http://www.australiagroup.net/en/> (last visited Oct. 25, 2016); ARMS CONTROL ASS'N, *The Australia Group at a Glance* (Oct. 2012), <http://www.armscontrol.org/factsheets/australiagroup>.

The Missile Technology Control Regime serves a parallel function regarding ballistic and cruise missiles and components that would be capable of delivering a payload of 500 kg over a distance of 300 km.²¹ The 2013 Arms Trade Treaty is the most recent and general iteration, addressing international sales (but not domestic production) of eight categories of major arms, including battle tanks, armed combat vehicles, and attack helicopters.²²

3. Test bans or limits

To address the “qualitative” aspects of an arms race (the seriatim technological improvement of the weapons, rather than the “quantitative” increases in their numbers), some treaties restrict the testing of new types. These provisions do not directly forbid the enhancements (still less do they address the numbers, proliferation, or use of the weapons), but they can inhibit weaponeers’ inventiveness by exploiting states’ natural caution against proceeding with the production and use of devices that have not been subjected to adequate proof testing.

The best illustration of this concept comes in the realm of nuclear weapons, where a sequence of treaties has circumscribed the location, size, and purpose of test detonations, and now aims to foreclose the explosions altogether. First, the 1963 Limited Test Ban Treaty confined the explosions to deep underground chambers, instead of the atmosphere;²³ then the 1974 Threshold Test Ban Treaty²⁴ and 1976 Peaceful Nuclear Explosions Treaty²⁵ restrained even those events to no more than 150 kilotons yield. The 1996 Comprehensive Test Ban Treaty (CTBT) would shut down the practice altogether but it has not yet entered into force.²⁶

²¹ THE MISSILE TECHNOLOGY CONTROL REGIME, EQUIPMENT, SOFTWARE AND TECHNOLOGY ANNEX (2016), http://mtcr.info/wordpress/wp-content/uploads/2016/10/MTCR-TEM-Technical_Annex_2016-10-20.pdf; U.S. DEP’T OF STATE, *Missile Technology Control Regime (MTCR)*, <http://www.state.gov/t/avc/trty/187155.htm> (last visited Oct. 25, 2016); *The Missile Technology Control Regime at a Glance*, ARMS CONTROL ASS’N (Aug. 2016), <http://www.armscontrol.org/factsheets/mtcr>.

²² Arms Trade Treaty art. 2.1, June 3, 2013, U.N. Treaty Collection, No. 52373, <https://treaties.un.org/doc/Publication/UNTS/No%20Volume/52373/Part/I-52373-08000002803628c4.pdf>.

²³ Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water art. I, Aug. 5, 1963, 14 U.S.T. 1313 [hereinafter Limited Test Ban Treaty or LTBT].

²⁴ Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions, U.S.-U.S.S.R., art. I, July 3, 1974, 1714 U.N.T.S. 216 [hereinafter Threshold Test Ban Treaty].

²⁵ Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions, U.S.-U.S.S.R., art. III.2, July 3, 1974, 15 I.L.M. 891 (1976) [hereinafter Peaceful Nuclear Explosions Treaty].

²⁶ Comprehensive Nuclear-Test-Ban Treaty, art. I, Sept. 24, 1996, S. TREATY DOC. No. 105-28 (1997) [hereinafter CTBT] (not in force).

In a similar vein, the 1979 SALT II Treaty²⁷ contained a provision confining the United States and the Soviet Union to only one new type of Inter-Continental Ballistic Missile (ICBM) each, and effectuated that restriction by allowing flight-testing of only one such new device.²⁸

4. Geographic deployment limits

Another familiar tactic is to restrict the locations in which specified armaments may be placed. This approach does not directly require reductions in the numbers of the arms or do much to inhibit their application in combat, but does help carve out certain areas as “special,” more or less exempt from ordinary arms competition.

The 1959 Antarctic Treaty,²⁹ the 1967 Outer Space Treaty,³⁰ and the 1971 Seabed Arms Control Treaty³¹ are salient illustrations. Each prohibits the emplacement of nuclear weapons in the specified environment, but leaves parties unconstrained in most other respects.

An array of regional treaties has crafted nuclear-weapon-free zones for swaths of populated areas; most of the southern hemisphere is now covered by such restrictions.³² These instruments reinforce the Non-Proliferation Treaty’s obligations by underscoring the NNWS commitment never to acquire nuclear weapons, and a series of associated protocols supports the deployment restrictions by having NWS agree not to conduct specified nuclear weapons activities inside the zones.

5. Confidence-building measures

Sometimes a treaty supports international peace and security not by limiting the numbers and locations of weapons but by requiring other actions that

²⁷ Treaty Between the United States of America and the Union of Soviet Socialist Republics On the Limitation of Strategic Offensive Arms, U.S.-U.S.S.R., June 18, 1979, S. TREATY DOC. 96-25 [hereinafter SALT II] (not in force).

²⁸ *Id.*, art. IV.9.

²⁹ Antarctic Treaty, Dec. 1, 1959, 12 U.S.T. 794 (entered into force June 23, 1961).

³⁰ 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 [hereinafter Outer Space Treaty] (entered into force Oct. 10, 1967).

³¹ Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof, Feb. 11, 1971, 23 U.S.T. 701 [hereinafter Seabed Arms Control Treaty] (entered into force May 18, 1972).

³² See Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, Feb. 14, 1967, 634 U.N.T.S. 326 [hereinafter Treaty of Tlatelolco] (entered into force Apr. 22, 1968); South Pacific Nuclear Free Zone Treaty, Aug. 6, 1985, 1445 U.N.T.S. 177 [hereinafter Treaty of Rarotonga] (entered into force Dec. 11, 1986); Treaty on the Southeast Asia Nuclear Weapon Free Zone, Dec. 15, 1995, 35 I.L.M. 635 (1996) [hereinafter Treaty of Bangkok] (entered into force Mar. 27, 1987); Treaty on a Nuclear-Weapon-Free Zone in Central Asia, Sept. 8, 2006, <http://disarmament.un.org/treaties/t/canwzfz> [hereinafter Treaty of Semipalatinsk] (entered into force Mar. 21, 2009); Treaty on the Nuclear-Weapon-Free Zone in Africa, Apr. 11, 1996, 35 I.L.M. 698 (1996) [hereinafter Treaty of Pelindaba] (entered into force July 15, 2009).

can nonetheless reassure a nervous country that its neighbor (or erstwhile potential adversary) is not preparing an imminent surprise attack. Confidence-building (or confidence-, transparency-, and security-building) measures can include pre-announcement of, and invitation to foreign observers at, major military maneuvers; expedited mechanisms for resolving potentially-disruptive military incidents at sea; and enhanced algorithms for emergency “hot line” communications in cases of ambiguity and uncertainty.³³

The 1992 Open Skies Treaty³⁴ is an illustration: it allows each party, including the United States, Russia, and most of the countries of Europe, to overfly each other’s territory and conduct multi-spectral aerial observation, on short notice and with few restrictions, to monitor locations and actions of potential military significance. The 2011 Vienna Document³⁵ likewise promotes transparency by requiring participants to notify each other about significant out-of-garrison troop movements and to invite observers to monitor the events.

6. Numerical caps

Perhaps the most obvious function of an arms control treaty is to set quantitative restrictions on the numbers of the regulated weapons. In the first

³³ See, e.g., U.S. DEP’T OF STATE, REPORT OF THE UNITED STATES OF AMERICA PURSUANT TO ACTIONS 5, 20, 21 OF THE 2010 NUCLEAR NON-PROLIFERATION TREATY REVIEW CONFERENCE FINAL DOCUMENT 12-14 (2014), <http://www.state.gov/documents/organization/225580.pdf> (summarizing transparency and confidence-building measures adopted by the United States and others in response to demands from non-nuclear countries); U.S. DEP’T OF STATE, UNITED STATES REPORT TO THE ORGANIZATION OF AMERICAN STATES ON THE APPLICATION OF CONFIDENCE AND SECURITY BUILDING MEASURES FOR 2009 AND 2010 (2011), <http://www.state.gov/p/wha/rls/187741.htm>; Rep. of the U.N. Grp. of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, U.N. Doc. A/68/189 (July 19, 2013), http://www.un.org/ga/search/view_doc.asp?symbol=A/68/189; CROFT, *supra* note 5, at 117–20.

An associated set of measures includes “safeguard” arrangements and additional protocols concluded by several states and the International Atomic Energy Agency (IAEA). These instruments do not directly restrict military affairs, but they are the vehicles through which the IAEA monitors international cooperation on peaceful uses of nuclear energy and guards against the diversion of nuclear material to weapons purposes. See INT’L ATOMIC ENERGY AGENCY, *Safeguards Legal Framework*, <https://www.iaea.org/safeguards/safeguards-legal-framework> (last visited Oct. 28, 2016); THE VERIFICATION RESEARCH, TRAINING AND INFORMATION CENTRE [VERTIC], THE IAEA AND NUCLEAR DISARMAMENT VERIFICATION: A PRIMER (2011), <http://www.vertic.org/media/assets/Publications/VM11%20WEB.pdf>; Dean, *supra* note 5, at 23. Of a similar character are the dozens of bilateral agreements between the United States and other countries, to cooperate on nuclear matters and ensure against military applications. *Id.*

³⁴ Treaty on Open Skies, Mar. 24, 1992, S. TREATY DOC. No. 102-37 (1992).

³⁵ Vienna Document 1990 of the Negotiations on Confidence- and Security-Building Measures Convened in Accordance with the Relevant Provisions of the Concluding Document of the Vienna Meeting of the Conference on Security and Cooperation in Europe arts. IV, V, Nov. 17, 1990, <http://www.osce.org/fsc/41245?download=true>; see also Vienna Document 1992, Mar. 4, 1992, <http://www.osce.org/fsc/41253?download=true>; Vienna Document 1994, Nov. 28, 1994, <http://www.state.gov/t/avc/trty/102586.htm>; Vienna Document 1999, Nov. 16, 1999, <http://www.osce.org/fsc/41276?download=true>; Vienna Document 2011, Dec. 22, 2011, <http://www.osce.org/fsc/86597?download=true>.

instance, the cap can be deliberately set high enough so participants need not reduce their current holdings at all—the ceiling leaves plenty of head room. In the case of the 1972 SALT I Interim Agreement on Strategic Offensive Arms,³⁶ for example, the United States and the Soviet Union were even allowed to finish the construction of in-progress launchers for ICBMs and Submarine-Launched Ballistic Missiles (SLBMs), but they could not initiate new building.³⁷ Even the SALT II Treaty would not have required much actual reduction in the inventories, mostly just capping their growth.³⁸

Conversely, for a country that currently possesses none of the relevant weapons, a “cap” is effectively a complete disarmament agreement. The 1993 Chemical Weapons Convention³⁹ and the 1972 Biological Weapons Convention,⁴⁰ in this respect, legally freeze their parties at zero, and most states were already at that level when the treaties were created.

7. Reductions without details on R2D

Progressing one important step further, a treaty might draw down the parties’ contemporaneous weapons numbers, but do so without inserting great specificity regarding the timetable, procedures, and standards for the required dismantling. The Biological Weapons Convention, for example, mandates that each party destroy or convert to peaceful purposes “all agents, toxins, weapons, equipment and means of delivery,” and to do so “as soon as possible but not later than nine months after entry into force of the Convention.”⁴¹ But it does not define the standard of “destruction” for each regulated item, or specify how those activities should, and should not, be undertaken, nor does it provide any mechanism for corroboration of a state’s autonomous destruction actions.⁴²

8. Reductions with R2D details

Finally, and most ambitiously, a treaty might not only designate target numbers (zero or otherwise) for the retained armaments, but also establish

³⁶ Interim Agreement Between the United States of America and the Union of Soviet Socialist Republics on Certain Measures with Respect to the Limitation of Strategic Offensive Arms, U.S.-U.S.S.R., May 26, 1972, 23 U.S.T. 3462 [hereinafter SALT I Interim Agreement] (entered into force Oct. 3, 1972).

³⁷ *Id.*, art. I.

³⁸ *See infra*, text accompanying notes 248–61 [discussing SALT II].

³⁹ Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction art. I, Jan. 13, 1993, 1974 U.N.T.S. 45 [hereinafter Chemical Weapons Convention or CWC] (entered into force Apr. 29, 1997).

⁴⁰ Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction art. I, Apr. 10, 1972, 26 U.S.T. 583 [hereinafter Biological Weapons Convention or BWC] (entered into force Mar. 26, 1975).

⁴¹ *Id.*, art. II.

⁴² The BWC does specify that in implementing the R2D operations, “all necessary safety precautions shall be observed to protect populations and the environment.” *Id.*; *see also infra*, text accompanying note 209.

stipulations about: a) the timetable for destruction; b) the criteria by which the completeness of “destruction” or “elimination” should be assessed; c) the procedures that must (and must not) be followed to accomplish the objective; and d) the routines for external verification of compliance with the obligations. Each of these criteria could be stated with more or less specificity, and countries could be afforded (or not) a range of choice or options.

As elaborated *infra*, modern arms control now provides numerous illustrations of this detail-oriented approach. The Chemical Weapons Convention contains a rigid, multi-step timetable pursuant to which each party is to rid itself of the prohibited toxic chemicals;⁴³ it defines destruction as “essentially irreversible”;⁴⁴ it requires adherence to the highest national standards for protecting the environment and the health and safety of workers and communities;⁴⁵ and it requires that observers from the treaty-created international organization oversee all operations.⁴⁶

The bilateral U.S.-U.S.S.R. 1991 START I⁴⁷ and 2010 New START⁴⁸ treaties are nearly as fulsome in determining schedules and procedures. In fact, as elaborated in Part II, one of the important innovations in the 2010 instrument was to substantially ease the burdens on the dismantling and inspection procedures that had proven dysfunctional in the 1991 treaty. The 1990 Conventional Forces in Europe Treaty⁴⁹ may contain the largest number of restrictions, as it regulates five categories of weapons (such as tanks, heavy artillery, and combat aircraft) for its 30 parties and for certain combinations of them.⁵⁰ For each category, the treaty declares in detail how a country is to accomplish the dismantling in order to remove items from the national quota.

This Article concentrates principally on Category 8, in which the full panoply of R2D specifications may be brought into play. But the other pigeonholes are relevant in analyzing the level of specificity that treaty-makers have episodically brought to the weapons-elimination task.

B. *Structural Options for Arms Control Treaties*

This Section identifies a series of choices treaty makers must resolve about the structural or operational aspects of the instrument. There is no “right

⁴³ CWC, *supra* note 39, art. VIII, Annex on Implementation and Verification, Part IV (A).C.15-17.

⁴⁴ *Id.*, Annex on Implementation and Verification, Part IV (A).C.12.

⁴⁵ *Id.*, arts. IV.10, VII.3.

⁴⁶ *Id.*, art. VIII, Annex on Implementation and Verification, Part IV (A).C.14 and D.50-70.

⁴⁷ Treaty on the Reduction and Limitation of Strategic Offensive Arms, July 31, 1991, U.S.-USSR, S. TREATY DOC. No. 102-20 (1991) [hereinafter START I Treaty].

⁴⁸ Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, U.S.-Russia., Apr. 8, 2010, S. TREATY DOC. No. 111-5 (2010) [hereinafter New START Treaty] (entered into force Feb. 5, 2011).

⁴⁹ Treaty on Conventional Armed Forces in Europe, Nov. 19, 1990, 30 I.L.M. 1 [hereinafter Conventional Forces in Europe Treaty or CFE Treaty] (entered into force July 17, 1992).

⁵⁰ *Id.*, arts. IV, V, VI.

answer” to these questions—multiple variations might be viable in particular circumstances—but they have strong implications for the R2D functions.⁵¹ Eight key variables are identified; these identify the most important recurrent substantive and procedural issues arising in arms control negotiations—they define the parameters of the treaty and reveal the parties’ intentions and constraints in constructing the regime.

1. Legally binding or not

Many of the most prominent arms control regimes are grounded in legally-binding treaties:⁵² the bilateral U.S.-U.S.S.R. SALT and START agreements, for example, or the multilateral Biological Weapons Convention and the 2008 Oslo Convention on cluster munitions.⁵³ Indeed, there may be a general expectation that to effectively address the most important, complicated security matters, the full formality of legal treaty-making is advisable.⁵⁴ Nonetheless, several prominent counter-examples exist of major instruments that were “merely” politically binding, such as the Helsinki,⁵⁵ Stockholm,⁵⁶ and Vienna Documents⁵⁷

⁵¹ DEN DEKKER, *supra* note 5, at 49–62.

⁵² This Article does not address the question, raised under domestic U.S. constitutional law, about the choice between a “treaty” and an “executive agreement” as a vehicle for creating international commitments. Both types of legally-binding documents have been used for arms control. The SALT I package of instruments, for example, as discussed *supra* text accompanying notes 211–13, included the Anti-Ballistic Missile Treaty, *infra* note 73 (cast as a treaty under Article II of the U.S. Constitution, approved pursuant to a two-thirds vote of advice and consent in the Senate) and the Interim Agreement on Strategic Offensive Arms, *see infra* note 36 (cast as an executive agreement, receiving a majority vote of endorsement in each House of Congress). *See* Keith E. Fryer & J. Michael Levengood, *Arms Control: SALT II—Executive Agreement or Treaty?*, 9 GA. J. INT’L & COMP. L. 123 (1979).

⁵³ Convention on Cluster Munitions, Dec. 3, 2008, 2688 U.N.T.S. 39 [hereinafter Cluster Munitions Convention or Oslo Convention] (entered into force Aug. 1, 2010).

⁵⁴ *See* Arms Control and Disarmament Act of 1961 § 33, 22 U.S.C. 2573(b) (2014) (prohibiting any agreement that would obligate the United States to reduce or limit its armed forces or armaments without authorization by Congress or the Senate’s advice and consent to a treaty). Countries have frequently used non-legally-binding unilateral statements or parallel declarations of intent to honor the terms of a treaty that has not entered into force or that has expired. *See* Fryer & Levengood, *supra* note 52, at 127–28 (noting U.S. and Soviet statements of intent to take no action inconsistent with the provisions of the SALT I Interim Agreement after its expiration); GRAHAM & LAVERA, *supra* note 5, at 374 (describing U.S. and Soviet agreement to conform to the terms of treaties limiting the size of nuclear weapons tests for fifteen years before those treaties were ratified).

⁵⁵ 1975 Helsinki Final Act (Final Act of the Conference on Security and Cooperation in Europe), Aug. 1, 1975, 14 I.L.M. 1292 [hereinafter Helsinki Document].

⁵⁶ 1986 Stockholm Document on Confidence- and Security-Building Measures and Disarmament in Europe (Document of the Stockholm Conference on Confidence- and Security-Building Measures and Disarmament in Europe), Sept. 19, 1986, 26 I.L.M. 190 [hereinafter Stockholm Document].

⁵⁷ *See* Vienna Documents, *supra* note 35.

regarding security and cooperation in Europe, and the 2015 Joint Comprehensive Plan of Action dealing with Iran's nuclear program.⁵⁸

It would be inaccurate to conclude that, in general, legally binding instruments are *per se* more important, of longer duration, or more fully complied with than non-legally-binding instruments, because there are plenty of contrary illustrations. Some non-legally-binding (or “politically-binding”) documents rank at the apex of successful international frameworks, while some legally-binding accords have failed to establish durable, well-respected rules and relationships.⁵⁹ Still, it may matter for the specification and operation of the R2D functions whether the instrument is grounded in legal or political compulsion.

2. Number and type of participants

An arms control treaty may be bilateral or multilateral, and may be global or regional in scope. Illustrating the bilateral types, during the Cold War, the United States and the Soviet Union repeatedly exercised their special responsibility for dealing with global security matters, especially where weapons of mass destruction were concerned. For example, they concluded the 1987 Intermediate-range Nuclear Forces (INF) Treaty⁶⁰ just between themselves,⁶¹ although subsequent developments have suggested that globalization of those restrictions might be valuable.⁶² Similarly, a host of measures for advance notification of possibly-ambiguous ballistic missile launches;⁶³ for reduction and

⁵⁸ Joint Comprehensive Plan of Action, July 14, 2015, <http://www.state.gov/e/eb/tfs/spi/iran/jcpoa/> (non-legally binding) [hereinafter JCPOA].

⁵⁹ See ROBERT DALTON, U.S. DEP'T OF STATE, INTERNATIONAL DOCUMENTS OF A NON-LEGALLY BINDING CHARACTER (1994), <http://www.state.gov/documents/organizations/65728.pdf>; Beard, *supra* note 5.

⁶⁰ Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles, U.S.-U.S.S.R., Dec. 8, 1987, 1657 U.N.T.S. 485 [hereinafter Intermediate Nuclear Forces Treaty or INF Treaty].

⁶¹ Although the INF Treaty is bilateral, the United States and the Soviet Union each had deployed relevant missiles on the territories of their European allies, so each had to negotiate subsequent agreements under which the basing countries would allow the inspections and other treaty-required actions. INF Treaty, *supra* note 60; Memorandum of Understanding Regarding the Establishment of the Data Base for the Treaty, art. III; *id.* Protocol Regarding Inspections Relating to the Treaty, art. II; see also JOSEPH P. HARAHAAN, ON-SITE INSPECTION AGENCY, U.S. DEP'T OF DEFENSE, ON-SITE INSPECTIONS UNDER THE INF TREATY 122–23 (1993) [hereinafter Harahan INFT]; GRAHAM & LAVERA, *supra* note 5, at 514–18 (discussing the role of several European countries in which the United States or the Soviet Union had based INF weapons).

⁶² See *Moscow Content With INF Treaty, Wants More States to Join*, SPUTNIK NEWS (Feb. 18, 2015), <http://sputniknews.com/politics/20150218/1018430952.html> (Russian ambassador states that both Russia and the United States believe the INF Treaty should be made into a multilateral agreement); David A. Cooper, *Globalizing Reagan's INF Treaty: Easier Said Than Done?*, 20 NONPROLIFERATION REV. 145 (2013); East Asia Forum, *Is China the Missing INF Treaty Ingredient?*, ECON. WATCH (Apr. 6, 2016), <http://www.economywatch.com/features/Is-China-the-Missing-INF-Treaty-Ingredient0406.html>.

⁶³ Agreement Between the United States of America and the Union of Soviet Socialist Republics on Notifications of Launches of Intercontinental Ballistic Missiles and Submarine-Launched Ballistic Missiles, May 31, 1988, 27 I.L.M. 1200 [hereinafter BMLA]; Memorandum of

resolution of incidents at sea;⁶⁴ and for expedited “hot line” crisis communications⁶⁵ were bilateral.

On the other hand, prominent instruments such as the Nuclear Non-Proliferation Treaty and the 1997 Ottawa Convention on anti-personnel land mines⁶⁶ have explicitly attempted to earn broad, even universal, participation; the disarmament and non-proliferation goals would be undercut if many “holdout” states resist recruitment.

Some treaties are explicitly regional in scope, attempting to attract most or all of the countries located in (or with special interests in) a defined geographic locale. Prominent among these are the series of treaties creating nuclear-weapon-free zones for Latin America, Africa, and other areas. As noted, some of these include protocols through which outside states can assume responsibilities for their activities and territorial possessions inside the zone.⁶⁷

3. Duration

Many of the treaties addressed in this Article—such as the Limited Test Ban Treaty and the Biological Weapons Convention—are of indefinite (i.e., permanent) duration.⁶⁸ Others have fixed, finite durations, such as fifteen years for START I⁶⁹ or “through December 31, 1985,” in the case of SALT II,⁷⁰ at which point they expire. The Nuclear Non-Proliferation Treaty adopts a bifurcated stance, with an initial duration of twenty-five years; after that, the parties instituted an indefinite extension.⁷¹ Any of these approaches is acceptable,

Understanding on Notifications of Missile Launches (Pre-Launch Notification System or PLNS), Dec. 16, 2000, <http://www.state.gov/t/isn/4954.htm>.

⁶⁴ Agreement Between the Government of the United States of America and the Government of the Union of Soviet Socialist Republics on the Prevention of Incidents On and Over the High Seas, May 25, 1972, 852 U.N.T.S. 153; *see generally* GRAHAM & LAVERA, *supra* note 5, at 301.

⁶⁵ Memorandum of Understanding Between the United States of America and the Union of Soviet Socialist Republics Regarding the Establishment of a Direct Communications Link, U.S.-U.S.S.R., June 20, 1963, 472 U.N.T.S. 163; Agreement Between the United States of America and the Union of Soviet Socialist Republics on Measures to Improve the U.S.A.-U.S.S.R. Direct Communications Link, Sept. 30, 1971, 806 U.N.T.S. 402; Agreement Between the United States of America and the Union of Soviet Socialist Republics to Expand the U.S.-U.S.S.R. Direct Communications Link, U.S.-U.S.S.R., July 17, 1984; *see also* CROFT, *supra* note 5, at 120 (noting the creation of similar hotline arrangements between France and the Soviet Union and the United Kingdom and the Soviet Union).

⁶⁶ Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction, Sept. 18, 1997, 2056 U.N.T.S. 211 [hereinafter Ottawa Convention].

⁶⁷ *See supra* text accompanying note 32 (discussing nuclear weapon free zones).

⁶⁸ Limited Test Ban Treaty, *supra* note 23, art. IV, is of “unlimited duration.” The Biological Weapons Convention, *supra* note 40, at art. XIII, is also of “unlimited duration.” The Outer Space Treaty, *supra* note 30, and the Seabed Arms Control Treaty, *supra* note 31, have no provisions for duration, and are regarded as permanent.

⁶⁹ START I, *supra* note 47, art. XVII.2.

⁷⁰ SALT II, *supra* note 27, art. XIX.1.

⁷¹ Non-Proliferation Treaty, *supra* note 16, art. X.2; GRAHAM & LAVERA, *supra* note 5, at 106.

but they have different implications for the treaty's R2D obligations, because depending on the specific circumstances, the process of dismantling the affected weaponry may require substantial time.

4. Length and detail

The drafting style of arms control agreements has evolved dramatically over the years. Some of the early instruments, such as the Geneva Protocol or the Antarctic Treaty, were only one or a few pages long.⁷² The SALT I documents were far lengthier and included layers of specifications in “agreed statements and common understandings,” in addition to the main text, recording the parties’ meeting of the minds in more detail.⁷³ The START I agreement was a behemoth, running almost 300 pages, including six protocols, several joint statements, and associated diplomatic correspondence.⁷⁴ Two instruments dealing with seemingly similar topics reflect well the new prolixity: the 1972 Biological Weapons Convention was about four pages long, containing fifteen articles and no appendices; printed in the same format, the 1993 Chemical Weapons Convention spread to almost 100 pages, burdened with twenty-four articles, three annexes (one of which contained eleven parts), and multiple other documents.⁷⁵

Obviously, if the negotiators seek to address the R2D obligations in detail—to specify precisely when, how, and where the weapons and facilities must be destroyed or converted—then more pages (and more negotiating time) must be devoted to that ambition. A very concise instrument cannot establish the breadth of coverage or the depth of treatment of R2D issues that the more ambitious arms control instruments include, and cannot therefore provide the same degree of practical guidance for implementation.

5. Extent of provisions for verification of compliance

Associated with the general question of “detail” is the specific matter of how much text will be devoted to measures intended to assure hesitant states that their treaty partners (and ostensible adversaries) really are complying with the treaty’s stipulations. The procedures for outside scrutiny to monitor states’ behavior can consume the bulk of the treaty: often the basic ban provisions can be relatively terse, but the verification apparatus can be exhaustive.⁷⁶ Again, the modern style calls for excruciating attention to verification, far exceeding

⁷² GRAHAM & LAVERA, *supra* note 5, at 11 (Geneva Protocol), 15–19 (Antarctic Treaty).

⁷³ See Treaty on the Limitation of Anti-Ballistic Missile Systems, U.S.-U.S.S.R., May 26, 1972, 23 U.S.T. 3435, 944 U.N.T.S. 13 [hereinafter, ABM Treaty] (no longer in force); SALT I Interim Agreement, *supra* note 36.

⁷⁴ START I, *supra* note 47.

⁷⁵ GRAHAM & LAVERA, *supra* note 5, at 296–99 (Biological Weapons Convention) and 1170–1266 (Chemical Weapons Convention).

