ARTICLE

# REVERSE DISTINCTION: A U.S. VIOLATION OF THE LAW OF ARMED CONFLICT IN SPACE

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**ABSTRACT**

*The "democratization of space"—referring to the vastly increased private sector engagement in satellite functions—has been one of the most conspicuous and successful recent developments in the field, exploiting the dramatically reduced costs of developing, launching, and operating spacecraft for applications such as reconnaissance and telecommunications. The U.S. government has vigorously endorsed this opportunity and is determined to rely upon commercial sources to provide essential support even for crucial national security space operations. Sequential declarations of official governmental space policy—adopted through Republican and Democratic administrations—have embraced this "outsourcing," intertwining military and intelligence community programs and functions into private sector and third state spacecraft. This integration of governmental and commercial space assets promises significant cost savings as well as offering more rapid uptake of new space technologies.*

*However, this intermingling runs afoul of one of the most central requirements of the traditional law of armed conflict: the principle of distinction (or discrimination), which mandates that in combat, states may lawfully direct their attacks only against military objectives, not against*

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*civilians or their property. An important corollary of this principle—referred to in this Article as "reverse distinction"—requires a state to separate its military assets from civilian objects. This precaution is necessary in order to spare civilians and their property from the worst ravages of warfare and also to enable the adversary to carry out its primary obligations under the distinction principle: to aim its attacks only against military targets.*

*This Article examines the growing, persistent U.S. violation of the principle of reverse distinction. As the U.S. national security space assets and functions become increasingly insinuated into private commercial and neutral spacecraft, the separation required by the law of armed conflict is ignored. This U.S. practice is both illegal and unwise, as it threatens to make future conflict in space even wider and more devastating than it would inherently have to be.*

**CONTENTS**

## INTRODUCTION

The theory and practice of "social distancing" were suddenly thrust upon a startled U.S. and global population by the novel coronavirus pandemic in spring 2020, as we all learned the importance of establishing adequate buffer zones around ourselves and sustaining a rigid keep-out perimeter against potential threats. Where common sense was insufficient, law augmented this effective barrier against intermingling and enforced the rigorous strictures of separation for mutual protection.

This Article addresses an analogous but very different genre of distancing: the requirement under the law of armed conflict ("LoAC") for separating military from civilian objects and personnel, and it applies those standards to a novel milieu, outer space. A burgeoning modern propensity for increased intermingling of civilian and military satellite assets may, in a surprising fashion, run afoul of fundamental, longstanding international legal principles that require a salient differentiation—and the United States is the leading (but not the only) offender in deliberately violating the obligation of sharp separation of different categories of space vehicles.

The starting point for the Article is the principle of distinction (also known as discrimination), a most fundamental tenet of the law of armed conflict. The primary thrust of distinction is the mandate that a military force is legally authorized to direct its attacks only against opposing military objectives, not against non-combatants such as civilians and neutrals and their property. An important corollary—which this Article refers to as "reverse distinction"—supports that primary injunction by requiring that military personnel and assets be effectively separated from their civilian counterparts. This physical distancing is intended to mitigate the suffering that armed conflict inevitably inflicts on non-combatants, and also to enable the opposing military to fulfill its primary obligation under the distinction principle, i.e., to direct its hostile fire exclusively against our military.

Reverse distinction is a somewhat "soft" obligation—it applies only to the extent that such separation is "feasible." But it constitutes operational

law nonetheless. For example, the United States has objected bitterly when hostile opponents took "human shields," illegally impeding a responsive use of force, or when, during the first Gulf War, Saddam Hussein ostentatiously parked fighter jets in front of a famous archeological temple, apparently for the purpose of deterring U.S. strikes against those tempting assets.

Regarding operations in outer space, however, it is the United States that now stands in violation of reverse distinction. Official U.S. government policy, through the last three presidencies, has directed an ever-increasing entanglement of U.S. national security space programs with their civil and commercial counterparts. In part, this blending of diverse functions is justified by cost-cutting economics and the effort to exploit the private sector's greater finesse at speedy exploitation of new space technology. But a less frequently acknowledged motivation is also evident: the desire to complicate the task confronting any enemy that might seek to attack U.S. national security satellites. While this melding of the functions and identities of spacecraft may carry tactical advantages, the greater proximity is both illegal and unwise in the longer term.

To pursue this thesis, the Article is structured as follows. After this Introduction, Part II presents the fundamentals of the law of armed conflict, with a special focus on the cardinal principles of distinction and reverse distinction. It demonstrates why these provisions are so central to the humanitarian considerations that animate LoAC and provides controversial illustrations of the "feasibility" dilemma.

Next, Part III turns to outer space and the emerging exploitation of a growing armada of satellites by the United States for the whole host of commercial and national security functions. It also describes the factors that have driven the United States in recent years to adopt an official policy of increasing reliance upon private and foreign spacecraft for the performance of previously exclusively military and intelligence community services.

Part IV then juxtaposes the two lines of inquiry, to argue that the United States is behaving here inconsistently with the fundamental LoAC restrictions; there is, at least, an irrevocable "anticipatory breach" of the principle of reverse distinction in space. This Part asserts that this departure from long-established legal obligations is as foolish as it is illegal, and assesses the adverse consequences of the different types of violations.

Part V then presents several proposed remedies, none of which will be cheap, easy, or politically palatable. Finally, a Conclusion offers some

reflective, forward-looking thoughts.

Social distancing, whether in dealing with colleagues and neighbors during the onslaught of COVID-19 or with military and civilian satellites in space, has significant costs. When familiar, convenient patterns of human interaction are disrupted by a novel virus, society suffers a profound short-term loss, in the hope of insinuating a degree of protection via herd immunity. In space, too, there is a substantial price to pay when international law compels a rigid separation of military and civilian orbital assets. In each situation, however, casual or deliberate intermingling leads to even worse long-term consequences.

## I. THE OBLIGATIONS OF DISTINCTION AND REVERSE DISTINCTION

### *A. Established LoAC Principles*

The concept of distinction (or discrimination) is central to the modern law of armed conflict.[1] At its core, distinction requires that a

[1] *See, e.g.*, JEAN-MARIE HENCKAERTS & LOUISE DOSWALD-BECK, CUSTOMARY INTERNATIONAL HUMANITARIAN LAW: RULES 3–36 (2005) (identifying "the Principle of Distinction between Civilians and Combatants" as Rule 1 in their authoritative study for the International Committee of the Red Cross of the customary international law of armed conflict, and identifying the companion principle requiring distinction between civilian objects and military objectives as Rule 7); GARY D. SOLIS, THE LAW OF ARMED CONFLICT: INTERNATIONAL HUMANITARIAN LAW IN WAR 269−76 (2d ed. 2016) (referring to the principle of distinction as the most significant battlefield concept); GENERAL COUNSEL OF THE DEP'T OF DEF., DEPARTMENT OF DEFENSE LAW OF WAR MANUAL § 2.5 (2016) [hereinafter DOD LAW OF WAR MANUAL], https://DOD.defense.gov/Portals/1/Documents/pubs/DOD%20Law%20of%20War%20Manual%20-%20June%202015%20Updated%20Dec%202016.pdf?ver=2016-12-13-172036-190 [https://perma.cc/GMM7-TBAJ]; *see also* Jeroen van den Boogaard, *Reimagining IHL Principles Part I: The Wrong Principles*, LIEBER INST. WEST POINT (Dec. 8, 2020), https://lieber.westpoint.edu/reimagining-ihl-principles-part-i-wrong-principles/ [https://perma.cc/4F3C-7Q4F] (noting that distinction is commonly cited as one of the foundational principles in LoAC); Laurie R. Blank, *Taking Distinction to the Next Level: Accountability for Fighters' Failure to Distinguish Themselves from Civilians*, 46 VAL. U. L. REV. 765, 767−78 (2012) (describing the ancient roots of the principle of distinction); W. Hays Parks, *Air War and the Law of War*, A.F. L. REV. 1, 113 (1990) (referring to distinction as "a principle with which there should be no disagreement"); Geoffrey S. Corn, *Beyond Human Shielding: Civilian Risk Exploitation and Indirect Civilian Targeting*, 96 INT'L L. STUD. 118, 119–21, 133–37 (2020) (discussing the universal applicability of distinction) [hereinafter Corn, *Beyond Human Shielding*]; Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts, art. 48, June 8, 1977, 1125 U.N.T.S. 3 [hereinafter Additional Protocol I] ("In order to ensure respect for and protection of the civilian

military force may direct its armed attacks only against enemy military objectives: personnel, equipment, and facilities that by their nature, location, purpose, or use, make an effective contribution to the adversary's warfighting.[2] Conversely, multiple categories of non-combatants are immune from intentional, direct targeting: civilians (and their property), neutrals, and those who have been rendered *hors de combat* through injury, sickness, or capture, for example.[3]

There is no absolute requirement to avoid all harm befalling civilians or other non-combatants in making an attack on a lawful target. As a practical matter, warfare will always visit awful consequences upon

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population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives."). Note that the United States has not ratified AP I but accepts much of its content, including the principle of distinction, as binding customary international law. DOD LAW OF WAR MANUAL, *supra*, §§ 2.5, 5.11; Michael J. Matheson, Deputy Legal Advisor, U.S. Dep't of State, Remarks on the United States Position on the Relation of Customary International Law to the 1977 Protocols Additional to the 1949 Geneva Conventions Address (Jan. 2, 1987), *in The Sixth Annual American Red Cross-Washington College of Law Conference on International Humanitarian: A Workshop on Customary International Law and the 1977 Protocols Addition to the 1949 Geneva Conventions*, 2 AM. U. J. INT'L L. & POL'Y 415, 419 (1987); Marco Sassòli & Anne Quintin, *Active and Passive Precautions in Air and Missile Warfare*, 44 ISR. Y.B. ON HUM. RTS 69, 77–78 (2014); Gabriel Swiney, *Saving Lives: The Principle of Distinction and the Realities of Modern War*, 39 INT'L LAW. 733, 735 (2005). In its 1996 advisory opinion on the legality of nuclear weapons, the International Court of Justice referred to the principle of distinction as the first of the "cardinal principles" of LoAC and as "intransgressible." Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226, ¶¶ 78–79 (July 8).

[2] Additional Protocol I, *supra* note 1, art. 52.2 ("Attacks shall be limited strictly to military objectives. In so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage."); HENCKAERTS & DOSWALD-BECK, *supra* note 1, Rule 8; SOLIS, *supra* note 1, at 505–26; DOD LAW OF WAR MANUAL, *supra* note 1, § 2.5.2; Int'l Law Ass'n Study Grp. on the Conduct of Hostilities in the 21st Century, *The Conduct of Hostilities and International Humanitarian Law: Challenges of 21st Century Warfare*, 93 INT'L L. STUD. 322, 326–49 (2017) [hereinafter ILA Study Group].

[3] DOD LAW OF WAR MANUAL, *supra* note 1, §§ 2.5.1, 2.5.2, 5.2.2; SOLIS, *supra* note 1, at 269 (emphasizing the applicability of principle of distinction to objects as well as to persons); Additional Protocol I, *supra* note 1, art. 52.1 (defining civilian objects as all items that are not military objectives)*; see also* Parks, *supra* note 1, at 52 (arguing that "the traditional distinction between the combatant and noncombatant was obsolete, and had been for the century preceding World War II").

innocents and their property.[4] Distinction, instead, is directed at the attacker's intentions and judgments: the only legally-authorized goal is to weaken the enemy's warfighting capabilities;[5] aiming at the civilians and their property is strictly prohibited,[6] and "constant care" must be exercised to spare them.[7]

A companion LoAC principle, proportionality, requires careful *a priori* weighing of the positive military value of a planned attack (in destroying, capturing, or neutralizing lawful targets) versus the negative harm (in inflicting unintended damage on the protected population and assets). If the predicted collateral damage is excessive in relation to the anticipated concrete and direct military benefit, then the attack must be modified or aborted.[8]

An important, but much less well-known corollary of the principle

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[4] SOLIS, *supra* note 1, at 292; Jean-François Quéguiner, *Precautions Under the Law Governing the Conduct of Hostilities*, 88 INT'L REV. RED CROSS 793, 794 (2006); *see generally* NORTH ATLANTIC TREATY ORGANIZATION, PROTECTION OF CIVILIANS HANDBOOK (2021) (creating a framework to explain the "Protection of Civilians" mindset that NATO staff should incorporate into planning and execution phases of NATO operations), https://shape.nato.int/resources/3/website/ACO-Protection-of-Civilians-Handbook.pdf [https://perma.cc/7WY3-2PQ5] [hereinafter NATO HANDBOOK].

[5] *See* St. Petersburg Declaration Renouncing the Use, in Time of War, of Certain Explosive Projectiles, preamble, Dec. 11, 1868, 138 Consol. T.S. 297 (stating that "the only legitimate object which States should endeavour to accomplish during war is to weaken the military forces of the enemy"); *see also* HENCKAERTS & DOSWALD-BECK, *supra* note 1, Rule 8 ("In so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose or use make an effective contribution to military action and whose partial or total destruction, capture or neutralisation, in the circumstances ruling at the time, offers a definite military advantage.");
*cf.* Additional Protocol I, *supra* note 1, art. 35 ("[T]he right of the Parties to the conflict to choose methods or means of warfare is not unlimited.").

[6] In addition, a weapon that cannot be effectively aimed at only military objectives is illegal because it is considered inherently indiscriminate. Additional Protocol I, *supra* note 1, art. 51.4 (b)–(c); HENCKAERTS & DOSWALD-BECK, *supra* note 1, Rules 12, 71; SOLIS, *supra* note 1, at 524–26.

[7] Additional Protocol I, *supra* note 1, art. 57.1; *see also* Quéguiner, *supra* note 4, at 796–97; ILA Study Group, *supra* note 2, at 379–81.

[8] Additional Protocol I, *supra* note 1, arts. 51.5(b), 57.2 (a)–(b) (prohibiting "an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated"); HENCKAERTS & DOSWALD-BECK, *supra* note 1, Rules 14–15; DOD LAW OF WAR MANUAL, *supra* note 1, § 5.11; SOLIS, *supra* note 1, at 292–305; Parks, *supra* note 1, at 168–202; ILA Study Group, *supra* note 2, at 350–70.

of distinction— sometimes cited as an obligation to undertake "passive precautions"[9]—but here referred to as "reverse distinction"—establishes a belligerent's obligation to separate or differentiate between its own military force (and its assets) and the nearby civilian population (and its assets).[10] One purpose of this enforced segregation is to draw the battle away from non-combatants (or vice-versa), trying to spare them the worst effects of the carnage. In the same vein, reverse distinction is also required in order to enable the enemy forces to engage honorably in battle and to respect their corresponding LoAC distinction obligation to aim exclusively at our military, not at civilians. Excessive co-location of civilians and combatants would inevitably jeopardize the former, as the opponent would be frustrated in attempting to attack only lawful targets that were too intermingled with immune persons and property.[11]

As articulated in Additional Protocol I to the 1949 Geneva Conventions ("AP I"), this obligation for undertaking "precautions against the effects of attacks" requires that:

> The Parties to the conflict shall, to the maximum extent

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[9] BRUNO ZIMMERMAN, ET AL., INT'L COMM. OF THE RED CROSS, COMMENTARY ON THE ADDITIONAL PROTOCOLS OF 8 JUNE 1977 TO THE GENEVA CONVENTIONS OF 12 AUGUST 1949 692, ¶ 2241 (1987), https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/1a13044f3bbb5b8ec12563fb0066f226/d37f727128e875d4c12563cd0043518b [https://perma.cc/AB9P-9XF2] [hereinafter ICRC 1987 COMMENTARY] (differentiating between active and passive precautions); Geoffrey Corn & James A. Schoettler, Jr., *Targeting and Civilian Risk Mitigation: The Essential Role of Precautionary Measures*, 223 MIL. L. REV. 785, 791, 827–28 (2015) (differentiating between "positive" precautionary measures of distinction in making an attack and "passive" precautions in a defender's segregating civilians from military objectives); Sassòli & Quintin, *supra* note 1, at 75 (describing three different types of required precautions in making an attack); *id.* at 112 (contending that the prohibition against using civilian objects to shield military objectives is "technically not a precautionary measure"); Geoffrey Corn, *Targeting, Distinction, and the Long War: Guarding against Conflation of Cause and Responsibility*, 46 ISR. Y.B. ON HUM. RTS. 135 (2016); ILA Study Group, *supra* note 2, at 372–88 (noting that the topic of precautions "has remained under-researched and more problematically under-emphasized"). This Article offers an alternative vocabulary, based on the facts that there is nothing "passive" about the protective principles under consideration, and that they are applicable to both attackers and defenders.

[10] DOD LAW OF WAR MANUAL, *supra* note 1, §§ 2.5.3, 5.2.3, 5.11; *see also* Corn & Schoettler, *supra* note 9; Eric Talbot Jensen, *Precautions Against the Effects of Attacks in Urban Areas*, 98 INT'L REV. RED CROSS 147 (2016); U.S. NAVY, MARINE CORPS, & COAST GUARD, THE COMMANDER'S HANDBOOK ON THE LAW OF NAVAL OPERATIONS 5-3, 8-3 (2007) [hereinafter COMMANDER'S HANDBOOK].

[11] DOD LAW OF WAR MANUAL, *supra* note 1, § 2.5.3; Corn & Schoettler, *supra* note 9, at 829; NATO HANDBOOK, *supra* note 4, § 4-3.a.3.

> feasible: a) …endeavour to remove the civilian population, individual civilians and civilian objects under their control from the vicinity of military objectives; b) avoid locating military objectives within or near densely populated areas; c) take the other necessary precautions to protect the civilian population, individual civilians and civilian objects[12] under their control against the dangers resulting from military operations.[13]

This affirmative reverse distinction requirement is both legally obligatory and expansive, and it is directed at protecting civilian property and locations as well as persons.[14] In addition, the references to "military

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[12] Note that there are relatively few persons in space at any given time, so the focus of this Article will be on civilian objects (i.e., spacecraft). The phrase "densely populated" principally refers to human populations. As discussed *infra*, space is becoming increasingly densely populated by uninhabited satellites, especially in certain popular orbits. In addition, reverse distinction would require a state to avoid locating military space launch facilities and ground control stations in densely populated terrestrial sites. *See* YORAM DINSTEIN & ARNE WILLY DAHL, OSLO MANUAL ON SELECT TOPICS OF THE LAW OF ARMED CONFLICT: RULES AND COMMENTARY 12−13 (2020) [hereinafter OSLO MANUAL] (applying the rules about precautions to military activities in space); Int'l Comm. of the Red Cross, *The Potential Human Cost of the Use of Weapons in Outer Space and the Protection Afforded by International Humanitarian Law*, ¶¶ 4–5 (2021), https://www.icrc.org/en/document/potential-human-cost-outer-space-weaponization-ihl-protection [https://perma.cc/S33G-2599] (emphasizing the human cost of the use of weapons in space) [hereinafter *The Potential Human Cost of Weapons in Outer Space*].

[13] Additional Protocol I, *supra* note 1, art. 58; HENCKAERTS & DOSWALD-BECK, *supra* note 1, Rule 23. The United States has not ratified AP I, but domestic U.S. authorities impose cognate obligations. *See* JOINT CHIEFS OF STAFF, JOINT TARGETING, JOINT PUBLICATION 3-60 A-4 (2013), https://www.justsecurity.org/wp-content/uploads/2015/06/Joint_Chiefs-Joint_Targeting_20130131.pdf [https://perma.cc/PB74-35VV]; Memorandum from James H. Anderson, Under Sec'y of Def. for Pol'y, to Sec'ys of the Mil. Dep't et al., Development of a DoD Instruction on Minimizing and Responding to Civilian Harm in Military Operations (Jan. 31, 2020), https://media.defense.gov/2020/Feb/20/2002252367/-1/-1/1/DEVELOPMENT-OF-A-DOD-INSTRUCTION-ON-MINIMIZING-AND-RESPONDING-TO-CIVILIAN-HARM-IN-MILITARY-OPERATIONS.PDF [https://perma.cc/6TX5-WQKZ]; Sassòli & Quintin, *supra* note 1, at 119-20 (assessing that art. 58(b) cannot be considered to have achieved the status of customary international law, but it has been supported by the United States); Michael N. Schmitt & John J. Merriam, *The Tyranny of Context: Israeli Targeting Practices in Legal Perspective*, 37 U. PA. J. INT'L L. 53, 131–36 (2015) (discussing Israeli view of precautions).