⁷⁶ See Dean, *supra* note 3, at 25 (stating that in the New START Treaty, the provisions for reduction and limitation of weapons constitute only ten lines in a treaty that consumes 356 pages); Allan S. Krass, *Arms Control Treaty Verification*, in 1 ENCYCLOPEDIA OF ARMS CONTROL, *supra* note 3, at 297.

standards that would have sufficed in an earlier age. The Chemical Weapons Convention is instructive: the “thou shalt not” passages of the treaty are essentially confined to one page, in the “general obligations” of article I; almost the entirety of the rest of the document is concerned with verification, in one way or another.⁷⁷

As applied to R2D, the verification function is to ensure not only that the affected weapons are destroyed, but also that they are *visibly* destroyed, pursuant to reliable monitoring by a disinterested set of outsiders, who can confirm that the process has been punctiliously thorough and has complied with the dictates of the treaty.⁷⁸

6. International organization

Connected to the verification function is the question of whether the treaty will create a new organization, or adapt an existing international structure, to oversee the treaty’s operation, resolve disputes, and, especially, to implement the inspection and monitoring system. This institution-building process has become quite common recently. In bilateral treaties, reciprocal inspection by the other party is the norm; sometimes, the two states charter some sort of organization to facilitate their subsequent information exchanges.⁷⁹ In multilateral arrangements, it is more common for the treaty to create a new international organization (such as the Comprehensive Test Ban Treaty Organization⁸⁰ or the Organization for the Prohibition of Chemical Weapons⁸¹) or to co-opt a standing body (such as the assignment to the pre-existing International Atomic Energy Agency of responsibilities pursuant to the Non-Proliferation Treaty⁸²). As noted, the R2D role of such an organization is to ensure that the treaty not only operates successfully, but that there is visible external corroboration of that success, without unilateral corner-cutting, even in the name of efficiency or expedience.

⁷⁷ CWC, *supra* note 39.

⁷⁸ See VERTIC, *supra* note 33, at 13–15 (discussing the value of verification in arms control treaties); DEN DEKKER, *supra* note 5, at 88–141 (discussing legality and modes of supervision of arms control treaties).

⁷⁹ See, e.g., ABM Treaty, *supra* note 73, art. XIII (creating a Standing Consultative Commission to consider questions of compliance, exchange information, etc.); Threshold Test Ban Treaty, *supra* note 24, 1990 Protocol, sec. XI.1 (creating Bilateral Consultative Commission to perform similar functions); see also GRAHAM & LAVERA, *supra* note 5, at 221–82 (describing creation of EURATOM to foster peaceful nuclear collaboration among the states of Europe, and Argentina and Brazil establishing the Argentine-Brazilian Agency for Accounting and Control to facilitate their nuclear activities); CROFT, *supra* note 5, at 99–103; DEN DEKKER, *supra* note 5, at 141–61 (surveying institutional mechanisms for arms control treaties); Gloria Duffy, *Arms Control Treaty Compliance*, in 1 ENCYCLOPEDIA OF ARMS CONTROL, *supra* note 3, at 279, 289–92.

⁸⁰ CTBT, *supra* note 26, art. II.

⁸¹ CWC, *supra* note 39, art. VIII. See also William Thomas Worster, *The Arms Trade Treaty Regime in International Institutional Law*, 36 U. PA. J. INT’L L. 995 (2015) (discussing another variant, under which the Arms Trade Treaty creates “organs” for treaty implementation without an “organization”).

⁸² See IAEA, *supra* note 33; VERTIC, *supra* note 33, at 27–31 (discussing IAEA role in verification of the Nuclear Non-Proliferation Treaty).

7. Symmetric or differentiated obligations

Most arms control treaties are completely even-handed in imposing identical obligations upon all parties. The Chemical Weapons Convention and the Biological Weapons Convention, for example, abolish those weapons equally for all members, with no special rights being retained by the countries that had been the first to develop mustard gas or anthrax weapons, or that continued to hold the largest and most diverse stockpiles.⁸³ The Non-Proliferation Treaty, in contrast, is starkly asymmetric: as noted above, it designates five countries as “nuclear weapon states” and the rest as “non-nuclear weapon states.” The latter group is obligated never to possess the regulated arms, while the former states (explicitly defined as countries that had manufactured and exploded a nuclear weapon prior to January 1, 1967) are allowed to retain them, subject to a commitment to move in good faith toward their elimination.⁸⁴

Of course, many disarmament accords are asymmetric in another important operational sense. If all weapons of a defined category are to be eliminated, the resulting burdens (financial and other) will fall more heavily upon the parties that had previously acquired the largest stockpiles. The treaty’s R2D features may be of little consequence to states that had never invested in the particular arms, but may be significant for those that had established, perhaps long ago, different procurement and retention priorities.

8. Status of the weapons

The final point in this roster presents a subtlety that can be of great moment for R2D: when addressing a category of to-be-prohibited arms, what conditions and locations of the weapons are legally relevant? That is, a disarmament treaty might address only the weapons that are in some sort of defined “active” status, which could include weapons that are held in stockpiles (e.g., stacked in warehouses) or those deployed in the field (e.g., available for operational use, but not yet expended). More ambitiously, the treaty might also extend its coverage to additional categories, including: weapons not yet fully manufactured or assembled; weapons that had been operationally fired, but failed to detonate completely (duds); weapons that were operationally deployed, then abandoned or simplistically disposed of, but that might still be at least partially functional; and weapons that are in a queue intended for dismantling but that, due to insufficient capacity in the dismantling facilities, might linger in limbo for an extended time.⁸⁵ Sometimes, the disarmament treaty also ambitiously deals with the facilities at which the banned weapons were manufactured, perhaps requiring

⁸³ Chemical Weapons Convention, *supra* note 39, art. I; Biological Weapons Convention, *supra* note 40, art. I.

⁸⁴ Non-Proliferation Treaty, *supra* note 16, art. IX.3 (definition of nuclear weapon state); *id.* art. VI (obligation to pursue disarmament).

⁸⁵ AMY F. WOOLF, CONG. RESEARCH SERV., RL33640, U.S. STRATEGIC NUCLEAR FORCES: BACKGROUND, DEVELOPMENTS, AND ISSUES 4–7 (2016) (discussing different categories and statuses of U.S. nuclear devices).

that the critical production equipment and structures be eliminated or reliably converted to other applications.

The Chemical Weapons Convention illustrates some of these options. Most of its provisions target inventories of chemical arms that were available for hostile uses, but the treaty also has detailed provisions regarding “old chemical weapons” (e.g., arms produced before 1925) and “abandoned chemical weapons” (e.g., arms previously left on the territory of some other state without its consent).⁸⁶ The Ottawa land mines treaty, explored *infra*, likewise specifies different obligations applicable to mines in stockpiles versus mines deployed in operational mine fields.⁸⁷

As elaborated in Part II, arms control treaty negotiators have drawn intermittently on all the possibilities regarding these eight points, and many of the available combinations of options have been exploited. The greatest focus here will be on instruments that are legally binding and richly detailed, but each of the other variables can also be significant for R2D operations.

C. Standards for Disarmament

The final task of this Part is to plumb four criteria—or tests—for successful R2D. Different treaties declare notably different standards about what is required in order to successfully remove a weapon from legal accountability. Few agreements are punctilious in addressing all four points in detail, but the categories can be discerned.

1. Substantive definition of “elimination”

The first question is whether the treaty identifies the overall standards, or specifies the particular steps that must be taken, to accomplish the destruction, elimination, disassembly, or conversion of the regulated items. The general notion is that the physical processes should be so complete that any subsequent effort to restore the scrapped item to weapons capability would be so expensive, difficult, time-consuming, and visible that the country contemplating such a reversal would elect instead to start the manufacturing process from scratch with other materials,

⁸⁶ CWC, *supra* note 39, art. II.5 (defining “old chemical weapons” as those produced before 1925, or produced between 1925 and 1946 that have deteriorated to such an extent that they can no longer be used as chemical weapons); *id.* art. II.6 (defining “abandoned chemical weapons” as those abandoned after January 1, 1925 on the territory of another state without its consent); *id.* Annex on Implementation and Verification, Part IV (B) (containing procedures for destroying old and abandoned chemical weapons); see Thomas Stock, *The Problem of Old and Abandoned Chemical Weapons Under the Chemical Weapons Convention*, in *THE NEW CHEMICAL WEAPONS CONVENTION: IMPLEMENTATION AND PROSPECTS* 203 (Michael Bothe et al. eds., 1998). The Chemical Weapons Convention also applies both to toxic chemicals and to their precursors (chemical reactants used at any stage in the production of chemical weapons). CWC, *supra* note 39, art. II.1, 3.

⁸⁷ Ottawa Convention, *supra* note 66, arts. 4, 5.

rather than recycling the older items.⁸⁸ In the Chemical Weapons Convention, for example, the destruction of a chemical weapon is defined as “a process by which chemicals are converted in an essentially irreversible way to a form unsuitable for production of chemical weapons.”⁸⁹

The Intermediate-range Nuclear Forces Treaty legislates specific steps for destroying particular weapons. The U.S. Pershing II missile, for example, “shall be eliminated by explosive demolition or burning”; its solid fuel, rocket nozzles and motor cases “shall be burned, crushed, flattened, or destroyed by explosion”; and its front section “shall be crushed or flattened.”⁹⁰ For the Soviet SS-4 missile, “nozzles of propulsion system shall be cut off at locations that are not assembly joints”; propellant tanks and instrumentation compartments “shall be cut into two pieces of approximately equal size”; and the front section “shall be crushed or flattened.”⁹¹

Some treaties permit the parties to convert some of the regulated weapons, facilities, or related items to other purposes, instead of completely razing assets that could find valuable applications in the civilian economy. At the same time, the other parties may be wary about the possibilities for covert re-conversion back to the prohibited purposes. In the Chemical Weapons Convention, for example, a party may request to use a former chemical weapons production facility for manufacturing other chemicals for industrial, agricultural, or medical functions. But the conversion process is subject to intense review by the treaty’s implementing organization, and the facility is exposed to “unimpeded access” by outside inspectors for ten years.⁹² The SALT II Treaty permitted the United States and the Soviet Union to re-purpose strategic weapons for other, usually non-nuclear missions. For example, heavy (i.e., nuclear-capable) long-range bombers may be converted to non-nuclear missions if there are “functionally-related observable differences which indicate whether or not they can perform the

⁸⁸ See ORG. FOR SEC. AND COOPERATION IN EUR., *Handbook of Best Practices on Small Arms and Light Weapons, Best Practice Guide on National Controls over Manufacture of Small Arms and Light Weapons*, at 7–11, FSC. GAL/43/03/Rev. 3 (2003) (describing best practices for the reliable destruction of small arms and light weapons, such as via burning, detonation, crushing, shredding, and burial, to ensure that weapons parts cannot be reused or a weapon reconstituted); DAVID CLIFF ET AL., VERTIC, IRREVERSIBILITY IN NUCLEAR DISARMAMENT: PRACTICAL STEPS AGAINST NUCLEAR REARMAMENT (2011), http://www.vertic.org/media/assets/Publications/Irreversibility_Report_Sept_2011.pdf (arguing that the reversibility of the destruction of nuclear weapons is not a binary yes/no question, but a matter of relative cost, difficulty, and timing).

⁸⁹ CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.12 (also specifying that destruction of chemical weapons hardware means a process “which in an irreversible manner renders munitions and other devices unusable as such”).

⁹⁰ Intermediate-Range Nuclear Forces Treaty, *supra* note 60, Protocol on Procedures Governing the Elimination of Missile Systems, art. II.10

⁹¹ *Id.*

⁹² CWC, *supra* note 39, Annex on Implementation and Verification, Part V.D.85. See also John A. Gilbert et al., *Destruction or Conversion of Russian Chemical Weapon Production Facilities*, in CHEMICAL WEAPON DESTRUCTION IN RUSSIA: POLITICAL, LEGAL AND TECHNICAL ASPECTS 55 (John Hart & Cynthia D. Miller eds., 1998).

mission of a heavy bomber.”⁹³ Likewise, regarding the Soviet Union’s eighteen launchers of “fractional orbital missiles,” twelve would be dismantled or destroyed, and six could be converted into launchers for testing other types of missiles undergoing modernization.⁹⁴

Obviously, the R2D specifications will vary enormously from treaty to treaty, depending upon the types of items being regulated. The regimes for dealing with diverse items such as land mines, fighter aircraft, weapons-grade uranium, or chemical production facilities are quite distinct. Moreover, the permitted “end products” can variously include toxic chemical byproducts (when chemical weapons are denatured by a neutralization process); “static display” showcases (when disarmed and retired missiles or tanks are donated to museums or parks); and training sites and targets (when dysfunctional items can still be useful as simulators or for target practice).

2. Timetables

Sometimes, a treaty simply specifies only one final deadline for accomplishing the required destruction. The Biological Weapons Convention, for example, requires each party to “destroy, or to divert to peaceful purposes, as soon as possible but not later than nine months after entry into force of the Convention” all the regulated biological materials, equipment and delivery systems.⁹⁵ Sometimes, a longer destruction timetable is allowed but a series of interim deadlines is specified, to ensure that parties are making steady progress toward the ultimate objective. The Conventional Forces in Europe Treaty provides a fulsome illustration, specifying four sequential phases of destruction: each party must complete twenty-five percent of its required reductions within sixteen months of the Convention entering into force; sixty percent within twenty-eight months; and one hundred percent within forty months; except that an extended deadline of sixty-four months can apply to certain armored combat vehicles.⁹⁶

Another R2D variable is whether the treaty provides for the possible extension or relaxation of the interim or final deadlines. Again, the Chemical Weapons Convention is the most well-developed instrument in this regard. It contemplates that “[i]f a State Party, due to exceptional circumstances beyond its control, believes that it cannot achieve the level of destruction specified,” it may propose changes in those levels.⁹⁷ The treaty’s implementing organization then reviews the application and the reasons behind it, as well as the operational plan for the remaining destruction operations. The treaty also specifies that “in no case shall the deadline for a State Party to complete its destruction of all chemical

⁹³ SALT II Treaty, *supra* note 27, art. VI.6, common understanding.

⁹⁴ *Id.*, art. VII.2, second common understanding.

⁹⁵ Biological Weapons Convention, *supra* note 40, art. II.

⁹⁶ CFE Treaty, *supra* note 49, art. VIII.4.

⁹⁷ CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.21.

weapons be extended beyond 15 years after the entry into force of this Convention.”⁹⁸

3. Protective standards

Recognizing that a slipshod R2D process regarding such hazardous weapons and materials might jeopardize the environment and the health and safety of the work crews performing the dismantling functions, as well as of the surrounding communities, some treaties have emplaced additional safeguards. To cite the Chemical Weapons Convention again, the treaty allows each party to decide for itself what incineration, neutralization, bioremediation or other processes to employ, except that it explicitly prohibits certain particularly egregious contaminating practices that had occasionally been used by short-sighted actors: dumping the chemicals into a body of water, land burial, and open-pit burning.⁹⁹ The treaty also demands that in the R2D operations, the state “shall assign the highest priority to ensuring the safety of people and to protecting the environment,” and “shall destroy chemical weapons in accordance with its national standards for safety and emissions.”¹⁰⁰

4. Verification

Finally, as noted above, sometimes the R2D processes must not only succeed in eliminating the designated weapons, they must do so visibly, subject to external corroboration. The treaty’s other parties may rightfully insist that a state cannot be self-policing in this regard, but must conduct the required destruction operations in the presence (real or virtual) of inspectors from other states or the treaty’s international organization.¹⁰¹

The Chemical Weapons Convention thus provides that each party shall ensure “that the destruction process can be verified under the provisions of this

⁹⁸ CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.26.

⁹⁹ CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.13. *See also* Ronald Sutherland, *The Destruction of Chemical Weapons and Chemical Weapons Production Facilities*, in *THE NEW CHEMICAL WEAPONS CONVENTION: IMPLEMENTATION AND PROSPECTS*, *supra* note 86, at 185, 187.

¹⁰⁰ CWC, *supra* note 39, arts. IV.10, VII.3; *see also* UNITED NATIONS DEP’T FOR DISARMAMENT AFFAIRS, *A DESTRUCTION HANDBOOK: SMALL ARMS, LIGHT WEAPONS, AMMUNITION AND EXPLOSIVES 5–9* (undated) (emphasizing that the “primary principle is that safe destruction should be the overriding objective in operations designed to reduce or eliminate weapons, ammunition and explosives” and that the “overall objective is to ensure that weapons can never be used to fire again and that ammunition and explosives are rendered completely inoperable and present no hazard to personnel engaged in the destruction process, the population at large and, to the extent possible, the environment”); BONN INT’L CTR. FOR CONVERSION, *DESTROYING SMALL ARMS AND LIGHT WEAPONS: SURVEY OF METHODS AND PRACTICAL GUIDE* (1999) (evaluating methods for collecting and destroying small arms).

¹⁰¹ *See* Harahan INFT, *supra* note 61, at 101–03 (stressing that under the INF Treaty, “[n]o missiles, launchers, or support equipment could be eliminated unless an inspection team was present to record and report the destruction”).

Convention.”¹⁰² The treaty specifies in detail the mechanisms for this oversight, including voluminous national declarations and annual reports, as well as on-site visits. The cost of performing these R2D verification functions can be substantial, and is to be borne by the inspected state.¹⁰³

II. Assessing Arms Control Treaties

This Part assesses the actual practice of historic, recent and current arms control treaty provisions according to the criteria established in Part I.¹⁰⁴ In particular, it highlights treaties for which the R2D specifications have proven problematic: either too tight, too loose, or imprecisely targeted. Unfortunately, for many treaties, the key data are obscured by security classification systems; the world simply does not know whether the absence of reported problems in accomplishing the required eliminations has been due to good luck, to hard work and prescient treaty drafting, or to diplomatic secrecy that conceals important disputes.¹⁰⁵ Nonetheless, some important observations can be made across four broad categories of treaty precedents.

A. *Treaties Containing No, or Virtually No, R2D Specifications*

The first category of disarmament agreements contains treaties that might be quite significant, widely accepted, and successful in meeting their parties’ security goals, but that do not incorporate notable specifications regarding R2D obligations and procedures. In some instances, the absence of these implementation details may be attributable to the treaty being “future-oriented,” in dealing with types of armaments that did not yet exist—the effort was to foreclose an incipient arms race, rather than to draw down any existing stockpiles. In other instances, the treaty was not aimed principally at erecting quantitative

¹⁰² CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.14; *see also id.*, Annex on Implementation and Verification, Part IV (A).D

¹⁰³ *Id.*, art. IV.16.

¹⁰⁴ This Article concentrates on arms control efforts of the Twentieth and Twenty-First centuries, but the international practice of disarmament (achieved by mutual consent or imposed by the victor of a major war) is much older. For surveys of R2D and related provisions stretching back to antiquity, *see* Neta C. Crawford, *Restraining Violence in Early Societies*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT 539 (Richard Dean Burns, ed., 1993); Stanley M. Burstein, *Arms Control in Antiquity*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra*, at 551; CROFT, *supra* note 5, at 20–33.

¹⁰⁵ Consider the U.S. government’s occasional reports about Soviet Union’s and other states’ compliance with arms control treaties. *See generally* Letter from Ronald Reagan, President, U.S., to Jim Wright, Speaker of the House of Representatives, U.S. (Dec. 2, 1987), <https://reaganlibrary.archives.gov/archives/speeches/1987/120287b.htm> [hereinafter 1987 COMPLIANCE REPORT] (transmitting report on Soviet noncompliance with arms control agreements); U.S. DEP’T OF STATE, ADHERENCE TO AND COMPLIANCE WITH ARMS CONTROL, NONPROLIFERATION, AND DISARMAMENT AGREEMENTS AND COMMITMENTS (2010), <http://www.state.gov/t/avc/rls/rpt/170924.htm> [hereinafter 2010 COMPLIANCE REPORT]; U.S. DEP’T OF STATE, 2016 REPORT ON ADHERENCE TO AND COMPLIANCE WITH ARMS CONTROL, NONPROLIFERATION, AND DISARMAMENT AGREEMENTS AND COMMITMENTS (2016), <http://www.state.gov/t/avc/rls/rpt/2016/255651.htm> [hereinafter 2016 COMPLIANCE REPORT]; GLORIA DUFFY, COMPLIANCE AND THE FUTURE OF ARMS CONTROL (1988).

restrictions on the possession of weapons, but sought to establish limits on their use, proliferation, testing, or locations, or to institute confidence-building measures. In some instances, perhaps, the negotiators simply did not know enough, or did not care enough, about the practicalities of the physical elimination processes. Twelve treaties and types of regimes are identified here, in roughly chronological order, with thumbnail sketches of their accomplishments and limitations.

1. Hague Conventions of 1899 and 1907¹⁰⁶

The Hague conferences were ambitious and diverse, producing a wide-ranging set of agreements, some of which deal with particular types of especially-reviled or fearsome weapons. The 1899 Declaration IV.1, for example, prohibits the launching of projectiles or explosives from balloons or via similar methods;¹⁰⁷ under Declaration IV.2, the contracting parties “agree to abstain from the use of projectiles the object of which is the diffusion of asphyxiating or deleterious gases”;¹⁰⁸ and Declaration IV.3 bars “the use of bullets which expand or flatten easily in the human body.”¹⁰⁹ Each of these limitations is applicable only to wars fought exclusively between parties to the relevant agreement. The 1907 Conference Declaration XIV prolonged the 1899 ban on aerial bombardment from balloons, which had originally been of only five years duration.¹¹⁰ All of these accords address only the *use* of weapons; none stretches to the chronologically prior functions such as manufacture, possession or deployment, and none contains any R2D provisions related to destruction or elimination of the devices.

2. 1925 Geneva Protocol¹¹¹

Despite earlier efforts to ban poisons and asphyxiating agents in warfare,¹¹² World War I produced some one million chemical casualties and over

¹⁰⁶ Hague 1899 and Hague 1907 Conventions, *supra* note 11. Antecedents of these accords include the 1868 St. Petersburg Declaration Renouncing the Use, in Time of War, of Certain Explosive Projectiles, Dec. 11, 1868, 18 Martens Nouveau Recueil (ser. 1) 474, 138 Consol. T.S. 297 (banning use of small arms ammunition consisting of “any projectile of a weight below 400 grams (14 ounces avoirdupois) which is either explosive or charged with fulminating or inflammable substances”) and the 1874 Brussels Declaration, Project of an International Declaration Concerning the Laws and Customs of War, art. 13(a), Aug. 27, 1874, 1 AJIL Supplement 96 (never entered into force) (forbidding poison or poisoned weapons). Neither of these instruments contained any R2D provisions. See BOOTHBY, *supra* note 5, at 10–15.

¹⁰⁷ 1899 Hague IV *supra* note 11, Declaration I.

¹⁰⁸ *Id.*, Declaration II.

¹⁰⁹ *Id.*, Declaration III.

¹¹⁰ 1907 Hague, *supra* note 11, Declaration XIV; 1907 Hague IV, Laws and Customs of War on Land, art. 25.

¹¹¹ Geneva Protocol, *supra* note 7. See generally U.S. DEP’T OF STATE, BUREAU OF INT’L SEC. AND NONPROLIFERATION, *Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare (Geneva Protocol)*, <http://www.state.gov/t/isn/4784.htm> (last visited Aug. 2, 2016); GRAHAM & LAVERA, *supra* note 5, at 7–10.

100,000 deaths.¹¹³ The 1919 Treaty of Versailles prohibited Germany from again manufacturing these implements,¹¹⁴ and the victors voluntarily undertook similar restraints upon themselves.¹¹⁵ The Geneva Protocol became the vehicle for global renunciation of chemical weapons, but a series of national reservations converted it into only a “no first use” agreement, applicable solely between its parties.¹¹⁶ The Geneva Protocol does not deal with mere possession of chemical arms, and does not address the destruction of those weapons at all.

3. Special areas treaties

Three widely accepted multilateral treaties delineate particular geographic locations as “special,” to be immunized from traditional terrestrial militarization.¹¹⁷ These instruments are designed to be prophylactic in nature, to preclude, rather than to undo, arms races in these areas, and they contain no R2D obligations that would deal with existing military assets. First, under the 1959 Antarctic Treaty,¹¹⁸ parties agree that Antarctica “shall be used for peaceful purposes only”; they have prohibited “any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military maneuvers, as well as the testing of any type of weapons.”¹¹⁹ They specifically prohibit any nuclear explosions on the continent.¹²⁰

Second, the 1967 Outer Space Treaty¹²¹ is principally concerned with facilitating peaceful exploration and exploitation of the exoatmospheric realm, but

¹¹² See MATHEWS, *supra* note 10, at 2 (noting that efforts to prohibit the use of poisons in warfare are “almost as ancient as the weapons themselves”); John Ellis Van Courtland Moon, *Controlling Chemical and Biological Weapons Through World War II*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 657.

¹¹³ GRAHAM & LAVERA, *supra* note 5, at 7; MATHEWS, *supra* note 10, at 4.

¹¹⁴ Treaty of Peace between the Allied and Associated Powers and Germany Part V, art. 171, June 28, 1919, 225 Consol. T.S. 188 [hereinafter Treaty of Versailles].

¹¹⁵ Moon, *supra* note 112, at 664.

¹¹⁶ Geneva Protocol, *supra* note 7; MATHEWS, *supra* note 10, at 6. The Geneva Protocol also expanded upon the earlier international instruments by banning use of “bacteriological” methods of warfare, as well as chemical agents. MATHEWS, *supra* note 10, at 5.

¹¹⁷ See Allan S. Nanes, *Demilitarization and Neutralization Through World War II*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 675 (noting the practice of declaring particular countries or regions to be neutral or demilitarized).

¹¹⁸ Antarctic Treaty, *supra* note 29. See generally U.S. DEP’T OF STATE, BUREAU OF ARMS CONTROL, VERIFICATION, AND COMPLIANCE, *Antarctic Treaty*, <http://www.state.gov/t/avc/trty/193967.htm> (last visited Aug. 2, 2016); GRAHAM & LAVERA, *supra* note 5, at 13–14; Christopher C. Joyner, *The Antarctic State Treaty: 1959 to the Present*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 817.

¹¹⁹ Antarctic Treaty, *supra* note 29, art. I.1. The treaty does not ban the use of military personnel and equipment for scientific or other peaceful purposes, but does require countries to notify other parties about the introduction of those assets into Antarctica. *Id.*, art. VII.5(c).

¹²⁰ Antarctic Treaty, *supra* note 29, art. V.1.

¹²¹ Outer Space Treaty, *supra* note 30. See generally U.S. DEP’T OF STATE, BUREAU OF ARMS CONTROL, VERIFICATION, AND COMPLIANCE, *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, <http://www.state.gov/t/avc/trty/187157.htm> (last visited Aug. 2, 2016); GRAHAM & LAVERA, *supra* note 5, at 34–35; Raymond L. Garthoff, *The Outer Space Treaty: 1967 to the Present*, in 2

its article IV contains the measures that directly limit military competition.¹²² Parties undertake not to place nuclear weapons in orbit around the Earth, not to install them on celestial bodies, and not to station them in outer space in any other manner.¹²³ Regarding the Moon and other celestial bodies, parties also agree not to establish military bases, not to test any type of weapon, and not to conduct military maneuvers.¹²⁴ These were largely activities that no state had yet undertaken or intended to undertake, so there were no existing objects that had to be disassembled, moved, or destroyed, and the treaty has no R2D provisions. Finally, the 1971 Seabed Arms Control Treaty¹²⁵ prohibits the implanting or emplacement of nuclear weapons and associated structures and installations on the seabed and subsoil of the oceans beyond twelve miles from shore.¹²⁶ As no country had previously established or planned such facilities, the treaty contains no R2D provisions.

4. Nuclear test ban treaties

A series of critical arms control measures progressively constrains the explosive testing of nuclear weapons, while doing nothing directly about the manufacture, possession, deployment, or use of those arms.¹²⁷ The multilateral 1963 Limited Test Ban Treaty initiated the sequence; its parties agree not to test the weapons in the atmosphere, in outer space, or under water.¹²⁸ Two bilateral U.S.-U.S.S.R. agreements—and two subsequent protocols that greatly enhance the verification of compliance—then address the only environment in which nuclear tests are allowed—deep underground chambers—confining them to 150 kilotons yield.¹²⁹ The culmination of that stream of agreements, the multilateral Comprehensive Test Ban Treaty, would bar all nuclear explosions in all locations; it has been negotiated, signed, and widely ratified, but has not yet entered into

ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 877; *see also* Agreement Governing Activities of States on the Moon and Other Celestial Bodies art. 3, Dec. 18, 1979, 1363 U.N.T.S. 22 (containing provisions similar to the Outer Space Treaty regarding peaceful and non-military uses of the moon).

¹²² Outer Space Treaty, *supra* note 30, art. IV.

¹²³ *Id.* The treaty also applies these limits to “other kinds of weapons of mass destruction.” *Id.*

¹²⁴ *Id.*, art. IV.

¹²⁵ Seabed Arms Control Treaty, *supra* note 31. *See generally* U.S. DEP’T OF STATE, BUREAU OF INT’L SEC. AND NONPROLIFERATION, *Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof*, <http://www.state.gov/t/isn/5187.htm>; GRAHAM & LAVERA, *supra* note 5, at 283–85; Bennett Ramberg, *The Seabed Treaty: 1971 to the Present*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 887.

¹²⁶ Seabed Arms Control Treaty, *supra* note 31, arts. I, II.

¹²⁷ *See* Benjamin S. Loeb, *Test Ban Proposals and Agreements: The 1950s to the Present*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 827.

¹²⁸ Limited Test Ban Treaty, *supra* note 23, art. I.1. *See generally* U.S. DEP’T OF STATE, BUREAU OF ARMS CONTROL, VERIFICATION, AND COMPLIANCE, *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space, and Under Water*, <http://www.state.gov/t/avc/trty/199116.htm>; GRAHAM & LAVERA, *supra* note 5, at 29–31.

¹²⁹ Threshold Test Ban Treaty, *supra* note 24; Peaceful Nuclear Explosions Treaty, *supra* note 25; GRAHAM & LAVERA, *supra* note 5, at 374 (discussing the 1990 verification protocols); CROFT, *supra* note 5, at 155–60.

force.¹³⁰ While these treaties provide impressive models for treaty verification arrangements, dealing with data reporting, inspections, international organizations, and other features,¹³¹ they do not require any dismantling of existing weapons and therefore contain no R2D provisions of the types at stake here.

5. 1968 Nuclear Non-Proliferation Treaty¹³²

The Non-Proliferation Treaty is the key international instrument restricting the dissemination of nuclear weapons capabilities.¹³³ Under it, most parties agree never to receive, manufacture or acquire nuclear weapons.¹³⁴ The five countries designated “nuclear weapon states” are allowed to retain those arms, subject to article VI, which commits all parties to “pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament.”¹³⁵ The scope of that somewhat vague disarmament obligation, and the vigor and speed with which the five possessors have pursued arms reductions pursuant to it, have remained tremendously controversial among the parties,¹³⁶ also attracting attention from the International Court of Justice.¹³⁷ The United States and Russia have emphasized the tremendous reduction in their respective nuclear arsenals—cut from over 30,000 nuclear weapons each to approximately 5,000 active weapons each today—as evidence of their commitment to article VI,¹³⁸ but the language of the treaty contains no R2D specifics that would guide or hasten the process. The treaty also does not address the question of what should occur if a non-party country that already possesses

¹³⁰ See CTBT, *supra* note 26; see also COMPREHENSIVE TEST BAN TREATY ORGANIZATION, <http://www.ctbto.org/> (reporting progress toward signature, ratification, and entry into force of the treaty); GRAHAM & LAVERA, *supra* note 5, at 1375–80.

¹³¹ Threshold Test Ban Treaty, *supra* note 24, Protocol; Peaceful Nuclear Explosions Treaty, *supra* note 25, Protocol; CTBT, *supra* note 26, art. IV.

¹³² NPT, *supra* note 16. See generally GRAHAM & LAVERA, *supra* note 5, at 98–107; Leonard S. Spector, *The Proliferation of Nuclear Weapons*, in 1 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 3, at 443.

¹³³ See also sources cited *supra* note 33 (discussing safeguards agreements with IAEA, which provide greater monitoring of the peaceful operation of nuclear facilities, but do not create additional substantive prohibitions, and do not deal directly with R2D); Convention on the Physical Protection of Nuclear Material, Mar. 3, 1980, T.I.A.S. No. 11080 (requiring safeguards during international transportation of nuclear materials).

¹³⁴ NPT, *supra* note 16, art. II.

¹³⁵ *Id.*, art. VI.

¹³⁶ Lewis A. Dunn, *Finding a Way Out of the NPT Disarmament Stalemate*, 45 ARMS CONTROL TODAY, no. 3, Apr. 2015, at 8; Jayantha Dhanapala & Sergio Duarte, *Is There a Future for the NPT?*, 45 ARMS CONTROL TODAY, no. 6, July/Aug. 2015, at 8; Henk Cor van der Kwast, *The NPT: Looking Back and Looking Ahead*, 45 ARMS CONTROL TODAY, no. 6, July/Aug. 2015, at 11.

¹³⁷ Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. Rep. 226 (Jul. 8); *Obligation to Pursue in Good Faith and Conclude Negotiations Leading to Nuclear Disarmament*, (Marsh. Is. v. U.K.), Application (Apr. 24, 2014), <http://www.icj-cij.org/docket/files/160/18296.pdf> (and companion cases brought against Pakistan and India).

¹³⁸ See Hans M. Kristensen, *US Nuclear Stockpile Numbers Published Enroute to Hiroshima*, FED’N OF AM. SCIENTISTS (May 26, 2016), <http://fas.org/blogs/security/2016/05/hiroshima-stockpile/> (charting reduction in U.S. nuclear stockpile 1945-2015).

nuclear weapons sought to join the treaty as a non-nuclear weapon state; presumably, it would be required to destroy its nuclear arsenal immediately, but the text provides no guidance.¹³⁹

6. Nuclear-weapon-free zone treaties

Countries in several large geographic regions have collaborated to establish themselves as zones free of nuclear weapons and associated activities.¹⁴⁰ These regimes generally reinforce the Nuclear Non-Proliferation Treaty by establishing additional, more specific constraints upon nuclear-related activities and by creating local international organizations to monitor and support compliance. Currently, these regional arrangements exist for Latin America and the Caribbean, the South Pacific, Southeast Asia, Africa, and Central Asia.¹⁴¹ The various treaties are not identical, but do contain several cognate provisions. For example, each treaty is accompanied by associated protocols, through which countries outside the zone can assume responsibilities: a) to apply the treaty's restrictions to their colonial or other territories inside the zone,¹⁴² and b) to refrain from conducting nuclear weapons activities such as testing, stationing, or using nuclear weapons in the zone.¹⁴³

¹³⁹ Unless the treaty was amended, these countries could not join the NPT as “nuclear weapon states” because that term is defined to include only countries that had manufactured and exploded a nuclear weapon prior to January 1, 1967, which none of them had done. NPT, *supra* note 16, art. IX.3; see David S. Jonas, *Variations on Non-Nuclear: May the “Final Four” Join the Nuclear Nonproliferation Treaty as Non-Nuclear Weapons States While Retaining Their Nuclear Weapons?*, 2005 MICH. ST. L. REV. 417 (2005).

¹⁴⁰ See *supra* text accompanying note 32 (discussing nuclear-weapon-free zones); see also UNITED NATIONS OFF. FOR DISARMAMENT AFFAIRS, *Nuclear-Weapon-Free Zones*, <https://www.un.org/disarmament/wmd/nuclear/nwzf/> (last visited Oct. 30, 2016); ARMS CONTROL ASS'N, *Nuclear-Weapon-Free Zones (NWFZ) at a Glance*, <http://www.armscontrol.org/factsheets/nwzf> (last updated May 2015); NUCLEAR AGE PEACE FOUND., *Nuclear Weapons Free Zones*, http://nuclearfiles.org/menu/library/treaties/nuclear-free-zones/trty_nuclear-free-zone-index.htm (last visited Oct. 30, 2016); John R. Redick, *Nuclear-Weapon-Free Zones*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 1079.

¹⁴¹ See *supra* note 32 (official citations for NWFZ treaties). Mongolia has also declared itself to constitute a national nuclear-weapon-free zone, and other states have agreed to respect that designation. See GRAHAM & LAVERA, *supra* note 5, at 91–92; Daryl G. Kimball, *Mongolia Recognized as Nuclear-Free Zone*, 42 ARMS CONTROL TODAY (Oct. 2, 2012), https://www.armscontrol.org/act/2012_10/Mongolia-Recognized-as-Nuclear-Free-Zone%20. In addition, there has been substantial international discussion and debate about the concept of a new international agreement to make the entire Middle East a zone free of all weapons of mass destruction, although no draft treaty has yet been generated. See Alexander Glaser et al., *Building on the Iran Deal: Steps Toward a Middle Eastern Nuclear-Weapon-Free Zone*, 45 ARMS CONTROL TODAY, no. 10, Dec. 2015, at 14; Kelsey Davenport, *UN Acts on Mideast Zone Amid Doubts*, 45 ARMS CONTROL TODAY, no. 10, Dec. 2015, at 27.

¹⁴² See, e.g., Treaty of Tlatelolco, *supra* note 32, Additional Protocol I; Treaty of Rarotonga, *supra* note 32, Protocol 1.

¹⁴³ See, e.g., Treaty of Tlatelolco, *supra* note 32, Additional Protocol II; Treaty of Rarotonga, *supra* note 32, Protocols 2 and 3.

With the sole exception of South Africa, none of the states that have joined one of the nuclear-weapon-free zone treaties has ever possessed nuclear weapons, so the R2D question of destroying or converting facilities, equipment, arms, or other items was generally not addressed in the texts.¹⁴⁴ For the African zone, article 6 requires each party to “dismantle and destroy any nuclear explosive device that it has manufactured prior to the coming into force of this Treaty;” to “destroy facilities for the manufacture of nuclear explosive devices or, where possible, to convert them to peaceful purposes;” and to allow the International Atomic Energy Agency to verify those actions.¹⁴⁵ South Africa had already completed the destruction and conversion of its nuclear weapons prior to joining the treaty, so those provisions remained moot.¹⁴⁶

The outside countries possessing nuclear weapons have mostly, but not unanimously, joined the relevant zonal protocols, but they have interpreted their obligations as not requiring departures from their prior nuclear weapons practices. In particular, no R2D operations have been undertaken.¹⁴⁷

7. Confidence-building and emergency communications measures

During the Cold War, the United States and the Soviet Union concluded several significant agreements designed to stabilize emerging crises, to avoid behaviors that could contribute to misunderstanding, and to reassure each other about their benign intentions during possibly ambiguous activities or confrontations. Prominent among these were the 1963 memorandum of understanding to establish a direct communications link (via the “hot line”) and its sequential technological improvements and modernizations;¹⁴⁸ the 1971

¹⁴⁴ The Soviet Union had briefly placed nuclear weapons in Cuba but these were never owned or possessed by Cuba, and they were removed prior to the negotiation of the Latin American treaty. See GRAHAM T. ALLISON, *ESSENCE OF DECISION: EXPLAINING THE CUBAN MISSILE CRISIS* 40–66 (1971).

¹⁴⁵ Treaty of Pelindaba, *supra* note 32, art. 6.

¹⁴⁶ CROFT, *supra* note 5, at 144–46; Adolf von Baeckmann, Garry Dillon & Demetrius Perricos, *Nuclear Verification in South Africa*, 37 IAEA BULL. 42, 42 (Jan. 1995); Sara Kutchesfahani & Marcie Lombardi, *South Africa*, in NUCLEAR SAFEGUARDS, SECURITY, AND NONPROLIFERATION: ACHIEVING SECURITY WITH TECHNOLOGY AND POLICY 289, 295–99 (James E. Doyle ed., 2008) (noting that South Africa secretly abandoned its nuclear program in 1990 and dismantled its arsenal of six operational nuclear weapons prior to joining the NPT in 1991; it subsequently invited the IAEA to examine aspects of the terminated program to verify that no weapons-related aspects remained); VERTIC, *supra* note 88, at 35. In addition, Libya had an advanced program to pursue nuclear weapons; Muammar Gadhafi terminated the program in 2003, leading to the dismantlement and removal from the country of relevant materials, equipment and documents. Wyn Bowen, *Libya*, in NUCLEAR SAFEGUARDS, SECURITY, AND NONPROLIFERATION: ACHIEVING SECURITY WITH TECHNOLOGY AND POLICY, *supra*, at 331, 348–51.

¹⁴⁷ See, e.g., Proclamation by President Nixon on Ratification of Additional Protocol II to the Treaty for the Prohibition of Nuclear Weapons in Latin America, *reprinted in* GRAHAM & LAVERA, *supra* note 5, at 57; WOOLF, *supra* note 5, at 29–31 (reporting U.S. and other countries’ actions regarding the protocols).

¹⁴⁸ See *supra* note 65 (citations for hotline agreements); see also Sam Jones, *US and China Set Up ‘Space Hotline,’* FIN. TIMES (Nov. 20, 2015), <https://next.ft.com/content/900870f4-8f9f-11e5-a549-b89a1dfede9b> (reporting establishment of a similar mechanism for rapid communications

Accidents Measures Agreement (to strengthen national organizational and technical procedures against unintended war);¹⁴⁹ the 1972 Incidents at Sea Agreement (to avoid collisions and interference on the oceans);¹⁵⁰ the 1987 Nuclear Risk Reduction Centers Agreement (to create facilities in national capitals to exchange information and facilitate communications);¹⁵¹ and the 1988 Ballistic Missile Launch Notification Agreement (to provide twenty-four hours' advance warning of any test launch of an ICBM or SLBM).¹⁵² As important as these accords are, they do not directly impose any limits on either party's weaponry holdings and do not contain R2D obligations.

The Open Skies Treaty¹⁵³ is another confidence-building measure, this time with a broad multilateral composition. It empowers its parties (in an area including most of Europe, Russia, the United States and Canada) to overfly each other on short notice with aircraft operating a variety of optical, infrared, and radar sensors, to observe military-related activities.¹⁵⁴ The treaty is longer and

between the United States and China). *See generally* GRAHAM & LAVERA, *supra* note 5, at 20–21; Webster A. Stone, *The Hot Line: Washington-Moscow Direct Communications Link, 1963 to the Present*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 847.

¹⁴⁹ Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between the United States of America and the Union of Soviet Socialist Republics, Sept. 30, 1971, 807 U.N.T.S. 57. *See generally* U.S. DEP'T OF STATE, BUREAU OF INT'L SEC. AND NONPROLIFERATION, Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between the United States of America and the Union of Soviet Socialist Republics (Accidents Measures Agreement), <http://www.state.gov/t/isn/4692.htm>; GRAHAM & LAVERA, *supra* note 5, at 289–91.

¹⁵⁰ *See supra* note 64 (discussing the Incidents at Sea agreement); *see also* Agreement Between the United States of America and the Union of Soviet Socialist Republics on the Prevention of Dangerous Military Activities, June 12, 1989, T.I.A.S. 11485, 1566 U.N.T.S. 309; Agreement on the Prevention of Nuclear War, U.S.-U.S.S.R., June 22, 1973, 24 U.S.T. 1478, 917 U.N.T.S. 86.

¹⁵¹ Agreement on the Establishment of Nuclear Risk Reduction Centers, U.S.-U.S.S.R., Sept. 15, 1987, 1530 U.N.T.S. 387; *see* Memorandum of Agreement Between the United States of America and the Russian Federation on the Establishment of a Joint Center for the Exchange of Data from Early Warning Systems and Notifications of Missile Launches, June 4, 2000, <http://www.state.gov/t/avc/trty/187151.htm>; Agreement on Reciprocal Advance Notification of Major Strategic Exercises, U.S.-U.S.S.R., Sept. 23, 1989, T.I.A.S. 11458, 2191 U.N.T.S. 283. *See generally* GRAHAM & LAVERA, *supra* note 5, at 503–04.

¹⁵² *See supra* note 63 (regarding BMLA). More recently, the United States, China, and other Pacific maritime states have concluded a number of similar agreements to reduce the danger of collisions at sea, unplanned encounters at sea that could spiral out of control, and air encounters over the ocean. *See* U.S.-China Memorandum of Understanding Regarding the Rules of Behavior for Safety of Air and Maritime Encounters, Nov. 10, 2014, http://archive.defense.gov/pubs/141112_MemorandumOfUnderstandingRegardingRules.pdf; Multilateral Convention on Preventing Collisions at Sea (COLREGS Convention), Oct. 20, 1972, 28 U.S.T. 3459; Western Pacific Naval Symposium Code for Unplanned Encounters at Sea, Apr. 22, 2014 (non-legally binding) <https://news.usni.org/2014/06/17/document-conduct-unplanned-encounters-sea>; RONALD O'ROURKE, CONG. RESEARCH. SERV., R42784, MARITIME TERRITORIAL AND EXCLUSIVE ECONOMIC ZONE (EEZ) DISPUTES INVOLVING CHINA: ISSUES FOR CONGRESS 16–20 (2015); Gordon Lubold, *New U.S.-China Military Rules Vague on Dealing with Conflicts*, WALL ST. J. (Sept. 25, 2015), http://www.wsj.com/article_email/new-u-s-china-military-rules-vague-on-dealing-with-conflicts-1443220819-IMyQjAxMTE1NDI3NzAyNjc5Wj.

¹⁵³ Open Skies Treaty, *supra* note 34.

¹⁵⁴ *See* U.S. DEP'T OF STATE, BUREAU OF ARMS CONTROL, VERIFICATION, *The Treaty on Open Skies Fact Sheet*, AND COMPLIANCE (Mar. 8, 2016),

more detailed than many, but contains no restrictions on weapons and no R2D requirements.

8. 1977 Environmental Modification Convention¹⁵⁵

Under this treaty, parties agree “not to engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects.”¹⁵⁶ No countries had demonstrated or even planned a capability for engaging in such techniques, nor have any such weapons been deployed.¹⁵⁷ The treaty is silent on R2D.

9. European security measures: Helsinki,¹⁵⁸ Stockholm¹⁵⁹ and Vienna¹⁶⁰ documents

A long and diverse series of non-legally-binding multilateral agreements has sought to enhance security, human rights, and other cooperation in Europe, featuring a plethora of increasingly precise confidence-building measures. These mechanisms have included prior announcement of major military training maneuvers and invitation of observers to such exercises, and increased transparency in military infrastructures, such as yearly trades of information about current and planned military budgets and weapons purchases. The Organization for Security and Cooperation in Europe (OSCE) has continuously expanded this remit, and data are regularly exchanged regarding a wide array of types of weapon systems located within the zone of application.¹⁶¹ There are some constraints on the number and frequency of major military maneuvers, and guidelines regarding the export of weapons, but no numerical restrictions regarding the quantities or types of armaments that parties may hold, and no requirements regarding R2D.¹⁶²

<http://www.state.gov/t/avc/rls/2016/254077.htm>; *Treaty on Open Skies (OS)*, U.S. DEP’T OF STATE, <http://www.state.gov/t/avc/cca/os/index.htm> (last visited Aug. 3, 2016); GRAHAM & LAVERA, *supra* note 5, at 822–23; CROFT, *supra* note 5, at 121–25.

¹⁵⁵ Convention on the Prohibition of Military or Other Hostile Use of Environmental Modification Techniques, May 18, 1977, 1108 U.N.T.S. 152, <http://www.state.gov/t/isn/4783.htm> [hereinafter EnMod Convention]; see Arthur H. Westing, *The Environmental Modification Convention: 1977 to the Present*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 5, at 947–54.

¹⁵⁶ EnMod Convention, *supra* note 155, art. I.

¹⁵⁷ See GRAHAM & LAVERA, *supra* note 5, at 464. See generally BOOTHBY, *supra* note 5, at 78–81.

¹⁵⁸ Helsinki Document, *supra* note 55.

¹⁵⁹ Stockholm Document, *supra* note 56.

¹⁶⁰ Vienna Documents, *supra* note 35.

¹⁶¹ See generally CROFT, *supra* note 5, at 129–31; GRAHAM & LAVERA, *supra* note 5, at 1272–73; James Macintosh, *Confidence-Building Measures in Europe: 1975 to the Present*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 3, at 929; U.S. DEP’T OF STATE, BUREAU OF INT’L SEC. AND NONPROLIFERATION, *Confidence- and Security-Building Measures*, <http://www.state.gov/t/isn/4725.htm> (last visited Aug. 3, 2016); U.S. DEP’T OF STATE, *Overview of Vienna Document 2011*, <http://www.state.gov/t/avc/cca/c43837.htm> (last visited Aug. 3, 2016).

¹⁶² Organization for Security and Cooperation in Europe, Vienna Document 2011 on Confidence- and Security-Building Measures, at § 9, FSC.DOC/1/11 (Nov. 30, 2011) (annual exchange of

The OSCE does offer advice and assistance regarding destruction of excess weapons and ammunition in a safe, expeditious, and effective fashion, helping to develop the state of the R2D art.¹⁶³

10. 1994 Budapest Memoranda¹⁶⁴

Upon the dissolution of the U.S.S.R., former Soviet republics Ukraine, Kazakhstan, and Belarus suddenly inherited de facto custody of hundreds of Soviet nuclear weapons physically located on their respective territories. After lengthy negotiations, each of the newly independent states agreed to ship the weapons back to Russia and to join the Nuclear Non-Proliferation Treaty as non-nuclear weapon states.¹⁶⁵ In the Budapest Memoranda, the United States, Russia and the United Kingdom, in response, extended security guaranties to each of the three countries.¹⁶⁶ None of the publicly available documents specifies R2D provisions regarding the repatriation or destruction of the nuclear weapons.

information on military forces, including organization, manpower, and major weapons); *id.* § II.15.1 (exchange of information regarding defense policy and doctrine); *id.* § II.15.4 (information about military budgets); *id.* § IV.19 (arrangements for reciprocal visits to air bases); *id.* § V (procedures for prior notification of certain military activities); *id.* § VI (arrangements for exchanging observers at certain military activities); *id.* § IX (compliance and verification); *see also* 2016 COMPLIANCE REPORT, *supra* note 105, at 12 (assessing compliance with Vienna Document by Russia and other states).

¹⁶³ ORG FOR SEC AND COOPERATION IN EUR., *OSCE Document on Small Arms and Light Weapons*, 10, FSC.DOC/1/00/Rev.1 (June 20, 2012); ORG FOR SEC AND COOPERATION IN EUR., *FSC Chairperson's Progress Report to the Ministerial Council on Further Implementation of the OSCE Document on Stockpiles of Conventional Ammunition*, MC.GAL/4/05 (Nov. 30, 2005); ORG FOR SEC AND COOPERATION IN EUR., *FSC Chairperson's Progress Report to the Eighteenth Meeting of the Ministerial Council, The Continuing Implementation of the OSCE Document on Stockpiles of Conventional Ammunition* (Dec. 2011); ORG. FOR SEC. AND COOPERATION IN EUR., *supra* note 88; ORG FOR SEC AND COOPERATION IN EUR., *OSCE Handbook of Best Practices on Conventional Ammunition*, FSC. DEL/73/07/Rev.1/Corr.1 (2008).

¹⁶⁴ Memorandum on Security Assurances in Connection with Ukraine's Accession to the Treaty on the Non-Proliferation of Nuclear Weapons (Dec. 5, 1990), *including* Joint Declaration by the Russian Federation and the United States of America (Dec. 4, 2009), U.N. Doc. A/49/765 (Dec. 19, 1994), http://www.un.org/en/ga/search/view_doc.asp?symbol=A/49/765.

¹⁶⁵ In the 1992 Lisbon Protocol, Russia, Belarus, Kazakhstan, and Ukraine agreed to serve as successor states to the U.S.S.R. for purposes of ratifying and implementing the START I agreement, and the latter three states agreed to surrender their new nuclear weapons and join the Non-Proliferation Treaty as NNWS. Protocol to the Treaty between the United States and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms, S. TREATY DOC. NO. 102-32 (1992), <http://www.acq.osd.mil/tc/treaties/start1/protocols/lisbon.htm>. *See generally* CROFT, *supra* note 5, at 139–44; GRAHAM & LAVERA, *supra* note 5, at 886–87; JOSEPH P. HARAHAAN, WITH COURAGE AND PERSISTENCE: ELIMINATING AND SECURING WEAPONS OF MASS DESTRUCTION WITH THE NUNN-LUGAR COOPERATIVE THREAT REDUCTION PROGRAMS 28–30, 67 (2014) [hereinafter, Harahan CTR].

¹⁶⁶ *See* Memorandum on Security Assurances in Connection with the Republic of Kazakhstan's Accession to the Treaty on the Non-Proliferation of Nuclear Weapons (Dec. 5, 1994), *in* NPT BRIEFING BOOK, at K-5 (John Simpson et al. eds., 2015); Memorandum on Security Assurances in Connection with the Republic of Belarus's Accession to the Treaty on the Non-Proliferation of Nuclear Weapons (Dec. 5, 1994), *in* NPT BRIEFING BOOK, *supra*, at K-4; Memorandum on

11. Cooperative Threat Reduction Programs

Since the fall of the Berlin Wall and the splintering of the U.S.S.R., the United States has partnered with the new republics, the former Soviet satellite states, and an increasingly diverse array of other countries, in efforts to reduce the risk of excess and inadequately secured weapons of mass destruction and related materials and equipment.¹⁶⁷ The Nunn-Lugar Act, the progenitor of many of these activities, originally authorized programs to “destroy nuclear weapons, chemical weapons, and other weapons;” to “transport, store, disable, and safeguard weapons in connection with their destruction;” and to assist in “planning and in resolving technical problems associated with weapons destruction.”¹⁶⁸ Typically, the United States concludes an overarching treaty, styled as an “umbrella agreement” with an affected country, pursuant to which more specific implementing agreements regarding numerous defined projects are undertaken; these can generate individual contracts containing great precision regarding the conduct of the elimination operations.¹⁶⁹ A related type of U.S.-Russia accord, known as the Megatons to Megawatts agreement, provided for the \$17-billion conversion over twenty years of 500 tonnes of weapons-grade Russian highly-enriched uranium into low-enriched uranium, suitable for fueling U.S. nuclear power plants.¹⁷⁰ These programs have generally been phenomenally successful in their R2D de-weaponization efforts, despite numerous hiccups, but details are not publicly available.¹⁷¹

Security Assurances in Connection with Ukraine’s Accession to the Treaty on Non-Proliferation of Nuclear Weapons, (Dec. 5, 1994), U.N. Doc. A/49/765, http://www.un.org/en/ga/search/view_doc.asp?symbol=A/49/765.

¹⁶⁷ See Harahan CTR, *supra* note 165; WOOLF, *supra* note 5, at 20–27; MARY BETH NIKITIN & AMY F. WOOLF, CONG. RESEARCH SERV., R43143, THE EVOLUTION OF COOPERATIVE THREAT REDUCTION: ISSUES FOR CONGRESS (2014); Amy E. Smithson, *Why Cooperative Threat Reduction Still Matters—Especially for Biological Dangers*, 72 BULL. ATOMIC SCIENTISTS 322 (2016).

¹⁶⁸ Soviet Nuclear Threat Reduction Act (Nunn-Lugar Act), 105 Stat. 1691, § 212 (b) (codified as 22 U.S.C. § 5952 (1991)) (repealed 2014).

¹⁶⁹ Harahan CTR, *supra* note 165, at 33–34, 125–29; NIKITIN & WOOLF, *supra* note 167, at 21.

¹⁷⁰ Agreement Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons, U.S.S.R.-U.S., Feb. 18, 1993, Hein KAV No. 3603, Temp. State Dep’t No. 93-59; NIKITIN & WOOLF, *supra* note 167, at 23; William J. Broad, *From Warheads to Cheap Energy*, N.Y. TIMES (Jan. 28, 2014), <http://www.nytimes.com/2014/01/28/science/thomas-l-neffs-idea-turned-russian-warheads-into-american-electricity.html> (reporting that the Russian uranium would have been sufficient to make 20,000 nuclear weapons, but instead it was used to supply fuel for half the U.S. nuclear power plants); see THE WHITE HOUSE, UNITED STATES NATIONAL PROGRESS REPORT – 2016 NUCLEAR SECURITY SUMMIT (2016), <https://www.whitehouse.gov/the-press-office/2016/03/31/united-states-national-progress-report-2016-nuclear-security-summit>

(describing unilateral U.S. actions to strengthen security over nuclear material, to minimize nuclear and other radioactive material, and to counter nuclear smuggling); David E. Hoffman & Eben Harrell, *Saving the World at Plutonium Mountain*, WASH. POST (Aug. 16, 2013), https://www.washingtonpost.com/opinions/saving-the-world-at-plutonium-mountain/2013/08/16/1d43dd3a-0381-11e3-88d6-d5795fab4637_story.html (describing the effort to retrieve weapons-usable material from a former Soviet nuclear test site).

¹⁷¹ See Harahan CTR, *supra* note 165, at 41–65 (describing early projects to eliminate former Soviet weapons, including nuclear missiles in Belarus); *id.* at 82–83 (efforts to eliminate former

One notable recent exception to that salutary record concerns a 2000 U.S.-Russia agreement under which each side would dispose of thirty-four metric tons of excess weapons-grade plutonium by converting it into mixed-oxide (MOX) fuel to burn in new generation power plants. Unfortunately, the economics of MOX facilities soon turned sour and neither country made satisfactory progress in constructing the new facilities. The United States eventually moved toward scuttling the ghastly-over-budget Savannah River site in South Carolina, proposing to dilute and dispose of the plutonium as entombed irradiated waste instead. Russia complained that even with elaborate pre-burial treatment, the plutonium could still be recovered and reused for weapons—adequate R2D processing would demand greater irreversibility in the disposition. Ultimately, spurred by the more general stark deterioration in U.S.-Russia relations, Moscow suspended the agreement in October 2016.¹⁷²

12. Export control regimes

The United States and like-minded countries have initiated an array of mechanisms to coordinate their national export control regimes regarding weapons and dual-capable items, technology, and substances. The Australia Group, for example, aligns the practices of participating states regarding international sales of chemical and biological materials;¹⁷³ the Missile Technology Control Regime¹⁷⁴ and the Hague Code of Conduct¹⁷⁵ perform

Soviet chemical weapons in Russia); *id.* at 135–81 (efforts to eliminate former Soviet missile silos in Ukraine); DEFENSE THREAT REDUCTION AGENCY, *Nunn-Lugar CTR Scorecard*, http://www.dtra.mil/Portals/61/Documents/20130501_fy13_ctr-scorecard_slides_may13.pdf (last visited Oct. 30, 2016).