[14] DOD LAW OF WAR MANUAL, *supra* note 1, § 5.2.3; Jensen, *supra* note 10, at 154; Quéguiner, *supra* note 4, at 820 (insisting that even though reverse distinction is framed in terms of "feasibility," it remains a legal obligation, not a mere recommendation); s*ee also* Parks, *supra* note 1, at 137, 147–49 (arguing that in this respect, AP I perversely provides greater protection for inanimate civilian objects than for human life).

objectives" apply to both fixed and mobile military assets, such as spacecraft,[15] and the passage imposes reciprocal obligations upon all parties to the armed conflict, i.e., both the attacking military force and the defender.[16] Moreover, although the treaty text is framed in terms of the obligations incident to initiating an "attack," that vocabulary is given an expansive meaning in this context, to encompass defensive operations, maneuver and withdrawal operations, and other less aggressive postures.[17] In fact, U.S. authorities have consistently emphasized that these precautionary provisions should "primarily" apply to the defender, who may be expected to have greater knowledge about, and to exercise greater control over, the nearby civilian community and infrastructure.[18]

Notably, this duty is not absolute; parties are committed only to use best efforts to separate military and civilian assets to the "maximum extent feasible."[19] For example, the U.S. Department of Defense ("DoD") Law of

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[15] Quéguiner, *supra* note 4, at 818 (interpreting AP I, art. 58(b) as stating that it is preferable for mobile military objectives (such as troops or weaponry) to avoid coming near densely populated areas at all, or if that cannot be avoided, to pass through the populated area as swiftly as possible); ICRC 1987 COMMENTARY, *supra* note 9, ¶ 2249 ("[M]oveable objects should be removed whenever possible away from military objectives."); OSLO MANUAL, *supra* note 12, at 73 (discussing moveable military objectives).

[16] Quéguiner, *supra* note 4, at 817–21.

[17] Additional Protocol I, *supra* note 1, art. 49; INT'L COMM. OF THE RED CROSS, THE LAW OF ARMED CONFLICT, CONDUCT OF OPERATIONS, LESSON 3, PART A, 4 (2002), https://www.icrc.org/en/doc/assets/files/other/law3_final.pdf. [https://perma.cc/WD8G-L6AQ].

[18] Arthur W. Rovine, *Contemporary Practice of the United States Relating to International Law*, 67 AM. J. INT'L L. 118, 122–23 (1973) (citing Letter from J. Fred Buzhardt, General Counsel of DoD, to Senator Edward Kennedy) ("[The principle of distinction] addresses primarily the Party exercising control over members of the civilian population. This principle recognizes the interdependence of the civilian community with the overall war effort of a modern society. But its application enjoins the party controlling the population to use its best efforts to distinguish or separate its military forces and war making activities from members of the civilian population to the maximum extent feasible so that civilian casualties and damage to civilian objects incidental to attacks on military objectives, will be minimized as much as possible."); Parks, *supra* note 1, at 153−56 (arguing that "[i]n customary international law the primary responsibility for preventing collateral civilian casualties rests with the defender and the individual civilian, with little or no responsibility imposed upon an attacker.").

[19] Additional Protocol I, *supra* note 1, art. 58; DOD LAW OF WAR MANUAL, *supra* note 1, § 2.5.3. Note the slightly different verbal formulations used in different parts of AP I. Art. 57.2(a)(i) requires planners to "do everything feasible" to verify that objects being attacked are not civilian; art. 57.2(a)(ii) requires planners to "take all feasible precautions" in selecting means and methods of attack; and art. 58 directs that parties shall "to the

War Manual states that parties to an armed conflict are obligated "to take feasible measures to separate physically their own military objectives from the civilian population and other protected persons and objects" and that "military commanders should avoid placing military objectives in densely populated areas," but it does not contain an unqualified or categorical prohibition on that type of intermingling.[20]

This elusive concept of "feasibility" thus contains an inherent degree of mushiness in all contexts, and it poses special problems for interpreting the reverse distinction obligations in the new milieu of space, as elaborated below. In like manner, the accompanying "hard law" obligation that "[i]n the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects"[21] poses similar interpretation ambiguities. In any situation, it would be advantageous to have a more pointed, operational definition of the feasibility standard—but that proves to be a quixotic search.[22]

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maximum extent feasible" separate military and civilian persons and property. For comparison, *see* Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field, art. 19, Aug. 12, 1949, 75 U.N.T.S. 31 (dealing with fixed and mobile medical units, which provides that such facilities may not be attacked, and also stipulates, "The responsible authorities shall ensure that the said medical establishments and units are, as far as possible, situated in such a manner that attacks against military objectives cannot imperil their safety.") AP I, art. 53, which deals with cultural objects and places of worship, contains a blanket prohibition, without employing the concept of feasibility, against attacking those types of facilities or using them in support of a military effort. Additional Protocol I, *supra* note 1, art. 53.

[20] DOD LAW OF WAR MANUAL, *supra* note 1, § 2.5.3.2. Note that in contrast, AP I's distinction requirement is strict. Additional Protocol I, *supra* note 1, art. 48 ("Parties to the conflict shall *at all times* distinguish between the civilian population and combatants.") (emphasis added).

[21] Additional Protocol I, *supra* note 1, art. 57.1.

[22] *See* DOD LAW OF WAR MANUAL, *supra* note 1, § 5.2.3.2, n.48 (noting other contexts in AP I and within the law of armed conflict more generally where the term "feasible" is used, also without comprehensive definition); HENCKAERTS & DOSWALD-BECK, *supra* note 1, at 54, 70–71; Corn & Schoettler, *supra* note 9, at 802–03; Jensen, *supra* note 10, at 163–66; Quéguiner, *supra* note 4, at 809–11 (specifying a "good faith" element in the definition of feasibility); Parks, *supra* note 1, at 156–59; Sassòli & Quintin, *supra* note 1, at 82-87; ILA Study Group, *supra* note 2, at 373–78 (noting that leading authorities do not provide much insight into the meaning of this "inherently variable" concept); ICRC 1987 COMMENTARY, *supra* note 9, ¶ 2245, at 691 ("Once again the term 'feasible' is used. In fact, the Diplomatic Conference often used this expression to illustrate the fact that no one can be required to do the impossible."); TALLINN MANUAL 2.0 ON THE INTERNATIONAL LAW APPLICABLE TO CYBER OPERATIONS 487–91 (Michael N. Schmitt ed. 2017) [hereinafter, TALLINN 2 MANUAL] (applying AP I art. 58 in the cyber context); Michael N. Schmitt, *Targeting in Operational Law*, *in* THE HANDBOOK OF THE INTERNATIONAL LAW

The DoD Law of War Manual, for example, reports that different authorities use interchangeable terms like practical, practicable, reasonable, due, and necessary to describe the required precautions, and concludes that there is no meaningful or operational difference between the various words.[23] The manual affirms that the standard is one of due diligence or due regard: "Feasible precautions are those that are practicable or practically possible, taking into account all circumstances ruling at the time, including humanitarian and military considerations."[24] Most of the factors that the manual then identifies as being relevant are grounded in immediate battlefield conditions (such as whether providing an advance warning to civilians to evacuate an area would increase the risk to the attacking forces, and whether such a warning would actually provide appreciable benefit to the civilians), but it also calls out "the cost of taking the precaution, in terms of time, money, or other resources."[25] It concludes that no general rule is possible to explicate the contours of feasibility, but "military commanders must make reasonable efforts to reduce the risk of harm to civilians and civilian objects."[26] The manual also includes guidance on certain specific applications of the principle of reverse distinction, some of which may have partial application in space: refraining from placing military objectives in densely populated areas;[27] removing civilians and civilian objects from the vicinity of military objectives;[28] establishing zones where civilians are protected;[29] and using distinctive signs and emblems to differentiate military and civilian objects and personnel.[30]

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OF MILITARY OPERATIONS 286–89 (Terry D. Gill & Dieter Fleck eds., 2d ed. 2015) [hereinafter Schmitt, *Targeting*]; INT'L COMM. OF THE RED CROSS, PRACTICE RELATING TO RULE 24. REMOVAL OF CIVILIANS AND CIVILIAN OBJECTS FROM THE VICINITY OF MILITARY OBJECTIVES, https://ihl-databases.icrc.org/applic/ihl/cihlweb_rus_2.nsf/docindexeng-print/v2_cha_chapter6_rule24?OpenDocument&Click= [https://perma.cc/46CD-F894] (collecting material from states' military manuals, national legislation, case law, and other sources regarding the actions required to separate civilians and civilian objects from the vicinity of military objectives).

[23] DOD LAW OF WAR MANUAL, *supra* note 1, § 5.2.3.1.

[24] *Id.* § 5.2.3.2.

[25] *Id.*

[26] *Id.*

[27] *Id.* § 5.14.1; *see also* Parks, *supra* note 1, at 156–59 (noting the reservations to AP I taken by Switzerland and Austria, who argued that the requirements of national defense of their small territories did not permit this degree of separation); Sassòli & Quintin, *supra* note 1, at 119.

[28] DOD LAW OF WAR MANUAL, *supra* note 1, § 5.14.2.

[29] *Id.* §§ 5.14.3, 5.11.2.

[30] *Id.* §§ 5.14.4–5; *see also Practical Measures to Strengthen the Protection of Civilians during Military Operations in Armed Conflict* (Oct. 2, 2019),

The concept of reverse distinction may initially seem most applicable in "old-fashioned" armed conflict, where opposing militaries confront each other in massive pitched battles through forests and open fields, and where they can, to some extent, dodge population centers. In contrast, modern low-intensity conflict, featuring "military operations in urban terrain" ("MOUT") often seems routinely to occur—by the belligerents' choice—in built-up areas.[31] Even then, however, reverse distinction requires the combatants to try to minimize their overlap with civilians; they should, for example, wherever possible, warn civilians about upcoming attacks, urge them to flee, and afford them an opportunity to do so. A military that is about to attack an urban center should endeavor to notify the civilian population, via leaflets or radio broadcasts, to evacuate the area, and the defending force should allow them and their mobile property expeditious exit.[32]

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https://www.dfa.ie/media/dfa/ourrolepolicies/peaceandsecurity/ewipa/United-States-Written-Submission-18-November-2019.pdf [https://perma.cc/CA7E-KZFU] (unpublished joint working paper provided by the United States and several other countries as follow up to Vienna Conference on Protecting Civilians in Urban Warfare describing principles, including precautions, applicable to protecting civilians during armed conflict).

[31] Corn & Schoettler, *supra* note 9, at 829–30; *see also* U.S. DEP'T OF DEF., REPORT TO CONGRESS ON THE CONDUCT OF THE PERSIAN GULF WAR, 31 INT'L LEGAL MATERIALS 612, 622 (1992) [hereinafter GULF WAR REPORT] (noting that during the Gulf War, coalition forces adopted a ground campaign plan that avoided populated areas, including not launching an amphibious assault into Kuwait City); U.N. Office of the High Comm'r for Hum. Rts., Report on the Protection of Civilians in the Context of the Ninewa Operations and the Retaking of Mosul City, 17 October 2016–10 July 2017, at 7–8 (2017), https://reliefweb.int/sites/reliefweb.int/files/resources/Mosul_report%2017Oct2016-10Jul201731%20October_2017.pdf [https://perma.cc/LA8J-9CAR] [hereinafter OHCHR Mosul City Report] (describing how Iraqi air force dropped thousands of leaflets warning the civilian occupants of ISIS-held Mosul of the forthcoming attack).

[32] Additional Protocol I, *supra* note 1, art. 57.2 (c); DOD LAW OF WAR MANUAL, *supra* note 1, §§ 5.14.2, 5.11.5; U.S. DEP'T OF DEF., ANNUAL REPORT ON CIVILIAN CASUALTIES IN CONNECTION WITH U.S. MILITARY OPERATIONS IN 2019 (2020), https://media.defense.gov/2019/May/02/2002126767/-1/-1/1/ANNUAL-REPORT-CIVILIAN-CASUALTIES-IN-CONNECTION-WITH-US-MILITARY-OPERATIONS.PDF [https://perma.cc/C9Z4-EJBM] (discussing measures undertaken to reduce harm to civilians and damage to their property, including issuing warnings and undertaking other precautions); Corn & Schoettler, *supra* note 9, at 814–20; Quéguiner, *supra* note 4, at 806–09. In addition, Parks has usefully emphasized that the responsibility for avoiding damage to civilians and their property "is a shared obligation of the attacker, defender and the civilian population." Both the attacker and the defender have a legal right to conduct hostilities, but also an obligation to care for the population, and the civilians "must assume some common sense responsibility for the risks of war." Parks, *supra* note 1, at 29, 55. Parks further cautions that LoAC should not increase the burden on the attacker

In support of the obligation to exercise "constant care" over civilians and their property, LoAC also imposes on the offensive force a duty to verify the military nature of the objective to be attacked and to assess the likely collateral damage. The attacker cannot simply assume that an unknown structure or other item is of a military nature (in fact, in some circumstances, the opposite presumption applies) but holds an affirmative obligation to investigate.[33]

The special phenomenon of dual-use or dual-capability often generates intractable problems for these assessments. Many objects, facilities, or sites are susceptible to a wide variety of applications—they may alternately or simultaneously be turned to both military and civilian functions. The infamous problem of a person who is a "farmer by day, fighter by night" has similarly bedeviled international legal disputes. To the extent that a person or object provides an effective contribution to the military action of the other side, it may sacrifice its protected status, but the borderline judgment calls become ineffably controversial.[34]

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in this regard, because ordinarily the defender will have much great knowledge about, and ability to control, the locations and movements of civilians and civilian objects. *Id.* at 153–56. *But see* Sassòli & Quintin, *supra* note 1, at 116-18 (acknowledging that the civilian population is best protected if all sides adopt precautionary measures, but insisting that AP I and customary international law impose the main responsibility on the attacker).

[33] Additional Protocol I, *supra* note 1, arts. 52.3, 57.2(a); HENCKAERTS & DOSWALD-BECK, *supra* note 1, Rule 16; Corn, *supra* note 9, at 163–64; Eric Talbot Jensen, *Cyber Attacks: Proportionality and Precautions in Attack*, 89 INT'L L. STUD. 198, 203–04 (2013) (arguing that an attacker must continue to monitor the target even if there is a fear that continued observation will result in discovery, reducing the element of surprise); Quéguiner, *supra* note 4, at 797–99 (emphasizing the attacker's obligation to gather information even about suddenly-appearing targets); Sassòli & Quintin, *supra* note 1, at 85–86.

[34] Under the law of armed conflict, an item is to be classified as either a military objective or a civilian object; there is no special intermediate legal category for dual-use or dual-purpose items. However, that vocabulary often proves convenient for discussing items that are of service simultaneously or interchangeably to both military and civilian applications. LAURENT GISEL, THE PRINCIPLE OF PROPORTIONALITY IN THE RULES GOVERNING THE CONDUCT OF HOSTILITIES UNDER INTERNATIONAL HUMANITARIAN LAW 37–40 (Int'l Comm. Red Cross ed., 2016), https://www.icrc.org/en/document/international-expert-meeting-report-principle-proportionality [https://perma.cc/5M37-V9T4]; *see also* Corn, *supra* note 1; Michael E. Guillory, *Civilianizing the Force: Is the United States Crossing the Rubicon?*, 51 A.F. L. Rev. 111 (2001); HENCKAERTS & DOSWALD-BECK, *supra* note 1, Rules 6, 8 (addressing the concept of a civilian directly participating in hostilities and the concept of dual-use facilities); ILA Study Group, *supra* note 2, at 335–37; SOLIS, *supra* note 1, at 217–22, 521-24 (discussing direct participation in hostilities and dual-use targets); Parks, *supra* note 1, at 117–21; Schmitt & Merriam, *supra* note 13, at 110–15; OSLO MANUAL, *supra* note 12, at 11–12 (applying to space activities the rule about directly

It is important to emphasize that one state's failure to honor its reverse distinction obligations does not release its opponent from its own LoAC obligations concerning distinction and proportionality. That is, even if State X deliberately and illegally entangles its civilian and military assets, its opponent, State Y, is nonetheless still required to target only X's military objectives and to avoid inflicting disproportionate harm on protected persons and property.[35]

The protections afforded by the concepts of distinction, proportionality, and reverse distinction also extend beyond the particular category of "civilians," to include, of special relevance in this analysis, neutrals. For example, as elaborated in Section IV.B., the territory of a neutral state is inviolable, and belligerents are required to respect neutral persons and property, so long as the state honors its obligations of impartiality and abstention from participation in or support for hostilities.[36] As Michel Bourbonnière and Ricky J. Lee explain it, some intermingling of civilian objects and military objectives may be inevitable, as a practical matter, but the LoAC rule "prevents a belligerent from artificially complicating the proportionality analysis by increasing the potential collateral damage to civilian objects in order to protect a military asset."[37]

### *B. Close Cases*

The problematic, indeterminate nature of the feasibility criterion has generated numerous distinctly different approaches to reverse distinction within disparate fact patterns. Some of these data points might be suggestive of suitable case-by-case relationships for reverse distinction in

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participating in hostilities); Michael N. Schmitt, *Wired Warfare: Computer Network Attack and Jus in Bello*, 84 INT'L REV. RED CROSS 365, 384 (discussing the vulnerability of dual-use objects to attack); Michael N. Schmitt, *Targeting Dual-Use Structures: An Alternative Interpretation*, ARTICLES OF WAR (June 28, 2021), https://lieber.westpoint.edu/targeting-dual-use-structures-alternative/ [https://perma.cc/4RRJ-LN27].

[35] Additional Protocol I, *supra* note 1, art. 51.7; *see also* Corn, *supra* note 9, at 165–66; Corn & Schoettler, *supra* note 9, at 832; Quéguiner, *supra* note 4, at 813–15.

[36] DOD LAW OF WAR MANUAL, *supra* note 1, § 15.3; COMMANDER'S HANDBOOK, *supra* note 10, ch. 7.

[37] Michel Bourbonnière & Ricky J. Lee, *Jus Ad Bellum and Jus in Bello Considerations on the Targeting of Satellites: The Targeting of Post-Modern Military Space Assets*, 44 ISR. Y.B. ON HUM. RTS. 167, 195 (2014). In some circumstances, a violation of reverse distinction may amount to the crime of perfidy, in "feigning of civilian, non-combatant status" for particular military advantage. *Id.* at 196 (quoting Additional Protocol I, *supra* note 1, art. 37.1(c)).

space, but some of the existing practices seem to skate very close to legally prohibited zones.[38]

A most obvious manifestation of the successful exercise of reverse distinction is simply the maintenance of standing, uniformed military forces, equipped with their own dedicated personnel, facilities, and hardware. An air force base, for example, is ordinarily a stand-alone operation, with key features unmistakably separated from civilian airports in the vicinity. An army fort may be large enough to resemble a small town, complete with a full range of support services, but it is typically quite distinct, securely fenced off from the civilian population. A navy yard, likewise, may perform some functions that are similar to commercial ports, but any redundancy is overlooked in favor of preserving the autonomy and separateness of the facility. Individual service members, too, freely mingle with civilians, but while on duty, they routinely wear uniforms distinguishable at a distance, and their military equipment likewise bears distinctive logos, as well as obvious features indicative of capabilities that are irrelevant or illegal for civilians.[39]

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[38] Corn & Schoettler, *supra* note 9, at 830 (emphasizing that the principle of reverse distinction does not mandate that military forces can never operate near civilian property, but that they can do so only when it is genuinely militarily necessary).