¹⁷² See VERTIC, IAEA Primer, *supra* note 33, at 33–43 (discussing the August 29, 2000 Plutonium Management and Disposition Agreement, calling for the United States and Russia to dispose of 34 tonnes of weapons-usable plutonium each); Andrei Akulov, *Dangerous Crossroads in US-Russian Relations: Arms Control and Non-Proliferation in Jeopardy*, GLOBAL RES. (June 16, 2016), <http://www.globalresearch.ca/dangerous-crossroads-in-us-russia-relations-arms-control-and-non-proliferation-in-jeopardy/5531225> (arguing that the United States has breached the agreement by failing to dispose of its plutonium as intended); Hugh Chalmers, *Another Setback for the US-Russia Plutonium Disposition Agreement*, 153 TRUST & VERIFY 12 (Summer 2016); Pavel Podvig, *Can the US-Russia Plutonium Disposition Agreement Be Saved?*, BULL. ATOMIC SCIENTISTS (Apr. 28, 2016), <http://thebulletin.org/can-us-russia-plutonium-disposition-agreement-be-saved9389> (discussing problems arising under the agreement); Dmitry Solovyov & Christian Lowe, *Putin Suspends Nuclear Pact, Raising Stakes in Row with Washington*, REUTERS (Oct. 3, 2016), <http://www.reuters.com/article/us-russia-usa-nuclear-idUSKCN1230YN> (reporting the suspension of the 2000 agreement); Alexy Arbatov, *The Ominous End of the Russia-U.S. Plutonium Agreement*, CARNEGIE MOSCOW CENTER (Oct. 17, 2016), <http://carnegie.ru/commentary/?fa=64869>; Garth McLennan, *The Gradual Decay of Post-Cold War Arms Control*, INT'L POL'Y DIGEST (Oct. 14, 2016), <http://intpolicydigest.org/2016/10/14/gradual-decay-post-cold-war-arms-control/>.

¹⁷³ See *supra* note 20 (describing Australia Group).

¹⁷⁴ See *supra* note 21 (describing Missile Technology Control Regime).

¹⁷⁵ Australian Foreign Ministry, *The Hague Code of Conduct Against Ballistic Missile Proliferation*, THE HAGUE CODE OF CONDUCT, <http://www.hcoc.at/> (last visited November 12, 2016); Paul Kerr, *Code of Conduct Aims to Stop Ballistic Missile Proliferation*, 33 ARMS CONTROL TODAY, no. 1, Jan./Feb. 2003, at 19; Beard, *supra* note 5, at 42–44.

similar functions regarding ballistic and cruise missiles; the Wassenaar Arrangement deals with conventional weapons,¹⁷⁶ and the Nuclear Suppliers Group¹⁷⁷ and the Proliferation Security Initiative¹⁷⁸ address access to nuclear materials. These regimes are not concerned with domestic production, possession, or consumption of the regulated materials, and they contain no R2D provisions. The latest incarnation of this concept is the 2013 Arms Trade Treaty,¹⁷⁹ which regulates international sales of eight categories of conventional weapons, including battle tanks, combat aircraft, warships, and small arms, but does not require parties to limit their own national holdings or to dismantle or destroy any items.¹⁸⁰ On a regional level, the Kinshasa Convention reflects an effort by eleven central African states to regulate the manufacture, illicit trade, and use of small arms and light weapons.¹⁸¹ It also includes a commitment to

¹⁷⁶ THE WASSENAAR ARRANGEMENT ON EXPORT CONTROLS FOR CONVENTIONAL ARMS AND DUAL-USE GOODS AND TECHNOLOGIES, <http://www.wassenaar.org/> (last visited Nov. 12, 2016); *The Wassenaar Arrangement at a Glance*, ARMS CONTROL ASS'N, <http://www.armscontrol.org/factsheets/wassenaar> (last updated Oct. 2012).

¹⁷⁷ NUCLEAR SUPPLIERS GROUP, <http://www.nuclearsuppliersgroup.org/en/> (last visited Oct. 30, 2016); *The Nuclear Suppliers Group (NSG) at a Glance*, ARMS CONTROL ASS'N, <http://www.armscontrol.org/factsheets/NSG> (last updated Oct. 2012); see also ZANGGER COMMITTEE, *Zangger Committee*, <http://www.foi.se/en/customer--partners/projects/zangger-committee.html> (last visited Oct. 31, 2016) (performing related functions).

¹⁷⁸ U.S. DEP'T OF STATE, *Proliferation Security Initiative*, <http://www.state.gov/t/isn/c10390.htm> (last visited Oct. 30, 2016); ARMS CONTROL ASS'N, *The Proliferation Security Initiative (PSI) at a Glance* (June 10, 2013), <http://www.armscontrol.org/factsheets/PSI>; see S.C. Res. 1540, U.N. Doc. S/RES/1540 (Apr. 28, 2004) (U.N. Security Council resolution requiring all states to enforce strict national controls regarding exports of materials related to weapons of mass destruction).

¹⁷⁹ Arms Trade Treaty, *supra* note 22; see Sarah Parker, *The Arms Trade Treaty: A Step Forward in Small Arms Control?*, SMALL ARMS SURV., RESEARCH NOTES, June 2013, at 1, http://www.smallarmssurvey.org/fileadmin/docs/H-Research_Notes/SAS-Research-Note-30.pdf; Sarah Parker & Marcus Wilson, *A Guide to the U.N. Small Arms Process*, SMALL ARMS SURV.: 2016 UPDATE (2016), <http://www.smallarmssurvey.org/fileadmin/docs/Q-Handbooks/HB-02-Diplo-Guide/SAS-HB02-Guide-UN-Small-Arms-Process.pdf> (discussing the sequence of international instruments intended to reduce the trafficking of weapons); Edward J. Laurance, Hendrik Wagenmakers & Herbert Wulf, *Managing the Global Problems Created by the Conventional Arms Trade: An Assessment of the United Nations Register of Conventional Arms*, 11 GLOBAL GOVERNANCE 225 (2005); Convention for the Control of the Trade in Arms and Ammunition and Protocol, Sept. 10, 1919, 7 L.N.T.S. 333; see also CROFT, *supra* note 5, at 147–51 (discussing evolution of the voluntary 1991 United Nations Arms Register, designed to promote transparency in international arms exports and imports).

¹⁸⁰ Related to the various treaties and non-treaty-based regimes restricting international transfers of weapons and related materials are a host of unilateral and multilateral sanctions regimes, under which countries restrict weapons sales to particular states, in retaliation for disapproved actions. See CROFT, *supra* note 5, at 168–70 (discussing arms embargoes of Libya, Haiti and Yugoslavia); U.S. DEP'T OF TREASURY, OFFICE OF FOREIGN ASSETS CONTROL, *North Korea Sanctions Program* (June 3, 2015), <https://www.treasury.gov/resource-center/sanctions/Programs/Documents/nkorea.pdf>; S.C. Res. 2270, U.N. Doc. S/RES/2270 (Mar. 2, 2016) (U.N. Security Council resolution imposing additional sanctions on North Korea).

¹⁸¹ Central African Convention for the Control of Small Arms and Light Weapons, Their Ammunition and All Parts and Components That Can Be Used for Their Manufacture, Repair and Assembly, Nov. 19, 2010, U.N. Doc A/65/517-S/2010/534 at 11 (Oct. 15, 2010) (not yet in force) [hereinafter Kinshasa Convention]; see also INTERNATIONAL ACTION NETWORK ON SMALL ARMS, IMPLEMENTATION PLAN FOR THE KINSHASA CONVENTION ON SMALL ARMS CONTROL Ch. V

“systematically destroy” weapons and ammunition that are “surplus, obsolete or illicit,” by adopting “the most effective techniques for destruction, in accordance with international norms in force.”¹⁸²

Overall, the agreements in this first category may be regarded as important and successful, contributing to international security by foreclosing potentially-destabilizing arms competition; many have attracted widespread adherence and proven durable over many years. Some may have laid the basis for subsequent, even more ambitious arms control proceedings. But they have not contributed much specification to the evolving law and practice regarding R2D obligations and customs.

B. *Treaties Containing Some R2D Obligations, But Without Many Specifications and Without Reported Compliance Problems*

The second category of international agreements comprises more ambitious undertakings, in which the destruction or related obligations are more numerous, overt, and detailed, and in which at least some operational procedures and standards are specified. Still, these are arrangements in which many fine points are lacking, and regarding which there have been few publicized controversies or instances of ambiguous or breaching behavior. Ten examples are summarized here.

1. 1919 Versailles Treaty¹⁸³

Starting this chronology with the immediate post-World War I instruments, the 1919 peace treaty between the victorious allies and Germany

(building national capacity for weapons destruction; training and equipping officials to seize and destroy weapons; and developing standards for weapons destruction). For somewhat similar regional efforts, *see also* ECOWAS Convention on Small Arms and Light Weapons, their Ammunition and Other Related Materials, art. 17, June 14, 2006, <http://www.poa-iss.org/RegionalOrganizations/ECOWAS/ECOWAS%20Convention%202006.pdf>; Protocol on Control of Firearms, Ammunition and Other Related Materials in the Southern African Development Community (SADC) Region, art. 10–12, Aug. 14, 2001, http://www.sadc.int/files/8613/5292/8361/Protocol_on_the_Control_of_Firearms_Ammunition2001.pdf; Nairobi Protocol for the Prevention, Control and Reduction of Small Arms and Light Weapons in the Great Lakes Region and the Horn of Africa, art. 8–9 Apr. 21, 2004, <http://www.poa-iss.org/RegionalOrganizations/RECSA/Nairobi%20Protocol.pdf>; Inter-American Convention Against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and Other Related Materials, Nov. 14, 1997, 37 I.L.M. 143; South Eastern and Eastern Eur. Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC), *About SEESAC*, <http://www.seesac.org/About-SEESAC/> (last visited Oct. 30, 2016) (describing activities of SEESAC, including support for the destruction of weaponry).

¹⁸² Kinshasa Convention, *supra* note 181, art. 15.3, 15.5. Article 2(t) defines “destruction” as “a process whereby a weapon, ammunition or explosive is rendered permanently inert so that it can no longer operate as it was designed to operate.” *Id.*

¹⁸³ Treaty of Versailles, *supra* note 114; *see* James Barros, *The League of Nations and Disarmament*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 605; Neal H. Petersen, *The Versailles Treaty: Imposed Disarmament*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 621; CROFT, *supra* note 5, at 27.

contains numerous specifications restricting the defeated state's retained military capabilities and assets. For example, article 115 requires the destruction of fortifications, military establishments, and harbors on the contested islands of Heligoland and Dune, with stipulations about what is required to destroy a "harbor."¹⁸⁴ Article 169 mandates that "German arms, munitions and war material, including anti-aircraft material" and special plants intended for the manufacture of military material must be surrendered to the victors within two months, "to be destroyed or rendered useless."¹⁸⁵ Article 192 deals in similar fashion with naval "arms, munitions and war material of all kinds, including mines and torpedoes," which are likewise to be destroyed or rendered useless.¹⁸⁶ An Inter-Allied Commission of Control is established to oversee the "complete execution of the delivery, destruction, demolition and rendering things useless," all to be conducted at Germany's expense.¹⁸⁷ A counterpart Naval Inter-Allied Commission of Control is given the "duty to proceed to the building yards and to supervise the breaking-up of the ships which are under construction there, to take delivery of all surface ships or submarines, salvage ships, docks and the tubular docks, and to supervise the destruction and breaking-up provided for."¹⁸⁸ Germany is obliged to provide all the information and documents these Commissions require, including data about the design of the warships, and "the details and models of the guns, munitions, torpedoes, mines, explosives, wireless telegraphic apparatus and, in general, everything relating to naval war materiel."¹⁸⁹

¹⁸⁴ Treaty of Versailles, *supra* note 114, art. 115; *see also id.*, art. 180 (regarding disarming and dismantling forts east of the Rhine River).

¹⁸⁵ Treaty of Versailles, *supra* note 114, art. 169.

¹⁸⁶ *Id.*, art. 192.

¹⁸⁷ *Id.*, arts. 204, 207.

¹⁸⁸ *Id.*, art. 209.

¹⁸⁹ *See* Treaty of Versailles, *supra* note 114; *see also* Petersen, *supra* note 104, at 630–33 (describing massive German violations of the arms control provisions of the Versailles Treaty).

2. 1922 Washington Naval Treaty¹⁹⁰

The Washington Naval Conference generated a flurry of treaties regulating the incipient buildup of major naval forces, of which the Five-Power Treaty is the most relevant. It legislated a ratio of 5:5:3:1.7:1.7 for the total battleship tonnage for the United States, the United Kingdom, Japan, France, and Italy, respectively.¹⁹¹ The caps required substantial destruction activity: the United States had to scrap fifteen old battleships and two new ones, as well as thirteen ships still under construction.¹⁹²

The treaty specifies two sequential stages for accomplishing the mandatory scrapping, designed to place the ship “in such condition that it cannot be put to combat use.”¹⁹³ First, the following items must be removed or destroyed on board: all guns and essential portions of guns; all machinery for working hydraulic or electric mountings; all fire-control instruments and range-finders; all ammunition, explosives, mines, torpedoes, and warheads; all wireless telegraphy installations; the conning tower and side armor or alternatively the main propelling machinery; and all landing and flying-off platforms.¹⁹⁴ These steps are to be completed within six months of the treaty’s entry into force.¹⁹⁵ Second, the scrapping is to be finalized by permanent sinking,; breaking the vessel up via destruction or removal of all machinery, boilers, armor and plating; or converting

¹⁹⁰ Treaty Between the United States of America, the British Empire, France, Italy, and Japan, Feb. 6, 1922, 25 L.N.T.S. 202 [hereinafter Five Power Treaty]; see U.S. DEP’T OF STATE, *The Washington Naval Conference 1921-1922*, <https://history.state.gov/milestones/1921-1936/naval-conference> (last visited Oct. 30, 2016); Thomas H. Buckley, *The Washington Naval Limitation System: 1921-1939*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 639. An interesting, much earlier instance of bilateral naval arms limitation was the 1817 Rush-Bagot Agreement, through which the United States and Great Britain largely demilitarized the Great Lakes, and agreed to dismantle excess ships and installations, thereby precluding an incipient naval arms race and leading to much improved relations between the two states. See CROFT, *supra* note 5, at 26; British-American Diplomacy: Exchange of Notes Relative to Naval Forces on the American Lakes, *reprinted in* 2 TREATIES AND OTHER INTERNATIONAL ACTS OF THE UNITED STATES OF AMERICA 645–47 (Hunter Miller ed., 1931–1948); Ron Purver, *The Rush-Bagot Agreement: Demilitarizing the Great Lakes, 1817 to the Present*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 581, 583–84 (noting that both the United States and Great Britain quickly reduced their respective naval presences on the Great Lakes even below the levels specified in the treaty; they did not “destroy” their ships and dockyards, but maintained them in a status that could be returned to operational capability); see also Andrew D. Farrand, *Chile and Argentina: Entente and Naval Limitation, 1902*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 595 (discussing another early bilateral measure of naval arms control).

¹⁹¹ Five Power Treaty, *supra* note 190, chapter I, art. IV; see Croft, *supra* note 5, at 27–28 (discussing other interwar naval arms limitation agreements including the London Naval Treaties of 1930 and 1936, which established a 10:10:7 ratio the United States, United Kingdom, and Japan for cruisers and destroyers, and gave Japan parity in submarines.)

¹⁹² AKIRA IRIYE, 3 CAMBRIDGE HISTORY OF AMERICAN FOREIGN RELATIONS: THE GLOBALIZING OF AMERICA, 1913–1945 75–78 (1993). The treaty lists by name the capital ships that may be retained by each participant. Five Power Treaty, *supra* note 190, Chapter II, Part 1.

¹⁹³ Five Power Treaty, *supra* note 190, Chapter II, Part 2, art. I.

¹⁹⁴ *Id.*, Chapter II, Part 2, art. III(b).

¹⁹⁵ *Id.*, Chapter II, Part 2, art. IV(a).

it to use exclusively as a target—to be completed within eighteen months of entry into force.¹⁹⁶

3. Post-World War II peace treaties

The 1947 treaty of peace with Italy is the most relevant of the post-World War II instruments.¹⁹⁷ It contains R2D provisions including the destruction or removal of the system of permanent Italian fortifications and military installations within twenty kilometers of the Franco-Italian and Italo-Yugoslav borders (to be completed within one year of the treaty's entry into force);¹⁹⁸ the transfer of specified naval vessels (and associated equipment, armaments, stores, and spare parts) to the Soviet Union, the United Kingdom, the United States, or France (within three months);¹⁹⁹ the destruction or scrapping for metal of other naval vessels afloat or under construction (within nine months);²⁰⁰ the sinking in the open seas at a depth of over 100 fathoms of submarines (within three months);²⁰¹ and the conversion to civilian uses or demolition of other naval vessels (within two years).²⁰²

Also instructive is the peace treaty with Bulgaria (and the substantively-identical separate agreements with Finland, Hungary, and Romania).²⁰³ It requires Bulgaria to destroy or hand over to the Soviet Union, the United Kingdom or the United States excess war material within one year of the treaty's entry into force.²⁰⁴ For this purpose, "war material" is defined exhaustively, to include, inter

¹⁹⁶ Five Power Treaty, *supra* note 190, Chapter II, Part 2, art. II, IV(a).

¹⁹⁷ Treaty of Peace with Italy, Feb. 10, 1947, 49 U.N.T.S. 126; *see* E. Timothy Smith, *The Disarming and Rearming of Italy*, in 2 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT, *supra* note 104, at 793. There was no comparable immediate post-World War II peace treaty with Germany, but the 1990 Treaty on the Final Settlement with Respect to Germany, concluded just prior to German reunification, contains some notable limits. Treaty on the Final Settlement with Respect to Germany, Sept. 12, 1990, S. TREATY DOC. No. 101-20, 1696 U.N.T.S. 123. It capped Germany's armed forces at 370,000 personnel, *id.* art. 3.2; banned German manufacture, possession, or control of nuclear, chemical and biological weapons, *id.* art. 3.1; and prohibited the stationing of nuclear weapons in the six German states that had constituted East Germany, *id.* art. 5.3. *Compare* Protocol No. IV on the Agency of Western European Union for the Control of Armament, Oct. 23, 1954, 211 U.N.T.S. 376, *reprinted in* 3 ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT (Richard Dean Burns ed., 1993), at 1202, *with* 1948 Brussels Treaty, 19 U.N.T.S. 51 (Mar. 17, 1948) (permitting Germany and Italy to join the Western Union Defence Organization and NATO and incorporating unilateral assurances by Germany that it would not manufacture atomic, chemical or biological weapons); *see* CROFT, *supra* note 5, at 137; Detlef Bald, *Germany*, in 1 ENCYCLOPEDIA OF ARMS CONTROL *supra* note 3, at 93.

¹⁹⁸ Treaty of Peace with Italy, *supra* note 197, art. 47.1.2, 48.1.2.

¹⁹⁹ *Id.*, art. 57.1.

²⁰⁰ *Id.*, art. 58.1.

²⁰¹ *Id.*, art. 58.1(c).

²⁰² *Id.*, art. 58.1(f).

²⁰³ Treaty of Peace with Bulgaria, Feb. 10, 1947, 61 Stat. 1915, 41 U.N.T.S. 21; Treaty of Peace with Finland, Feb. 10, 1947, 48 U.N.T.S. 203; Treaty of Peace with Hungary, Feb. 10, 1947, 61 Stat. 2065, 41 U.N.T.S. 135; Treaty of Peace with Rumania, Feb. 10, 1947, 61 Stat. 1757, 42 U.N.T.S. 34.

²⁰⁴ Treaty of Peace with Bulgaria, *supra* note 203, art. 15.

alia, machine guns; mortars; rocket projectors; “warships of all kinds;” “aircraft, assembled or unassembled;” “asphyxiating, lethal, toxic or incapacitating substances intended for war purposes;” propellants and explosives; and factory and tool equipment designed for producing or maintaining weapons.²⁰⁵

4. 1972 Biological Weapons Convention²⁰⁶

The Biological Weapons Convention is a successor to the Geneva Protocol, advancing beyond that simple non-use agreement to ban the development, production, stockpiling, acquisition, and retention of biological agents and toxins, as well as of weapons and other means of delivery of those agents for hostile purposes or in armed conflict.²⁰⁷ Each party is obliged to “destroy, or divert to peaceful purposes, as soon as possible but not later than [within] nine months,” all the relevant items that are in its possession or under its jurisdiction or control.²⁰⁸ The treaty was the first to specify safeguards in the R2D process, requiring that “[i]n implementing the provisions of this article all necessary safety precautions shall be observed to protect populations and the environment.”²⁰⁹ There have been no publicly reported issues specifically related to the R2D provisions, but the United States has alleged that certain treaty parties have not complied in other ways with their obligations to rid themselves of biological weapons.²¹⁰

5. SALT I

The bilateral SALT I negotiations produced two 1972 U.S.-U.S.S.R. accords: the Interim Agreement on Strategic Offensive Arms²¹¹ and the Treaty on Anti-Ballistic Missile Systems.²¹² The documents were of unprecedented length and detail, but amounted basically to “freezes” on existing levels of offensive and defensive systems, rather than major commitments to reduce current inventories

²⁰⁵ Treaty of Peace with Bulgaria, *supra* note 203, Annex III.

²⁰⁶ Biological Weapons Convention, *supra* note 40. *See generally* GRAHAM & LAVERA, *supra* note 5, at 292–95.

²⁰⁷ Biological Weapons Convention, *supra* note 40, art. I.

²⁰⁸ *Id.*, art. II. The United States did not insist that the BWC incorporate detailed standards for verification of compliance or specifications about R2D, because the United States had already decided to destroy its own biological weapons stockpile unilaterally as being militarily unusable, regardless of what other countries might, or might not, do. *See* GRAHAM & LAVERA, *supra* note 5, at 293.

²⁰⁹ Biological Weapons Convention, *supra* note 40, art. II.

²¹⁰ *See* DUFFY, *supra* note 79, at 51–52; 1987 COMPLIANCE REPORT, *supra* note 105, at 5–6; 2010 COMPLIANCE REPORT, *supra* note 105, at 10–26; 2016 COMPLIANCE REPORT, *supra* note 105, at 5–6.

²¹¹ *See* SALT I Interim Agreement, *supra* note 36. *See generally* GRAHAM & LAVERA, *supra* note 5, at 306–09, 336–37.

²¹² *See* ABM Treaty, *supra* note 73. *See generally* GRAHAM & LAVERA, *supra* note 5, at 306–13; U.S. DEP’T OF STATE, BUREAU OF ARMS CONTROL, VERIFICATION, AND COMPLIANCE, *Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems (ABM Treaty)*, <http://www.state.gov/t/avc/trty/101888.htm> (last visited Oct. 31, 2016).

and destroy key components.²¹³ Even a 1974 protocol to the ABM Treaty,²¹⁴ which reduced each side's quota of defensive systems from two permitted sites to only one, essentially eliminated only an excess capacity that neither side was interested in exploiting. Repeated compliance issues emerged with respect to the agreements, but none specifically related to R2D.²¹⁵

Regarding destruction obligations, the ABM Treaty provides that "ABM systems or their components in excess of the numbers or outside the areas specified in this Treaty, as well as ABM systems or their components prohibited by this Treaty, shall be destroyed or dismantled under agreed procedures within the shortest agreed period of time."²¹⁶ The 1974 protocol is more detailed; it allows each party to change the location of its single allowed ABM deployment site, by dismantling or destroying its original existing facilities, pursuant to specified procedures, in order to construct the alternative site from scratch.²¹⁷ To satisfy the protocol's standard for destruction, the operation would have to ensure that the systems and components "would be put in a condition that precludes the possibility of their use for ABM purposes," that "reactivation of units dismantled or destroyed would be detectable" by the treaty's verification procedures, and that the "reactivation time of those units would not be substantially less than the time required for new construction."²¹⁸ The protocol also contains sets of specifications regarding procedures governing the dismantling or destruction of ABM systems and components, such as the instruction that excess silo launchers at test ranges "shall be made unusable by dismantling or destruction of their above-ground structures and headworks, and removal of launch rails" within three months of

²¹³ See GRAHAM & LAVERA, *supra* note 5, at 306–10, 336–37; see also Robert W. Buchheim & Philip J. Farley, *The U.S.-Soviet Standing Consultative Commission*, in U.S.-SOVIET SECURITY COOPERATION: ACHIEVEMENTS, FAILURES, LESSONS 254, 59 (Alexander L. George et al. eds., 1988) (reporting minor delay by U.S.S.R. in meeting the anticipated timetable for dismantling ICBMs).

Prior to, and concurrent with, the series of bilateral (United States and Soviet Union/Russia) SALT and START negotiations discussed in this Article were a variety of proposals and concepts for control of nuclear and other weapons that never resulted in treaties or policies that were successfully negotiated, completed, signed, and implemented. Some of these included interesting and ambitious proposals for arms control and R2D, but they are not analyzed here because there was no implementation. See generally PHILIP TAUBMAN, *THE PARTNERSHIP: FIVE COLD WARRIORS AND THEIR QUEST TO BAN THE BOMB* (2012); Alessandro Corradini, *General and Complete Disarmament Proposals*, in 2 *ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT*, *supra* note 3, at 1041; REYKJAVIK REVISITED: STEPS TOWARD A WORLD FREE OF NUCLEAR WEAPONS (George P. Shultz et al. eds., 2008); Leneice N. Wu, *The Baruch Plan, 1946-1949*, in 2 *ENCYCLOPEDIA OF ARMS CONTROL AND DISARMAMENT*, *supra* note 3, at 771.

²¹⁴ Protocol to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missiles, July 3, 1974, 27 U.S.T. 1645, <http://www.state.gov/t/avc/trty/101888.htm#protocolabm> [hereinafter ABM Treaty Protocol].

²¹⁵ See DUFFY, *supra* note 105, at 19–22, 49–51, 89–103, 105–30; see also Buchheim & Farley, *supra* note 213.

²¹⁶ ABM Treaty, *supra* note 73, art. VIII.

²¹⁷ See ABM Treaty Protocol, *supra* note 214, art. I, II.

²¹⁸ ABM Treaty Protocol, *supra* note 214, Protocol on Procedures Governing Replacement, Dismantling or Destruction, and Notification Thereof, for ABM Systems and Their Components, ¶ 3.

their initiation.²¹⁹ Regarding the U.S. ABM facility at Malmstrom Air Force Base in North Dakota, the protocol is even more detailed: it demands that “metal reinforcing rods on radar buildings shall be cut off,” that radar buildings for which walls had been constructed shall be left uncovered for six months (to permit observation by Soviet reconnaissance satellites), and that “earth grading of the entire area shall be accomplished and construction materials removed,” all to begin within six months.²²⁰

Since neither the United States nor the Soviet Union ever sought to exercise the legal right to change the location of an ABM site, none of these criteria were ever operational.²²¹

6. 1981 Convention on Certain Conventional Weapons²²²

The Convention on Certain Conventional Weapons embodies an unusual structure. The main text of the treaty is quite spare, and mostly administrative; it comprises only the legal boilerplate provisions. The real work is performed by a series of independent protocols (now numbering five), which each party may elect to join or to reject à la carte, dealing with particular types of especially problematic weapon systems.²²³ These protocols exhibit different attitudes toward R2D commitments. Some contain solely or mainly prohibitions or restrictions on use, with no attention to obligations about possession, destruction, conversion or the like. Protocol 1, for example, consists of a single sentence, banning the use of weapons that injure via fragments that are not detectable in the human body by x-rays.²²⁴ Similarly, Protocol 3 governs the use of incendiary weapons,²²⁵ and Protocol 4 prohibits the use of blinding laser weapons,²²⁶ but neither addresses the possession or elimination of these devices.

On the other hand, Protocol 2, as amended in 1996,²²⁷ regulates (but does not wholly prohibit) anti-personnel land mines and requires that “[w]ithout delay after the cessation of active hostilities, all minefields, mined areas, mines, booby

²¹⁹ ABM Treaty Protocol, *supra* note 214, Protocol on Procedures Governing Replacement, Dismantling or Destruction, and Notification Thereof, for ABM Systems and Their Components; Procedures Governing the Dismantling or Destruction, and Notification Thereof, for ABM Systems and Their Components, I.2, 3.

²²⁰ ABM Treaty Protocol, *supra* note 214, Protocol on Procedures Governing Replacement, Dismantling or Destruction, and Notification Thereof, for ABM Systems and Their Components; Procedures Governing the Dismantling or Destruction, and Notification Thereof, for ABM Systems and Their Components, II.

²²¹ DUFFY, *supra* note 105, at 24, 32–41 (also noting numerous other types of compliance issues arising in connection with each party’s performance under the ABM Treaty).

²²² CCW, *supra* note 12.

²²³ See GRAHAM & LAVERA, *supra* note 5, at 480–81; see also BOOTHBY, *supra* note 5, at 92–102, 189–207.

²²⁴ CCW, *supra* note 12, Protocol on Non-Detectable Fragments.

²²⁵ *Id.*, Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons.

²²⁶ *Id.*, Protocol on Blinding Laser Weapons.

²²⁷ *Id.*, Protocol on Prohibitions or Restrictions on the Use of Mines, Booby Traps and Other Devices, as Amended on May 3 1996.

traps and other devices shall be cleared, removed, [or] destroyed.”²²⁸ In support of that obligation, parties are to record the location of their minefields to the extent possible, and provide that information to mine clearance and destruction operations after the war.²²⁹ In addition, if United Nations peacekeeping forces might be jeopardized by a minefield, the responsible party shall “remove or render harmless” the offending devices.²³⁰

CCW Protocol 5²³¹ deals similarly with “explosive remnants of war” (munitions that failed to explode when dropped or fired, or that have been abandoned). In fact, this may be the only treaty that is mostly concerned with R2D operations, cleaning up lingering hazards from a battlefield. It requires each party, after the cessation of hostilities, to survey and assess its territory, and to mark and then to clear, remove, or destroy the explosive remnants.²³² The country that used (or abandoned) the weapons that became explosive remnants is obligated to provide technical, financial, material or human resources assistance in the cleanup and destruction process.²³³ A party that used or abandoned the weapons that became explosive remnants shall provide relevant information about the weapons to the territorial state “without delay after the cessation of active hostilities.”²³⁴

7. Interim chemical weapons agreements

In anticipation of the negotiation and conclusion of what eventually became the multilateral Chemical Weapons Convention, the United States and the Soviet Union, as possessors of the lion’s share of the world’s chemical weapons, concluded two bilateral instruments to pave the way for the comprehensive accord. The first, known as the 1989 Wyoming Memorandum of Understanding, provided for mutual exchanges of information regarding the quantities, types, and locations of chemical weapons stockpiles, and for reciprocal visits to each other’s chemical weapons facilities.²³⁵ The next year, the Bilateral Destruction Agreement committed each side to reduce its chemical weapons holdings to 5000 tons of agents according to a fixed schedule: the process was to begin by December 31, 1992; at least fifty percent of the aggregate declared inventory was to be destroyed within seven years; and the final goal was to be met three years

²²⁸ CCW, *supra* note 12, Amended Mines Protocol, art. 10.1.

²²⁹ *See id.*, Amended Mines Protocol, art. 9, Technical Annex.

²³⁰ *Id.*, Amended Mines Protocol, art. 12.

²³¹ *Id.*, Protocol on Explosive Remnants of War; *see* BOOTHBY, *supra* note 4, at 305–19.

²³² *Id.*, Protocol on Explosive Remnants of War, art. 3.2, 3.3.

²³³ *See id.*, Protocol on Explosive Remnants of War, art. 3.1.

²³⁴ *Id.*, Protocol on Explosive Remnants of War, art. 4.2.

²³⁵ *See* Memorandum of Understanding Between the Government of the Union of Soviet Socialist Republics and the Government of the United States of America Regarding a Bilateral Verification Experiment and Data Exchange Related to Prohibition of Chemical Weapons, U.S.S.R.-U.S., Sept. 23, 1989, T.I.A.S. No. 11460; *id.*, arts. II.7, III.5 (regarding visits to facilities for destroying chemical weapons).

thereafter.²³⁶ The commitment also included destruction of the munitions, devices, and containers from which the chemicals were removed, and each side was allowed to retain no more than eight chemical weapons storage facilities.²³⁷ Each side was to inform the other, initially and annually, about its general and detailed plans for carrying out the requisite elimination operations.²³⁸ If either side “experiences problems that will prevent it from destroying its chemical weapons at a rate sufficient to meet the levels specified” (i.e., at least 1000 agent tons per year), it shall notify the other side and initiate consultations; the other side is then released from its obligation to destroy its own chemical weapons at the original, faster rate.²³⁹ These two agreements were never fully operationalized, and they were eventually superseded by the multilateral Chemical Weapons Convention.²⁴⁰

8. Presidential Nuclear Initiatives

In 1991, President George H.W. Bush initiated a series of unilateral pledges to reduce and limit U.S. tactical nuclear weapons. Soviet President Mikhail Gorbachev, and later Russian President Boris Yeltsin, instituted reciprocal, non-legally-binding commitments. On the U.S. side, these exchanges included the withdrawal from Europe and destruction of all U.S. ground-launched short-range nuclear weapons, and halting the deployment of tactical nuclear weapons on surface ships and attack submarines. Russia pledged to eliminate nuclear artillery munitions and to mirror the U.S. removal of nuclear weapons from surface ships and multipurpose submarines. The United States completed its weapons withdrawals in 1992 and its eliminations by 2003. Russia’s fulfillment of its commitments has been ambiguous; the U.S. Department of State has complained about the lack of clarity regarding Russian weapons destruction.²⁴¹

²³⁶ See Agreement Between the United States of America and the Union of Soviet Socialist Republics on Destruction and Non-Production of Chemical Weapons and on Measures to Facilitate the Multilateral Convention on Banning Chemical Weapons, U.S.S.R.-U.S., June 1, 1990, 29 I.L.M. 932 [hereinafter *Bilateral Destruction Agreement*]; *id.*, art. IV (destruction timetable); *id.*, art. II (pledging cooperation between the two parties regarding exploration of methods and technologies for destroying chemical weapons, measures to ensure the safety and protection of people and the environment, construction of destruction facilities and operation of destruction equipment, and monitoring of the destruction of chemical weapons).

²³⁷ See *Bilateral Destruction Agreement*, *supra* note 236, art. IV.5, 9.

²³⁸ See *id.*, art. IV.6–8.

²³⁹ *Id.*, art. IV.4, 10.

²⁴⁰ See FED’N OF AM. SCIENTISTS, *Chemical Weapons*, <http://fas.org/nuke/guide/russia/cbw/cw.htm> (last visited Nov. 1, 2016) (describing Russia’s failure to comply with the data declaration provisions of the Wyoming agreement and its implementing procedures).

²⁴¹ See *The Presidential Nuclear Initiatives (PNIs) on Tactical Nuclear Weapons at a Glance*, ARMS CONTROL ASS’N (Nov. 1, 2010), <http://www.armscontrol.org/factsheets/pniglance>; see also CROFT, *supra* note 5, at 76–79; Eli Corin, *Presidential Nuclear Initiatives: An Alternative Paradigm for Arms Control*, NUCLEAR THREAT INST. (Mar. 1, 2004), <http://www.nti.org/analysis/articles/presidential-nuclear-initiatives/>.

9. 1994 Agreed Framework with North Korea²⁴²

The United States and the Democratic People's Republic of Korea (North Korea, or the DPRK) negotiated the non-legally-binding Agreed Framework to attempt to defuse the crisis regarding the DPRK's emergent nuclear weapons program. Under the compromise, North Korea agreed to suspend operations at a small research reactor and a plutonium reprocessing plant at Yongbyon within one month, and to halt construction of a larger reactor at Yongbyon and a much larger facility at Taechon. These facilities would then be dismantled when the United States supplied two replacement (more proliferation-resistant) nuclear power plants. North Korea would submit to full safeguards inspections by the International Atomic Energy Agency (IAEA). In addition, spent nuclear fuel from the research reactor would be removed from the country.²⁴³ However, the deal collapsed in 2003, amidst distrust and cross-complaints about violation and bad faith, and none of the destruction operations was completed.²⁴⁴

10. 2015 Joint Comprehensive Plan of Action with Iran²⁴⁵

The non-legally-binding agreement between Iran and the five permanent members of the United Nations Security Council plus Germany and the European Union contains several measures related to R2D.²⁴⁶ Iran has agreed to eliminate its entire stockpile of medium-enriched uranium and to cut its inventory of low-enriched uranium by ninety-eight percent; the excess enriched uranium will be downblended or sold outside the country. Iran will reduce its operational centrifuges by two thirds, and confine itself to operating only the oldest type of centrifuges (although the newer models will be stored, not destroyed). Iran will also undertake to convert some prominent facilities to non-nuclear or other functions, not to construct additional facilities of concern, and to ship all spent nuclear fuel out of the country. The IAEA will have comprehensive access to sites of concern across Iran. Most of these provisions took effect as soon as the agreement became operational and will last fifteen years. Although it is too early

²⁴² Agreed Framework Between the United States of America and the Democratic People's Republic of Korea, D.P.R.K.-U.S., Oct. 21, 1994, 34 I.L.M. 604.

²⁴³ See *id.*, ¶ I.

²⁴⁴ See generally GRAHAM & LAVERA, *supra* note 5, at 1268–69; CLIFF ET AL., *supra* note 88, at 62–72; see also George Baldwin & Jooho Whang, *Case Study: Dismantlement and Radioactive Waste Management of DPRK Plutonium Facilities*, in NUCLEAR SAFEGUARDS, SECURITY, AND NONPROLIFERATION: ACHIEVING SECURITY WITH TECHNOLOGY AND POLICY, *supra* note 146, at 377 (studying actions that would be necessary to achieve the complete, verifiable, and irreversible dismantlement of North Korea's nuclear weapons-related facilities).

²⁴⁵ JCPOA, *supra* note 58.

²⁴⁶ See THE WHITE HOUSE, *The Iran Nuclear Deal: What You Need to Know About the JCPOA*, https://www.whitehouse.gov/sites/default/files/docs/jcpoa_what_you_need_to_know.pdf (last visited Nov. 3, 2016).

to be confident, as of this writing, it appears that all parties are complying with the agreement, and the scheduled eliminations are proceeding as planned.²⁴⁷

C. *Detailed R2D Specifications; No Reported Implementation Problems*

The analysis now progresses to treaties that have demonstrated an even higher degree of attention to possible R2D obligations. Four agreements are surveyed here: three are bilateral accords between the superpowers to deal with their nuclear arsenals; the fourth is a multilateral pact concerning conventional forces in Europe. Notably, despite (or because of) this fastidious attention to detail, significant implementation or compliance questions have not arisen here—at least not any publicly-revealed questions that are attributable to the operation of the R2D functions. In these four instances, the treaty provisions regarding destruction, conversion, or other elimination operations are so voluminous that they are merely summarized here, or representative illustrations are offered, instead of burdening the text with a comprehensive report.

1. 1979 SALT II Treaty²⁴⁸

The United States and the Soviet Union negotiated and signed a successor to the SALT I Interim Agreement, discussed *supra*,²⁴⁹ but were unable to bring it into force, as their relationship faltered following the Soviet invasion of Afghanistan.²⁵⁰ SALT II would have capped the growth in the two sides' offensive nuclear arsenals, and begun (modestly) the process of drawing down the numbers. The initial common ceiling allowed each side a total of 2,400 ICBM launchers, SLBM launchers, and heavy bombers; the cap was reduced eighteen months later to 2,250.²⁵¹ The treaty also essayed to impede further qualitative improvements in the arsenals by inhibiting the testing of new types of

²⁴⁷ See Joby Warrick, *U.N. Watchdog: Iran Nuclear Deal Appears to be Working so Far, but Inspectors Are 'Stretched'*, WASH. POST (June 3, 2016), <https://www.washingtonpost.com/news/worldviews/wp/2016/06/03/u-n-watchdog-iran-nuclear-deal-appears-to-be-working-so-far-but-inspectors-are-stretched/>; see also Ilan Goldenberg, *Judging the Iran Nuclear Deal, Six Months In*, NAT'L INT. (Jan. 12, 2016), <http://nationalinterest.org/feature/judging-the-iran-nuke-deal-six-months-14875>; International Atomic Energy Agency Director General, *Verification and Monitoring in the Islamic Republic of Iran in Light of United Nations Security Council Resolution 2231 (2015)*, GOV/2016/8 (Feb. 26, 2016), <https://www.iaea.org/sites/default/files/gov-2016-8-derestricted.pdf>; PAUL K. KERR, CONG. RESEARCH SERV., RL34544, *IRAN'S NUCLEAR PROGRAM: STATUS* (2016).

²⁴⁸ SALT II, *supra* note 27; see also *Treaty Between The United States of America and The Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms (SALT II)*, U.S. DEP'T OF STATE, BUREAU OF ARMS CONTROL, VERIFICATION, AND COMPLIANCE, <http://www.state.gov/t/isn/5195.htm> (last visited Nov. 3, 2016).

²⁴⁹ SALT I Interim Agreement, *supra* note 36.

²⁵⁰ See GRAHAM & LAVERA, *supra* note 5, at 343–47. The United States and the U.S.S.R. agreed, on a non-legally-binding basis, to extend the application of the SALT I Interim Agreement after its expiration, and to comply with the provisions of the SALT II Treaty while its ratification was pending. *Id.* at 345–46.

²⁵¹ SALT II, *supra* note 27, art. III.1, 2.

missiles.²⁵² It incorporated several provisions stating precisely when and how the newly-excess weapons would have to be eliminated from accountability under the treaty's numerical limits, and it delegated to the Standing Consultative Commission (the body created in SALT I to implement the agreements and resolve compliance controversies arising under them) the task of specifying the precise procedures and standards for destruction, dismantling, or conversion.²⁵³ Most of the work product of this subsidiary negotiating group has not been released to the public.²⁵⁴

Under article XI of SALT II, reductions necessary to satisfy the initial 2,400 ceiling should have begun on the date the treaty entered into force, and been completed within four months for ICBM launchers; six months for SLBM launchers; and three months for heavy bombers.²⁵⁵ Dismantling and destruction necessary to meet the subsequent 2,250 level would then have been undertaken over a twelve-month period, to be completed by December 31, 1981.²⁵⁶ Regarding categories of weapons totally prohibited by the treaty, elimination was to be "completed within the shortest possible agreed period of time, but not later than six months after the entry into force of this Treaty."²⁵⁷

SALT II also barred several types of upgrading conversion operations, such as prohibiting parties from converting launchers of "light" (relatively smaller and less powerful) ICBMs into launchers for "heavy" ICBMs, and barring the conversion of launchers for shorter range missiles into launchers for ICBMs.²⁵⁸ Conversely, it does sometimes allow a party to convert a launcher or aircraft of a type that is limited by the treaty into a weapon that is not regulated by the treaty, provided specified procedures and markings are followed.²⁵⁹ These can depend on the existence or creation of "externally observable design features" or "functionally related observable differences" between the converted and unconverted weapons.²⁶⁰ As usual with the U.S.-Soviet nuclear weapons treaties, there were numerous, persistent compliance questions, but none related to R2D.²⁶¹

²⁵² See SALT II, *supra* note 27, art. IV.9.

²⁵³ See SALT II, *supra* note 27, arts. XI, XVII.2(e).

²⁵⁴ See generally Buchheim & Farley, *supra* note 213, at 267; DUFFY, *supra* note 105, at 163–84, 221–26; GRAHAM & LAVERA, *supra* note 5, at 321–35; U.S. DEP'T OF STATE, BUREAU OF ARMS CONTROL, VERIFICATION, AND COMPLIANCE, *Five-Year ABM Treaty Reviews*, <http://www.state.gov/t/avc/trty/101888.htm#buchheim> (last visited Nov. 3, 2016).

²⁵⁵ SALT II, *supra* note 27, art. XI.2.

²⁵⁶ *Id.*, art. XI.3.

²⁵⁷ *Id.*, art. XI.4.

²⁵⁸ *Id.*, art. IV.3, 8.

²⁵⁹ *Id.*, art. VI.6, agreed statement.

²⁶⁰ *Id.*, art. II.5, fifth common understanding; art. VI.6, common understanding.

²⁶¹ DUFFY, *supra* note 105, at 22–24, 41–49, 62–88.

2. 1987 Intermediate-range Nuclear Forces Treaty²⁶²

This treaty may be regarded as the first of the “hyper-developed” arms control instruments, in which the United States and the Soviet Union carried to an unprecedented extreme their fascination with drafting minute detail into the text of the accord. The INF Treaty ambitiously requires the parties permanently to eliminate (not merely to reduce) worldwide (not merely those based in Europe) the entire category of deployed and non-deployed ground-launched ballistic and cruise missiles capable of flying ranges between 500 and 5,500 kilometers, together with the launchers for such missiles and the associated support structures and equipment as well as their deployment areas, missile operating bases, and missile support facilities.²⁶³

The treaty establishes different standards for “intermediate range” missiles (with ranges from 1,000 to 5,500 kilometers) and “shorter range” systems (with ranges of 500 to 1,000 kilometers.)²⁶⁴ Regarding intermediate systems, the elimination of all items was to be completed within three years of the treaty’s entry into force. An interim deadline, at twenty-nine months after entry into force, required each state to reduce its holdings, so as to retain no more than the number of deployed missiles that could carry 180 warheads and no more than the number of deployed launchers that could contain the number of missiles that could carry 171 warheads.²⁶⁵ For the less numerous, shorter-range systems, all missiles, launchers, and support equipment were to be eliminated within eighteen months.²⁶⁶

The treaty identifies the facilities in each country where the elimination functions are to be carried out, and provides to the other side a robust right to verify on-site the host’s compliance with the requirements detailed in the treaty’s Protocol on Elimination.²⁶⁷

²⁶² INF Treaty, *supra* note 60.

²⁶³ See GRAHAM & LAVERA, *supra* note 5, at 512–18; HARAHAAN INFT, *supra* note 61, at 101–02 (explaining that the purpose of the intermediate deadline was to ensure that the United States and the Soviet Union were achieving parity in their progress toward complete compliance); U.S. DEP’T OF STATE, BUREAU OF ARMS CONTROL, VERIFICATION, AND COMPLIANCE, *Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles (INF Treaty)*, <http://www.state.gov/t/avc/trty/102360.htm> (last visited Nov. 3, 2016).

²⁶⁴ INF Treaty, *supra* note 60, arts. II.5, II.6, IV, V.

²⁶⁵ *Id.*, art. IV.

²⁶⁶ *Id.*, art. V.1.

²⁶⁷ *Id.*, art. X, XI.1, Protocol on Procedures Governing the Elimination of Missile Systems Subject to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles [hereinafter Protocol on Elimination]. The INF Treaty’s Protocol Regarding Inspections contains expansive rights for the inspectors and specifies the step-by-step mechanisms and timetables for initiating, conducting, and reporting about the different types of inspections allowed by the treaty. See *id.*, Protocol Regarding Inspections Relating to the Treaty Between the United States of America and the Union

Each party is empowered to select the particular technological means necessary to accomplish its eliminations, subject to a roster of specialized procedures identified in article II.10 of the Protocol on Elimination.²⁶⁸ For example, for the U.S. ground-launched cruise missile system, three sets of procedures are required: the missile is destroyed by cutting it longitudinally into two pieces, severing the wings and tail section from the air frame at locations that are not assembly joints, and crushing or flattening the front section. Next, the launch canister shall be crushed, flattened, cut into two pieces of approximately equal size, or destroyed by explosion. Finally, for the launcher, the erector-launcher mechanism is to be removed from the chassis and cut into two pieces of approximately equal size; all support equipment is to be removed from the chassis; and the chassis shall be cut at a location that is not an assembly joint into two pieces of approximately equal size.²⁶⁹ Similar exactitude is applied to all other treaty-related U.S. and Soviet systems.²⁷⁰

Due to concern that an orderly disassembly process might not be fast enough to meet the deadlines, the treaty allows each side to dispose of up to 100 of its intermediate-range missiles by launching them to destruction, one-by-one, with no recovery of the components permitted, within the first six months of the treaty's life.²⁷¹ The treaty also permits regulated items to be eliminated from accountability by loss or accidental destruction, or by placing up to fifteen such pieces (suitably modified, disarmed, and degraded) on "static display" as museum pieces.²⁷²

The requisite INF eliminations—860 by the United States and 1840 by the Soviet Union—were all completed on time, and without controversy (at least without any disputes that erupted to public attention).²⁷³ Subsequently, the United States has made prominent accusations about a Russian violation of the INF Treaty, but that issue is not connected to the R2D functions.²⁷⁴

of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles.

²⁶⁸ INF Treaty, *supra* note 60, Protocol on Elimination, art. II.10.

²⁶⁹ *Id.*, Protocol on Elimination, art. II.10, section on BGM-109G.

²⁷⁰ *Id.*, Protocol on Elimination, art. II.10.

²⁷¹ *Id.*, art. X.5, XI.7, Protocol on Elimination, art. III.

²⁷² *Id.*, Protocol on Elimination, art. V.

²⁷³ U.S. DEP'T OF STATE, BUREAU OF ARMS CONTROL, VERIFICATION, AND COMPLIANCE, *Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles (INF Treaty)*, <http://www.state.gov/t/avc/trty/102360.htm> (last visited Nov. 3, 2016) (noting that 2,692 missiles were eliminated under the INF Treaty; both the United States and the Soviet Union completed their required eliminations in May, 1991); HARAHAN INFT, *supra* note 61, at 10–14; Alexei Arbatov, *Saving Nuclear Arms Control*, 72 BULL. ATOMIC SCIENTISTS 165 (2016).

²⁷⁴ 2016 COMPLIANCE REPORT, *supra* note 105, at 4; Michael R. Gordon, *U.S. Plans to Counter Arms Breach by Russia*, N.Y. TIMES (Dec. 1, 2015), <http://www.nytimes.com/2015/12/02/world/europe/us-plans-to-counter-arms-breach-by-russia.html>; *The INF Treaty, Russian Compliance and the U.S. Policy Response Before the Subcomm. on Strategic Forces of the H. Comm. on Armed Services*, 113th Cong. (2014) (prepared

3. 1990 Conventional Forces in Europe Treaty²⁷⁵

The Conventional Forces in Europe (CFE) Treaty was originally negotiated on a bloc-to-bloc (NATO and Warsaw Pact) basis, but it transcended the ending of the Cold War, the reconfiguration of alliances, and the dissolution of the U.S.S.R.²⁷⁶ The “area of application” for the treaty is all of Europe—from the Atlantic Ocean to the Ural Mountains—and, in several concentric rings emanating from central Europe to the flanks, distinct limits are established on the weapons holdings of each of the thirty participating states, as well as on selected sub-regional combinations of them.²⁷⁷ Five major categories of armaments (but not the number of military personnel) are limited, concentrating on the types of weapons that would potentially be most decisive in launching a surprise or aggressive attack: battle tanks, armored combat vehicles, artillery, combat aircraft, and combat helicopters.²⁷⁸

The treaty requires that the reductions necessary to reach specified national and group quotas shall be accomplished in three stages: twenty-five percent to be completed within sixteen months; sixty percent within twenty-eight months; and one hundred percent within forty months.²⁷⁹ The Protocol on Reduction specifies that treaty-limited items are to be disposed of only at designated reduction sites, and that a variety of destruction methods may be utilized and different types of end products are acceptable.²⁸⁰ For example, a

statement of Steven Pifer), <http://www.brookings.edu/research/testimony/2014/07/17-inf-treaty-russia-compliance-us-policy-response-pifer>; Rod Lyon, *The Great Nuclear Guessing Game: Has Russia Violated the INF Treaty?*, NAT'L INT. (Sept. 25, 2015), <http://nationalinterest.org/blog/the-buzz/the-great-nuclear-guessing-game-has-russia-violated-the-inf-13936>; Arbatov, *supra* note 273. Russia has also alleged that the United States has violated the INF Treaty. AMY F. WOOLF, CONG. RESEARCH SERV., R43832, RUSSIAN COMPLIANCE WITH THE INTERMEDIATE RANGE NUCLEAR FORCES (INF) TREATY: BACKGROUND AND ISSUES FOR CONGRESS 19–22 (2016).

²⁷⁵ CFE Treaty, *supra* note 49.

²⁷⁶ See GRAHAM & LAVERA, *supra* note 5, at 592–98; JOSEPH P. HARAHAHAN & JOHN C. KUHN, III, ON-SITE INSPECTIONS UNDER THE CFE TREATY (1996) [hereinafter Harahan CFE]. Associated with the CFE Treaty are a 1992 non-legally-binding agreement (referred to as CFE 1A) regarding limits on the states' numbers of military personnel, *available at* <http://www.state.gov/t/isn/108142.htm>, and a follow-on Adaptation Agreement (sometimes referred to as CFE 2) that would reconfigure the allocations of military equipment. *Agreement on the Adaptation of the Treaty on Conventional Armed Forces in Europe* (CFE 2), in ORG. FOR SEC. AND COOPERATION IN EUR., *Istanbul Document 1999* (Jan. 2000), <http://www.osce.org/mc/39569?download=true>. The Adaptation Agreement was signed in 1999, but has not entered into force, due to outstanding disagreements about Russian military forces remaining in Georgia and Moldova. See Tom Z. Collina, *Fact Sheet: The Conventional Armed Forces in Europe (CFE) Treaty and the Adapted CFE Treaty at a Glance*, ARMS CONTROL ASS'N. (Aug. 2012), <http://www.armscontrol.org/factsheet/cfe> [hereinafter Collina CFE Fact Sheet]; CROFT, *supra* note 5, at 79–86, 125–29.

²⁷⁷ CFE Treaty, *supra* note 49, art. II.B, IV.

²⁷⁸ *Id.*, art. I.1.

²⁷⁹ *Id.*, art. VIII.4. An extended deadline of sixty-four months can apply to certain armored combat vehicles. *Id.*

²⁸⁰ *Id.*, Protocol on Procedures Governing the Reduction of Conventional Armaments and Equipment Limited by the Treaty on Conventional Armed Forces in Europe. The standard for the required reductions is for each type of military item is “to preclude their further use or restoration

battle tank may be destroyed by (1) severing (requiring removal of the turret and other special equipment from the chassis; welding or cutting elements of the gun breech system; severing the gun tube “into two parts at a distance of no more than 100 millimetres from the breech ring;” and severing other elements of the gun, the hull and several sections from both sides); (2) explosive demolition (by simultaneously firing explosive charges inside the gun tube, outside the hull, and inside the turret casing, resulting in cracking, distorting, deforming, or rupturing key elements); (3) deformation (removing essential features, cutting or welding others, and deforming the hull and turret); or (4) smashing (dropping a heavy steel wrecking ball repeatedly until the hull is cracked in three separate places and the turret in at least one place).²⁸¹ Comparably elaborate protocols are presented for each of the other categories of weaponry.²⁸²

In addition, the treaty permits a party to reduce its weapons holdings by converting selected items to non-military purposes.²⁸³ For example, a battle tank or armored combat vehicle may be modified for service as a bulldozer, firefighting vehicle, crane, or rescue vehicle, among other options.²⁸⁴ The treaty also recognizes that items may be destroyed by accident,²⁸⁵ and it allows each state to retire one percent of its items for static display,²⁸⁶ 2.5 percent as targets for shooting practice,²⁸⁷ and five percent for training purposes.²⁸⁸ Multi-purpose helicopters are subject to their own specialized regime for re-categorization, described in a separate protocol.²⁸⁹

The Conventional Forces in Europe Treaty claims enormous success in accomplishing these disarmament steps: some 58,000 operational items have been verifiably removed from national military inventories and permanently destroyed.²⁹⁰ Despite the breathtaking detail of the destruction requirements, no conspicuous R2D problems or delays have surfaced. It is true that Russia managed to dodge some of its elimination requirements by the last-minute

for military purposes.” *Id.*, Protocol on Reduction, sec. I.4. See Harahan CFE, *supra* note 276, at Ch. 1, Reductions.

²⁸¹ CFE Treaty, *supra* note 49, Protocol on Reduction, sec. III.

²⁸² *Id.*, Protocol on Reduction, secs. IV-VII

²⁸³ CFE Treaty, *supra* note 49, Protocol on Reduction, sec. VIII; see ADRIAN WILKINSON, SOUTH EASTERN AND EASTERN EUROPE CLEARINGHOUSE FOR THE CONTROL OF SMALL ARMS AND LIGHT WEAPONS DEFENCE CONVERSION: THE DISPOSAL AND DEMILITARIZATION OF HEAVY WEAPON SYSTEMS (2007), <https://www.sipri.org/sites/default/files/research/disarmament/dualuse/pdf-archive-att/pdfs/seesac-defence-conversion-the-disposal-and-demilitarization-of-heavy-weapon-systems.pdf>.

²⁸⁴ CFE Treaty, *supra* note 49, Protocol on Reduction, sec. VIII.4.

²⁸⁵ *Id.*, Protocol on Reduction, sec. IX.

²⁸⁶ *Id.*, Protocol on Reduction, sec. X.

²⁸⁷ *Id.*, Protocol on Reduction, sec. XI.

²⁸⁸ *Id.*, Protocol on Reduction, sec. XII.

²⁸⁹ *Id.*, Protocol on Procedures Governing the Categorisation of Combat Helicopters and the Recategorisation of Multi-Purpose Attack Helicopters.