[39] Corn & Schoettler, *supra* note 9, at 831; SOLIS, *supra* note 1, at 272–73 (discussing the legal requirement for combatants to distinguish themselves from civilians, such as by wearing uniforms); Philip Carter & David Barno, *Military Bases Are Our Most Exclusive Gated Communities—and That Hurts Veterans*, WASH. POST (Nov. 8, 2013) https://www.washingtonpost.com/opinions/military-bases-are-our-most-exclusive-gated-communities--and-that-hurts-veterans/2013/11/08/27841b1e-47cb-11e3-a196-3544a03c2351_story.html [https://perma.cc/2XT8-C26V] (observing that "troops and their families live and work on massive military bases, separated geographically, socially and economically from the society they serve . . . The military increasingly concentrates itself on large bases nowhere near major population centers. Rural settings afford vast ranges and runways for training purposes, but they limit interaction with civilians."); ANGELA HALVORSON, UNDERSTANDING THE MILITARY: THE INSTITUTION, THE CULTURE, AND THE PEOPLE, SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION 3 (2010), https://www.samhsa.gov/sites/default/files/military_white_paper_final.pdf [https://perma.cc/2KXA-NJCT] ("At most duty stations, active component service members and their families exist within a self-contained community. Military bases have their own grocery stores (commissary), shopping centers (base exchange [BX] or post exchange [PX]), food courts and other restaurants, dry cleaners, barber shops, hair salons, daycare centers, schools, and other daily amenities. For some military members it is possible to live life on a base or post and never interact with the 'outside world.' Active military families generally stick together, drawn to one another by shared experiences and lifestyles."). *But see* National Guard Bureau, Air National Guard Pamphlet AP I-1001 (Apr. 8, 2003), *reprinted in* FAA AIRPORT COMPLIANCE MANUAL, FAA ORDER NO. 5190.6B (Sept. 30, 2009), at 143,

In addition, if extra personnel or equipment were suddenly needed for a "surge" to cope with an unexpected emergency, the military forces would look first to their respective reserve components, which contain their own integrated equipment.[40] The United States has not drafted anyone into military service since 1973, and does not routinely expect to impress into the armed forces privately-owned aircraft or ships.[41]

Another major component of the U.S. national security structure is the predominantly civilian, hydra-headed intelligence community ("IC"), which traditionally is to a large extent similarly separated from the general population.[42] The CIA headquarters, for example, is conspicuously marked and fenced, off-limits to all but employees and authorized visitors, and other

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https://www.faa.gov/airports/resources/publications/orders/compliance_5190_6/media/5190_6b_appJ1.pdf [https://perma.cc/69VL-BAHM] (recording procedures for military use of civilian airfields).

[40] *See* Adam Stone, *Added Help with Equipment: Separate Funding Account Enables Congress to Provide the Guard with Modernization the Pentagon Often Doesn't*, 2018 NAT'L GUARD MAG. 20, http://www.nationalguardmagazine.com/publication/?m=12619&i=491208&p=22&ver=html5 [https://perma.cc/MX5T-UY4A] (describing how Congress allocates funding to modernize Reserve and National Guard components' dedicated equipment).

[41] Sara Schmitt & Robert A. Bettinger, *The Potentiality of Space Enterprise Force Reconstitution: Nationalizing Civilian Satellites During Kinetic Conflicts*, 33 AIR & SPACE POWER 61, 62–63 (2019) (describing programs under which the federal government entered into military-civilian contracts to acquire private airlift and sealift services during emergencies; these rarely-utilized provisions would enable the government to mobilize civilian assets on a temporary, expedited basis by consent of the owners); Marcus Weisgerber & Tara Copp, *Defense Secretary Orders US Airlines to Help with Evacuation*, DEFENSE ONE (Aug. 22, 2021), https://www.defenseone.com/threats/2021/08/heres-how-us-could-get-afghanistan-evacuees-united-states-more-quickly/184736/ [https://perma.cc/EE8K-YDG5] (reporting activation of the Civil Reserve Air Fleet to assist in transporting civilians evacuated from Afghanistan in August 2021; U.S. commercial airlines volunteered up to 18 planes to move people from staging areas, not directly from Afghanistan); David E. Rosenbaum, *Nation Ends Draft, Turns to Volunteers*, N.Y. TIMES (Jan. 28, 1973) https://timesmachine.nytimes.com/timesmachine/1973/01/28/10API16556.html?pageNumber=1 [https://perma.cc/JBQ6-3TTV] (reporting the ending of the draft); Laura Keenan, *Digital Dunkirk: What the Afghan Evacuation Should Teach Us About the Future of Volunteer Support to the US Military*, MODERN WAR INSTITUTE AT WEST POINT (Sept. 22, 2021), https://mwi.usma.edu/digital-dunkirk-what-the-afghan-evacuation-should-teach-us-about-the-future-of-volunteer-support-to-the-us-military/ [https://perma.cc/D85Z-FG7W].

[42] *Members of the IC*, OFF. DIRECTOR NAT'L INTEL., https://www.dni.gov/index.php/what-we-do/members-of-the-ic [https://perma.cc/LM7G-3SSM] (last visited Oct. 5, 2021) (describing eighteen organizations constituting the Intelligence Community).

IC units are similarly secure against civilian mingling.[43] The CIA does exploit "open source intelligence," including occasionally interviewing private citizens (tourists, businesspeople, etc.) who have traveled to locations that the agency itself has trouble visiting.[44] Of course, there are also covert intelligence agents, who feign private status while actually engaged as IC assets.[45]

The U.S. national security community routinely collaborates with foreign counterparts,[46] but for its core capabilities, it often prefers to rely

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[43] Dana Priest & William M. Arkin, *Top Secret America: A Hidden World, Growing Beyond Control*, WASH. POST (July 19, 2010), https://www.washingtonpost.com/investigations/top-secret-america/2010/07/19/hidden-world-growing-beyond-control-2/ [https://perma.cc/55TY-KNPA] (describing the vast extent of the IC facilities and their security measures and public access restrictions).

[44] HEATHER J. WILLIAMS & ILANA BLUM, RAND CORP., DEFINING SECOND GENERATION OPEN SOURCE INTELLIGENCE (OSINT) FOR THE DEFENSE ENTERPRISE 8–20 (2018) (describing open source intelligence); BELFER CTR. SCI. & INT'L AFF., AN INTELLIGENCE AGENDA FOR A NEW ADMINISTRATION 7 (2020), https://www.belfercenter.org/sites/default/files/2020-12/IntelAgenda.pdf [https://perma.cc/EZ3G-MAYU] (emphasizing the importance of open source collection); Byron Tau, *App Taps Unwitting Users Abroad to Gather Open-Source Intelligence*, WALL ST. J. (June 24, 2021), https://www.wsj.com/articles/app-taps-unwitting-users-abroad-to-gather-open-source-intelligence-11624544026 [https://perma.cc/85FD-VNGP]; ALEKSANDRA BIELSKA, NOA REBECCA KURZ YVES BAUMGARTNER & VYTENIS BENETIS, I-INTELLIGENCE, OPEN SOURCE INTELLIGENCE TOOLS AND RESOURCES HANDBOOK 2020 (2020), https://i-intelligence.eu/uploads/public-documents/OSINT_Handbook_2020.pdf [https://perma.cc/38DH-DKMH].

[45] Zach Dorfman, *Botched CIA Communications System Helped Blow Cover of Chinese Agents*, FOREIGN POL'Y (Aug. 15, 2018), https://foreignpolicy.com/2018/08/15/botched-cia-communications-system-helped-blow-cover-chinese-agents-intelligence/ [https://perma.cc/YHX9-DDSW] (reporting that between 2010 and 2012, Chinese counterintelligence efforts led to the arrest and execution of dozens of China-based U.S. intelligence assets); M. Ilyas Khan, *Shakil Afridi: The Doctor Who Helped the CIA Find Bin Laden*, BBC NEWS (Oct. 9, 2019), https://www.bbc.com/news/world-asia-49960979 [https://perma.cc/A8A6-YMCN] (reporting Pakistan's prosecution of a Pakistani doctor who had assisted the CIA in the bin Laden operation).

[46] *Five Eyes Intelligence Oversight and Review Council*, OFF. DIR. NAT'L INTEL., https://www.dni.gov/index.php/ncsc-how-we-work/217-about/organization/icig-pages/2660-icig-fiorc [https://perma.cc/G7FH-DEX8] (last visited Oct. 5, 2021) (discussing close collaboration between U.S. intelligence officials and counterparts in Australia, Canada, New Zealand, and the United Kingdom); Theresa Hitchens, *DOD Space Strategy Focuses on Allies, Commercial; Where Was the Intel Community?*, BREAKING DEF. (June 17, 2020), https://breakingdefense.com/2020/06/DOD-space-strategy-focuses-on-allies-commercial-where-was-intel-community/ [https://perma.cc/RN7T-56R8] (describing coordination on development of U.S. space policy with Five Eyes partners and select others); Scarlet Kim & Paulina Perlin, *Newly Disclosed NSA Documents Shed Further Light on Five Eyes Alliance*, LAWFARE (Mar. 25, 2019),

upon its own indigenous technical prowess, even when cooperation with foreign sources could offer interesting augmentation. For example, regarding seismic monitoring of possible clandestine nuclear weapon tests, the United States jealously maintains its own Atomic Energy Detection System. This network is kept distinct from the multilateral International Monitoring System established by the treaty-based Comprehensive Test Ban Treaty Organization, even though the multilateral structure enjoys access to remote locations in some problematic countries that the United States does not.[47] Similarly, for overhead reconnaissance of military-related sites in Russia, the United States maintains an extensive and expensive fleet of observation satellites, and downplays the value of aerial monitoring accomplished via the Open Skies Treaty, even though the international structure allows a much closer, more flexible suite of sensors and flight plans.[48]

Regarding the creation and deployment of new national security-related technologies and capabilities, the relationship between the public and private sectors is complex. Weapons-related research is conducted simultaneously by multiple types of facilities, including government

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https://www.lawfareblog.com/newly-disclosed-nsa-documents-shed-further-light-five-eyes-alliance [https://perma.cc/JR2G-TGG5].

[47] NAT'L RSCH. COUNCIL, THE COMPREHENSIVE NUCLEAR TEST BAN TREATY: TECHNICAL ISSUES FOR THE UNITED STATES 35–76 (2012) (discussing the treaty-based and national capabilities for monitoring compliance with the test ban treaty); *How the International Monitoring System Works*, COMPREHENSIVE NUCLEAR TEST BAN TREATY ORG., https://www.ctbto.org/verification-regime/ [https://perma.cc/F2XC-BNNZ] (last visited Oct. 5, 2021) (describing the 337 facilities around the world constituting the treaty's international monitoring system); Paul G. Richards & Won-Young Kim, *Advances in Monitoring Nuclear Weapon Testing*, SCI. AM. (Mar. 1, 2009), https://www.scientificamerican.com/article/advances-in-monitoring-nuclear/ [https://perma.cc/XUA4-Y73K] (describing the international and U.S. seismic and other monitoring systems).

[48] Treaty on Open Skies, Mar. 24, 1992, S. TREATY DOC. 102-37; Press Release, Michael R. Pompeo, U.S. Dep't of State, On the Treaty on Open Skies (May 21, 2020), https://ee.usembassy.gov/2020-05-22-1/ [https://perma.cc/ASQ6-P44Z] (announcing the U.S. decision to withdraw from the Open Skies Treaty); Bonnie Jenkins, *A Farewell to the Open Skies Treaty, and an Era of Imaginative Thinking*, BROOKINGS (June 16, 2020), brookings.edu/blog/order-from-chaos/2020/06/16/a-farewell-to-the-open-skies-treaty-and-an-era-of-imaginative-thinking/ [https://perma.cc/9YEE-MWFW]; Alexander Graef & Moritz Kutt, *Visualizing the Open Skies Treaty*, OPEN SKIES, https://openskies.flights/ [https://perma.cc/U2J2-6EDX] (last visited Oct. 5, 2021); Justin Key Canfil, *The U.S. Will Exit the Open Skies Treaty and It's Unclear Why*, LAWFARE (June 3, 2020), https://www.lawfareblog.com/us-will-exit-open-skies-treaty-and-its-unclear-why [https://perma.cc/LK6Z-VCYU].

agencies, government-owned and contractor-operated labs, federally funded research and development centers, private corporations of all sizes, universities, and others.[49] Ordinarily, for the construction of important weapon systems, the government contracts with private manufacturers, who fabricate the required products to unique government specifications. Major weapons are quite distinct from civilian programs – there are no private counterparts for intercontinental ballistic missile ("ICBMs"), nuclear submarines, or main battle tanks—although some of the same facilities, labor force, and equipment can sometimes interchangeably build items like fighter or transport aircraft for the government and civilian airliners for private customers.[50]

Once the hardware is manufactured, it is usually certified to the government, which owns, maintains, and operates it—a private contractor may have some enduring relationship in servicing and supporting the equipment, but its use, especially in combat, is an inherently governmental

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[49] JONATHAN MEDALIA, MARY BETH NIKITIN ET AL., CONG. RSCH. SERV., R40439, NUCLEAR WEAPONS R&D ORGANIZATIONS IN NINE NATIONS 1–3 (2013), https://www.everycrsreport.com/files/20130501_R40439_15e65cfe304426da2f18d44db8eae4021ebdcf95.pdf [https://perma.cc/EF9F-5HZ2] (discussing multiple government facilities involved in U.S. nuclear weapons research, testing, and fabrication); *Federally Funded Research and Development Centers and University Affiliated Research Centers*, DEF. INNOVATION MARKETPLACE (Mar. 2021), https://defenseinnovationmarketplace.dtic.mil/ffrdcs-uarcs/ [https://perma.cc/733B-FEMD] (explaining that "Federally Funded Research and Development Centers (FFRDCs) and University Affiliated Research Centers (UARCs) are not-for-profit entities sponsored and primarily funded by the U.S. government to address technical needs that cannot be met as effectively by existing government or contractor resources."); *Government Owned/Contractor Operated Heritage*, SANDIA NAT'L LAB., https://www.sandia.gov/about/history/goco.html [https://perma.cc/RX9V-N3WP] (last visited Oct. 5, 2021) (noting that "[i]ndustrial, academic, and nonprofit organizations have historically managed the U.S. Department of Energy national laboratories and other major government owned/contractor operated (GOCO) facilities.").

[50] *See* Rachel S. Cohen, *Northrop Wins $13.3B Contract to Design New ICBMs*, AIR FORCE MAG. (Sept. 8, 2020), https://www.airforcemag.com/northrop-wins-13-3b-contract-to-build-new-icbms/#:~:text=Northrop%20Grumman%20will%20officially%20move [https://perma.cc/GV45-5JWA] (reporting Air Force contract with Northrop Grumman for new missile; Northrop will also manufacture a new nuclear-capable bomber, while Lockheed Martin or Raytheon will create a new bomb, and other suppliers work on the F-35 Joint Strike Fighter); Eric Berger, *The Numbers Don't Lie – NASA's Move to Commercial Space Has Saved Money*, ARS TECHNICA (May 20, 2020), https://arstechnica.com/features/2020/05/the-numbers-dont-lie-nasas-move-to-commercial-space-has-saved-money/ [https://perma.cc/3QBH-78FV] (comparing the standard process of government contracting with the innovative use of the private sector in commercial space activities); Guillory, *supra* note 34, at 114.

function.[51] There are realms (the field of cyber activity provides a conspicuous illustration) where some in the private sector may have a technological advantage over the U.S. government as a whole, but in general, the traditional relationship separates military from private actions, with the government owning, and uniformed or IC personnel operating, the key installations and hardware.[52]

On the other hand, there are certain important areas in which maintenance of a rigid, sustained separation between national security and civilian assets would surely not be regarded as "feasible." Vast features of national critical infrastructure are so large, expensive, dispersed, and integrated into daily life that it would be wholly impractical to construct duplicates for the two distinct purposes. The entire U.S. interstate highway grid, for example, was originally designated as the National Defense Highway System, largely justified and funded in order to enhance the domestic mobility of troops and their equipment among military bases, airports, seaports, etc.[53] Obviously, it would be absurd to demand the construction of parallel roadways, bridges, and tunnels to segregate the various streams of military and civilian traffic that today freely share these arteries. The national and local facilities for generating and distributing electricity, for supplying potable water, and for ensuring electronic

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[51] *See* Swiney, *supra* note 1, at 752–53; Guillory, *supra* note 34, at 133–36. A noteworthy exception is the U.S. Navy's Military Sealift Command, which provides much of the ocean transportation for the Department of Defense, via 125 civilian-crewed ships that replenish U.S. Navy ships, conduct specialized missions, strategically preposition combat cargo at sea around the world, and move military cargo and supplies used by deployed U.S. forces and coalition partners. *About MSC*, U.S. NAVY MIL. SEALIFT COMMAND, https://sealiftcommand.com/about-msc [https://perma.cc/VNJ3-EKFC] (last visited Oct. 16, 2021). The U.S. government also retains the statutory right, in an emergency, to mobilize the domestic industry in compulsory support of national defense. *See* MICHAEL H. CECIRE & HEIDI M. PETERS, CONG. RSCH. SERV., IN11470, DEFENSE PRODUCTION ACT (DPA): RECENT DEVELOPMENTS IN RESPONSE TO COVID-19 (2020), https://fas.org/sgp/crs/natsec/IN11470.pdf [https://perma.cc/GA63-HQ88].

[52] *See* Guillory, *supra* note 34, at 134–136; Shannon Vavra, *Trump Administration Wants Private Sector to Do More to Counter Foreign Intelligence Efforts*, CYBERSCOOP (Feb. 10, 2020), https://www.cyberscoop.com/trump-administration-wants-private-sector-counter-foreign-intelligence-efforts/ [https://perma.cc/89ED-GLB3] (describing plans for greater public/private collaboration in response to cyber dangers, including routine meetings between government and private companies).

[53] *See Highways for National Defense*, U.S. ARMY TRANSP. ENG'G AGENCY, https://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/Pages/HighwaysNationalDefense.aspx [https://perma.cc/XB8N-ZB4E] (last visited Feb. 23, 2021); *National Defense Highway System*, GLOBALSECURITY.ORG (May 5, 2011), https://www.globalsecurity.org/military/facility/ndhs.htm [https://perma.cc/Q5D6-36XD].

communications are all likewise inherently dual-use and inseparable.[54]

In a different way, sometimes a degree of separation is established at the outset, but becomes infeasible to sustain over the longer term, as economic and social conditions evolve. For example, a military base might initially be erected in a remote, unpopulated area, but a town may sooner or later spring up around it, as commercial establishments throng to the base's gates, to serve otherwise-sequestered customers. In that situation, there can be no reasonable expectation that law would prohibit this in-migration of civilians or require constant hopscotching relocation of the base.[55]

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[54] Corn, *supra* note 9, at 155 (noting that the drafting of AP I reflected the negotiators' awareness of circumstances in which it would be unrealistic to insist upon complete separation of military and civilian property); Jensen, *supra* note 33, at 213 (noting that 90–98% of the U.S. military digital communications relies upon civilian-owned and -operated infrastructure); GULF WAR REPORT, *supra* note 31, at 623 (noting that much dual-use national infrastructure, in both the United States and Iraq, was available to serve both military and civilian purposes; Iraq had developed an extensive array of fallback or redundant utilities to serve its military forces, and much of that additional infrastructure was located in civilian areas).

The rules regarding items that may be characterized as "dual-use" (i.e., applied for both military and civilian purposes) or "dual-capable" (i.e., potentially available for both categories of function) can pose vexing problems for the evaluation of satellites. Under standard LoAC analyses, an item is either a civilian object or a military objective; there is no third or intermediate category for dual items. But the definition of a military objective is sufficiently capacious that an item may be targetable due to its nature, purpose, or intended use (if it makes or will make an effective contribution to the military operations and its destruction would offer a definite military advantage), which can flow far beyond its current actual application. *See* DOD LAW OF WAR MANUAL, *supra* note 1, § 5.6.6.1 (discussing an object's connection to the enemy's war-fighting, war-supporting, or war-sustaining effort, including the possibility that it might be converted in the future into a more direct role); P.J. Blount, *Targeting in Outer Space: Legal Aspects of Operational Military Actions in Space*, HARV. NAT'L SEC. J. 1, 10–11 (2012) (arguing that an object's current use, not its potential future application, should govern its characterization as civilian or military); ILA Study Group, *supra* note 2, at 355 ("Objects, which could potentially become military objectives in the future, remain civilian objects as long as they have not yet actually become military objectives."); Swiney, *supra* note 1, at 751 ("The strict separation of military and civilian assets envisioned by Distinction simply does not exist in the real world.").