²⁹⁰ Collina CFE Fact Sheet, *supra* note 276; see Harahan CFE, *supra* note 276, at chapter 8 (noting that Belarus failed to meet the deadline for completing its destruction obligations, due to financial limitations).

expedient of moving thousands of treaty-limited items across the Urals and outside the treaty's area of application.²⁹¹ More recently, Russia suspended its participation in required CFE Treaty notifications and related activities in 2007, in protest against other parties' unwillingness to modify the treaty obligations, placing the future of the treaty regime in grave doubt.²⁹² But the problem is not in the R2D procedures; those seem to have operated with precision, speed, and success.²⁹³

4. 2010 New START Treaty²⁹⁴

The most recent contribution to the cavalcade of bilateral U.S.-Russia nuclear arms control agreements was intended both to further reduce the countries' nuclear weapons inventories, limiting each side to 1,550 countable weapons,²⁹⁵ and to streamline the cumbersome START I procedures for inspections and eliminations (discussed further *infra*).²⁹⁶ Even with that simplification, however, New START presents a mouthful of R2D obligations.

The principal R2D features of New START will be familiar by now, as they mimic provisions discussed *supra* regarding other, especially nuclear, arms control treaties, so they may be summarized only briefly here. The articulated standard is to render the weapons "inoperable, precluding their use for their original purpose."²⁹⁷ As is now customary, the treaty identifies unique mechanisms for the elimination of each category of weapon. For example, a solid-fueled ICBM may be destroyed by explosion; by cutting or punching a one-meter hole along the lateral surface of the first stage rocket motor case; by cutting that first stage rocket motor case into two parts of approximately equal size; or by crushing or flattening it.²⁹⁸ Following one of those processes, the party is required to display or exhibit the carcass for up to two months for the other party's

²⁹¹ GRAHAM & LAVERA, *supra* note 5, at 596; Harahan CFE, *supra* note 276, at chapters 7, 8; *Treaty on Conventional Forces in Europe (CFE)*, GLOBALSECURITY.ORG, <http://www.globalsecurity.org/military/world/russia/cfe-treaty.htm> (last visited Aug. 10, 2016) (Russia removed 70,000 pieces of military equipment from the CFE Treaty area; much of this was later destroyed).

²⁹² U.S. DEP'T OF STATE, *Compliance with the Treaty on Conventional Armed Forces in Europe Condition 5(C)*, (Jan. 2016), <http://www.state.gov/t/avc/rls/rpt/2016/255560.htm> [hereinafter 5(C) Report] (also noting that the United States has responded to Russia's actions by ceasing implementation of certain CFE obligations with respect to Russia); Collina CFE Fact Sheet, *supra* note 276; WOOLF, *supra* note 5, at 40–42.

²⁹³ See 5(C) Report, *supra* note 292; 2010 COMPLIANCE REPORT, *supra* note 105, at 27–35 (U.S. government asserts CFE compliance issues with Armenia, Azerbaijan, and others, as well as Russia, but none connected to the operation of the treaty's R2D functions).

²⁹⁴ New START Treaty, *supra* note 48; see generally *New START*, U.S. DEP'T OF STATE, <http://www.state.gov/t/avc/newstart/index.htm> (last visited Aug. 10, 2016); AMY F. WOOLF, CONG. RESEARCH SERV., R41219, *THE NEW START TREATY: CENTRAL LIMITS AND KEY PROVISIONS* (2016).

²⁹⁵ New START Treaty, *supra* note 48, art. II.1(b).

²⁹⁶ See *infra* text accompanying notes 361–70 (discussing START I verification mechanisms).

²⁹⁷ New START Treaty, *supra* note 48, Protocol, Part 3, sec. I.2.

²⁹⁸ *Id.*, Protocol, Part 3, sec. II.2.

examination, by satellite photoreconnaissance or on-site, to ensure accountability; notification in advance of the conversion or elimination operation is also required.²⁹⁹

A regulated weapon may also be destroyed by accident, by launch or static firing, or by rendering it inoperable and placing it on static display or converting it into a trainer.³⁰⁰ Under New START, so-called “type two” inspections are conducted to verify that the elimination functions have been carried out in conformity with the text.³⁰¹ As before, some weapons may be converted, rather than destroyed, such as permitting the U.S. B-52 and B-1B bombers to be adapted to perform exclusively non-nuclear functions.³⁰²

The R2D functions of the New START Treaty are still underway; parties have seven years after entry into force (i.e., until February 2018) to complete the process and reach the specified numerical end-state.³⁰³ To date, there have been few public complaints about violations of the destruction, conversion, inspection and other functions, or allegations of illegitimate corner-cutting.³⁰⁴

²⁹⁹ *Id.*, Protocol, Part 3, sec. II.3.

³⁰⁰ *Id.*, Protocol, Part 3, sec. VI.1.

³⁰¹ *Id.*, Protocol, Part 5, sec. VII.1(e),(f).

³⁰² *Id.*, art. VI, Protocol, Part 3. See Richard Tomkins, *Nuclear Weapons Capability Stripped from Some B-52 Bombers*, UPI (Sept. 21, 2015), http://www.upi.com/Business_News/Security-Industry/2015/09/21/Nuclear-weapons-capability-stripped-from-some-B-52-bombers/3231442767214/ (reporting that thirty B-52 bombers have been converted to exclusively conventional weapons capability in conformity with New START).

³⁰³ New START Treaty, *supra* note 48, art. II. The calendar deadline resulting from this provision is February 2018.

³⁰⁴ Anita Friedt, Principal Deputy Assistant Secretary of State, Remarks at Royal United Services Institute (June 2, 2016), <http://www.state.gov/t/avc/rls/257997.htm> (reporting that “[n]ew START implementation is proceeding well and both the United States and Russia are expected to meet the Treaty’s central limits when they take effect in February 2018”). As of April 2016, Russia was well below the number of permitted deployed launchers, and somewhat above the number of accountable warheads; the United States was slightly below the warhead limit and slightly above the launcher limit. Hans M. Kristensen, *New START Data Shows Russian Increases and US Decreases*, FED’N OF AM. SCIENTISTS (Apr. 3, 2016), <https://fas.org/blogs/security/2016/04/new-start-data-shows-russian-increases-and-us-decreases/>; see also Hans M. Kristensen, *U.S. Drops Below New START Warhead Limit for the First Time*, FED’N OF AM. SCIENTISTS (Oct. 6, 2015) [hereinafter Kristensen, *U.S. Drops*]; U.S. DEP’T OF STATE, ANNUAL REPORT ON IMPLEMENTATION OF THE NEW START TREATY (2016); WOOLF, *supra* note 294, at 25–26. *But see* Bill Gertz, *Russians Violating New START Arms Treaty*, FREE BEACON (June 9, 2016), <http://freebeacon.com/national-security/russians-violating-new-start-arms-treaty/> (reporting that Russia has not followed the New START provisions for eliminating SS-25 mobile missiles, simply unbolting critical components instead of cutting them to accomplish permanent disability, and presenting only missile launch canisters, instead of missiles, for inspection); Michaela Dodge, HERITAGE FOUND., *New Strategic Arms Reduction Treaty: Time to Stop the Damage to U.S. National Security* (2016), <http://www.heritage.org/research/reports/2016/06/new-strategic-arms-reduction-treaty-time-to-stop-the-damage-to-us-national-security>.

D. *Great Detail in Treaty R2D Specifications and Significant Associated Implementation Problems*

The final task of this Part is to scrutinize three important treaties in which the elaborate legal detail and specification about dismantling, destruction, conversion and related processes did generate notorious implementation problems. The three case studies depict quite different types of R2D failures; whether the R2D obligations were too tight, too loose, or just inapt, the concomitant enforcement quandaries have been substantial—and appear to be insoluble for some years to come.

1. 1993 Chemical Weapons Convention³⁰⁵

The Chemical Weapons Convention (CWC) is cited so frequently *supra*, because it is such an important, widely acclaimed, and in many respects successful instrument.³⁰⁶ It has achieved nearly universal adherence and has helped entrench the global taboo against the possession and use of a particularly ancient and reviled scourge. Under this ambitious treaty's auspices, the vast majority of the world's chemical weapons inventories have been ostentatiously and undeniably eradicated.³⁰⁷ Nonetheless, notable problems have erupted, some of them associated with the concern for detail in R2D that permeates the text of the instrument.

The first problem emerges from the manifest noncompliance with the CWC's strict timetable for states to eliminate their chemical weapons stocks. The treaty's "order of destruction" establishes a fixed schedule, with sequential interim deadlines leading in lock step to complete eradication of all chemical weapons within ten years of the treaty's entry into force.³⁰⁸ If a party experiences

³⁰⁵ CWC, *supra* note 39.

³⁰⁶ MATHEWS, *supra* note 10, at 10 (asserting that the Chemical Weapons Convention "has been increasingly seen as one of the most (if not the most) successful arms control and disarmament treaties"). See generally GRAHAM & LAVERA, *supra* note 5, at 1168–70; Paul F. Walker, *Abolishing Chemical Weapons: Progress, Challenges, and Opportunities*, 40 ARMS CONTROL TODAY (Nov. 4, 2010), https://www.armscontrol.org/act/2010_11/Walker.

³⁰⁷ See generally, ORG. FOR THE PROHIBITION OF CHEMICAL WEAPONS, <https://www.opcw.org/> (last visited Nov. 6, 2016) (website reporting statistics such as the treaty's coverage of 192 states constituting 98 percent of the global population; 90 percent of the world's declared chemical weapons stockpiles have been destroyed; and 6,194 verification inspections have taken place); U.S. DEP'T OF STATE, COMPLIANCE WITH THE CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION, STOCKPILING AND USE OF CHEMICAL WEAPONS AND ON THEIR DESTRUCTION, Condition 10 (C) Report (Apr. 2016), <http://www.state.gov/t/avc/rls/rpt/2016/255563.htm>; Sutherland, *supra* note 99. The CWC also requires the destruction or conversion of the facilities at which chemical weapons were formerly produced. ORG. FOR THE PROHIBITION OF CHEMICAL WEAPONS, FACT SHEET 6: ELIMINATING CHEMICAL WEAPONS AND CHEMICAL WEAPONS PRODUCTION FACILITIES (Mar. 2016), https://www.opcw.org/fileadmin/OPCW/Fact_Sheets/English/Fact_Sheet_6_-_destruction.pdf. Fourteen states have declared such facilities; all of them have been disabled, sixty-seven have been destroyed, and twenty-three have been converted. *Id.*

³⁰⁸ CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.17.

“exceptional circumstances beyond its control,” it may request an extension, and several parties have successfully done so.³⁰⁹ But the treaty flatly declares that “in no case shall the deadline for a State Party to complete its destruction of all chemical weapons be extended beyond 15 years.”³¹⁰

The extended 15-year deadline expired on April 29, 2012.³¹¹ The United States and Russia both failed to meet that obligation; both are currently in blatant violation of the treaty, and will remain so for years—until at least 2023 for the United States.³¹² I have elsewhere examined in detail the multiple reasons for this regrettable violation, and need not repeat that analysis here.³¹³ Suffice it to say that in large measure, the U.S. failure is a “self-inflicted wound,” hardly attributable to “circumstances beyond its control.”³¹⁴ There was a toxic combination of congenital bureaucratic mismanagement of the dismantling operations and a “not in my back yard” (NIMBY) mentality that resulted in a congressional mandate to explore “alternative technologies” (instead of relying on the Pentagon’s favored incineration processes, which succeeded in destroying ninety percent of the inventory on time) at two of the sites where the munitions and chemical agents were housed. The process of conceptualizing, developing, building, testing, and (eventually) operating those alternative technologies is consuming time and money not budgeted into the original CWC calculations.³¹⁵

But it must also be observed that the sheer task of handling and destroying the United States’ diverse and now aging and fragile chemical weapons stockpile has simply proven to be more difficult and lengthy than originally

³⁰⁹ CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.21; *see, e.g.*, Organization for The Prohibition of Chemical Weapons, Conference of the States Parties, *Request by the United States of America for Establishment of a Revised Date for the Final Deadline for Destroying All of Its Category I Chemical Weapons*, C-11/DEC.17 (Dec. 8, 2006) https://www.opcw.org/fileadmin/OPCW/CSP/C-11/en/C-11_dec.17-EN.pdf (extending the deadline for elimination of all U.S. chemical weapons to April 29, 2012); Organization for The Prohibition of Chemical Weapons, Conference of the States Parties, *Proposal by the Russian Federation on Setting a Specific Date for Completion of the Destruction of Its Stockpiles of Category I Chemical Weapons*, C-11/DEC.18 (Dec. 8, 2006) https://www.opcw.org/fileadmin/OPCW/CSP/C-11/en/C-11_dec.18-EN.pdf (setting the same extended date for Russia).

³¹⁰ CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.26.

³¹¹ *See Genesis and Historical Development*, ORGANIZATION FOR THE PROHIBITION OF CHEMICAL WEAPONS, <https://www.opcw.org/chemical-weapons-convention/genesis-and-historical-development/> (last visited Aug. 10, 2016) (noting that the Chemical Weapons Convention entered into force on April 29, 1997).

³¹² WOOLF, *supra* note 5, at 51, 52.

³¹³ David A. Koplow, *Train Wreck: The U.S. Violation of the Chemical Weapons Convention*, 6 J. NAT’L SECURITY L. & POL’Y 319 (2013) [hereinafter *Train Wreck*].

³¹⁴ CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.21.

³¹⁵ *Train Wreck*, *supra* note 313, at 340–43; Organization for the Prohibition of Chemical Weapons, Executive Council, *Note by the Director-General: Overall Progress with Respect to the Destruction of the Remaining Chemical Weapons Stockpiles*, ¶ 28, ED-80/DG.22 (Sept. 28, 2015), https://www.opcw.org/fileadmin/OPCW/EC/80/en/ec80dg22_e_.pdf [hereinafter *Overall Progress*] (reporting that the date for re-starting U.S. operations to destroy chemical weapons slipped a further six months, to June 2016); Walker, *supra* note 306.

contemplated.³¹⁶ During the CWC negotiations, the U.S. delegates were confident that the entire stockpile would be eradicated well within the ten-year period, and they accepted the possibility of the additional five-year extension simply as a “buffer zone” measure of caution. In particular, the United States’ posture was to insist upon a hard final deadline for the destruction process in order to avoid ceding to other states (conspicuously, of course, the Soviet Union) the possibility of open-ended procrastination.³¹⁷

In Russia, the saga of the missed deadline features a late start to the R2D process (due to the tumult and economic crisis prevailing there when the treaty was initiated), as well as persistent inadequate funding and inattention to its execution (even with substantial financial assistance from the United States and other donors). Russia had anticipated fulfilling its 2012 commitment by the end of 2015, but it now appears that Moscow’s treaty breach will run a further five years or so beyond that.³¹⁸

The CWC parties have responded to these patent overages with remarkable diplomatic aplomb. Under U.S. leadership, the treaty organizations and most of the parties have refrained from formally labeling the United States and Russia as being in material breach of their obligations, and have likewise resisted invoking the international legal remedies for violations. Instead, the practical accommodation has included renewed expressions by the two states of their unswerving commitment to the object and purpose of the CWC and to eventual compliance with the R2D obligations; submission of revised plans and timetables; increased reporting and scrutiny of the progress toward compliance; and enhanced external verification of each step. The other parties have not “forgiven” or “waived” the violations, and none has moved toward any type of tactical “offset,” such as retaining or building its own chemical weapons, but neither have they issued any legal penalties or political reprimands (with the conspicuous exception of strong rhetoric from Iran). It is almost as if the innocent parties “understand” that Russia and the United States have gotten themselves badly stuck in a situation of breach, and are now struggling to extricate

³¹⁶ Train Wreck, *supra* note 313, at 340.

³¹⁷ *Chemical Weapons Convention, Senate Hearing 103-869 on Treaty Doc. 103-21 Before the S. Comm. on Foreign Relations*, 103d Cong. 9, 20, 37, 67, and 84 (1994) (statements of Harold P. Smith, Jr., John D. Holum, Stephen Ledogar, Walter B. Slocombe, and Donald Mahley); WALTER KRUTZSCH & RALF TRAPP, *A COMMENTARY ON THE CHEMICAL WEAPONS CONVENTION* 63 (1994).

³¹⁸ Harahan CTR, *supra* note 165, at 285–93; Walker, *supra* note 306; Overall Progress, *supra* note 315, para. 18 (noting that Russia now projects completing the destruction process in December 2020); COMPLIANCE WITH THE CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION, STOCKPILING AND USE OF CHEMICAL WEAPONS AND ON THEIR DESTRUCTION, Condition 10 (C) Report, *supra* note 307 (observing that Russia has now destroyed ninety-two percent of its chemical weapons inventory); Train Wreck, *supra* note 313, at 343–47; Woolf, *supra* note 5, at 51; CHEMICAL WEAPON DESTRUCTION IN RUSSIA: POLITICAL, LEGAL AND TECHNICAL ASPECTS, *supra* note 92.

themselves from that unhappy plight: the CWC deadline has simply proven too tight, and the violation of it is not being strictly enforced.³¹⁹

The R2D provisions of the CWC have proven problematic in other respects as well. Sometimes, despite all the foresight that a decade-long multilateral negotiation and a 100-page treaty text could incorporate, situations have arisen in which the destruction, verification or other procedures seemed inapposite or unduly burdensome. For example, in Iraq during the chaotic 2004-09 insurgency, U.S. and U.K. military forces recovered 4530 old (pre-1991) Iraqi chemical weapons, including degraded artillery projectiles loaded with sarin and mustard agents. The Western troops took custody of the weapons in order to secure and stabilize them and to prevent them from becoming accessible to terrorists. This was surely a prudent, expedient response to a dangerous emergency situation, but the acquisition of the chemical weapons, as well as their subsequent examination, retention, transport, and destruction, were accomplished in secret, without participation or awareness by the government of Iraq or the CWC's treaty implementation bodies. When these operations ultimately came to light, the United States and the United Kingdom took the position that they had declined to follow the CWC procedures because the treaty's R2D formula was not applicable to such a wartime emergency recovery operation. Most other parties seemed relatively comfortable with that excuse, but Iran angrily decried it as a deliberate, sustained circumvention of the CWC, unjustified by any provision in the text.³²⁰

³¹⁹ Train Wreck, *supra* note 313, at 356–58; Organization for the Prohibition of Chemical Weapons, Conference of the States Parties, Decision: Final Extended Deadline of 29 April 2012, C-16/DEC.11 (Dec. 1, 2011), https://www.opcw.org/fileadmin/OPCW/CSP/C-16/en/c16dec11_e_.pdf; Organization for the Prohibition of Chemical Weapons, Conference of States Parties, *Report of the OPCW on the Implementation of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction in 2014*, at 5–7, C-20/4 (Dec. 2, 2015), https://www.opcw.org/fileadmin/OPCW/CSP/C-20/en/c2004_e_.pdf; Organization for the Prohibition of Chemical Weapons, Conference of the States Parties, *Note by the Director-General: Report on the Overall Progress with Respect to the Destruction of the Remaining Chemical Weapons Stockpiles*, C-19/DG.15 (Nov. 28, 2014) https://www.opcw.org/fileadmin/OPCW/CSP/C-19/en/c19dg15_e_.pdf; Organization for the Prohibition of Chemical Weapons, Conference of the States Parties, *Islamic Republic of Iran, Statement by H.E. Ambassador Dr. Alireza Jahangiri, Permanent Representative to the OPCW from the Islamic Republic of Iran, at the 20th Session of the Conference of the States Parties*, C-20/NAT.49 (Dec. 1, 2015), https://www.opcw.org/fileadmin/OPCW/CSP/C-20/national_statemements/c20nat49_e_.pdf.

³²⁰ Organization for the Prohibition of Chemical Weapons, Technical Secretariat, *Note by the Technical Secretariat: Reports of the Technical Secretariat for the Purpose of Reviewing Documentation Related to the Recovery and Destruction of Iraqi Chemical Weapons*, Verification Division, S/1224/2014 (Nov. 19, 2014), https://www.opcw.org/fileadmin/OPCW/S_series/2014/en/s-1224-2014_e_.pdf; C.J. Chivers, *Thousands of Iraq Chemical Weapons Destroyed in Open Air, Watchdog Says*, N.Y. TIMES (Nov. 23, 2014); Organization for the Prohibition of Chemical Weapons, Conference of the States Parties, *The Islamic Republic of Iran's View and Concern Over the Discovery and Destruction of Chemical Weapons by the United States and the United Kingdom in Iraq*, C-15/NAT.1 (Nov. 29,

Combat and post-combat environments can be problematic for punctilious treaty R2D operations in other respects, too. When Iraq joined the CWC in 2009, it formally declared possession of an unspecified quantity of chemical weapons entombed in two subterranean bunkers at Muthanna that had been bombed by U.S. and coalition forces during the 1991 war. The precariously unstable condition of the bunkers, Iraq maintained, precluded taking any inventory of the lethal contents, and foreclosed any prudent excavation and R2D operations. That detritus has remained in place, basically persisting outside the CWC rules. Subsequently, some feared that when fighters from the terrorist group ISIS overran the bunkers' location in 2014, they might have undertaken to exhume some of the still-usable chemical arms.³²¹

Likewise, in Libya in 2011³²² and in Syria in 2014,³²³ the fighting of insurgency or civil war campaigns disrupted treaty-required efforts to collect,

2010); Organization for the Prohibition of Chemical Weapons, Executive Council, *Statement by Ambassador Robert P. Mikulak, United States Delegation to the OPCW at the 69th Session of the Executive Council*, at 3, EC-69/NAT.15 (July 11, 2012); Organization for the Prohibition of Chemical Weapons, Executive Council, *Statement by Ambassador Robert P. Mikulak, United States Delegation to the OPCW at the 65th Session of the Executive Council*, at 5, EC-65/NAT.8 (July 12, 2011).

³²¹ COMPLIANCE WITH THE CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION, STOCKPILING AND USE OF CHEMICAL WEAPONS AND ON THEIR DESTRUCTION, CONDITION 10 (C) REPORT, *supra* note 307; Walker, *supra* note 306; Woolf, *supra* note 5, at 53; Organization for the Prohibition of Chemical Weapons, Conference of States Parties, *Report of the OPCW on the Implementation of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction in 2014*, at 4–5, C-20/4 (2015).

³²² Kenneth D. Ward, U.S. Ambassador, Statement at 51st Meeting of the Organization for the Prohibition of Chemical Weapons Executive Council, EC-M-51 (Feb. 24, 2016), https://www.opcw.org/fileadmin/OPCW/EC/M-51/en/EC-M_51_USA_Statement.pdf; Woolf, *supra* note 5, at 49–50; Jonathan B. Tucker, *The Rollback of Libya's Chemical Weapons Program*, 16 NONPROLIFERATION REVIEW 363 (2009), <http://www.tandfonline.com/doi/pdf/10.1080/10736700903255060>; Walker, *supra* note 306; Michelle Nichols, *U.N. Authorizes States to Help Libya Dispose of Chemicals*, REUTERS (July 22, 2016), <http://www.reuters.com/article/us-libya-security-chemicalweapons-un-idUSKCN1022CG>; Organization for the Prohibition of Chemical Weapons Executive Council, *Decision: Destruction of Libya's Remaining Chemical Weapons*, EC-M-52/DEC.1 (July 20, 2016), https://www.opcw.org/fileadmin/OPCW/EC/M-52/en/ecm52dec01_e_.pdf; Missy Ryan & Greg Jaffe, *As ISIS Closed In, a Race to Remove Chemical Weapons Precursors in Libya*, WASH. POST (Sept. 13, 2016) https://www.washingtonpost.com/world/national-security/as-isis-closed-in-a-race-to-remove-chemical-weapon-precursors-in-libya/2016/09/13/85094326-78f7-11e6-beac-57a4a412e93a_story.html; Press Release, U.S. Dep't of State, Removal of Chemical Weapons Precursors from Libya (Sept. 1, 2016), <http://www.state.gov/r/pa/prs/ps/2016/09/261535.htm> (noting international partners' successful removal from Libya of the last chemical weapons materials).

³²³ The United States and others assisted Syria in the destruction of its declared stockpile of 1300 tons of chemical weapons, but subsequent events demonstrated that President Assad had not declared his full inventory, and continues to use chemical weapons against his own population. Woolf, *supra* note 5, at 50–51; *Compliance with the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction, Condition 10 (C) Report*, *supra* note 307; Press Release, U.S. Department of State, Framework for the Elimination of Syrian Chemical Weapons (Sept. 14, 2013),

count, and destroy all the chemical weapons, and to do so in a manner susceptible to oversight by the international organization. The CWC has no special R2D provisions dealing with operations in these tumultuous, but hardly rare, circumstances, and the standard treaty algorithms, for all their specificity, seem unsuitable.³²⁴

Finally, the CWC regime has also suffered from persistent agitation about full compliance with the R2D structures applicable to old and abandoned chemical weapons. Most prominently, Japan has accepted its responsibility to find, recover, and destroy the 300,000 to 400,000 still-lethal chemical weapons it deployed and then deserted in China during and after World War II. This type of remediation is both technically and politically complex; approximately 50,000 items have been recovered, but China has strongly protested Japan's ongoing failure to meet its proclaimed schedule.³²⁵

2. 1997 Ottawa Convention on Anti-Personnel Land Mines³²⁶

The humanitarian problem of persistent anti-personnel land mines—hardy devices that, once deployed, can remain lethal and almost invisible in the soil or flora for years or decades—animated the negotiation and widespread acceptance of the Ottawa mine ban treaty. Too many of the victims of land mines have been

<http://www.state.gov/r/pa/prs/ps/2013/09/214247.htm>; Oliver Meier, *The Danger of Chemical Weapons in Syria*, STIFTUNG WISSENSCHAFT UND POLITIK (Apr. 23, 2016), http://www.swp-berlin.org/fileadmin/contents/products/comments/2016C23_mro.pdf; Rick Gladstone, *Syria Used Chlorine in Bombs Against Civilians, Report Says*, N.Y. TIMES (Aug. 25, 2016), <http://www.nytimes.com/2016/08/25/world/middleeast/syria-used-chlorine-in-bombs-against-civilians-report-says.html>; Colum Lynch, *The World May Never Know if Syria Really Destroyed All Its Chemical Weapons*, FOREIGN POLICY (Aug. 31, 2016), <http://foreignpolicy.com/2016/08/31/the-world-may-never-know-if-syria-really-destroyed-all-its-chemical-weapons/>.

³²⁴ Albania also missed the deadline for compliance with its CWC destruction obligation in a minor way. Walker, *supra* note 306.

³²⁵ Organization for the Prohibition of Chemical Weapons, Executive Council, *Report by the Director-General, Overall Progress with Respect to the Destruction of Chemical Weapons Abandoned by Japan in the People's Republic of China*, EC-80/DG.21 (Oct. 7, 2015); Ahmet Uzumcu, Address to 15th Chemical Weapons Demilitarization Conference 5–6 (May 22, 2012) (transcript available at https://www.opcw.org/fileadmin/OPCW/ODG/uzumcu/DG_CWD_Glasgow_May_2012.pdf); Mike Brombach, GLOBAL GREEN, ABANDONED CHEMICAL WEAPONS IN CHINA: THE UNRESOLVED JAPANESE LEGACY (2011), <http://static1.squarespace.com/static/5548ed90e4b0b0a763d0e704/t/55548b35e4b031f59111a514/1431604021283/publication-183-1.pdf>; *China Urges Japan to Speed Up Destruction of Chemical Weapons Abandoned in China During WWII*, XINHUANET (Aug. 15, 2015), http://news.xinhuanet.com/english/2015-08/16/c_134521469.htm; Walker, *supra* note 5.