[55] *See* DOD LAW OF WAR MANUAL, *supra* note 1, § 5.14.1 (noting that in some circumstances, it may not be possible to refrain from placing military objectives in densely populated areas); ICRC 1987 COMMENTARY, *supra* note 9, ¶¶ 2249, 2251 (observing that the circumstances of war can change rapidly, so the standard of feasible separation is not rigid); HENCKAERTS & DOSWALD-BECK, *supra* note 1, at 73–74; Quéguiner, *supra* note 4, at 819 (noting that urbanized areas routinely include military objectives). Sometimes co-location is inevitable, such as in a small and mountainous country, where much of the human activity, both civilian and military, has to occur in narrow valleys. For example,

### *C. Case Studies*

Despite all this ambiguity in the operation of reverse distinction, and notwithstanding the sponginess implicit in the criterion of feasibility, there are still plenty of teeth in the legal requirement for separation, and some insistent criticism of its violation—voiced, in particular, by the United States. This section now presents two miniature case studies of notorious breaches of reverse distinction: one depicting a state bringing its military hardware impermissibly close to protected civilian locations; the other presenting the opposite scenario, with a belligerent illegally pulling civilians into proximity of military objectives. In each case, some additional variations upon the central theme are also noted.

#### 1. Saddam Hussein's Jets

Perhaps the most egregious modern example of a state flagrantly and deliberately failing to honor reverse distinction came in February 1991 during the first Gulf War. Iraqi President Saddam Hussein ostentatiously ordered two Soviet-made MiG-21 bombers to be parked right next to one of Mesopotamia's most priceless archeological sites, the ziggurat of the famous temple of Ur-Nammu, dating from 2100 BC. The obvious intention was to deter U.S. bombers from striking those valuable military assets, or alternatively to bait them into such an attack, and then to exploit for global propaganda purposes any resulting harm inflicted on the extraordinary cultural property.[56]

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Switzerland has discreetly placed weapons arsenals and command centers into disguised buildings designed to look like ordinary homes or offices, in order to facilitate local resistance to any invasion and to fool enemy targeters. *See* ICRC 1987 COMMENTARY, *supra* note 9, ¶¶ 2246, 2254 (discussing use of camouflage); Parks, *supra* note 1, at 136 n.406 (also noting similar practices in contemporary Sweden and by both sides during World War II, and differentiating between the use of camouflage and the co-location of military and civilian assets, also resisting the suggestion that use of camouflage to mask a military site as civilian could constitute perfidy); Jensen, *supra* note 10, at 159–60; *see generally* Kevin Jon Heller, *Disguising a Military Object as a Civilian Object: Prohibited Perfidy or Permissible Ruse of War?* 91 INT'L LAW STUD. 517 (2015).

[56] *See* Oswald Johnston, *Iraqis Put Warplanes at Ancient Temple, U.S. Says*, L.A. TIMES (Feb. 14, 1991), https://www.latimes.com/archives/la-xpm-1991-02-14-mn-1799-story.html [https://perma.cc/4HNW-PNR9]; GULF WAR REPORT, *supra* note 31, at 626; *Crafting Tragedy*, THE WHITE HOUSE: PRESIDENT GEORGE W. BUSH ARCHIVES, https://georgewbush-whitehouse.archives.gov/ogc/apparatus/crafting.html [https://perma.cc/8JNL-ZVUS] (last visited Feb. 23, 2021); SOLIS, *supra* note 1, at 295; Jim Garamone, *Iraqi Regime Uses People, Culture to Shield Military*, AM. FORCES PRESS

U.S. authorities roundly condemned this treacherous breach of battlefield legal obligations.[57] Under a straightforward legal analysis, the MiGs remained military objectives and the ziggurat remained a civilian object. A proportionality assessment would likely suggest that the anticipated collateral damage from striking the jets could vastly outweigh the military gain, and prudent public relations policy as well as LoAC counseled restraint.[58] So in that sense, Saddam's illegal tactic succeeded.

Other illustrations of similar Iraqi violations of reverse distinction were abundant during that conflict.[59] The United States formally reported to the United Nations on March 8, 1991, that:

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SERV. (Feb. 27, 2003), https://web.archive.org/web/20170930022534/https://archive.defense.gov/news/newsarticle.aspx?id=29371; Corn, *supra* note 1, at 155–56 (describing the use of human shields as illegally baiting the adversary to make an unwise attack).

[57] FAYE DONNELLY, SECURITIZATION AND THE IRAQ WAR: THE RULES OF ENGAGEMENT IN WORLD POLITICS 118–19 (2013) (quoting Donald Rumsfeld February 19, 2003 statement discussing Iraq's violations: "These are not tactics of war, they are crimes of war"); Johnston, *supra* note 56 (quoting Secretary of Defense Dick Cheney); GULF WAR REPORT, *supra* note 31, at 621.

[58] *See* IAN HENDERSON, THE CONTEMPORARY LAW OF TARGETING: MILITARY OBJECTIVES, PROPORTIONALITY AND PRECAUTIONS IN ATTACK UNDER ADDITIONAL PROTOCOL I 55 (2009) (discussing the proportionality calculation, "So, while the 'positioning of the aircraft adjacent to Ur (without servicing equipment or a runway nearby) effectively had placed each out of action, thereby limiting the value of their destruction by Coalition air forces when weighed against the risk of damage to the temple,' the aircraft remained legitimate military objectives but with only small military value."); DOD LAW OF WAR MANUAL, *supra* note 1, §§ 2.5.5, 5.4.4 ("A party is not relieved of its obligations to discriminate in conducting attacks by the failures of its adversary to distinguish its military objectives from protected persons and objects."); GULF WAR REPORT, *supra* note 31, at 626.

[59] *See* GULF WAR REPORT, *supra* note 31, at 624 (reporting Iraqi violations of reverse distinction including dispersing military helicopters into residential areas, storing military supplies in mosques, schools and hospitals, including a cache of Silkworm missiles in a school in Kuwait City, and storing chemical weapon production equipment in a sugar factory); THE WHITE HOUSE: PRESIDENT GEORGE W. BUSH ARCHIVES, *supra* note 56; A.P.V. ROGERS, LAW ON THE BATTLEFIELD 77–78 (1996).

In a similar vein, in 1998 in Operation Desert Fox, the United States attacked numerous facilities associated with Saddam Hussein's chemical and biological weapons programs but decided not to attack the facilities where those substances were produced or stored because Iraq had constructed them so close to population centers that there would be an excessive danger of severe collateral damage. *See* JASON D. ELLIS & GEOFFREY D. KIEFER, COMBATING PROLIFERATION: STRATEGIC INTELLIGENCE AND SECURITY POLICY 186–87 (2004).

> The Iraqi Government . . . intentionally placed civilians at risk through its behavior. Following are a few concrete examples of such behaviour:
>
> (a) The Iraqi Government moved significant amounts of military weapons and equipment into civilian areas with the deliberate purpose of using innocent civilians and their homes as shields against attacks on legitimate military targets;
> (b) Iraqi fighter and bomber aircraft were dispersed into villages near the military airfields where they were parked between civilian houses and even placed immediately adjacent to important archaeological sites and historic treasures;
> (c) Coalition aircraft were fired upon by anti-aircraft weapons in residential neighbourhoods in various cities. In Baghdad, anti-aircraft sites were located on hotel roofs;
> (d) In one case, military engineering equipment used to traverse rivers, including mobile bridge sections, was located in several villages near an important crossing point. The Iraqis parked each vehicle adjacent to a civilian house.[60]

Observers in other armed conflicts have reported comparable violations of reverse distinction, such as South Ossetian fighters using civilian homes and buildings in the city of Tskhinvali to fire upon Georgian forces,[61] Tamil Tigers in Sri Lanka preventing civilians from fleeing from the violence,[62] and ISIS and Hamas using mosques and hospitals as strongholds during combat in Syria and Gaza.[63]

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[60] U.N. Security Council, Letter dated Mar. 5, 1991 from the Permanent Representative of the United States of America to the United Nations addressed to the President of the Security Council, U.N. Doc. S/22341, 2–3 (Mar. 8, 1991), http://www.un.org/en/ga/search/view_doc.asp?symbol=S/22341 [https:/perma.cc/69CL-2ZXE]; *see also* U.S. CENT. INTEL. AGENCY, PUTTING NONCOMBATANTS AT RISK: SADDAM'S USE OF 'HUMAN SHIELDS' 5–7 (2003), https://permanent.fdlp.gov/websites/www.cia.gov/www.cia.gov/cia/reports/iraq_human_shields/iraq_human_shields.pdf [https://perma.cc/YQV6-QDBU] [hereinafter PUTTING AT RISK]; GULF WAR REPORT, *supra* note 31, at 624.

[61] *See* Jensen, *supra* note 10, at 160 n.58.

[62] *See id.* at 160 n.59.

[63] *See* Terri Moon Cronk, *DOD Spokesman: ISIS Deliberately Misuses Mosques*, U.S. DEP'T OF DEF. NEWS (Oct. 18, 2013), https://www.defense.gov/Explore/News/Article/Article/1669289/DOD-spokesman-isis-deliberately-misuses-mosques/ [https://perma.cc/7X9K-WCUM]; Combined Joint Task

2. Slobodan Milosevic's Bridges

In some ways the inverse tactic—instead of moving military hardware impermissibly close to civilian sites—is to bring civilians, prisoners of war, or other protected persons too proximate to the military line of engagement.[64] Three different types of ploys, each endeavoring to deter effective responsive fire, can be discerned. An involuntary human shield is essentially a victim of kidnapping, forced to stand next to a fighter and to accompany him or her through a danger zone. Voluntary human shields are civilians, perhaps motivated by patriotic fervor, who freely position themselves near high value military objectives, to coerce the opponent to eschew attacking them, for fear of causing excessive collateral damage. An unwitting human shield is someone who does not even recognize that they have been maneuvered into a position of increased hazard, and who is now visibly living in, working at, or visiting a potential

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Force, *Coalition Strikes Mosul Hospital*, U.S. DEP'T OF DEF. (Dec. 8, 2016), https://DOD.defense.gov/Portals/1/features/2014/0814_iraq/docs/20161208-01-Media-Release-Coalition-Strikes-Mosul-Hospital.pdf [https://perma.cc/5AHJ-6WKA]; U.N. Refugee and Works Agency, *UNRWA Strongly Condemns Placement of Rockets in School* (July 17, 2014), https://www.unrwa.org/newsroom/press-releases/unrwa-strongly-condemns-placement-rockets-school [https://perma.cc/2QCY-VDMR] (finding military equipment stored in UNRWA schools in the Gaza Strip); Terrence McCoy, *Why Hamas Stores its Weapons Inside Hospitals, Mosques and Schools*, WASH. POST (July 31, 2014), https://www.washingtonpost.com/news/morning-mix/wp/2014/07/31/why-hamas-stores-its-weapons-inside-hospitals-mosques-and-schools/ [https://perma.cc/AM4L-TGQS]; s*ee also* Parks, *supra* note 1, at 28, 160, 165 (reporting similar violations of the reverse distinction requirements by North Vietnam (locating war material in populated areas and parking military convoys in villages) and by the PLO (shifting defensive positions into Lebanese towns and placing artillery atop hospitals)); Blank, *supra* note 1, at 790–91; Bassem Mroue, *US Strikes IS-Held Mosque as Syria Battle Intensifies*, ASSOCIATED PRESS (Feb. 12, 2019), https://apnews.com/article/1f4ccde02f214ee08090e22557747091 [https://perma.cc/PVJJ-BXTC]; *Why They Died: Civilian Casualties in Lebanon During the 2006 War*, 2007 HUM. RTS. WATCH 1, 5 (2007), https://www.hrw.org/sites/default/files/reports/lebanon0907.pdf [https://perma.cc/YY8X-S3JZ] (reporting Hezbollah firing rockets from within populated areas, storing weapons in populated areas, and taking human shields); Schmitt & Merriam, *supra* note 13, at 119–23 (discussing Israeli view of co-locating of military and civilian assets).

[64] *See*, *e.g.*, Parks, *supra* note 1, at 159 (differentiating "between a failure to separate civilians from the vicinity of military objectives and the intentional placement of military objectives in populated areas or the movement of civilians into the vicinity of military objectives in order to shield the military objectives from attack"); Sassòli & Quintin, *supra* note 1, at 113–14 (noting that it can be difficult to determine whether the presence of civilians near military objectives is due to the defender's illegal effort to obtain protection of its forces, or due to the defender's lack of care for the civilian population).

target site.[65] At least the first variant—an involuntary human shield—is manifestly illegal, constituting a war crime in blatant violation of the principle of reverse distinction.[66]

Several particularly glaring breaches of these standards occurred during the Kosovo War in the Federal Republic of Yugoslavia in 1999. There, Serbian leader Slobodan Milosevic conspicuously recruited thousands of civilians—many of them wearing bull's-eye T-shirts—to assemble on and around potential U.S. bombing aim-points in Belgrade, such as three key bridges over the Danube and Sava Rivers.[67] That

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[65] *See, e.g.*, Ian Drury, *Mission Aborted on Orders of SAS: RAF Attack Is Halted after Troops Spot Human Shields*, DAILY MAIL (Mar. 22, 2011), https://www.dailymail.co.uk/news/article-1368626/Libya-RAF-abort-attack-SAS-spot-Gaddafi-using-human-shields.html [https://perma.cc/WY34-HA6M] (reporting on Libyan government's use of journalists and others as unwitting human shields); Stéphanie Bouchié de Belle, *Chained to Cannons or Wearing Targets on Their T-Shirts: Human Shields in International Humanitarian Law*, 90 INT'L REV. RED CROSS 872 (2008), https://www.icrc.org/en/doc/assets/files/other/irrc-872-bouchie-de-belle.pdf [https://perma.cc/N2PE-JAW4]; SOLIS, *supra* note 1, at 349–52; Quéguiner, *supra* note 4, at 811−17; ILA Study Group, *supra* note 2, at 360–62.

[66] Additional Protocol I, *supra* note 1, arts. 51(7), 58; Geneva Convention Relative to the Treatment of Prisoners of War, arts. 3.1(b), 28, Aug. 12, 1949, 6 U.S.T. 3316 [hereinafter Geneva IV]; Rome Statute of the International Criminal Court, art. 8(2)(b)(xxiii), July 17, 1998, 2187 U.N.T.S. 3 [hereinafter Rome Statute] (classifying the use of human shields during an international armed conflict as a war crime under the ICC's jurisdiction); HENCKAERTS & DOSWALD-BECK, *supra* note 1, Rule 97; GULF WAR REPORT, *supra* note 1, at 618; Quéguiner, *supra* note 4, at 811−17; Bouchié de Belle, *supra* note 65; Linda D. Kozaryn, *Serb "Human Shield" Ploys Are War Crimes, U.S. Envoy Says*, U.S. DEP'T OF DEF. NEWS (May 19, 1999), http://www.defenselink.mil/news/newsarticle.aspx?id=42058 [https://web.archive.org/web/20090218035953/http://www.defenselink.mil/news/newsarticle.aspx?id=42058] (quoting U.S. Ambassador for War Crimes Issues David Scheffer as labeling Milosevic's use of human shields as a war crime); Corn, *Beyond Human Shielding*, *supra* note 1, at 124–28, 138–44; Schmitt and Merriam, *supra* note 13, at 115–19; NATO HANDBOOK, *supra* note 4, at 4.

[67] *See, e.g.*, George Nash, *Human Shields Defend Belgrade Bridges*, UNITED PRESS INT'L (Apr. 15, 1999), https://www.upi.com/Archives/1999/04/15/Human-shields-defend-Belgrade-bridges/2094924148800/ [https://perma.cc/K532-3ZMW]; Lara Marlowe, *Bombed Bridges Dominate Collective Imagination*, IR. TIMES (June 22, 1999), https://www.irishtimes.com/news/bombed-bridges-dominate-collective-imagination-1.198448 [https://perma.cc/77PX-K3ZV] (reporting that Serbian government employees were paid, and then ordered, to participate in the crowds on Belgrade bridges). Serbian authorities also employed involuntary human shields in other incidents during the fighting about Kosovo. *See, e.g.*, Will England, *Refugees Call Korisa a Setup; Serbs Locked Them Up to Die, Survivors Say*, BALT. SUN (June 20, 1999), https://www.baltimoresun.com/news/bs-xpm-1999-06-20-9906220504-story.html [https://perma.cc/F7JM-QXBX] (discussing use of refugees as involuntary shields); Linda

perfidious co-location did not alter the character of the bridges as legitimate targets, but it illegitimately affected U.S. military operations and was manifestly incompatible with the LoAC obligations of the Federal Republic of Yugoslavia.[68] U.S. authorities condemned the tactic in the strongest terms.[69]

Tragically, the practice of using human shields is not uncommon. Iraq's Saddam Hussein was a most persistent practitioner of this dark art. In late 1990, prior to the Coalition's launch of Desert Storm, Iraq "held more than 800 Western, Japanese, and Kuwaiti nationals as involuntary human shields at strategic installations in Iraq and Kuwait to deter attack."[70] In 1997, during a crisis over Iraq's refusal to permit UN inspections of sensitive government sites, Hussein "encouraged hundreds of Iraqi families to put themselves at risk as 'voluntary' human shields at palaces and strategic facilities."[71] In 2003, just prior to the Second Gulf War, he overtly solicited "international peace groups to send members to Iraq to serve as voluntary human shields."[72]

More recently, the ISIS fighters who seized civilians to provide themselves cover during shoot-outs in the streets of Iraqi cities were likewise manifestly failing to respect the reverse distinction principle of separation between fighters and protected persons.[73]

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D. Kozaryn, *U.S. Claim Milosevic Uses Refugees as Human Shields*, U.S. DEP'T OF DEF. NEWS (May 18, 1999), https://web.archive.org/web/20090729005300/http://www.defenselink.mil/news/newsarticle.aspx?id=42060 (citing multiple apparent uses of human shields); Kozaryn, *supra* note 66 (reporting Serbian forces compelling hundreds of Albanian men to serve as human shields during battles and to protect military convoys and fuel facilities).

[68] *See* Bouchié de Belle, *supra* note 65, at 888 (arguing that most uses of human shields do not constitute perfidy); *id.* at 893–96 (reporting that experts are divided on the question of whether a voluntary human shield is "directly participating in hostilities"); *id.* at 899−902 (discussing the attacker's obligations regarding human shields and the calculation of proportionality); ILA Study Group, *supra* note 2, at 361; Kozaryn, *supra* note 66.

[69] Kozaryn, *supra* note 66.

[70] PUTTING AT RISK, *supra* note 60, at i; GULF WAR REPORT, *supra* note 31, at 624.

[71] PUTTING AT RISK, *supra* note 60, at i.

[72] *Id.*

[73] *See* Quinta Jurecic, *Defense Department General Counsel Remarks at IDF Conference*, LAWFARE (May 28, 2019), https://www.lawfareblog.com/defense-department-general-counsel-remarks-idf-conference [https://perma.cc/W8LG-E8FL] (describing ISIS tactics including forcing flocks of children to accompany ISIS commanders in dangerous travel); U.N. Off. of the High Comm'r for Hum. Rts., Battle for Mosul: ISIL Forces Thousands of Civilians from Their Homes and Executes Hundreds (Oct. 28, 2016), https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=20783&LangI

## II. LoAC IN SPACE

Having surveyed the traditional LoAC provisions regarding the obligations of reverse distinction as applied in the more familiar earthbound military venues, the Article now turns to an examination of contemporary and emerging military operations in space. The discussion begins with three background observations about historical patterns in the exploitation of "the ultimate high ground," then pivots to consider three recently surfacing, contrary trends.

### *A. Historical Context*

The starting point for this analysis is to emphasize three salient conditions that have come over the years to characterize human activities in space: (a) the enormous, diverse importance of satellite services in providing essential support for key operations of the civilian economy and the national security of the United States and other advanced countries; (b) the longstanding domination of space activities by national governments, rather than by private actors, pursuant to both international legal obligations and economic realities; and (c) the blessed absence to date of armed conflict in space. As discussed below, the first of these traditional conditions will undoubtedly continue and even accelerate into the foreseeable future; the second is being rapidly altered by revolutionary technological and social change; and the third is now more precarious than ever.

1. The Importance of Space

Space is now fully integrated into almost all aspects of life in economically developed countries; neither the civilian economy nor the national security sector could operate in modern form without unfettered access to orbital resources. On the civilian side, satellites enable

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D=E [https://perma.cc/ZXV4-BQFR] (condemning ISIS practice of forcible human shields); Moni Basu, *Human Shields in Iraq: The New ISIS Strategy in Fight for Mosul*, CNN (Oct. 30, 2016), https://www.cnn.com/2016/10/30/middleeast/iraq-mosul-isis-human-shields/index.html [https://perma.cc/54TU-QLTM] (describing ISIS fighters embedding with civilians and taking civilians hostage as human shields); OHCHR Mosul City Report, *supra* note 31, at 31–32 (describing ISIS use of human shields in Mosul in 2017); *see also* Shannon Bosch, *Targeting Decisions Involving Voluntary Human Shields in International Armed Conflicts in Light of the Notion of Direct Participation in Hostilities*, 46 COMP. INT'L L.J. S. AFR. 447, 447–48 (2013) (citing other examples of use of voluntary human shields in international armed conflict).

communications (internet, telephone, and television); transportation (GPS for cars, airplanes, and ships); reconnaissance (weather forecasting and Earth resources monitoring); and more.[74] Cognate services are equally vital on the military side, for communications (between headquarters and fielded forces, and among units maneuvering swiftly in battle); transportation (positioning bombers, naval forces, and "smart" missiles); reconnaissance (detecting enemy missile launches and guiding interceptors against them, surveilling adversary maneuvers, and monitoring compliance with arms control treaties); and more.[75]

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[74] *See* ROBERT S. WILSON, MICHAEL P. GLEASON, SAMIRA PATEL & LUC H. RIESBECK, THE VALUE OF SPACE, CTR. FOR SPACE POL'Y & STRATEGY 1–12 (2020), https://aerospace.org/sites/default/files/2020-05/Gleason-Wilson_ValueOfSpace_20200511.pdf [https://perma.cc/WXR6-CYAT] (highlighting satellite services for precision agriculture, ocean monitoring, weather forecasting, and other essential applications); U.S. DEP'T OF DEF., DEFENSE SPACE STRATEGY SUMMARY 3 (2020) ("Today, U.S. reliance upon space has increased to the point where space capabilities not only enhance, but enable our way of life and way of war."); EXEC. OFF. OF THE PRESIDENT, NATIONAL SPACE POLICY OF THE UNITED STATES OF AMERICA 1 (June 28, 2010) [hereinafter OBAMA SPACE POLICY], https://obamawhitehouse.archives.gov/sites/default/files/national_space_policy_6-28-10.pdf [https://perma.cc/5M3D-96HR] ("Space systems allow people and governments around the world to see with clarity, communicate with certainty, navigate with accuracy, and operate with assurance."); TIMOTHY J. HALL ET. AL., CLEARING SKIES IN THE FORECAST FOR THE NATION'S WEATHER SATELLITES, CTR. FOR SPACE POL'Y AND STRATEGY (2021) (emphasizing the military value of space weather data).

[75] *See* U.S. SPACE FORCE, SPACEPOWER: DOCTRINE FOR SPACE FORCES, SPACE CAPSTONE PUBLICATION 28–44 (2020), https://www.spaceforce.mil/Portals/1/Space%20Capstone%20Publication_10%20Aug%202020.pdf [https://perma.cc/YY9X-CBM3] [hereinafter SPACEPOWER]; U.S. JOINT CHIEFS OF STAFF, SPACE OPERATIONS, JOINT PUBLICATION 3–14, at II-1 to II-8 (2018), https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_14ch1.pdf?ver=qmkgYPyKBvsIZyrnswSMCg%3D%3D [https://perma.cc/KX2R-REYW]; ELBRIDGE COLBY, FROM SANCTUARY TO BATTLEFIELD: A FRAMEWORK FOR A U.S. DEFENSE AND DETERRENCE STRATEGY FOR SPACE, CTR. FOR NEW AM. SEC. (2016), https://s3.us-east-1.amazonaws.com/files.cnas.org/documents/CNAS-Space-Report_16107.pdf?mtime=20160906081938&focal=none [https://perma.cc/7A3N-XED7]; David Martin, *The Battle Above*, CBS NEWS (Apr. 26, 2015), http://www.cbsnews.com/news/rare-look-at-space-command-satellite-defense-60-minutes/ [https://perma.cc/VJY3-6F6G] (interview with Gen. Hyten describing crucial value of military space assets); WILSON ET AL., *supra* note 74, at 12−15; BEYZA UNAL, CHATHAM HOUSE, CYBERSECURITY OF NATO'S SPACE-BASED STRATEGIC ASSETS 9 (2019) (reporting that the U.S. military's use of precision-guided munitions, many of which rely on satellites, grew from 10% during the first Gulf War in 1990–91, to 60% in Afghanistan in 2001, to 68% in Iraq in 2003); Ricky J. Lee & Sarah L. Steele, *Military Use of Satellite Communications, Remote Sensing, and Global Positioning Systems in the War on Terror*, 79 J. AIR L. & COM. 69, *passim* (2014).

The United States is currently the most successful nation at exploiting the unique advantages of space, and maintains more (and more advanced) satellites than any other state. But a dozen other countries are also capable of increasingly sophisticated space operations and virtually all societies are tied, in one way or another, to space programs.[76] Despite economic vicissitudes, the global space economy continues to thrive, with annual revenues variously estimated as now topping $400 billion and climbing.[77]

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[76] *See* CASSANDRA STEER, CTR. ETHICS & RULE OF LAW, WHY OUTER SPACE MATTERS FOR NATIONAL AND INTERNATIONAL SECURITY 2 (2020) (noting that 13 countries have independent launch capability); ROBERT S. WILSON, COLLEEN STOVER & STEVEN R. JORDAN TOMASZEWSKI, CTR. FOR SPACE POL'Y & STRATEGY, DEFENSE SPACE PARTNERSHIPS: A STRATEGIC PRIORITY 2 (2020), https://aerospace.org/sites/default/files/2020-09/Wilson_DefensePartnerships_20200916.pdf [https://perma.cc/TJR2-BVX9] (reporting that over sixty countries have a national space budget and over seventy countries own or operate satellites); Robert S. Wilson, *More to See and More to Hide: Forecasting the Effect of Space Tech. on Nuclear Weapon Issues*, 2021 IISTP OCCASIONAL PAPERS 117, 118-20 (emphasizing growth and diversity in countries' space activities); Martin, *supra* note 75 (assessing U.S. space budget); KEVIN POLLPETER, TIMOTHY DITTER, ANTHONY MILLER & BRIAN WAIDELICH, CHINA AEROSPACE STUD. INST., CHINA'S SPACE NARRATIVE: EXAMINING THE PORTRAYAL OF THE US-CHINA SPACE RELATIONSHIP IN CHINESE SOURCES AND ITS IMPLICATIONS FOR THE UNITED STATES 9 (2020) (describing China's rapid growth in space activities, undertaken in pursuit of international respect, wealth, and power); Anatoly Zak, *Russian Military and Dual-Purpose Spacecraft: Latest Status and Operational Overview*, 2019 CNA OCCASIONAL PAPER SERIES 1 (2019); Theresa Hitchens, *China Set to Beat US, Russia Again in Space Launch Race*, BREAKING DEF. (Oct. 30, 2020), https://breakingdefense.com/2020/10/china-set-to-beat-us-russia-again-in-space-launch-race/ [https://perma.cc/4J8S-4Z8H] (reporting that for the third year in a row, China will launch more satellites than any other country); Judd Devermont & Temidayo Oniosun, *Is the United States Losing the African Space Race?*, WAR ON THE ROCKS (June 23, 2020) (surveying growing space programs in several African states), https://warontherocks.com/2020/06/is-the-united-states-losing-the-african-space-race/ [https://perma.cc/7288-7YTH]; ROBERT S. WILSON, CTR. FOR SPACE POL'Y & STRATEGY, JAPAN'S GRADUAL SHIFT TOWARD SPACE SECURITY (2020) (examining Japan's growing military use of space).

[77] *See* Jeff Foust, *Commerce Department to Develop New Estimate of the Size of the Space Economy*, SPACE NEWS (Jan. 2, 2020), https://spacenews.com/commerce-department-to-develop-new-estimate-of-the-size-of-the-space-economy/ [https://perma.cc/38X7-4SW8] ("A number of estimates exist on the size of the space economy, which vary depending on what is included. A May 2019 report prepared for the Satellite Industry Association (SIA) by Bryce Space and Technology estimated the global space economy to be $360 billion, of which the satellite industry accounted for $277 billion and the rest primarily by government space budgets. The Space Foundation, in its annual Space Report published in July 2019, estimated the global space economy to be nearly $415 billion in 2018. The two reports also differed in estimated growth: the SIA report saw growth

2. The Central Role of Governments

Historically, human space activity was dominated—and almost exclusively populated—by national governments. After the Soviet Union orbited *Sputnik* in 1957, the United States military community struggled to match it, and the space race was on—with governments in both protagonists leading the way. Capitalist and communist countries, of course, maintained very different roles and capabilities for their respective public and private sectors, and numerous hybrid consortia also emerged. But the story of space activity—well into the 21st century—remained predominantly a saga of government investment, innovation and use.[78]

International law reinforced that structure. The 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies[79] (Outer Space

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of 3% in 2018, versus 8% in the Space Foundation report. Those estimates, and projections for future growth, have led some to predict the space economy, however it is defined, to be worth at least $1 trillion within 20 years. U.S. government officials, including Commerce Secretary Wilbur Ross, have frequently talked about efforts to create a trillion-dollar space economy."); KEITH W. CRANE, EVAN LINCK, BHAVYA LAL & RACHEL Y. WEI, INST. FOR DEF. ANALYSIS, MEASURING THE SPACE ECONOMY: ESTIMATING THE VALUE OF ECONOMIC ACTIVITIES IN AND FOR SPACE (2020); Jason Rainbow, *Space Industry in Midst of Transformation Following Record Private and Public Investments*, SPACE NEWS, (Apr. 30, 2021), https://spacenews.com/space-industry-in-midst-of-transformation-following-record-private-and-public-investments/ [https://perma.cc/CL3D-D462].

[78] *See* Christopher Ashley Ford, *Whither Arms Control in Outer Space? Space Threats, Space Hypocrisy, and the Hope of Space Norms*, U.S. DEP'T OF STATE (Apr. 6, 2020), https://2017-2021.state.gov/whither-arms-control-in-outer-space-space-threats-space-hypocrisy-and-the-hope-of-space-norms/index.html [https://perma.cc/6JW6-58BC] (explaining that for many years "space issues were conceived primarily through the lens of bilateral Cold War rivalry"); Elizabeth Seebode Waldrop, *Integration of Military and Civilian Space Assets: Legal and National Security Implications*, 55 A.F. L. REV. 157, 165 (2004). At the same time, there were also vigorous private and international activities in space, especially regarding communications. FRANCIS LYALL & PAUL B. LARSEN, SPACE LAW: A TREATISE 281–300 (2d ed. 2018) (describing early intergovernmental communications organizations such as INTELSAT and INMARSAT); MARK L. GOLDSTEIN, U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-04-891, TELECOMMUNICATIONS: INTELSAT PRIVATIZATION AND THE IMPLEMENTATION OF THE ORBIT ACT (2004), https://www.gao.gov/assets/250/244064.pdf [https://perma.cc/R6RG-X8C5] (describing legal structure of INTELSAT); About COMSAT, COMSAT, https://www.comsat.com/about-comsat/ [https://perma.cc/7W3Z-5BMW] (last visited Oct. 8, 2021) (discussing history of Comsat).

[79] Treaty on Principles Governing the Activities of States in the Exploration and Use of

Treaty or "OST") is the foundational document in the field, joined by all the leading spacefaring states.[80] It establishes the preeminent "constitutional" norms for space operations, including the postulates that the exploration and use of space "shall be carried out for the benefit and in the interests of all countries";[81] that space "shall be free for exploration and use by all States";[82] and that space "is not subject to national appropriation by claim of sovereignty."[83]

Of special relevance here, the OST also stipulates that states "shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding."[84] The corpus of the law of armed conflict is therefore fully applicable in space; it represents a *lex specialis*, to be construed and applied to human activity even in locations beyond national jurisdiction.[85]

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Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

[80] *See* U.N. Office of Outer Space Affairs, Status of International Agreements Relating to Activities in Outer Space (Jan. 2020), https://www.unoosa.org/documents/pdf/spacelaw/treatystatus/TreatiesStatus-2020E.pdf [https://perma.cc/H6GU-PZSE] (listing 110 parties to OST). *See generally*, LYALL & LARSEN, *supra* note 78, at 49–73.

[81] Outer Space Treaty, *supra* note 79, art. I.

[82] *Id.*

[83] *Id.* art. II.

[84] *Id.* art. III.

[85] *See* Michael Schmitt & Kieran Tinkler, *War in Space: How International Humanitarian Law Might Apply: The Woomera Manual Project—Part 3*, JUST SEC. (Mar. 9, 2020), https://www.justsecurity.org/68906/war-in-space-how-international-humanitarian-law-might-apply/ [https://perma.cc/T7L3-WJ4F]; Schmitt, *Targeting*, supra note 22, at 269–70 (observing that the text of AP I refers explicitly to its applicability to warfare on "land, air or sea," but customary international law extends its coverage to space, as well). *See generally* Rep. of the Study Group of the Int'l Law Comm'n on Its Fifty-Eighth Session, Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law, U.N. Doc A/CN.4/L.682 (2006), https://legal.un.org/ilc/documentation/english/a_cn4_l682.pdf [https://perma.cc/TS5K-EZP9]; Frans G. von der Dunk, *Armed Conflicts in Outer Space: Which Law Applies*, 97 INT'L LEGAL STUD. 188, 214 (2021) (addressing both the law of armed conflict and the law of space as *lex specialis*, superseding other more general international law); OSLO MANUAL, *supra* note 12, at 5 (presenting a rule about LoAC as *lex specialis* that prevails over general law of Outer Space during armed conflict); *The Potential Human Cost of Weapons in Outer Space*, *supra* note 12, ¶¶ 8–9 (discussing applicability of LoAC in outer space).

Regarding the relationship between public sector and private sector space activities, the Soviet Union had initially demanded during the OST negotiations that only national governments should be allowed to conduct operations outside the atmosphere—it regarded corporations as simply another evasive mechanism through which the capitalist states would pursue national hegemony. In contrast, the United States and others insisted that appropriately regulated non-governmental organizations should be empowered to undertake the full array of space investments, too.[86] The Solomonic compromise reflected in OST art. VI permits corporate and other private activities in space, but provides that each party to the treaty "shall bear international responsibility" for space activities, whether conducted by its "governmental agencies or by non-governmental entities."[87] The treaty further mandates that each party shall ensure that all space activities under its jurisdiction are conducted in conformity with the treaty, and the state must provide "authorization and continuing supervision" of the space activities of its non-governmental entities.[88]

Pursuant to those mandates, three distinct types of space programs have flourished in the United States and elsewhere. The first category comprises the military and IC spacecraft, developed and operated to pursue the array of national security functions. By one count, the United States currently maintains 216 satellites of this character, more or less completely dedicated to defense and intelligence surveillance, communications, and other needs.[89] The second cluster is "civil space," which includes NASA's multiple space exploration programs and the global utilities (satellites engaged in weather forecasting, GPS, mapping, the International Space Station, etc.) that serve the world community—currently estimated at 198 satellites for the United States.[90] Again, these are longstanding public

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[86] *See* Maggie Koerth-Baker, *Who Makes the Rules for Outer Space*?, PBS NOVA (Nov. 30, 2015), https://www.pbs.org/wgbh/nova/article/space-law/ [https://perma.cc/TS5K-EZP9].

[87] Outer Space Treaty, *supra* note 79, art. VI.

[88] *Id.*

[89] *UCS Satellite Database*, UNION CONCERNED SCIENTISTS, https://www.ucsusa.org/resources/satellite-database [https://perma.cc/79L8-R6JS] (last updated May 1, 2021) (providing information about 4,084 operational satellites, including 2,505 attributed to the United States, as of May 2021).

[90] *Id.*; Randy Seftas, *The Civil Space Sector*, FED'N AM. SCIENTISTS, https://fas.org/spp/eprint/article07.html [https://perma.cc/3L84-D946] (last visited Feb. 25, 2021) (prepared for the Commission to Assess United States National Security Space Management and Organization) (describing the civil space sector); *Landsat Missions*, U.S. GEOLOGICAL SURV., https://www.usgs.gov/core-science-systems/nli/landsat [https://perma.cc/LJ8D-VPD5] (last visited Feb. 25, 2021) (describing satellite-based Earth resources monitoring program).

functions, with roots in the earliest days of the space age. The third group is private sector activity, with for-profit corporations seeking to establish, and then to serve, growing markets for multifarious satellite services. This commercial category was the last to emerge, but it has grown enormously in the past few years; the U.S. inventory now stands at 2,091.[91] These three sets of activities have never been hermetically sealed off from each other, but a leading feature of the traditional approach to space has been the fact that many of the most vital highly-classified national security programs have been "black," isolated from public knowledge, or commercial sharing.[92]

3. The Absence of Armed Conflict in Space

To date, the world has been miraculously free of armed conflict in space. However, space has assuredly long been militarized: there have been arms races in space;[93] there have been applications of space military assets in support of terrestrial-based warfare;[94] there have been threats and bluster

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[91] *UCS Satellite Database*, *supra* note 87.

[92] Andrew Stanniland & Denis Curtin, *An Examination of the Governmental Use of Military and Commercial Satellite Communications*, *in* HANDBOOK OF SATELLITE APPLICATIONS 271, 274 (Joseph N. Pelton et al. eds., 2d ed. 2017) (noting that during the Cold War period, "the vast majority of the United States and NATO defense-related communications traffic was carried by a country's own national satellite(s) with some minor military traffic being carried by commercial satellites"); George B. Kistiakowsky, Memorandum for Record, Notes on Meeting with the President, 9:30 a.m., September 28, 1960 (1960), https://nsarchive2.gwu.edu/NSAEBB/NSAEBB225/doc07.pdf [https://perma.cc/CE53-WJAT] (reporting discussions with President Eisenhower about keeping high-resolution satellite reconnaissance systems "black," rather than making such projects public); *Military/National Security Space Activities*, SPACE POL'Y ONLINE (Jan. 26, 2021), https://spacepolicyonline.com/topics/militarynational-security-space-activities/ [https://perma.cc/S8PX-JUPZ] ("There is no easy way to track national security space funding since a substantial portion of the activities are classified ('black') programs.").

[93] PAUL B. STARES, THE MILITARIZATION OF SPACE: U.S. POLICY, 1945–1984 (1985) (history of U.S. and Soviet ASAT programs from the earliest days of the space age through the Cold War); Aaron Bateman, *America Can Protect its Satellites Without Kinetic Space Weapons*, WAR ON THE ROCKS (July 20, 2020), https://warontherocks.com/2020/07/america-can-protect-its-satellites-without-kinetic-space-weapons/ [https://perma.cc/JE6K-B4UF] (recounting the history of ASAT arms races); Dwayne A. Day, *To Attack or Deter? The Role of Anti-Satellite Weapons*, SPACE REV. (Apr. 20, 2020), https://www.thespacereview.com/article/3927/1 [https://perma.cc/CZS2-JT8P].