³²⁶ Ottawa Convention, *supra* note 66. See generally GRAHAM & LAVERA, *supra* note 5, at 1441–43.

civilians, especially children, who happen upon the devastating devices long after the soldiers have marched away, and even after the war has long since ended.³²⁷

In pursuit of a comprehensive solution to all aspects of the mine problem, the Ottawa treaty forbids its parties from using, developing, producing, stockpiling, retaining, or transferring mines.³²⁸ Moreover, it establishes two distinct, complementary types of R2D obligations. First, regarding mines in stockpiles (devices that are fully manufactured and functional, but that are stored in a warehouse, not yet deployed to the field), article 4 requires destruction “as soon as possible but not later than four years after the entry into force of this Convention.”³²⁹ There is no provision for extension or waiver of that deadline. In contrast, article 5 deals with elimination of mines already deployed into mine fields. There, the obligation is to destroy the mines as soon as possible, but no later than ten years after the treaty’s entry into force, and the treaty includes a mechanism for possible extensions.³³⁰ If a party “believes it will be unable to destroy” the fielded mines within the ten-year period, it may request a continuance from the relevant treaty organs, specifying the duration of the proposed extension and a detailed explanation of the reasons for it, including a description of the demining work already undertaken; the “financial and technical means available” to the party; the “circumstances which impede the ability” of the party to meet the original deadline; and the “humanitarian, social, economic, and

³²⁷ INT’L CAMPAIGN TO BAN LANDMINES, LANDMINE MONITOR 2015 25–29 (2015), http://www.the-monitor.org/media/2152583/Landmine-Monitor-2015_finalpdf.pdf, [hereinafter 2015 Landmine Monitor Report]; U.S. DEP’T OF STATE, *To Walk the Earth in Safety*, 6 (2015), <http://www.state.gov/documents/organization/248978.pdf> [hereinafter Walk the Earth] (estimating 4000 casualties per year from land mines). Note that the United States and several other large mine-using countries have refrained from joining the Ottawa Convention, favoring CCW amended protocol 2, *supra* text accompanying notes 227–30, instead. The United States has pursued the development of non-persistent mines, which self-destroy or self-neutralize, thereby becoming inactive after fixed, short period of time, and thus do not contribute to the humanitarian problem. U.S. DEP’T OF DEFENSE, LANDMINE POLICY WHITE PAPER (2004), http://www.dod.mil/pubs/landminepolicy/full_statement_of_policy_feb_2004.html; Emily Alpert, *Why Hasn't the U.S. Signed an International Ban on Land Mines?*, L.A. TIMES (Apr. 5, 2012), http://latimesblogs.latimes.com/world_now/2012/04/mine-treaty-us-ottawa-convention.html; 2015 LANDMINE MONITOR REPORT, *supra*, at 12 (discussing the relationship between the Ottawa Convention and CCW).

³²⁸ Ottawa Convention, *supra* note 66, art. 1.

³²⁹ *Id.*, art. 4.

³³⁰ *Id.*, art. 5. For comparison, the 1907 Hague Convention includes post-conflict cleanup obligations regarding sea mines (instead of the land mines that are the subject of the Ottawa Convention). Under Hague VIII, dealing with automatic submarine contact mines anchored to the sea floor, parties are obligated at the conclusion of a war, to do their “utmost to remove the mines which they have laid.” Each party must remove mines from its own waters “with the least possible delay” and notify other states about mines it has placed off their coasts. Convention Relative to Laying of Automatic Submarine Contact Mines, art. 5, Oct. 18, 1907, 36 Stat. 2332, http://avalon.law.yale.edu/20th_century/hague08.asp; see Boothby, *supra* note 5, at 281–85.

environmental implications of the extension.”³³¹ Repeated extensions are available.

Experience under the Ottawa convention has starkly revealed two opposite types of problems with these two R2D deadlines, one proving to be too tight, and the other too loose. First, regarding stockpiled mines, ninety parties have devoted the resources necessary to meet the treaty obligations, and more than forty-nine million stockpiled mines have been successfully eliminated.³³² But three states³³³—Belarus, Greece, and Ukraine—have been in persistent violation, failing to meet the four-year obligation, and registering precious little progress toward compliance.³³⁴ The Ottawa deadline for Belarus and Greece came and went on March 1, 2008; Ukraine, which joined the treaty later, has been in default since June 1, 2010.³³⁵ At last count, Ukraine still held 5,767,600 mines; Belarus 2,861,636; and Greece 452,695.³³⁶ Of the three, Ukraine seems to be registering the least progress toward fulfillment of article 4.³³⁷

These violations are of great concern to other treaty parties and to the non-governmental organizations that monitor compliance with the Ottawa convention.³³⁸ The treaty’s 2009 Cartagena Action Plan called upon the tardy states to accelerate their activities and offered multilateral assistance; when that failed to generate the desired results, the 2014 Maputo Action Plan called for revised projections of new destruction dates.³³⁹

Regarding the obligation to destroy mines in mined areas, the record of successful compliance is much worse.³⁴⁰ Clearing a minefield is difficult, expensive and dangerous: the process must be painstaking and virtually 100

³³¹ Ottawa Convention, *supra* note 66, art. 5.3, 5.4; *see* BOOTHBY, *supra* note 5, at 181–84 (construing the Ottawa destruction obligations).

³³² 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 13–14.

³³³ Turkey was also in violation of its Ottawa Convention obligation to destroy stockpiled landmines for over three years; its deadline was March 2008, but it did not complete the destruction of its nearly 3 million landmines until August 2011. INTERNATIONAL CAMPAIGN TO BAN LANDMINES, LANDMINE MONITOR 2012 6 (2012), http://www.the-monitor.org/media/1639374/Landmine_Monitor_2012.pdf.

³³⁴ Greece’s efforts to destroy its stockpile of mines have encountered a special problem. Greece had shipped many of its mines to Bulgaria for destruction in a facility there, but a serious explosive accident in October 2014 destroyed the facility and put the plans for elimination of the Greek stockpile on indefinite hold. *See* INT’L CAMPAIGN TO BAN LANDMINES, LANDMINE MONITOR 2014 16–17 (2014), <http://www.the-monitor.org/media/1716915/Landmine-Monitor-2014-Web.pdf> [hereinafter 2014 LANDMINE MONITOR REPORT]; 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 14.

³³⁵ 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 13–14, n. 78.

³³⁶ *Id.*, at 14.

³³⁷ *Id.*, at 14; 2014 LANDMINE MONITOR REPORT, *supra* note 334, at 17.

³³⁸ 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 14.

³³⁹ *Id.*, at 14, 23; 2014 LANDMINE MONITOR REPORT, *supra* note 334, at 27–29.

³⁴⁰ 2014 LANDMINE MONITOR REPORT, *supra* note 334, at 21 (noting that less land was cleared of landmines in 2013 than in 2012); 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 17 (noting that somewhat more acreage was cleared of landmines in 2014 than in 2013, but fewer mines were destroyed in the process).

percent thorough in order to return an area to productive employment.³⁴¹ While several Ottawa members have reported restoring all their mine-contaminated areas,³⁴² many parties still have outstanding article 5 clearance obligations; in fact, more states have requested extensions of up to ten years than have successfully completed their clearance operations.³⁴³ Thirty-three states have requested deadline extensions, some for the second, third, or in one case, fourth time.³⁴⁴ Despite the parties' repeated affirmation that the extensions should be the exception, not the rule, seventy-two percent of the states with residual article 5 obligations currently have extensions in place, and only three states are adjudged to be "on track" to complete their mine clearance obligations.³⁴⁵

More distressing, the implementation behavior of Ottawa parties, when granted extensions, has been disappointing. Several states have been unable or unwilling to devote the necessary resources and efforts to their demining operations, and progress toward mine-free acreage has been slow—only about 200 square kilometers have been reliably cleared worldwide per year.³⁴⁶ The treaty's monitoring body "has called on States Parties to act with greater urgency in fulfilling their clearance obligations."³⁴⁷

The Ottawa convention thus vividly illustrates the Hobson's choice regarding R2D deadlines: if the timetable is too tough, and not subject to extension, then countries will be prone to violate it, breaching the treaty. Conversely, if the schedule is more lenient, and if it permits prolongations, there is a grave danger that parties will slack off, routinely obtain extensions and re-extensions, and not apply themselves seriously to the destruction task at hand.

A useful point of comparison here arises from the 2008 Oslo Convention on Cluster Munitions,³⁴⁸ which is very much the heir of the Ottawa convention in

³⁴¹ 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 17, 19 (noting that fifty-seven states and four other areas still have an identified threat from emplaced mines.)

³⁴² *Id.*, at 17, 20 (reporting that twenty-nine states and one other area have declared themselves cleared of mines since the Ottawa treaty entered into force in 1999); 2014 LANDMINE MONITOR REPORT, *supra* note 334, at 21; Press Release, U.S. Dep't of State, United States Welcomes Mozambique Announcement on Landmine Clearance (Sept. 17, 2015) (announcing that Mozambique, which had been one of the world's most landmine-affected states, has completed the clearance of all known mine fields in the country).

³⁴³ 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 20–23; 2014 LANDMINE MONITOR REPORT, *supra* note 334, at 25; WALK THE EARTH, *supra* note 327, at 6 (estimating that fifty-six countries remain affected by land mine fields).

³⁴⁴ 2014 LANDMINE MONITOR REPORT, *supra* note 334, at 25.

³⁴⁵ 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 17, 20; 2014 LANDMINE MONITOR REPORT, *supra* note 334, at 25.

³⁴⁶ 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 19.

³⁴⁷ 2014 LANDMINE MONITOR REPORT, *supra* note 334, at 25, 27 (discussing the general lack of political will to traverse the "rocky road" of landmine clearance); 2015 LANDMINE MONITOR REPORT, *supra* note 327, at 22.

³⁴⁸ Oslo Convention, *supra* note 53. A cluster munition is a weapon in which a canister is fired or dropped at a target; while in flight, it opens and dispenses or releases a large quantity of small explosive submunitions, each of which attacks a target. *Id.*, art. 2.2; see BOOTHBY, *supra* note 5, at 264–79.

terms of humanitarian motivations, global diplomatic leadership, and implementation structures. The Oslo text also largely adopts the Ottawa format and language regarding weapons in stockpiles and in the field, but with some interesting departures regarding R2D.

Oslo parties undertake to destroy all their stockpiled cluster munitions as soon as possible, but not later than eight years after entry into force³⁴⁹ (and the Oslo text also commits them to “ensure that destruction methods comply with applicable international standards for protecting public health and the environment.”³⁵⁰) Unlike the land mines treaty, however, the cluster munitions convention allows for the possibility of an extension of this stockpile deadline, and even contemplates repeated sequential extensions, if a party “believes that it will be unable” to accomplish the task on time.³⁵¹ The treaty text attempts to tilt parties against profligate use of this escape hatch by limiting each extension to a maximum of four years, and specifying that “the requested extensions shall not exceed the number of years strictly necessary for that State Party to complete its obligations.”³⁵² The application process for an extension is also more burdensome, demanding more detailed explanations from the state about its plan for how and when the stockpile destruction will be completed, the financial and technical resources it will devote to the task, and the exceptional circumstances justifying the extension.³⁵³ The other treaty parties will then decide by majority vote whether to accede to the request, and “may decide to grant a shorter extension than that requested and may propose benchmarks for the extension, as appropriate.”³⁵⁴

Regarding R2D of cluster munitions that have previously been fired, but that failed to explode and still linger as duds on the (former) battlefield,³⁵⁵ each Oslo party undertakes to clear and destroy cluster munition remnants in the contaminated areas under its jurisdiction and control within ten years.³⁵⁶ Again,

³⁴⁹ Oslo Convention, *supra* note 53, art. 3.2.

³⁵⁰ *Id.*, art. 3.2. Compare with the Chemical Weapons Convention, which requires compliance with a country’s own national standards for safety and environmental protection, rather than international standards. CWC, *supra* note 39, art. IV.10.

³⁵¹ Oslo Convention, *supra* note 53, art. 3.3.

³⁵² *Id.*, art. 3.3.

³⁵³ *Id.*, art. 3.4.

³⁵⁴ *Id.*, art. 3.5.

³⁵⁵ A cluster submunition that fails to detonate as intended can linger on the battlefield for an extended period of time, approximating the humanitarian problem of persistent anti-personnel land mines and posing a prolonged danger to civilians; the procedures for clearing the two types of ordnance can be similarly difficult and hazardous. See *Cluster Munitions*, LANDMINE & CLUSTER MUNITION MONITOR (June 2015), <http://www.the-monitor.org/en-gb/the-issues/cluster-munitions.aspx>; Lyndal Rowlands, *War Zones Littered with More than Just Mines*, INTER PRESS SERVICE (Apr. 4, 2016), <http://www.ipsnews.net/2016/04/warzones-littered-with-much-more-than-just-landmines/>; CLUSTER MUNITION COALITION, CLUSTER MUNITION MONITOR 2016, 69–87 (2016), <http://reliefweb.int/sites/reliefweb.int/files/resources/Cluster%20Munition%20Monitor%202016%20-%20Web%20-%20complete.pdf> (discussing clearance standards and accomplishments).

³⁵⁶ Oslo Convention, *supra* note 53, art. 4.1.

an extension of the deadline can be sought, but it is shorter (five years) than in the Ottawa treaty,³⁵⁷ and the supporting information is more fulsome (including reporting on the “humanitarian, social, economic and environmental implications of the proposed extension” and an explicit accounting of how much land area has been cleared and how much still remains to be cleared).³⁵⁸ An Oslo treaty party is also “strongly encouraged” (but not required) to provide technical, financial, material or human resources assistance where it had previously used cluster munitions in the territory of another treaty party, generating remnants that now require clearance and destruction.³⁵⁹

Since the Oslo convention entered into force only in 2010, it is too early to assess parties’ performance in any detail, or to determine whether the newer variations upon the Ottawa provisions regarding deadlines and extensions have had a salutary effect on R2D functions.³⁶⁰

3. 1991 START I Treaty³⁶¹

As noted above, the bilateral START I is the standard-bearer for excruciatingly precise attention to detail in the R2D operations,³⁶² and its

³⁵⁷ Oslo Convention, *supra* note 53, art. 4.5.

³⁵⁸ *Id.*, art. 4.6.

³⁵⁹ *Id.*, art. 4.4; *see also id.* art. 6 (specifying other obligations for international cooperation and assistance in remediating cluster munition problems.)

³⁶⁰ CLUSTER MUNITION COALITION, *supra* note 355, at 40–41 (reporting that parties to the Oslo treaty have destroyed nearly 1.4 million cluster munitions (containing 172 million submunitions) since the convention took force in 2010, including 79,184 in 2015; twenty-five parties completed their stockpile destruction obligations in that period); *id.* at 70–81 (regarding clearance of cluster munitions from contaminated areas, seven states have completed their clearance operations, while twenty-four other states still have problematic areas, and only three states appear to be on track to meet their article 4 clearance obligations); *id.* at 82–88 (describing the Dubrovnik Action Plan and the Vientiane Action Plan, designed to spur effective and timely implementation of the Oslo obligations).

³⁶¹ START I Treaty, *supra* note 47. *See generally* GRAHAM & LAVERA, *supra* note 5, at 883–89; CROFT, *supra* note 5, at 70–76.

³⁶² Two noteworthy subsequent (and much shorter) U.S.-Russia agreements built upon START I by further reducing the parties’ permitted numbers of weapons, while incorporating the START I verification, elimination, and other institutional provisions. START II was signed January 3, 1993, but never entered into force; it would have limited each side to 3000-3500 warheads attributable to deployed ICBMs, SLBMs, and heavy bombers, and eliminated the largest ICBMs and multiple-warhead ICBMs. START II largely relied upon the R2D provisions of START I, with some exceptions. *See* Treaty Between the United States of America and the Russian Federation on Further Reduction and Limitation of Strategic Offensive Arms (the START II Treaty), U.S.-Russ., art. II, Jan. 3, 1993, S. TREATY. DOC. 103–1 (1993), <http://www.state.gov/t/avc/trty/102887.htm>. *See generally* GRAHAM & LAVERA, *supra* note 5, at 887–88; CROFT, *supra* note 5, at 103–10; WOOLF, *supra* note 5, at 10–12. The Treaty on Strategic Offensive Reductions (SORT or Moscow Treaty) was signed in 2002; it was in force from 2003 until 2011, when it was superseded by the New START Treaty. Treaty on Strategic Offensive Reductions, Russ.-U.S., May 24, 2002, S. TREATY DOC. NO. 107–8 (2002). SORT reduced the quota on strategic warheads to 1700–2200 for each party over a ten-year period. *Id.* SORT contains no R2D provisions of its own; the START I mechanisms were largely adopted. *See generally* U.S. DEPARTMENT OF STATE, BUREAU OF INT’L SECURITY AND NONPROLIFERATION, Treaty Between the United States of America and

implementation generated a rather different, peculiar type of R2D problem. The treaty's Protocol on Procedures Governing the Conversion or Elimination of Items Subject to the Treaty exhibits the now-familiar exactitude in prescribing specialized procedures for eliminating each type of weapon. Just to note one example: for destroying road-mobile launchers of ICBMs, the erector-launcher mechanism and leveling supports shall be removed from the launcher chassis; the framework on which the ICBM is mounted shall be cut at locations that are not assembly joints into two pieces of approximately equal size; missile launch support equipment shall be removed from the chassis; the mountings of the erector-launcher shall be cut off the chassis; and a portion of the chassis at least 0.78 meters in length shall be cut off aft of the rear axle and cut into two pieces of approximately equal size.³⁶³

In addition, START I contains a seventy-page Protocol on Inspections and Continuous Monitoring Activities, to enable each party to satisfy itself regarding obscure and possibly problematic activities conducted inside the other state related to the treaty. These included a bewildering array of types of inspections, with carefully orchestrated rights and functions allocated to the inspecting personnel and to their hosts.³⁶⁴

At the same time, the actual arms reductions required by the treaty were fairly modest.³⁶⁵ Each side was allowed a total of 1600 deployed launchers for ICBMs and SLBMs plus heavy bombers; 6000 warheads attributable to deployed ICBMs and SLBMs; and 3600 metric tons of aggregate deployed throw weight; in addition, there were sublimits on particular categories of weapons.³⁶⁶ Reductions to meet the targets were to be accomplished in three stages, with deadlines at thirty-six, sixty, and eighty-four months.³⁶⁷

The unanticipated START I problem arose from this odd combination of generously high ceilings and expensively cumbersome R2D requirements. Both the United States and the Soviet Union discovered, to their mutual surprise, that it

the Russian Federation on Strategic Offensive Reductions, U.S.-Russ. (May 24, 2002), <http://www.state.gov/t/isn/18016.htm>; GRAHAM & LAVERA, *supra* note 5, at 1453–54. In addition, in March 1997, Presidents Bill Clinton and Boris Yeltsin signed a “Joint Statement on Parameters of Future Reductions in Nuclear Forces,” anticipating a START III agreement, which was never concluded. See CLIFF ET AL., *supra* note 88. The Joint Statement pointed toward further reductions in nuclear forces, including the concepts of irreversibility and permanent duration. *Id.* at 56.

³⁶³ START I, *supra* note 47, Protocol on Conversion or Elimination, art. III.3.

³⁶⁴ *Id.*, Protocol on Inspections and Continuous Monitoring Activities.

³⁶⁵ Note that START I, like most of the companion nuclear arms control treaties, does not require destruction of the nuclear explosive devices themselves, or even of the missiles that carry those warheads. Only the *launchers* of those missiles must be destroyed, while the missiles and warheads could simply be removed from deployed status and stored indefinitely. WOOLF, *supra* note 5, at 9.

³⁶⁶ START I, *supra* note 47, art. II.

³⁶⁷ *Id.*, art. II.2; WOOLF, *supra* note 5, at 9 (noting that the United States and Russia completed all their START I required reductions by the treaty's designated end date); 2010 COMPLIANCE REPORT, *supra* note 105, at 8 (noting a number of longstanding compliance issues under START I).

became advantageous not to destroy the weapons, even those that were, in fact, dysfunctional due to age, disrepair, or partial completion of the elimination procedures. A country could simply continue to carry those anachronistic weapons on its registry of START I accountable weapons, even though they could no longer be fired. Instead of complying with the treaty's costly algorithms for destruction, and for concomitant inspections, dozens of these inoperable "phantom" weapons remained subject to the treaty's numerical count, with no adverse legal or political consequences.³⁶⁸

The complex R2D provisions of START I thus provided a perverse counter-incentive: instead of destroying missiles, bombers, and other weapons that were no longer needed, wanted, or useable, it was beneficial to retain many of these obsolete arms on the treaty's books. Neither side wanted to devote the time and money necessary to comply with the treaty's onerous standards, and neither was compelled to do so because the numerical caps had been set so high.

As described above,³⁶⁹ the successor New START Treaty attempted to address this bizarre phenomenon—after it had persisted for nearly twenty years—both by lowering each side's numerical quota (so actual elimination of the phantom weapons became necessary) and by simplifying and easing the burden on the destruction and inspection processes (so fulfilling the mandate was no longer such an albatross).³⁷⁰

III. Observations

The R2D experiences surveyed above are quite varied. Many times, an arms control treaty has simply not imposed any quantitative restrictions on armaments, or has finessed the question of exactly how the parties are to accomplish the mandatory reductions. Sometimes, the numerical targets have been deliberately set high, making compliance unproblematic but at the cost of meaningful results. In some cases, especially regarding more recent and more sophisticated instruments, the R2D obligations have been substantial, and

³⁶⁸ WOOLF, *supra* note 294, at 6–9; Tom Z. Collina, *START Deadline Looms; Endgame Begins*, 39 ARMS CONTROL TODAY, no. 9, Nov. 2009, at 29, 31 (100 ICBM launchers, 96 SLBM launch tubes on 4 Trident submarines, and nearly 150 long range bombers no longer carry nuclear weapons but nonetheless still count under the START I treaty limits); Steven Pifer, Senior Foreign Policy Fellow, Brookings Institution, Remarks to the Arms Control Association: START Follow-on Treaty: Assessing Progress on Nuclear Risk Reduction (Dec. 9, 2009), <https://www.armscontrol.org/pressroom/StartFollowonBriefing> (describing two unflyable B-52 aircraft that have no engines or landing gear, but still count under START I because they have not been eliminated in the treaty-prescribed manner; similarly 50 MX missile silos from which the missiles have been removed, and into which ground water has been seeping for years, still count under START I; Russia has similar decommissioned nuclear missile submarines that are probably scheduled for dismantlement but have not met the treaty standard for elimination).

³⁶⁹ See *supra*, text accompanying notes 294–304 (discussing the New START Treaty).

³⁷⁰ Kristensen, U.S. Drops, *supra* note 304, at 3 (noting that for the first 4.5 years under the New START Treaty, all U.S. weapons reductions were attributable to elimination of phantom weapons; in September 2015, the United States announced that it had completed denuclearization of the first operational B-52 bomber).

compliance with them has been expensive, but the overall system has proven workable. Quite often, the public record is simply incomplete: diplomatic discretion and security classification have obscured insight into any possible headaches that might have emerged regarding destruction, conversion, or other elimination operations. In three prominent instances, however—the Chemical Weapons Convention, the Ottawa treaty on anti-personnel land mines, and the START I nuclear arms control treaty—noteworthy difficulties have emerged that shed useful light on the general phenomenon of R2D obligations.

To organize this diverse universe of experiences, and to extract “lessons learned” for future application, it is instructive to return now to the four standards for disarmament identified at the end of Part I (this time, for convenience, addressing them in an altered sequence). What are the takeaways regarding constraints upon the R2D methods; specifications for the procedures used; verification of the operations; and timetables?

A. *Constraints*

Arms control treaties typically afford their parties a substantial measure of discretion regarding the exact R2D methods to employ to rid themselves of the now-excess weaponry, but sometimes particular types of techniques are declared *verboten*. The most common form of constraint is designed to ensure adequate protection of the environment and the health and safety of R2D workers and neighboring communities.

As noted, the Chemical Weapons Convention specifically forbids some patently outrageous mechanisms for destroying toxic substances, such as ocean dumping, land burial, and open-pit burning.³⁷¹ Perhaps in this green-conscious age, no country would resort to those forms of despoliation anyway,³⁷² but not that long ago, such techniques were more or less standard. It is conceivable that a hard-pressed CWC party might have been tempted to embrace such dangerous and foolhardy alternatives, had the treaty not explicitly outlawed them. But there might also be other egregious chemical weapons disposal techniques that should have been specifically banned too, and in other future arms control measures, it might be difficult to foresee all manner of deviant options that a rogue, thoughtless, or impoverished country might resort to for R2D.

As a more generic mandate, some treaties broadly require each party in the R2D operations to “assign the highest priority to ensuring the safety of people and to protecting the environment.”³⁷³ Two further options have emerged here. Under the Chemical Weapons Convention, each party is obligated to conform to its own “national standards for safety and emissions,”³⁷⁴ while under the Oslo cluster

³⁷¹ CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (A).C.13.

³⁷² Reportedly, the United States destroyed thousands of recovered Iraqi chemical weapons via secret open-air detonation in 2004-09. Chivers, *supra* note 320.

³⁷³ CWC, *supra* note 39, arts. IV.10, VII.3.

³⁷⁴ *Id.*, art. IV.10 (emphasis added).

munitions convention, the requirement is to comply with “applicable international standards for protecting public health and the environment.”³⁷⁵ Some treaty drafters might prefer to cite international standards in this context, especially if some of the potential treaty partners unfortunately cling to weak, out-of-date national standards that are insufficiently protective. On the other hand, some of the applicable international standards might not yet be specified with adequate precision, meaning that parties would not know exactly what criteria they were signing up for, and the evolving international tests might prove to be either too expensive and difficult or too vague and lenient.

In any event, it should be clear that no treaty party could validly cite the environmental, health, and safety standards as a legitimate excuse for failing to comply in a timely manner with the fundamental R2D obligations. Some in the United States had suggested that the inability to meet the Chemical Weapons Convention’s rigid 2012 deadline for eliminating all chemical weapons might be excused because of the difficulty in conforming to stringent domestic U.S. standards regarding air and water emissions, environmental assessment and permitting, and the like. But the tribulation in satisfying one of the treaty’s terms does not allow a party to wiggle out of its other terms—the commitment under international law is to find a way to fulfill all treaty obligations, not to pick and choose among them. If a state considers honoring all the overlapping prohibitions and mandates too burdensome, its recourse is to seek to amend the treaty, to alter its domestic law, to devote additional resources to the problem, or simply to stay away from the treaty. Joining the instrument and then failing to comply with its requirements, including the standards about environmentalism, health and safety, is not a sound path.³⁷⁶

Looking forward, we might also ask whether additional standards may likewise be relevant to 21st century disarmament agreements, beyond the concerns for preserving the environment, health, and safety that have already been introduced. For example, cost has not generally been identified as a relevant variable in prior treaties, nor has the potential value of recycling or reusing scarce materials.³⁷⁷ In addition, the United Nations frequently expresses special concerns

³⁷⁵ Oslo Convention, *supra* note 53, art. 3.2 (emphasis added).

³⁷⁶ Compare with Walker, *supra* note 306, at 3 (asserting that, with regard to the CWC timetable for destroying chemical weapons, “it remains clear that the primary goals are protection of public health, the environment, and worker safety; schedule deadlines are secondary”); see Igor Khripunov, *Russia’s Legal Basis for Chemical Demilitarization*, in CHEMICAL WEAPON DESTRUCTION IN RUSSIA: POLITICAL, LEGAL AND TECHNICAL ASPECTS, *supra* note 92 at 30, 43–44 (discussing Russia’s environmental laws regarding destruction of chemical weapons).

³⁷⁷ The price tag for R2D operations can be immense. Regarding chemical weapons, for example, the United States has already spent or committed \$28 billion, with an additional \$10 billion or more necessary to complete the task. See Chris Schneidmiller, *U.S. Chemical Weapons Disposal Slippage “No Surprise,” Expert Says*, GLOBAL SECURITY NEWSWIRE (Apr. 18, 2012), <http://www.nti.org/gsn/article/us-chemical-weapons-disposal-slippage-no-surprise-expert-says/>; see also ORG. FOR SEC. AND COOPERATION IN EUR., *supra* note 88, at 16 (highlighting the value of recycling ferrous and non-ferrous materials from destroyed small arms and light weapons); WILKINSON, *supra* note 283, at 7–9 (analyzing options for recovery of scrap metal from

for global energy production and use, the unique needs of women and children in international security, the interests of the poorest developing countries, the advancement of human rights and workers' rights, and the protection of intellectual property, among other causes.³⁷⁸ At the moment, it is hard to foresee how any of these issues might be wedged into the R2D provisions of a disarmament accord, but that potential evolution should be borne in mind.³⁷⁹

Finally, the special circumstances of R2D during, or in the aftermath of, armed conflict should be explicitly considered in the text of future treaties. Sometimes, the normal procedures for recovery, assessment, processing, and destruction of treaty-regulated items are simply too hazardous to apply in full. In Iraq, the bomb-damaged Muthanna bunkers that housed fragile chemical weapons were deemed too difficult to enter safely; permanent entombment might be preferable.³⁸⁰ In Libya, the chemical demilitarization site was imperiled by civil war; in Syria, the task of consolidating and extracting dispersed chemical weapons could have required authorities to crisscross rebel lines and battlefields.³⁸¹

Similar difficulties could complicate R2D performance under other existing or future treaties. If a party considers that *force majeure* impedes legally-required operations, it should consult the treaty's implementing organization, overtly or confidentially requesting assistance, a waiver, or an extension, not making a unilateral decision to defer or modify its performance. Future treaties ought to explicitly contemplate these sorts of wartime or post-war emergencies.

destruction of heavy weapons); Harahan CFE, *supra* note 276, at Chapter 8 (discussing parties' complaints about the high cost of weapons eliminations under the CFE Treaty, sometimes leading to modifications in the procedures).

³⁷⁸ See, e.g., S.C. Res. 1325 (Oct. 31, 2000) (regarding Women and Peace and Security); Michael Astor, *U.N. Official: Peace Treaties Need to Address Indigenous Women*, ASSOCIATED PRESS (May 17, 2016); *UN-Energy Knowledge Network*, UN INTER-AGENCY NETWORK ON ENERGY (Aug. 11, 2016), <http://www.un-energy.org/>.