[94] Gulf War I is often cited as "the first space war," in recognition of the unprecedented heavy use by the United States and coalition forces of space assets for communication, remote sensing, positioning, and other services. *See* Richard A. Morgan, *Military Use of Commercial Communication Satellites: A New Look at the Outer Space Treaty and*

about space inevitably becoming a theater of armed conflict;[95] and there have been new military units charged with the responsibility of preparing for, and ultimately conducting, battles in space.[96] In short, space is not, and never has been, a "sanctuary" removed from armed contestation.[97]

The OST's specification that the Moon and other celestial "shall be used by all States Parties to the Treaty exclusively for peaceful purposes"[98] has been widely understood to bar only *aggressive* operations, not to inhibit military operations directed at lawful self-defense (and, anyway, this provision directly applies only to activities on celestial bodies, not to those undertaken in the void of space).[99] But to date, there has been no true space

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*Peaceful Purposes*, 60 J. AIR L. & COM. 237, 239 (1994); Kestutis Paulauskas, *Space: NATO's Latest Frontier,* NATO REV. (Mar. 13, 2020), https://www.nato.int/docu/review/articles/2020/03/13/space-natos-latest-frontier/index.html [https://perma.cc/EX3G-WU9Q].

[95] *See*, *e.g.*, DONALD RUMSFELD ET AL., REPORT OF THE COMMISSION TO ASSESS UNITED STATES NATIONAL SECURITY SPACE MANAGEMENT AND ORGANIZATION 22 (2001) (warning that in view of satellite vulnerabilities "[t]he U.S. is an attractive candidate for a 'Space Pearl Harbor'"); DEFENSE SPACE STRATEGY SUMMARY, *supra* note 74, at 1 (asserting that "[s]pace is now a distinct warfighting domain" and alleging that China and Russia have weaponized space); AIR FORCE SPACE COMMAND, SPACE WARFIGHTING CONSTRUCT (2017), https://www.afspc.af.mil/Portals/3/documents/Space%20Warfighting%20Construct%20Handout%20-%203%20Apr%202017.pdf?ver=2017-04-05-191055-757 [https://perma.cc/D5N5-CBTY] (quoting Air Force Chief of Staff David L. Goldfein saying, "Our vision is the first to normalize space operations as a joint warfighting domain; no different than any other warfighting domain. Only when we think about and talk about space in the same way we talk about operations in the air, on land, at sea, or in cyber will we move in the direction of truly integrating space operations across all warfighting domains.").

[96] *See infra* text accompanying note 112 (discussing the new U.S. Space Force).

[97] *See* Bateman, *supra* note 91; ROBIN DICKEY, CTR. FOR SPACE POL'Y & STRATEGY, THE RISE AND FALL OF SPACE SANCTUARY IN U.S. POLICY 1 (2020), https://aerospace.org/sites/default/files/2020-09/Updated_Dickey_SpaceSanctuary_20200901_0.pdf [https://perma.cc/J4YN-7UCP] (asserting that "since 1976 a policy of treating space as a sanctuary has been consistently rejected"); TODD HARRISON, KAITLYN JOHNSON & MAKENA YOUNG, CTR. FOR STRATEGIC & INT'L STUD., DEFENSE AGAINST THE DARK ARTS IN SPACE: PROTECTING SPACE SYSTEMS FROM COUNTERSPACE WEAPONS 1 (2021), https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/210225_Harrison_Defense_Space.pdf [https://perma.cc/88NB-QMFU] [hereinafter HARRISON ET AL., DARK ARTS].

[98] Outer Space Treaty, *supra* note 79, art. IV.

[99] LYALL & LARSEN, *supra* note 78, at 468–69; COMMANDER'S HANDBOOK, *supra* note 10, at 2-17; Morgan, *supra* note 94, at 298–310 (discussing how the "peaceful purposes" clause in OST art. IV applies to outer space); Schmitt & Tinkler, *supra* note 85; Jeremy Grunert, *The "Peaceful Use" of Outer Space?*, WAR ON THE ROCKS (June 22, 2021),

warfare—no hostilities directed against enemy assets in space, and no projectiles fired from space against Earthbound targets.

This absence of active exoatmospheric combat means that there is precious little actual physical state practice to draw upon in interpreting the ambiguous weapons-related terms of the OST or in deriving the operational rules that might further inform future combat in space. Therefore, the effort to construe the LoAC obligations about reverse distinction, in particular, must draw upon general principles of international law, official statements by states, analogies from other areas of practice, and logic.[100]

### *B. Modern Revolutions in Space*

In contrast to those traditional characteristics of U.S. and global space programs, the modern era features three important dynamic forces, impelling rapid, far-reaching structural changes in the country's and the world's approaches to space operations.

1. The Democratization of Space

The economics of "new space" are being revolutionized by dramatically reduced launch costs and the proliferation of small, inexpensive payloads, including modular "cubesats," facilitating unprecedented access.[101] Consequently, the orbital population is poised for

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https://warontherocks.com/2021/06/outer-space-the-peaceful-use-of-a-warfighting-domain [https://perma.cc/9CSD-9Q7N].

[100] Under the Statute of the International Court of Justice, the leading sources of public international law include, *inter alia*, customary law (built upon the behavior and statements of states), treaties, and recognized general principles of law. Statute of the International Court of Justice, art. 38, Apr. 18, 1946, 33 U.N.T.S. 993. Additional clarity about the international military law applicable in space is anticipated in the form of manuals being developed by international groups of legal experts. *See The Woomera Manual*, UNIV. ADEL., https://law.adelaide.edu.au/woomera [https://perma.cc/PS4H-KN6Z] (last visited Nov. 4, 2021); *What is the MILAMOS Project?*, MCGILL UNIV., https://www.mcgill.ca/milamos, [https://perma.cc/YM4G-RBU3] (last visited Nov. 4, 2021). The author of this Article is participating in the Woomera Manual project.

[101] *See* Dave Baiocchi & William Welser IV, *The Democratization of Space: New Actors Need New Rules*, 94 FOREIGN AFFS. 98, 99–100 (2015); TODD HARRISON, ANDREW HUNTER, KAITLYN JOHNSON & THOMAS ROBERTS, CTR. FOR STRATEGIC & INT'L STUD., IMPLICATIONS OF ULTRA-LOW-COST ACCESS TO SPACE 3–9 (2017), https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/170316_Harrison_UltraLowCostAccess_Web.pdf [https://perma.cc/EZQ3-FHYD]; Dana Kim, *The "Democratization of Space" and the Increasing Effects of Commercial Satellite Imagery on Foreign Policy*, 18 NEW PERSPS.

explosive growth: in 2008, there were approximately 500 operationally active satellites in space;[102] by 2017, that roster had grown to 1,738;[103] and by April 2021 there were 4,084 functional spacecraft in orbit.[104] Projections for the immediate future are far more flamboyant: SpaceX alone currently has authorization to launch a constellation of 12,000 satellites in the next

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FOREIGN POL'Y 35, 35 (2019), https://www.csis.org/democratization-space-and-increasing-effects-commercial-satellite-imagery-foreign-policy [https://perma.cc/3GTE-F52R]; STEVEN KOSIAK, CTR. FOR NEW AM. SEC., SMALL SATELLITES IN THE EMERGING SPACE ENVIRONMENT: IMPLICATIONS FOR U.S. NATIONAL SECURITY-RELATED SPACE PLANS AND PROGRAMS 4 (2019), https://www.cnas.org/publications/reports/small-satellites-in-the-emerging-space-environment [https://perma.cc/GA82-6M8T] (discussing satellite size); *id.* at 10–12 (discussing launch costs); Jeff Matthews, *The Decline of Commercial Space Launch Costs*, DELOITTE, https://www2.deloitte.com/us/en/pages/public-sector/articles/commercial-space-launch-cost.html [https://perma.cc/2JJ5-WZAF]; John McKenna, *How New Technology is Democratizing Access to Space*, SPECTRA (July 16, 2018), https://spectra.mhi.com/how-new-technology-is-democratizing-access-to-space [https://perma.cc/KE6F-NNNF]; GLENN C. NYE III ET AL., CTR. FOR STUD. PRESIDENCY & CONGRESS, SECURING THE HIGHEST GROUND: INTEGRATING COMMERCIAL SPACE INNOVATION INTO NATIONAL SECURITY MISSIONS 7–8 (2019), https://static1.squarespace.com/static/5cb0a1b1d86cc932778ab82b/t/5d5ecda75489fb0001d85500/1566494123916/CSPC+NSSP+Report+Digital+Version+-+Securing+the+Highest+Ground%5B235%5D.pdf [https://perma.cc/FT7A-GBTE] (discussing "[t]he [b]urgeoning [c]ommercial [m]arket" for space capabilities); *see generally* NASA, NASA/TP-2020-5008734, STATE-OF-THE-ART SMALL SPACECRAFT TECHNOLOGY (2020), https://www.nasa.gov/sites/default/files/atoms/files/soa2020_final3.pdf [https://perma.cc/7ERB-TY5L] (reporting growth in use of cubesats—defined as small spacecraft weighing only a few kilograms and based on a 10-centimeter square format—and other small spacecraft).

[102] Bradley Townsend, *Space: An Offense-Dominant Environment?*, PURVIEW (Dec. 26, 2018), https://purview.dodlive.mil/Home/Story-Display-Page/Article/2618101/space-an-offense-dominant-environment/ [https://perma.cc/7D8H-23GS].

[103] *Id.* By another accounting, NASA's Orbital Debris office tallied 2,647 operational space payloads (many of which were combined into joint satellites) in January 2000, 3,299 in January 2010, and 5,301 in January 2020. *Orbital Box Score*, 5 ORBITAL DEBRIS Q. NEWS 9 (Jan. 2000), https://orbitaldebris.jsc.nasa.gov/quarterly-news/pdfs/odqnv5i1.pdf [https://perma.cc/T73X-QDMV]; *Satellite Box Score*, 14 ORBITAL DEBRIS Q. NEWS 11 (Jan. 2010), https://orbitaldebris.jsc.nasa.gov/quarterly-news/pdfs/odqnv14i1.pdf [https://perma.cc/K4K3-LQ2E]; *Satellite Box Score*, 24 ORBITAL DEBRIS Q. NEWS 16 (Feb. 2020), https://orbitaldebris.jsc.nasa.gov/quarterly-news/pdfs/odqnv24i1.pdf [https://perma.cc/7563-89YJ].

[104] *UCS Satellite Database*, *supra* note 87; *see* DANIEL PORRAS, U.N. INST. FOR DISARMAMENT RSCH., SHARED RISKS: AN EXAMINATION OF UNIVERSAL SPACE SECURITY CHALLENGES 6 (2019) (citing growth in space activity and noting that in 2008, seven countries launched 106 objects into orbit, 42 of which were commercial; in 2017, nineteen countries launched 469 objects, 292 of which were commercial).

few years, and it has sought permission for up to 30,000 more.[105]

These new swarms of miniaturized private sector satellites will not offer the same capabilities as the legacy national security systems, but their sheer quantity makes a qualitative difference. Instead of relying exclusively on a small number of large, conspicuous, expensive, bespoke monoliths, the space community can turn to diverse, flexible, interchangeable, omnipresent platforms. The imagery products will not be as sharp and the dispersion of control will pose challenges for safe and orderly space traffic management, but there are resilience advantages to spreading the satellite "eggs" into many more redundant "baskets."[106]

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[105] Mike Wall, *SpaceX's Starlink Constellation Could Swell by 30,000 More Satellites*, SPACE.COM (Oct. 16, 2019), https://www.space.com/spacex-30000-more-starlink-satellites.html [https://perma.cc/8MCV-Z8JR] (reporting SpaceX's contemplated satellite constellation).

[106] KOSIAK, *supra* note 101, at 18 (concluding that "constellations composed of large numbers of small, less complex, and less costly satellites are likely to become progressively more cost-effective relative to constellations made up of small numbers of large, complex, and more expensive satellites," but also that the difference is not likely to be dramatic in the short run); WHITE HOUSE, SPACE POLICY DIRECTIVE-3: NATIONAL SPACE TRAFFIC MANAGEMENT POLICY (June 2018), https://trumpwhitehouse.archives.gov/presidential-actions/space-policy-directive-3-national-space-traffic-management-policy/ [https://perma.cc/UL3G-RLCL] (addressing the challenges of overcrowding in popular orbits); Theresa Hitchens, *NGA Future is "Hybrid" of Commercial, IC Sources: Gauthier*, BREAKING DEF. (Apr. 14, 2020), https://breakingdefense.com/2020/04/nga-future-is-hybrid-of-commercial-ic-sources-gauthier [https://perma.cc/XP6D-4LHZ] [hereinafter Hitchens, *NGA Future*] (quoting senior governmental official describing increasing reliance upon a mixture of growing commercial spacecraft for military and IC functions); *see* Brian G. Chow & Brandon W. Kelley, *Peace in the Era of Weaponized Satellites*, SPACE NEWS (July 28, 2021), https://spacenews.com/op-ed-peace-in-the-era-of-weaponized-space [https://perma.cc/MJG4-P4CP] (noting that constellations of small satellites cannot completely substitute for some of the large, special-purpose national security satellites); Matthew A. Hallex & Travis S. Cottom, *Proliferated Commercial Satellite Constellations*, 97 JOINT FORCE Q. 20, 21–23 (2020) (describing proliferated commercial satellite constellations providing services in remote sensing and communications, and noting that other countries are pursuing similar programs); NYE ET AL., *supra* note 101, *passim*; Dax Linville & Robert A. Bettinger, *An Argument Against Satellite Resiliency: Simplicity in the Face of Modern Satellite Design*, 34 AIR & SPACE POWER J. 43, 47–48 (2020) (arguing for the special value of low-cost swarms of satellites); KATHRYN WALSH, IAN CHRISTENSEN & ROB RONCI, SECURE WORLD FOUND., LOST WITHOUT TRANSLATION: IDENTIFYING GAPS IN U.S. PERCEPTIONS OF THE CHINESE COMMERCIAL SPACE SECTOR 7–9 (2021), https://swfound.org/media/207116/swf_caelus_lost_without_translation_identifying_gaps_in_us_perceptions_of_the_chinese_commercial_space_sector_2021.pdf [https://perma.cc/XPP4-BYA8] (discussing the rising private commercial space sector in China); Nathan Strout, *Report: Iran Used Commercial Satellite Images to Monitor US*

2. Increased Threats to Satellite Operations

The value of enhancing the diversity and resilience of the satellite architecture is underscored in an era of distinctly increasing threats to safe and secure space operations.

The pursuit of anti-satellite ("ASAT") capabilities has long held an irresistible allure for major military competitors. The United States and the Soviet Union each pursued numerous space control concepts from the earliest days of the space age, and each tested and deployed operational systems for blowing up, colliding into, or burning holes in each other's prize orbiters.[107] More recently, China ostentatiously joined the ASAT race in 2007,[108] and in 2019 India also demonstrated its orbital destructive capacity.[109]

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*Forces Before Attack*, C4ISRNET (Mar. 1, 2021), https://www.c4isrnet.com/intel-geoint/2021/03/01/report-iran-used-commercial-satellite-images-to-monitor-us-forces-before-attack [https://perma.cc/R7SP-29TC] (reporting that Iran had obtained several satellite images of the U.S. air base in Iraq just before launching the January 7, 2020 missile attack against it); Erik Lin-Greenberg & Theo Milonopoulos, *How Commercial Satellites Are Transforming Intelligence*, FOREIGN AFFAIRS (September 23, 2021), https://www.foreignaffairs.com/articles/world/2021-09-23/private-eyes-sky [https://perma.cc/3SDE-7CE6].

[107] *See* STARES, *supra* note 93 (discussing history of U.S. and USSR ASATs).

[108] Carin Zissis, *China's Anti-Satellite Test*, COUNCIL ON FOREIGN RELS. (Feb. 22, 2007), https://www.cfr.org/backgrounder/chinas-anti-satellite-test [https://perma.cc/7Y6S-W2NE]; Brian Weeden, *Through a Glass, Darkly: Chinese, American, and Russian Anti-Satellite Testing in Space*, SPACE REV. (Mar. 17, 2014), https://www.thespacereview.com/article/2473/1[https://perma.cc/3MK7-LEFL]; Michael C. Mineiro, FY-1C *and* USA-193 *ASAT Intercepts: An Assessment of Legal Obligations under Article IX of the Outer Space Treaty*, 34 J. SPACE L. 321, 321–22 (2008); BRIAN WEEDEN, SECURE WORLD FOUND., ANTI-SATELLITE TESTS IN SPACE— THE CASE OF CHINA (2013), https://swfound.org/media/115643/china_asat_testing_fact_sheet_aug_2013.pdf [https://perma.cc/L3JU-XTWC]; BRIAN WEEDEN, SECURE WORLD FOUND., 2007 CHINESE ANTI-SATELLITE TEST FACT SHEET 1 (2010), https://swfound.org/media/9550/chinese_asat_fact_sheet_updated_2012.pdf [https://perma.cc/J3D5-FX3S].

[109] SECURE WORLD FOUND., GLOBAL COUNTERSPACE CAPABILITIES: AN OPEN SOURCE ASSESSMENT 5-1 to 5-4 (Brian Weeden & Victoria Samson eds., 2020), https://weaponsandwarfare.files.wordpress.com/2020/04/swf_global_counterspace_april2020.pdf [https://perma.cc/5JJF-V97S] [hereinafter GLOBAL COUNTERSPACE CAPABILITIES] (explaining India's military space activities and its 2019 test of an ASAT interceptor); TODD HARRISON, KAITLYN JOHNSON, THOMAS G. ROBERTS, TYLER WAY & MAKENA YOUNG, CTR. FOR STRATEGIC & INT'L STUD., SPACE THREAT ASSESSMENT 2020, at 41–46

The United States has loudly sounded the alarm about increasing Chinese and Russian military space endeavors, some of which are ostentatiously directed at enhancing their ASAT prowess, while other aspects seem more ambiguous or pointedly mysterious.[110] For their part, China and Russia have reciprocally pointed to the U.S. predominance in national security space programs, and leading U.S. authorities have been alternately coy in describing current capacities and stalwart in asserting that the overall goal is to "dominate" space.[111]

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(2020), https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/200330_SpaceThreatAssessment20_WEB_FINAL1.pdf?6sNra8FsZ1LbdVj3xY867tUVu0RNHw9V [https://perma.cc/T93T-GGXZ] (describing India's ASAT programs and its 2019 test).

[110] GLOBAL COUNTERSPACE CAPABILITIES, *supra* note 109, at 1-1 (describing China's several distinct types of ASAT systems, noting that "China appears to be highly motivated to develop counterspace capabilities"); *id.* at 2-1 (assessing that Russia has embarked on a set of programs over the last decade to regain some of its Cold War-era counterspace capability); HARRISON ET AL., *supra* note 109, at 8–18 (describing China's military space programs and doctrine, noting a shift toward non-kinetic ASATs); *id.* at 19–28 (describing Russia's ASAT activities); *id.* at 29−53 (examining the space control activities of Iran, North Korea, and others); U.S. DEF. INTEL. AGENCY, CHALLENGES TO SECURITY IN SPACE 13–29 (2019) [hereinafter CHALLENGES TO SECURITY IN SPACE] (discussing space weapon development in China and Russia); Martin, *supra* note 73 (discussing Chinese and Russian ASAT test activities); ZAK, *supra* note 76, at 28; Aaron Bateman, *As Russia Stalks US Satellites, a Space Arms Race May Be Heating Up*, BULL. ATOMIC SCIENTISTS (May 22, 2020), https://thebulletin.org/2020/05/as-russian-satellites-stalk-us-ones-is-a-space-arms-race-heating-up [https://perma.cc/C2R7-8SLG]; Jessica West, *Did Russia Test a Weapon in Space?*, 2020 Ploughshares Spotlight 20-1 (July 2020), https://ploughshares.ca/wp-content/uploads/2020/07/ASATRussiaJuly30.2020.pdf [https://perma.cc/2EGJ-7NK6] (describing ambiguous Russian space activities in July 2020 that may have constituted a novel ASAT test); Ford, *supra* note 78 (highlighting Russian and Chinese military activities in space); Nathan Strout, *Space Command Calls Out Another Russian Anti-satellite Weapon Test*, C4ISRNET (Dec. 16, 2020), https://www.c4isrnet.com/battlefield-tech/space/2020/12/16/space-command-calls-out-another-russian-anti-satellite-weapon-test [https://perma.cc/EQC3-JABL] (reporting a Russian ASAT test, and United States criticism of it, in December 2020); John W. Raymond, *How We're Building a 21st-Century Space Force*, ATLANTIC (Dec. 20, 2020), https://www.theatlantic.com/ideas/archive/2020/12/building-21st-century-space-force/617434 [https://perma.cc/J8JW-CHL8].