³⁷⁹ John Freeman, *The Experience of the Chemical Weapons Convention: Lessons for the Elimination of Nuclear Weapons*, in *ELEMENTS OF A NUCLEAR DISARMAMENT TREATY: UNBLOCKING THE ROAD TO ZERO* 117, 142 (Barry M. Blechman & Alexander K. Bollfrass eds., 2010) (assessing that environmental considerations were not very weighty during the negotiation of the Chemical Weapons Convention, but since then, a rising global environmental consciousness has augmented the importance of adhering to stringent standards during the destruction of chemical weapons, and this new emphasis "has directly prolonged rates of destruction").

³⁸⁰ See *supra* text accompanying note 321 (discussing chemical weapons housed in Iraq's damaged Muthanna bunkers).

³⁸¹ See *supra* text accompanying note 322, 323 (discussing difficulty in obtaining access to chemical weapons and conducting treaty-required destruction operations in war-torn Libya and Syria); see also Ambassador Alexey Borodavkin, Permanent Representative of the Russian Federation, Statement at the Plenary Meeting of the Conference on Disarmament (Mar. 29, 2016), [http://www.unog.ch/80256EDD006B8954/\(httpAssets\)/174C3A5D8EF0E726C1257F850032BBD4/\\$file/1385+Russian+Federation.pdf](http://www.unog.ch/80256EDD006B8954/(httpAssets)/174C3A5D8EF0E726C1257F850032BBD4/$file/1385+Russian+Federation.pdf) (arguing that "the CWC does not cover situations, non-standard but highly sensitive from the security point of view, which may arise during conflicts").

B. *Specifications*

As described above, disarmament treaties vary widely regarding how punctilious the negotiators care to be in articulating the details of the R2D functions. Sometimes, the treaty simply requires that an item be destroyed, without further elaboration of how that operation is to be conducted or what the exact content of “destruction” connotes. Other times, the treaty makers zealously get down into the weeds, such as specifying that a piece of the chassis of a missile launcher at least 0.78 meters in length shall be severed off aft of the rear axle and cut into two pieces of approximately equal size.³⁸² Obviously, painstaking insistence upon details can burden both the negotiations and the text, costing time in the bargaining and generating additional opportunities for mischief in interpretation—but sometimes that acute level of precision is necessary.

Some general considerations may be applicable. If the parties do not trust each other very much, more R2D specification will typically be necessary in the treaty text. (This point is elaborated in the immediately following section regarding verification of compliance.) If the items to be destroyed are large, complicated, and multifaceted, then more R2D details would be called for: there are fewer different criteria applicable in destroying, say, an anti-personnel land mine than in eliminating a nuclear submarine. Likewise, if the items are expensive or rare, parties might have more incentive to recover and reuse them (or their components), so additional measures regarding the permanency of the elimination could be sought. Similarly, if the treaty will allow a party to convert an item to a new, permitted use, instead of completely destroying it, then a raft of additional constraints must be applicable.

The problem of incomplete elimination is not merely hypothetical. At one point, the United States doubted that Russia’s preferred mechanism for destroying its chemical weapons—a two-step bituminization process that converted the toxins into a tar-like slurry—was truly irreversible.³⁸³ But there are no known instances of a party to a disarmament treaty evading its obligations by recovering imperfectly-destroyed weapons or facilities and restoring them to operational capacity.

This question could be characterized as an aspect of the familiar public policy choice between reliance upon a “design standard,” with the treaty demarcating the specific steps that must be taken to satisfy the destruction obligation, or a “performance standard,” in which the treaty simply articulates the

³⁸² See *supra* text accompanying notes 262–74 (discussing R2D provisions of INF Treaty).

³⁸³ See 2010 COMPLIANCE REPORT, *supra* note 105 (Russia argued—and the CWC’s treaty organization essentially agreed—that the procedure’s first step (chemical neutralization) constituted elimination of the toxic agents, even before the second step (incineration or other disposal of the reaction products); the United States contended that the first step would not achieve irreversibility).

final objective, leaving each party more freedom to decide how to meet it.³⁸⁴ In arms control treaties, the general absence of a neutral adjudicator, who could impartially and authoritatively resolve possible disputes about the adequacy of a party's compliance with either sort of standard, complicates the analysis.

The lesson to be learned, therefore, is the importance for negotiators of constructing an appropriate match between the level of specificity and the character and objectives of the particular treaty to create a suitably deft R2P apparatus.

C. *Verification*

Adequate confidence in other parties' reciprocal compliance with their obligations is fundamental in arms control—few states would be willing to disarm themselves of a militarily-valuable commodity if they doubted the fidelity of their neighbors' parallel performance. Regarding R2D specifically, the treaty makers must craft provisions to ensure that the necessary accounting and elimination functions are not only undertaken, but that they are undertaken visibly and authenticated by outside inspectors or monitors.

But verification need not always proceed with the same types of protocols, nor need it always rise to the same high standard of reliability, regardless of what security interests are at stake. At one extreme, where the treaty regulates weapons or activities that no state has ever demonstrated much interest or capability in exploiting, such as the Environmental Modification or Seabed Arms Control treaties, the danger of sudden, undetectable cheating is low.

Likewise, the depth and rigor of the verification protocols can vary, depending upon states' judgments about why a party might uphold, or violate, the treaty. In the cases of the Ottawa land mines treaty, the Oslo cluster munitions treaty, and the Biological Weapons Convention, for example, the participating states were willing (even eager) to give up the weapons in question, because they considered those armaments to be indiscriminate, inhumane, and illegitimate; they were no longer regarded as offering a useable military capability.³⁸⁵ Those states were on track to dispose of those particular devices, even if other states stayed away from the treaty, and even if some states joined the treaty but then cheated on its obligations. If a rogue state were to use the forbidden weapons in combat, the treaty parties would not elect to retaliate in kind; they would find some other mechanism for defending themselves and their interests, and would not conclude that the deviant state had procured or retained a desirable military advantage by preserving its inventory. In that circumstance, timely, comprehensive verification of compliance with the disarmament treaty is still important for validating the

³⁸⁴ See, e.g., David Besanko, *Performance Versus Design Standards in the Regulation of Pollution*, 34 J. PUB. ECON. 19 (1987).

³⁸⁵ See *supra* text accompanying note 208 (discussing United States' decision to destroy its biological weapons stockpiles).

concept of international adherence to the rule of law, but its strategic significance may be regarded as secondary.³⁸⁶

In contrast, with nuclear weapons treaties or with the treaty on Conventional Forces in Europe, strict reciprocity in accepting and implementing the obligations is much more critical. The weapons being capped and destroyed are more central to states' national security, and parties generally perceive that covert cheating could confer a decided military advantage. Verification is therefore vital in those settings, and states would not be willing to implement their R2D commitments without adequate assurances of reciprocal compliance.³⁸⁷

Fortunately, the task of monitoring weapons destruction is usually relatively easy, compared to the other verification burdens of a major arms control treaty. Successful implementation of the R2D operations of the treaties surveyed above has validated numerous techniques for insightful observation, reporting, and dispute resolution. Corroboration that a particular weapon, facility, or other item has been destroyed is generally highly reliable; it is hard to fake an explosive demolition of a missile or to fool an inspector that the wings of an aircraft have been wholly severed if they have not. Robust tags and seals can confirm that inspectors are not seeing the same destroyed items over and over, and even the conversion of military assets and their subsequent lawful operations can be carefully monitored.³⁸⁸ In contrast, the problem of adequately verifying the non-production of new devices, or the absence of an inventory of additional hidden weapons, is typically a much greater verification quandary.³⁸⁹

An important exception to that generalization, however, concerns the occasional need for secrecy in R2D operations, for example to ensure that foreign observers who are monitoring a particularly sensitive destruction operation—

³⁸⁶ In these cases, the problem of treaty non-compliance often arises from a state being unwilling or unable to devote the resources to destroy the weapons on time, not from a state deliberately seeking a one-sided military advantage by illegally holding onto weapons it has promised to eliminate.

³⁸⁷ Dean, *supra* note 5, at 26 (contrasting the lower need for verification of compliance with treaties limiting landmines and cluster munitions vs. the greatly heightened insistence upon exacting standards in a treaty dealing with nuclear weapons).

³⁸⁸ See Steve Fetter & Ivan Oelrich, *Verifying a Prohibition on Nuclear Weapons*, in *ELEMENTS OF A NUCLEAR DISARMAMENT TREATY: UNBLOCKING THE ROAD TO ZERO*, *supra* note 379, at 39; DAVID CLIFF ET AL., *VERTIC, VERIFYING WARHEAD DISMANTLEMENT: PAST PRESENT, FUTURE* (2010), <http://www.vertic.org/media/assets/Publications/VM9.pdf>.

³⁸⁹ See *generally* *ELEMENTS OF A NUCLEAR DISARMAMENT TREATY: UNBLOCKING THE ROAD TO ZERO*, *supra* note 379 (assessing mechanisms for verifying and enforcing a treaty abolishing nuclear weapons); *NUCLEAR THREAT INSTITUTE, INNOVATING VERIFICATION: NEW TOOLS AND NEW ACTORS TO REDUCE NUCLEAR THREATS* (2014), http://www.nti.org/media/pdfs/VPP_Overview_FINAL.pdf?_id=1405445582 (outlining ambitious project to develop novel methods and relationships for verification of compliance); Rose Gottemoeller, U.S. State Department Acting Under Secretary for Arms Control and International Security, Remarks at the Finnish Institute for International Affairs: Arms Control in the Information Age: Harnessing “Sisu” (Aug. 29, 2012), <http://www.state.gov/t/us/197056.htm> (stressing need for creativity in generating new verification concepts).

especially the disassembly of a nuclear weapon—do not acquire critical information about the design and function of the mechanism, which could perversely promote proliferation.³⁹⁰

Finally, it is noteworthy that unforeseen problems may arise that complicate the ordinary verification processes. For example, the U.S. and U.K. 2004-09 operations to recover Iraqi chemical weapons, procuring them from black market or other underground sources before they could fall into the hands of insurgents or terrorists, was a good faith prophylaxis. Military security and secrecy were necessary to maximize the chances for finding all such hazardous items and keeping them out of circulation. It made sense to embargo the relevant information even from the government of Iraq and the Organization for the Prohibition of Chemical Weapons, which might not have been able to reliably preclude leaks.³⁹¹

On the other hand, it is not clear that the imposed secrecy had to be quite so comprehensive and long-lasting, that the associated transport, analysis, and destruction operations could not have been notified to at least some in the organization, and that the demilitarization process could not have been appreciably closer to the treaty's environmental standards. Going forward, the treaty-makers or the body charged with implementing the obligations should develop in-text prospective standards for exceptions or modifications of the verification operations in extreme situations.³⁹² These might include providing for *in camera* disclosures of key details to a select few, and for those criteria to be applied uniformly, not unilaterally by self-judging states. Arms control treaties should not presume, or even suggest, that the fundamental provisions become inoperative or subject to unilateral suspension during armed conflict.

D. *Destruction Timetable*

This is the most problematic of the issues presented, and it raises the most profound difficulties for the R2D functions. If the schedule for destroying the regulated armaments is too tight, it will generate violations; if it is too loose, it will promote dilatory avoidance behaviors and the weapons eliminations may

³⁹⁰ See Ettore Greco, *Protection of Confidential Information and the Chemical Weapons Convention*, in *THE NEW CHEMICAL WEAPONS CONVENTION: IMPLEMENTATION AND PROSPECTS*, *supra* note 86, at 353 (assessing the provisions of various arms control treaties designed to ensure that foreign inspectors do not obtain secret militarily-useful information or corporate proprietary data); CLIFF ET AL., *supra* note 388; CWC, *supra* note 39, Annex on the Protection of Confidential Information (establishing procedures for preventing the disclosure of sensitive data); *see also* CTBT, *supra* note 26, art. II.7.

³⁹¹ *See supra* text accompanying note 320 (regarding recovery and disposal of Iraqi chemical weapons outside the provisions of the CWC).

³⁹² For example, if the North Korean regime were to collapse suddenly, some responsible outside state should undertake to take control of the “loose” weapons of mass destruction, as a temporary expedient to prevent them from falling into the wrong hands, even if the Chemical Weapons Convention, the Biological Weapons Convention, and the Nuclear Non-Proliferation Treaty do not endorse that sort of “acquisition” of the devices.

never take place. Sometimes, the violations—such as the sustained U.S. and Russian failures to comply with the “order of destruction” under the Chemical Weapons Convention—may not necessarily be all that “serious” in terms of perpetuating a militarily significant advantage over treaty-observant states. But those breaches do undermine the treaty more generally and erode respect for the rule of international law. Just as bad, the START I phenomenon of phantom weapons is legal, but a little ridiculous.

A deadline in a treaty, as in other aspects of public and private life, can perform a powerful forcing function: a public commitment to an arms control R2D schedule has a psychological value, as well as a legal obligation.³⁹³ These incentives can operate even if the deadline is somewhat artificial, in the sense that it really does not matter very much whether the United States and Russia meet their elimination obligations under the New START Treaty by 2018 as required, or whether they reach the prescribed lower numbers of weapons somewhat earlier or later.

But the psychological effect of a deadline can also cut the other way. If a country is going to be tardy in meeting a commitment, and will incur whatever political price is associated with that dereliction, maybe it does not matter too much whether it misses the target by a little or by a lot. For example, under current plans, the United States will not fulfill its obligation to rid itself of all chemical weapons until 2023 (eleven years after the treaty requires),³⁹⁴ in view of that reality, it might not be worth devoting additional resources to try to speed up performance a bit or to avoid still further slippage in the program. In the extreme case, if a state foresees that compliance with an overly rigid R2D timetable would be unduly expensive, burdensome, or otherwise problematic, it might simply decline to join a treaty that it would otherwise find appealing.

It is easy to say, in responding to parties’ performance under the Chemical Weapons Convention or the Ottawa land mines treaty, that the negotiators should simply “be more realistic” in prescribing the R2D timetables.³⁹⁵ But that bromide does not get us very far. Despite best efforts at foresight, the negotiators and their political masters consistently underestimate the cost and difficulty of R2D enterprises and the effect of NIMBY considerations in prolonging the tasks.

³⁹³ Jean Galbraith, *International Law as Behavior Symposium: Time’s Up – Deadlines as Behavior in International Law*, OPINIO JURIS BLOG (Jan. 19, 2015), <http://opiniojuris.org/2015/01/19/international-law-behavior-symposium-times-deadlines-behavior-international-law/> (discussing the uses of deadlines in international law); MARCO PINFARI, PEACE NEGOTIATIONS AND TIME: DEADLINE DIPLOMACY IN TERRITORIAL DISPUTES (2013) (studying the effect of deadlines in negotiation of peace treaties); Daniel Carpenter et al., *The Complications of Controlling Agency Time Discretion: FDA Review Deadlines and Postmarket Drug Safety*, 56 AM. J. POL. SCI. 98 (2012).

³⁹⁴ See *supra* text accompanying notes 312–17 (discussing the U.S. timetable for destroying chemical weapons).

³⁹⁵ Freeman, *supra* note 379, at 143–44.

In retrospect, perhaps negotiators should have been more skeptical about the projected timetable for eliminating chemical weapons: the U.S. program had repeatedly blown past all prior schedules and budgets, and it may have been hubris to predict that markedly better performance would suddenly be forthcoming.³⁹⁶ Likewise, in retrospect, the Ottawa negotiators should not have been surprised that so many states would dodge the task of clearing land mines from active fields—it is a dangerous and expensive undertaking.

If a treaty allows extensions, in addition to or instead of a generous initial grant of time for the R2D functions, it creates an additional opportunity for dawdling behavior. The Ottawa treaty's tolerance of extensions has turned into a laggard's paradise: repeated prolongations of the deadlines have been easy to obtain, and have sufficed to push back indefinitely any real commitment of resources in demining. In response, the Oslo cluster munitions agreement undertook to admit extensions, but to try to tilt the system against them, by making extensions shorter, harder to justify, and less automatic.³⁹⁷ Any such amelioration may turn out to be modest, however; if the treaty parties can still grant each other continuances without much adverse consequence, they are likely to do so, regardless of the treaty's "tilt."³⁹⁸

It might be possible to institute genuine penalties for violations and for unwarranted repeated extensions of disarmament treaty provisions. In principle, these penalties could include fines, loss of institutional privileges, trade sanctions, or a more prominent campaign to "name and shame" the protagonists guilty of a serial disrespect for their R2D legal obligations. Such provisions, however, would also disincentivize states from joining the treaty in the first place. Alternatively, positive inducements could be imagined, such as financial and technical assistance in fulfilling the R2D obligations, tied to measurable compliance steps. Ordinarily, the responsibility for meeting the fiscal costs of disarmament lies with the state possessing the weapons, but alternative cost-shifting measures are often created.³⁹⁹ Again, there is a question of who ultimately pays the price of such programs, and whether they create a "moral hazard" by subsidizing helplessness.

Finally, there may be some interplay between these various factors. In START I, for example, it was the unfortunate combination of high ceilings (not requiring ambitious cuts in the numbers of deployed nuclear weapons) and rigorous verification standards (creating overwhelming and expensive exactitude

³⁹⁶ Train Wreck, *supra* note 313, at 332–34.

³⁹⁷ See *supra* text accompanying notes 348–60 (comparing the Ottawa and Oslo conventions).

³⁹⁸ See CWC, *supra* note 39, Annex on Implementation and Verification, Part IV (B).C.17–18 (regarding the elimination of abandoned chemical weapons, the OPCW Executive Council "may in exceptional circumstances modify the provisions on the time-limit and the order of destruction, if it determines that doing so would not pose a risk to the object and purpose of this Convention" and the affected parties may negotiate separate arrangements regarding such destruction operations).

³⁹⁹ CWC, *supra* note 39, art. IV.16 (each party is responsible for meeting the costs of destruction of its chemical weapons); but see *supra* text accompanying notes 318, 323, 324 (United States and others provided assistance to Russia, Syria, and Albania in the destruction of chemical weapons).

in the R2D protocols) that produced the unforeseen phenomenon of phantom weapons.⁴⁰⁰ Even though the treaty had a nominal non-extendable destruction deadline of seven years, with sequential interim targets at three and five years, the parties found themselves holding onto numerous inoperable weapons, as if they had ceded to each other an indefinite extension of those deadlines. Parties seeking substantive future agreements should therefore bear in mind that there is more than one way to subvert the treaty's objectives.

Conclusion

The immediate prospects for additional, significant arms control measures certainly do not look promising at the moment. The sustained rupture in U.S.-Russian relations evokes blunt images of a new Cold War, while gridlock in the U.S. Congress sabotages domestic effectuation of any new negotiated accords. But those adverse circumstances will not preclude progress forever. Indeed, it is worth recalling that some of the most substantive and far-reaching disarmament accords discussed above had their origins in the darkest periods of the original Cold War; indeed, the parties sometimes appreciated that negotiations on these critical weapons technologies afforded them a unique vehicle for getting past the nadir in their relationship and restoring a measure of stability, predictability, and hope even during bleak times. Arms control, after all, offers the only peaceable mechanism for reducing the number, types, and capabilities of the weapons that potential enemies wield against us, and judicious international agreements can serve the mutual self-interest of all participants.⁴⁰¹

This study of the back-end of the arms control process has revealed a dazzling array of state practice: the negotiators and implementers have demonstrated enormous creativity in generating diverse responses to the various R2D challenges they have encountered. For the most part, this is a story of great success—the treaty-makers' objectives have been accomplished with a minimum of fuss, delay, cost, and controversy. But some conspicuous predicaments have also arisen. The Chemical Weapons Convention has been plagued by manifest, long-term violations of a central R2D provision by the two largest and most important parties. That breach, arising when the treaty's mandatory disarmament timetable proved too rigid by several years, subverts the success of the regime and contradicts the general U.S. insistence upon fealty to the rule of law in international affairs. The Ottawa land mines convention starkly reveals both of the

⁴⁰⁰ See *supra* text accompanying note 368 (discussing phantom weapons).

⁴⁰¹ Lawrence J. Korb, *The Way Back to the US-Russia Negotiating Table*, BULLETIN OF THE ATOMIC SCIENTISTS (Apr. 21, 2016), <http://thebulletin.org/way-back-us-russia-negotiating-table9355>; Arbatov, *supra* note 273; Adam Mount, *Time for a Different Kind of US-Russian Arms Control*, BULL. OF THE ATOMIC SCIENTISTS (Oct. 27, 2015), <http://thebulletin.org/time-different-kind-us-russian-arms-control8829> (arguing that while the current outlook is not good for arms control, such agreements become even more important when U.S.-Russian relations worsen); Kennette Benedict, *Time to Limit All Those Other Weapons, Too*, BULL. OF THE ATOMIC SCIENTISTS (Oct. 22, 2015), <http://thebulletin.org/time-limit-all-those-other-weapons-too8821> (arguing in favor of undertaking ambitious new measures to control the full array of non-nuclear weapons).

contradictory dangers: if the R2D schedule is too tough, countries will be prone to violate it; conversely, if it is too loose, parties will evade their responsibilities, and the sought-after de-weaponization efforts will never be completed. The START I charade of phantom weapons demonstrates how insufficiently prescient negotiators can generate perverse incentives that frustrate their labors.

It is hard to predict exactly where opportunities might arise for fresh arms control initiatives.⁴⁰² Great attention has been lavished on the cyber realm, and the dangers and provocations in that domain are readily apparent. Many observers suggest that any comprehensive restraints on cyber actions would be premature, but the United States and China have taken at least baby steps in that direction; perhaps those might eventuate in a legally binding instrument someday.⁴⁰³ Outer space might be another venue ripe for arms control initiatives: the European Union has promulgated a draft “code of conduct” for exo-atmospheric operations,⁴⁰⁴ and Russia and China have been hawking their alternative proposal for a more far-reaching treaty to prevent the placement of weapons in space.⁴⁰⁵ Neither of those undertakings has commanded widespread support, but additional developments are not impossible.⁴⁰⁶ Advanced military robotics have likewise excited considerable passion and controversy, as autonomous lethal weapons are advancing beyond the drawing boards. The parties to the Convention on Certain

⁴⁰² See generally, BOOTHBY, *supra* note 5, at 356–81 (contemplating how future evolutions in weapons technology and humanitarian concerns may affect the law of armed conflict).

⁴⁰³ See Robert Litwak & Meg King, *Arms Control in Cyberspace?*, WILSON CENTER (Nov. 2, 2015), <https://www.wilsoncenter.org/publication/arms-control-cyberspace>; Ido Kilovaty & Itamar Mann, *Towards a Cyber-Security Treaty*, JUST SECURITY (Aug. 3, 2016), <https://www.justsecurity.org/32268/cyber-security-treaty/>; WHITE HOUSE OFFICE OF THE PRESS SECRETARY, FACT SHEET: PRESIDENT XI JINPING’S STATE VISIT TO THE UNITED STATES (Sept. 25, 2015), <https://www.whitehouse.gov/the-press-office/2015/09/25/fact-sheet-president-xi-jinpings-state-visit-united-states> (discussing U.S.-China agreement on restricting cyber activities); David E. Sanger, *U.S. and China Seek Arms Deal for Cyberspace*, N.Y. TIMES (Sept. 20, 2015), <http://www.nytimes.com/2015/09/20/world/asia/us-and-china-seek-arms-deal-for-cyberspace.html>; Ellen Nakashima, *World’s Richest Nations Agree Hacking for Commercial Benefit Is Off-Limits*, WASH. POST (Nov. 16, 2015), https://www.washingtonpost.com/world/national-security/worlds-richest-nations-agree-hacking-for-commercial-benefit-is-off-limits/2015/11/16/40bd0800-8ca9-11e5-acff-673ae92ddd2b_story.html; see also Rep. of the Group of Governmental Experts on Developments in the Field of Information and Telecommunications in the Context of International Security, established pursuant to General Assembly resolution 68/243, U.N. Doc. A/70/174, (July 22, 2015), https://s3.amazonaws.com/access.3cdn.net/bd427f4dd731e54a2a_ojm6i6d5g.pdf (reporting consensus of international experts on principles of global cooperation on cyber security); BOOTHBY, *supra* note 5, at 237–42.

⁴⁰⁴ Beard, *supra* note 5; Timothy Farnsworth, *No End in Sight for Space Code*, 45 ARMS CONTROL TODAY, no. 7, Sept. 2015, at 36.

⁴⁰⁵ Beard, *supra* note 5; Jeff Foust, *U.S. Dismisses Space Weapons Treaty Proposal As “Fundamentally Flawed”*, SPACE NEWS (Sept. 11, 2014), <http://spacenews.com/41842us-dismisses-space-weapons-treaty-proposal-as-fundamentally-flawed/>.

⁴⁰⁶ See Disarmament Commission, Proposal for the Inclusion of an Additional Item in the Agenda of the Disarmament Commission for 2015-2017, U.N. Doc. A/CN.10/2016/WP.1 (Apr. 20, 2016), http://www.un.org/ga/search/view_doc.asp?symbol=A/CN.10/2016/WP.1 (working paper submitted jointly by the United States, Russia and China for the United Nations Disarmament Commission to prepare recommendations regarding preventing an arms race in outer space).

Conventional Weapons have taken up this topic with surprising energy; no new protocol is yet circulating but would certainly be plausible.⁴⁰⁷

None of these initiatives would likely highlight R2D operations; they deal with concepts, technologies and devices that are for the most part not yet reflected in large quantities of deployed hardware that could be counted, measured, and eliminated. But some other plausible arms control enterprises might be forthcoming, too. For example, a treaty to limit the production of additional fissile materials for nuclear weapons has been on the international agenda for many years. Considerable problems in the concept, implementation and diplomacy have precluded progress to date, but a breakthrough is still possible, and the standards, criteria, timetables and verification of the disposal of highly enriched uranium and plutonium would have to be front and center in any negotiation.⁴⁰⁸ As another example, the INF Treaty, discussed repeatedly above, is now a bilateral U.S.-Russia commitment, but as other countries develop comparable nuclear-capable missiles, there might one day be renewed interest in multilateralizing it. Any such expansion would present multiple R2D issues for several countries.⁴⁰⁹ Even more ambitiously, the concept of complete nuclear disarmament—“getting to zero”—has been pressed insistently as a measure to fulfill the obligations of the Non-Proliferation Treaty. Any such accord is still a long way off, but the R2D provisions would play a prominent role in any negotiations.⁴¹⁰

In all of these sectors, there can be no “one size fits all” approach; R2D must be bespoke, to adapt to the particular demands of the specific weapon, treaty, and participating states. The precedents of arms control reveal multiple variations; sometimes the negotiators become bewitched by the pursuit of detail, but sometimes they have ignored the topic altogether.

Weapons elimination undoubtedly carries great symbolic value; in addition to its direct contribution to peace and stability, R2D functions can be cathartic, celebrating a collective turning away from previous weaponization.⁴¹¹

⁴⁰⁷ *Ban Support Grows, Process Goes Slow*, CAMPAIGN TO STOP KILLER ROBOTS (Apr. 15, 2016), <https://www.stopkillerrobots.org/2016/04/thirdmtg/>; *'Killer Robots' to Be Debated at UN*, BBC NEWS (May 9, 2014), <http://www.bbc.com/news/technology-27343076>; Erico Guizzo & Evan Ackerman, *Do We Want Robot Warriors to Decide Who Lives or Dies?*, IEEE SPECTRUM (May 31, 2016), <http://spectrum.ieee.org/robotics/military-robots/do-we-want-robot-warriors-to-decide-who-lives-or-dies>; BOOTHBY, *supra* note 5, at 247–57.

⁴⁰⁸ See Elena Sokova & Charles Streeper, *Elimination of Excess Fissile Material*, in NUCLEAR SAFEGUARDS, SECURITY, AND NONPROLIFERATION: ACHIEVING SECURITY WITH TECHNOLOGY AND POLICY, *supra* note 146, at 353; VERTIC, *supra* note 33, at 39–43 (discussing concepts for monitoring the disposition of fissile material recovered from dismantled nuclear weapons); WOLF, *supra* note 5, at 35–36.

⁴⁰⁹ See *supra* text accompanying note 62 (discussing proposals to multilateralize the INF Treaty).

⁴¹⁰ TAUBMAN, *supra* note 213; INTERNATIONAL ASSOCIATION OF LAWYERS AGAINST NUCLEAR ARMS, ET AL., *SECURING OUR SURVIVAL: THE CASE FOR A NUCLEAR WEAPONS CONVENTION* (2007), <http://www.lcnp.org/pubs/2007-securing-our-survival.pdf>.

⁴¹¹ See ORG. FOR SEC. AND COOPERATION IN EUR., *supra* note 88, at 7 (highlighting symbolic value of a “public bonfire of weapons”).

Whether the swords are beaten into plowshares or eliminated altogether, the eve of destruction is a powerfully dramatic place to be.