[111] *See* GLOBAL COUNTERSPACE CAPABILITIES, *supra* note 109, at 3-1 to 3-23 (describing several types of U.S. space control programs, noting that U.S. rhetoric increasingly refers to space as a warfighting domain, and prepares for a potential war in space); Anthony Capaccio, *U.S. Building Ground-Based Network of Offensive Weapons to Jam Russian Satellites – Report*, BLOOMBERG (Apr. 17, 2020), https://www.bloomberg.com/news/articles/2020-04-17/u-s-space-force-is-arming-to-jam-russian-and-chinese-satellites (describing U.S. Counter Communications System designed to jam adversaries' satellite communications); Theresa Hitchens, *U.S., Allies Agree on*

All three countries (and others, as well) have reformatted their military bureaucracies to emphasize the space mission; the 2019 creation of the United States Space Force underscores this new priority.[112] International

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*Threats in Space But Struggle with Messaging*, BREAKING DEF. (Sept. 11, 2020), https://breakingdefense.com/2020/09/us-allies-agree-on-threats-in-space-but-struggle-with-messaging/ [https://perma.cc/PQ66-ZFTD] (discussing change in U.S. rhetoric toward domination of space); STEER, *supra* note 76, at 32–33 (tracking the shift in U.S. space doctrine statements from an earlier emphasis on preventing and deterring aggression to the more recent objectives of exerting offensive space control and active defense strategies); Lee Hudson & Irene Klotz, *Pentagon Reveals Experiments Attached to X-37B Orbital Text Vehicle*, AVIATION WK. & SPACE TECH. (May 15, 2020), https://aviationweek.com/defense-space/space/pentagon-reveals-experiments-attached-x-37b-orbital-test-vehicle [https://perma.cc/A2EL-54CK] (describing the X-37B reusable spacecraft, which is capable of undertaking a wide variety of missions, including weapons functions); Joseph Trevithick, *Space Force Has a Unit Dedicated to Orbital Warfare That Now Operates the X-37B Spaceplane*, DRIVE (Oct. 30, 2020), https://www.thedrive.com/the-war-zone/37361/space-force-has-a-unit-dedicated-to-orbital-warfare-that-now-operates-the-x-37b-spaceplane [https://perma.cc/FVU6-XBCE]; Martin, *supra* note 73 (interviewing U.S. Air Force General Hyten, who generally describes U.S. ASAT programs, but comments about the X-37B only that "[i]t's really for cool things"); POLLPETER ET AL., *supra* note 76, at 57–62 (reporting Chinese perceptions of U.S. military space developments); Jeffrey Edmonds, *Russia and China Playing Musical Chairs in Zero Gravity*, WAR ON THE ROCKS (Aug. 14, 2020), https://warontherocks.com/2020/08/russia-and-china-playing-musical-chairs-in-zero-gravity [https://perma.cc/MF6W-AVS7] (discussing Russian and Chinese apprehensions about U.S. military space capabilities and objectives).

[112] *See* SPACEPOWER, *supra* note 75, *passim*; U.S. CHIEF OF SPACE OPERATIONS, CHIEF OF SPACE OPERATIONS' PLANNING GUIDANCE 3 (2020), https://media.defense.gov/2020/Nov/09/2002531998/-1/-1/0/CSO%20PLANNING%20GUIDANCE.PDF [https://perma.cc/9TA3-W7TT]; GLOBAL COUNTERSPACE CAPABILITIES, *supra* note 109, at 1–24 (describing recent significant reorganization of Chinese military space and counterspace forces); *id.* at 2-29 to 2-30 (describing Russian reorganization of space forces in 2015); HARRISON ET AL., *supra* note 109, at 10 (describing organization of China's military space programs); *id.* at 20 (Russia); CHALLENGES TO SECURITY IN SPACE, *supra* note 110, at 14–15, 24 (discussing reorganization of Chinese and Russian space programs); U.S. DEP'T OF DEF., MILITARY AND SECURITY DEVELOPMENTS INVOLVING THE PEOPLE'S REPUBLIC OF CHINA, ANNUAL REPORT TO CONGRESS 61–65 (2020), https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF [https://perma.cc/C7AK-JT2Z] [hereinafter PRC MILITARY DEVELOPMENTS] (describing organization of China's military space force); MARK STOKES, GABRIEL ALVARADO, EMILY WEINSTEIN & IAN EASTON, U.S.-CHINA ECON. & SEC. REV. COMM'N, CHINA'S SPACE AND COUNTERSPACE CAPABILITIES AND ACTIVITIES 6, 21–27 (Mar. 30, 2020), https://www.uscc.gov/sites/default/files/2020-05/China_Space_and_Counterspace_Activities.pdf [https://perma.cc/7NT2-DWZZ]; POLLPETER ET AL., *supra* note 76, at 75–76; Chelsea Gohd, *Everyone Wants a Space Force—But Why?*, SPACE.COM (Sept. 11, 2020), https://www.space.com/every-country-wants-space-force.html [https://perma.cc/5YY8-BJQM] (noting space force military units

dialogue has also come to feature an array of bombastic rhetoric labeling space as just another domain of military operations, which—like land, sea, and air—will "inevitably" provide a venue for arms races and eventually for armed conflict.[113]

It is clear that there is now a widespread perception of sharply rising threats in space, and multiple types of space control weapons could be brought to bear.[114] Kinetic ASAT systems could be designed to collide with a target spacecraft, or to explode in proximity to it, and these devices could be deployed in either a "direct ascent" mode (in which the attacker launches a missile to intercept the target within minutes) or as a "co-orbital" device (which may be placed into space months or years earlier, and orbit silently until it is directed to seek and suddenly attack its prey). Alternatively, directed energy systems, such as high-energy lasers, could be employed to

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in France, Canada, Japan, Russia, and China); Hitchens, *supra* note 111; Raymond, *supra* note 110.

[113] *See* GLOBAL COUNTERSPACE CAPABILITIES, *supra* note 109, at 1-23 (citing Chinese military writings about the importance of achieving space superiority); HARRISON ET AL., *supra* note 109, at 10 (quoting Chinese white paper about outer space becoming "new commanding heights" for strategic competition); *id.* at 22 (quoting Russian rhetoric about building a capability to "intercept absolutely everything that flies from space"); CHALLENGES TO SECURITY IN SPACE, *supra* note 110, at 14 (paraphrasing Chinese writings about using space weapons to "blind and deafen the enemy"); *id.* at 23–24 (citing Russian military literature viewing space as a warfighting domain, where supremacy will be decisive in future wars); STOKES ET AL., *supra* note 112, at 9–13; POLLPETER ET AL., *supra* note 76, at 56–57; Aaron Bateman, *America Needs a Coalition to Win a Space War*, WAR ON THE ROCKS (Apr. 29, 2020), https://warontherocks.com/2020/04/america-needs-a-coalition-to-win-a-space-war [https://perma.cc/ZJ26-ZULH] (noting that NATO and the United Kingdom have declared space to be an operational or warfighting domain); UNAL, *supra* note 75, at 8–9 (describing increasing use of satellite assets for military purposes by NATO and its member states); U.S. DEP'T OF DEF., DEFENSE SPACE STRATEGY FACT SHEET 1 (2020), https://media.defense.gov/2020/Jun/17/2002317392/-1/-1/1/2020_DEFENSE_SPACE_STRATEGY_FACTSHEET.PDF [https://perma.cc/2C4D-N3HA] (asserting that "space is now a contested, warfighting domain" and that the Department's goal is "to ensure U.S. space superiority"); Paulauskas, *supra* note 94 (discussing NATO's space policy, recognizing space as an operational domain); Leonard David, *Is War in Space Inevitable?*, SPACE.COM, (May 11, 2021), https://www.space.com/is-space-war-inevitable-anti-satellite-technoloy [https://perma.cc/CK2M-K498] (surveying diverse space experts about the likelihood of armed conflict in space).

[114] *See* COLBY, *supra* note 75, at 7–8 (stressing vulnerability of vital U.S. satellites); NYE ET AL., *supra* note 101, at 5–6 (surveying the "growing threat environment in space"); Martin, *supra* note 75 (describing Chinese 2007 ASAT test as a "wakeup call" for the U.S. military); STOKES ET AL., *supra* note 112, at 101–03 (recommending vigorous congressional response to recent Chinese counterspace activities); POLLPETER ET AL., *supra* note 76, *passim*.

burn a hole in a sensitive spot on an enemy satellite or to "dazzle" its sensors, inflicting either permanent, catastrophic damage or selective, temporary denial of service. Electronic jamming could disrupt the vital signals to and from a satellite, and cyber methods could scramble a satellite's onboard computers or even commandeer it, bending it to the attacker's service. The most powerful and deft ASAT tools are probably the exclusive province of the major space nations, but primitive or limited ASAT capabilities are also now proliferating to multiple other countries and even to non-state actors.[115]

3. Integrating Governmental and Private Space Sectors

The public and private sectors have long enjoyed a symbiotic partnership in space activities, but the nature of that relationship is continuously evolving. The most pronounced contemporary trend is an emphatic U.S. governmental commitment to "outsourcing"—to rely more on the private sector for the performance of space military and IC functions, and to integrate more fully the diverse and growing private sector satellite capacities into governmental planning and budgeting.[116] In functional terms,

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[115] GLOBAL COUNTERSPACE CAPABILITIES, *supra* note 109, *passim* (describing the various kinetic, directed energy, and electronic ASAT capabilities of China, Russia, the United States, and others); HARRISON ET AL., *supra* note 109, at 2–7 (surveying distinct types of ASAT weapons); CHALLENGES TO SECURITY IN SPACE, *supra* note 110, at 9–11 (describing counterspace concepts); Cybersecurity Principles for Space Systems, 85 Fed. Reg. 56155 (Sept. 10, 2020), https://trumpwhitehouse.archives.gov/presidential-actions/memorandum-space-policy-directive-5-cybersecurity-principles-space-systems [https://perma.cc/YD2B-UDDR] (emphasizing the vulnerability of space systems to malicious cyber activity); Niall Firth, *How to War in Space (and Get Away with It)*, MIT TECH. REV (June 26, 2019), https://www.technologyreview.com/2019/06/26/725/satellite-space-wars [https://perma.cc/6BJE-QCG7]**;** STOKES ET AL., *supra* note 112, at 39–43; Darrell Etherington, *In-Space Satellite Servicing Proves Successful in Record-Breaking Orbital Spacecraft Operation*, TECHCRUNCH (Apr. 17, 2020), https://techcrunch.com/2020/04/17/in-space-satellite-servicing-proves-successful-in-record-breaking-orbital-spacecraft-operation/?guccounter=1 [https://perma.cc/HW3C-YJLG] (describing successful commercial servicing of an orbiting satellite to give it extended functionality, but also noting that this capability could be used for hostile purposes).

[116] Doug Loverro, *If Commercial Space is Ready to Set Sail, Why Are We Still Missing the Boat?*, BREAKING DEF. (Aug. 25, 2021), https://breakingdefense.com/2021/08/if-commercial-space-is-ready-to-set-sail-why-are-we-still-missing-the-boat [https://perma.cc/Q3ND-3HWE] (suggesting the creation of a space version of the existing Civil Reserve Air Fleet, to make space assets available for military-related functions on an emergency basis; differentiating between combat, combat support, and combat service support operations, and suggesting that many civilian space assets could be available for the last category). Julian E. Barnes, *Intelligence Agencies Pushed to Use More Commercial*

the three crucial fields of remote sensing, communications, and launch services, in particular, are seen as potentially fruitful areas for further enhanced collaboration in this hybrid public-private structure.[117]

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*Satellites*, N.Y. TIMES (September 27, 2021), https://www.nytimes.com/2021/09/27/us/politics/intelligence-agencies-commercial-satellites.html [https://perma.cc/JYX4-WGTT].

[117] Robert Work, Deputy Sec'y, U.S. Dep't of Def., Remarks at the Space Symposium (Apr. 12, 2016), https://www.defense.gov/Newsroom/Speeches/Speech/Article/723498/remarks-at-the-space-symposium [https://perma.cc/96A9-UX6J] ("DoD already depends on commercial satellite communications to meet our worldwide needs with companies such as Intelsat and Viasat among others. In the future we will depend on remote sensing where operators like Skybox and Planet Labs, which are adding to the already substantial capabilities of Digital Globe, flying dozens of satellites with plans to add hundreds, even thousands more. We're also on the verge of a revolution in space flight driven by a new generation of private rocket builders."); Morgan, *supra* note 94, at 240, 270–76; Hitchens, *supra* note 111; Lee & Steele, *supra* note 75, at 80 (noting that 80% of U.S. government satellite communications, including traffic for the military, is carried over commercial systems); NYE ET AL., *supra* note 101, *passim* (calling for even greater reliance upon the private sector for the performance of national security space functions); Theresa Hitchens & Colin Clark, *Commercial Satellites: Will They Be Military Targets?*, BREAKING DEF. (July 16, 2019). https://breakingdefense.com/2019/07/commercial-satellites-will-they-be-military-targets [https://perma.cc/23ML-QTJ7] (reporting that the U.S. Air Force Chief of Staff commented that the military would probably rely upon commercial satellites even for communications related to orders for the use of nuclear weapons); *Today's Brief*, SN MILITARY.SPACE (SpaceNews.com, Alexandria, Va.), Jan. 26, 2021, https://mailchi.mp/spacenews/sn-military-space-starfleet-amendment-sparks-op-ed-feud-ula-investigates-delta-4-heavy-abort-sda-picks-satellite-providers-175426?e=b1aafee5f6 [https://perma.cc/LZ4K-ACVF] (quoting Gen. John Hyten, Vice Chairman of the Joint Chiefs of Staff, saying that DoD's partnership with the launch industry has been a huge success, and that it should be replicated in other sectors of the space industry like satellite manufacturing, remote sensing and space situational awareness. "We should be partnered with everybody that's operating in space. If somebody wants to partner with us we should figure out how to come up with the resources and partner with them."); C. Todd Lopez, *Aboard Commercial Rocket, Space Defense Agency Send Up Satellites for First Time*, DOD NEWS (June 23, 2021), https://www.defense.gov/News/News-Stories/Article/Article/2668483/aboard-commercial-rocket-space-defense-agency-sends-up-satellites-for-first-time [https://perma.cc/CRR7-JJEP] (reporting Space Development Agency's first use of a commercial launcher); Theresa Hitchens, *As BlackSky Tees Up Hourly Imagery, NRO Extends Contract*, BREAKING DEF. (Aug. 18, 2021), https://breakingdefense.com/2021/08/as-blacksky-tees-up-hourly-imagery-nro-extends-contract [https://perma.cc/VNS2-V3SX] [hereinafter Hitchens, *BlackSky*] (noting that National Reconnaissance Office is expanding its purchase of commercial space imagery); Theresa Hitchens, *Space Force Expands Commercial Launch Services Pool*, BREAKING DEF. (Aug. 13, 2021), https://breakingdefense.com/2021/08/space-force-expands-commercial-launch-services-pool [https://perma.cc/B925-46VC] [hereinafter Hitchens, *Commercial Launch Services Pool*] (reporting that eleven commercial launch services providers will be competing for twenty Space Force launches, worth up to $986 million);

A variety of contractual relationships can be created to enable the government to acquire this type of commercial support. For example, the military could purchase the imagery obtained by a private reconnaissance satellite; it could lease all or part of a particular satellite's communications services for a specified duration (or procure the option to command those services if needed); and it could hire a private launch company for use of its boosters and ground stations. In addition, the phenomenon of ride-sharing via "hosted payloads" has become much more common—a situation (discussed more fully *infra*[118]) in which a single commercial rocket may boost multiple, diverse types of satellites into orbit, or in which a single satellite "bus" may contain and continuously support a variety of quite distinct modules. For example, a satellite that is nominally commercial in character may also house a component that fulfills a military function, or vice-versa. These collaborative efforts can offer substantial advantages in cost, coverage, and timeliness.[119]

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Theresa Hitchens, *New Space Systems Command Gears Up Commercial Engagement*, BREAKING DEF. (Aug. 19, 2021), https://breakingdefense.com/2021/08/new-space-systems-command-gears-up-commercial-engagement [https://perma.cc/N3GN-ZDZZ] [hereinafter Hitchens, *New Space Systems Command*] (reporting military interest in a variety of commercial space technologies).

[118] *See infra* text accompanying note 119 (describing hosted payloads).

[119] Stanniland & Curtin, *supra* note 92, at 276 (noting that hosting of payloads is not a new concept—it has been used by the U.S. government for decades—but that its popularity is now increasing rapidly); *id.* at 285–90 (describing advantages of hosted payloads and increasing use of the strategy by several countries); Nathan Strout, *NGA Adds Small Satellite Imagery to its Unclassified Collection*, C4ISRNET (Nov. 5, 2020), https://www.c4isrnet.com/intel-geoint/2020/11/05/nga-adds-small-sat-imagery-to-its-unclassified-collection [https://perma.cc/XE57-9EDQ] (reporting that the National Geospatial Intelligence Agency (NGA) has purchased "thousands of new images and terabits of additional geospatial data" from several commercial satellite operators); U.S. GOV'T ACCOUNTABILITY OFF., GAO-18-493, DOD'S USE OF COMMERCIAL SATELLITES TO HOST DEFENSE PAYLOADS WOULD BENEFIT FROM CENTRALIZING DATA, REPORT TO THE HOUSE ARMED SERVICES COMMITTEE, at 3–4 (2018), https://www.gao.gov/assets/gao-18-493.pdf [https://perma.cc/2634-NH59] [hereinafter GAO HOSTED PAYLOADS] (defining commercially hosted military payloads, and explaining their potential benefits); *id.* at 9–14 (noting that by 2018, the U.S. Department of Defense had placed military satellites as hosted payloads on civilian satellites three times, and has planned three more such applications); Peter A. Cunningham, *Military Payloads Hosted on Commercial Satellites: How Can the Space and Missile Systems Increase the Number of Commercially Hosted Military Payload Contract Awards?* 53 WRIGHT FLYER PAPER 1, 9 (2015) (citing examples of commercially hosted payloads); *id.* at 1 (citing and critiquing reports that use of hosted payloads resulted in saving $400 million and three to ten years of development time); Jason Sherman, *Complete Space-based Kill Assessment Constellation Set to Be in Place, Online Next Month*, INSIDE DEF. (Feb. 22, 2019), https://insidedefense.com/inside-navy/complete-

At an even more fine-grained level of detail, in many instances a single satellite program can be adapted for dual (or multiple) purposes. An individual Earth reconnaissance sensor, for example, can provide data to a wide variety of military, civil, and commercial users; a communications satellite can house multiple transponders that can simultaneously or intermittently support several streams of diverse data links.[120]

Recent official U.S. government space policy assertions have not only acknowledged and welcomed this heightened entanglement of private and public space functions, they have also promoted and directed it, including for performance of the most important national security duties.[121]

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ska-constellation-set-be-place-online-next-month [https://perma.cc/93XT-6Q3N] (reporting Missile Defense Agency plans to use a commercial host for twenty-two payloads related to missile intercepts); *DARPA Signs SSL to Phoenix Program . . . Servicing PODS in Space*, SAT. NEWS DAILY (Nov. 4, 2013), http://www.satnews.com/story.php?number=1234218280 [https://perma.cc/D6QN-85UB] (describing commercially hosted defense satellite program); Mike Gruss, *Industry Officials Call for Dedicated U.S. Air Force Funding for Hosted Payloads*, SPACE NEWS (Oct. 14, 2013), https://spacenews.com/37704industry-officials-call-for-dedicated-us-air-force-funding-for-hosted/ [https://perma.cc/X8L2-P82P]; Debra Werner, *What Happened to the Promise of Hosted Payloads? It's Complicated*, SPACE NEWS (Aug. 8, 2019), https://spacenews.com/what-happened-to-the-promise-of-hosted-payloads-its-complicated [https://perma.cc/H5K5-ZDZR]; BONNIE L. TRIEZENBERG, COLBY P. STEINER, GRANT JOHNSON, JONATHAN CHAM, EDER SOUSA, MOON KIM & MARY KATE ADGIE, RAND CORP., ASSESSING THE IMPACT OF U.S. AIR FORCE NATIONAL SECURITY SPACE LAUNCH ACQUISITION DECISIONS 45–46, 55 (2020) (emphasizing that national security satellites are often heavier than commercial satellites, and so require more powerful launchers, which may be in short supply); KOSIAK, *supra* note 101, at 20 (noting reports that use of hosted payloads has saved the Department of Defense several hundred million dollars).

[120] VARSHA AGRAWAL & ANIL K. MAINI, SATELLITE TECHNOLOGY: PRINCIPLES AND APPLICATIONS 235–36 (2019) (explaining that a satellite's transponder can provide communications services to multiple geographically dispersed users simultaneously); Chris Woodford, *Satellites*, EXPLAINTHATSTUFF! (Dec. 16, 2020), https://www.explainthatstuff.com/satellites.html [https://perma.cc/W4MK-EX4E] (describing how transponders on a single satellite can serve multiple senders and receivers of communications); Waldrop, *supra* note 78, at 174–75. Some have argued that "[a]ll space technologies are inherently dual-use." G. Ryan Faith, *The Future of Space: Trouble on the Final Frontier*, WORLD AFFS., Sept./Oct. 2012, at 84; *see also* Paulauskas, *supra* note 94 ("Most satellites serve multiple civilian, commercial or security functions."). Moreover, in many applications, it may be possible for a spacecraft, or a component, to switch between military and civilian applications instantly and invisibly. Michael N. Schmitt, *International Law and Military Operations in Space*, 10 MAX PLANCK Y.B. U.N. L. 89, 117 (2006).

[121] The space policy documents of previous U.S. administrations had also emphasized *inter alia*, the role of the private sector in space activities, as well as the opportunities for

For example, the George W. Bush administration's April 25, 2003 U.S. Commercial Remote Sensing Policy declared a national commitment to "[r]ely to the maximum practical extent on U.S. commercial remote sensing space capabilities for filling imagery and geospatial needs for military, intelligence, foreign policy, homeland security, and civil users."[122] Even further, that policy reversed the traditional concept of using commercial capabilities only as gap-fillers, to supplement governmental national security assets; instead, it asserted the opposite priority, deciding to "[f]ocus United States Government remote sensing space systems on meeting needs that can not be effectively, affordably, and reliably satisfied by commercial providers because of economic factors, civil mission needs, national security concerns, or foreign policy concerns."[123] Likewise, General Jay

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collaboration with foreign actors, but those earlier statements did not as explicitly address the possibilities for enhancing those actors' direct participation in U.S. national security operations. *See, e.g.*, EXEC. OFF. OF THE PRESIDENT, NATIONAL SPACE POLICY, NSDD-42 (July 4, 1982), https://www.hq.nasa.gov/office/pao/History/nsdd-42.html [https://perma.cc/LK4G-WHYW]; NATIONAL SCI. AND TECH. COUNCIL, EXEC. OFF. OF THE PRESIDENT, NATIONAL SPACE POLICY, PDD/NSTC-8 (Sept. 19, 1996), https://fas.org/spp/military/docops/national/nstc-8.htm [https://perma.cc/G32V-J88E; Waldrop, *supra* note 78, at 163–64 (noting the U.S. government's pursuit, since 1982, of expanding private sector involvement in civil space activities).

[122] EXEC. OFF. OF THE PRESIDENT, U.S. COMMERCIAL REMOTE SENSING POLICY, NSPD-27 § II (Apr. 25, 2003), https://fas.org/irp/offdocs/nspd/remsens.html [https://perma.cc/F494-DE9B] [hereinafter BUSH REMOTE SENSING POLICY]. The policy statement further directs the Secretary of Defense and the Director of the CIA, in consultation with private industry, to "[c]ompetitively outsource functions to enable the United States Government to rely to the maximum practical extent on commercial remote sensing space capabilities for filling imagery and geospatial needs." *Id.* § V. Three years later, on August 31, 2006, the Bush administration restated that undertaking in its National Space Policy. EXEC. OFF. OF THE PRESIDENT, NATIONAL SPACE POLICY § 2 (Aug. 31, 2006), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/national-space-policy-2006.pdf [https://perma.cc/B3VN-RW4C] [hereinafter BUSH NATIONAL SPACE POLICY] ("The United States is committed to encouraging and facilitating a growing and entrepreneurial U.S. commercial space sector. Toward that end, the United States Government will use U.S. commercial space capabilities to the maximum practical extent, consistent with national security."); *id.* § 7 (announcing that the government will "[d]evelop systems when it is in the national interest and there is no suitable, cost effective U.S. commercial or, as appropriate, foreign commercial service or system that is or will be available when required" and will "[r]efrain from conducting activities that preclude, deter, or compete with U.S. commercial space activities, unless required by national security or public safety").

[123] BUSH REMOTE SENSING POLICY, *supra* note 122, § II; *id.* § III ("A robust U.S. commercial remote sensing space industry can augment and potentially replace some United States Government capabilities and can contribute to U.S. military, intelligence, foreign policy, homeland security, and civil objectives, as well as U.S. economic competitiveness.").

Raymond, the first Chief of Space Operations, committed in December 2020 to expanding the use of commercial satellites, saying, "What *used to be* commercially viable now is just a subset of what *can be* commercially viable, and there's a huge opportunity going forward."[124]

At the same time, the United States has also been seeking a different type of diversity in the sources it relies upon for space services, by turning to collaboration with *foreign* providers, both public and private.[125] For

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[124] Theresa Hitchens, *Space Force Will Boost Reliance on Commercial Sats: Gen. Raymond*, BREAKING DEF., (Dec. 2, 2020), https://breakingdefense.com/2020/12/space-force-will-boost-reliance-on-commercial-sats-gen-raymond [https://perma.cc/MG3W-CZVZ] [hereinafter Hitchens, *Space Force Commercial Reliance*].

[125] Alfred Oehlers, *Partnerships and Soft Power in Space*, 21 SEC. NEXUS PERSPS. 1 (2020), https://apcss.org/wp-content/uploads/2020/10/N2539-Oehlers-Partnerships-and-Soft-Power-in-Space.pdf [https://perma.cc/PXY3-VEQZ] (describing U.S. Space Force plans to seek partnerships with additional countries regarding military space activities); Michael R. Gordon, *A Nation Challenged: Public Information; Pentagon Corners Output of Special Afghan Images*, N.Y. TIMES (Oct. 19, 2001), https://www.nytimes.com/2001/10/19/world/nation-challenged-public-information-pentagon-corners-output-special-afghan.html [https://perma.cc/K9ET-95HM] (reporting U.S. military's preemptive purchase of the entire output of Space Imaging Inc.'s Ikonos photoreconnaissance imagery of Afghanistan during the start of the fighting there); Mike Gruss, *Pentagon's Lease of Chinese Bandwidth Arouses Concern*, SPACE NEWS (Apr. 29, 2013), https://spacenews.com/35158pentagons-lease-of-chinese-bandwidth-arouses-concern [https://perma.cc/TPT3-MRQX] (reporting that the U.S. military had leased communications services from a Chinese satellite because it was the only provider available for coverage of Africa); Noah Shachtman, *Pentagon Paying China—Yes, China—To Carry Data*, BROOKINGS (Apr. 29, 2013), https://www.brookings.edu/opinions/pentagon-paying-china-yes-china-to-carry-data [https://perma.cc/4JSA-4D2E]; Waldrop, supra note 78, at 166–67 (reporting that during the first Gulf War, both Iraqi and Coalition military forces relied upon the same Arabsat satellite for communications); Loren Thompson, *Airbus Wants to Sell Space Services to U.S. Spy Agencies. That Raises Some Questions*, FORBES (Nov. 9, 2020), https://www.forbes.com/sites/lorenthompson/2020/11/09/airbus-wants-to-sell-space-services-to-us-spy-agencies-that-raises-some-questions/?sh=6e76e9324f9e [https://perma.cc/UD4F-ZDQW] (noting foreign firms contracting with U.S. intelligence agencies to provide satellite imagery and geospatial intelligence); Liu Zhen, *American Spy Plane Pilots Use China's Satellite Navigation System BeiDou as Backup to GPS, US General Says*, S. CHINA MORNING POST (Mar. 8, 2020), https://www.scmp.com/news/china/military/article/3074154/american-spy-plane-pilots-use-chinas-satellite-navigation [https://perma.cc/J2SL-MWEK] (reporting that pilots of U-2 reconnaissance aircraft are equipped to use Chinese, Russian, and European global positioning satellite systems as backups, in case the U.S. GPS system is unavailable); Josef Aschbacher, *Commercialisation of the Space Sector: What Can ESA Do in Europe?*, PARABOLIC ARC (Sept. 9, 2021), http://www.parabolicarc.com/2021/09/09/commercialisation-of-the-space-sector-what-can-esa-do-in-europe [https://perma.cc/GS8E-KR57].

example, the Bush administration's 2006 National Space Policy directed that "The United States Government will pursue, as appropriate, and consistent with U.S. national security interests, international cooperation with foreign nations and/or consortia on space activities that are of mutual benefit and that further the peaceful exploration and use of space, as well as to advance national security, homeland security, and foreign policy objectives."[126] Areas identified for potential international cooperation included "providing space surveillance information consistent with security requirements and U.S. national security and foreign policy interests."[127] Today, the U.S. government is committed to further expansion of the possibilities for space collaboration with non-traditional foreign partner states, including Norway, Singapore, Indonesia, and Brazil.[128]

Space policy pronouncements from the Obama administration reflected similar predilections. In order to "promote a robust domestic commercial space industry," the revised 2010 National Space Policy committed the federal government to:

> - Purchase and use commercial space capabilities and services to the maximum practical extent when such capabilities and services are available in the marketplace and meet United States Government requirements;
> - Actively explore the use of inventive, nontraditional arrangements for acquiring commercial space goods and services to meet United States Government requirements, including measures such as public-private partnerships, hosting government capabilities on commercial spacecraft, and purchasing scientific or operational data

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[126] BUSH NATIONAL SPACE POLICY, *supra* note 122, § 8.

[127] *Id.*

[128] WILSON ET AL., *supra* note 76, at 1 (reporting agreement to host U.S. communications payloads on Norwegian satellites); Hitchens, *Space Force Commercial Reliance*, *supra* note 124; Theresa Hitchens, *New International Partnerships Could Spur Hosted Payloads: Gen Thompson*, BREAKING DEF. (Nov. 23, 2020), https://breakingdefense.com/2020/11/new-international-partnerships-could-spur-hosted-payloads-gen-thompson [https://perma.cc/L5AJ-W6N8] (discussing expedited efforts to expand space cooperation with non-traditional partner countries); Theresa Hitchens, *NRO Erects Buy American Barriers Against Allied Satellite Data*, BREAKING DEF. (July 19, 2021), https://breakingdefense.com/2021/07/exclusive-nro-erects-buy-american-barriers-against-allied-satellite-data [https://perma.cc/77HF-RDT4] (reporting that the National Reconnaissance Office, unlike other military and IC entities, intends to restrict its purchase of commercial remote sensing vendors to U.S. firms, while other U.S. agencies continue to deal with foreign suppliers).

> products from commercial satellite operators in support of government missions;
> - Develop governmental space systems only when it is in the national interest and there is no suitable, cost-effective U.S. commercial or, as appropriate, foreign commercial service or system that is or will be available;
> - Refrain from conducting United States Government space activities that preclude, discourage, or compete with U.S. commercial space activities, unless required by national security or public safety[.][129]

Obama's January 2011 National Security Space Strategy was even more explicit about the advantages that would accrue from a more intimate partnership between the U.S. national security space enterprise and potential commercial and foreign collaborators, in complicating the task of any adversary that might seek to degrade space capabilities during armed conflict:

> The evolving strategic environment allows for additional opportunities to partner with responsible nations, international organizations, and commercial firms. DoD and the IC will continue to partner with others to augment the U.S. national security space posture across many mission areas….By sharing or exchanging capabilities, data, services, personnel, operations, and technology, we can ensure access to information and services from a more diverse set of systems – an advantage in a contested space environment. We will promote appropriate cost-sharing and risk-sharing partnerships to develop and share capabilities.[130]

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[129] OBAMA SPACE POLICY, *supra* note 74, at 10.

[130] U.S. DEP'T OF DEF., NATIONAL SECURITY SPACE STRATEGY: UNCLASSIFIED SUMMARY 9 (2011), https://www.dni.gov/files/documents/Newsroom/Reports%20and%20Pubs/2011_nationalsecurityspacestrategy.pdf [https://perma.cc/BR4X-RUCV]. This document also declared: "We will seek to expand mutually beneficial agreements with key partners to utilize existing and planned capabilities that can augment U.S. national security space capabilities. We will pursue increased interoperability, compatibility, and integration of partner nations into appropriate DoD and IC networks to support information sharing and collective endeavors, taking affordability and mutual benefit into account. . . . Strategic partnerships with commercial firms will continue to enable access to a more diverse, robust, and distributed set of space systems. . . . Strategic partnerships with commercial firms will be pursued in areas that both stabilize costs and improve the resilience of space architectures upon which we rely. . . . We will develop space systems only when there is no suitable,

The Obama National Security Space Strategy addressed a variety of approaches for enhancing the resilience of the U.S. space system architecture, including "drawing on distributed international and commercial partner capabilities" in "the most feasible, mission-effective, and fiscally sound"[131] ways, stressing:

> We will seek to deny adversaries meaningful benefits of attack by improving cost effective protection and strengthening the resilience of our architectures. Partnerships with other nations, commercial firms, and international organizations, as well as alternative U.S. Government approaches such as cross-domain solutions, hosted payloads, responsive options, and other innovative solutions, can deliver capability, should our space systems be attacked. This also will enable our ability to operate in a degraded space environment.[132]

That document also highlighted the special role of international collaborations, asserting that "we will seek to establish relationships and agreements whereby we can access partner capabilities if U.S. systems are degraded or unavailable. We will be prepared to use these capabilities to ensure the timely continuity of services in a degraded space environment."[133]

The Trump administration's space policy pronouncements were fully consistent with its predecessors on these points.[134] For example, the

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cost-effective commercial alternative or when national security needs dictate." *Id.*

[131] *Id.* at 11.

[132] *Id.* at 10.

[133] *Id.* at 11. However, at the same time, U.S. policy generally insisted that U.S. government satellites should be launched on space vehicles manufactured in the United States, unless an exception applies. *See* EXEC. OFF. OF THE PRESIDENT, NATIONAL SPACE TRANSPORTATION POLICY 8 (Nov. 21, 2013), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/national_space_transportation_policy_11212013.pdf [https://perma.cc/57TK-YHF2].

[134] *See* EXEC. OFF. OF THE PRESIDENT, NATIONAL SPACE POLICY OF THE UNITED STATES OF AMERICA 8 (Dec. 9, 2020), https://trumpwhitehouse.archives.gov/wp-content/uploads/2020/12/National-Space-Policy.pdf [https://perma.cc/9ZK5-S22S] [hereinafter TRUMP SPACE POLICY]; Memorandum on the National Space Policy, 85 Fed. Reg. 81,755 (Dec. 9, 2020), https://www.govinfo.gov/content/pkg/FR-2020-12-16/pdf/2020-27892.pdf [https://perma.cc/WD6W-PJZ3]; Press Release, Office of the Press Sec'y, Fact Sheet: President Donald J. Trump is Unveiling an America First National

December 9, 2020 National Space Policy emphasized the need to "strengthen existing partnerships and pursue new partnerships" with the U.S. commercial space sector.[135] It also explicitly approved, as an exception to the general rule that U.S. government payloads shall be carried into space only by launch vehicles manufactured in the United States, the use of "[h]osted payload arrangements on spacecraft not owned by the United States government."[136] More generally, the Trump policy directed the heads of all federal agencies to

> [p]urchase and use United States commercial space capabilities and services, to the maximum practical extent . . . [p]rioritize partnerships with commercial industry to meet Government requirements . . . [c]onsider inventive, nontraditional arrangements for acquiring commercial space goods and services to meet United States Government requirements, including measures such as hosting Government capabilities on commercial spacecraft . . . [and] [d]evelop Government space systems only when in the national interest and no suitable or cost-effective United States commercial or, as appropriate, international commercial capability or service is available.[137]

Other senior voices within the Trump executive branch offered near-identical perspectives. The Joint Chiefs of Staff April 10, 2018 publication on Space Operations, for example, observed that, "The joint force is becoming increasingly dependent on the use of commercial space systems to provide communications; tagging, tracking, and locating; and other support . . . Although there may be additional risks associated with using commercial services, these should be balanced against the potential benefits, including support to coalition partners and the effectiveness of maintaining a surge capacity without procuring larger and more expensive DOD satellite constellations."[138] Even nuclear command and control

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Space Strategy (Mar. 23, 2018), https://aerospace.csis.org/wp-content/uploads/2018/09/Trump-National-Space-Strategy.pdf [https://perma.cc/GC6K-GX5H] (highlighting program to make "America First Among the Stars"); Space Policy Directive-2: Streamlining Regulations on Commercial Use of Space, 83 Fed. Reg. 24,901 (May 30, 2018), https://www.govinfo.gov/content/pkg/FR-2018-05-30/pdf/2018-11769.pdf [https://perma.cc/3SJU-W7Y9] (reducing regulations on private sector space activities).

[135] TRUMP SPACE POLICY, *supra* note 134, at 12.

[136] *Id.* at 8.

[137] *Id.* at 20.

[138] U.S. JOINT CHIEFS OF STAFF, *supra* note 75, at I-6.

messages, the most important national security functions imaginable, may be carried on future commercial networks.[139]

Regarding exploitation of other states' space assets, the Chiefs assessed, "Leveraging capabilities of allies and partners provides greater strength, resiliency, and flexibility to space operations and complicates our adversary's decision making."[140] The report added, "Partnerships can enhance collective security capabilities and provide a deterrent effect against adversaries from attacking or interfering with friendly space capabilities. Space capabilities derived from a mix of DOD, commercial, and multinational platforms enhance the resilience of our overall national space enterprise and increase the ability of joint forces to operate effectively through a denied, degraded, or disrupted space OE [operational environment]."[141]

To date, the Biden Administration has not yet articulated its space policy regarding these matters.[142]

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[139] Nathan Strout, *Can Commercial Satellites Revolutionize Nuclear Command and Control*, C4ISRNET (July 12, 2019), https://www.c4isrnet.com/battlefield-tech/c2-comms/2019/07/12/can-commercial-satellites-revolutionize-nuclear-command-and-control/ [https://perma.cc/4HKE-XNE4] (quoting Air Force Chief of Staff David Goldfein as stating that utilization of commercial carriers for conventional military communications "has equal applications to the nuclear command and control side").

[140] U.S. JOINT CHIEFS OF STAFF, *supra* note 75, at I-6; *see also* C. Todd Lopez, *Air Force Space Command Works to Counter Adversary Exploits*, DOD NEWS (Dec. 4, 2019), https://www.defense.gov/Explore/News/Article/Article/2031544/air-force-space-command-works-to-counter-adversary-exploits [https://perma.cc/NDG4-FRLD] (quoting Air Force Lt. Gen. David D. Thompson regarding the value of assembling "a coalition that brings the capabilities that they need and we need to various scenarios and presents complicated situations to any potential adversary" and explaining that those partnerships are not confined to foreign militaries, but include civil agencies like NASA and commercial industry); John J. Klein, *The Influence of Commercial Space Capabilities on Deterrence*, CTR. FOR NEW AM. SEC. (Mar. 25, 2019), https://www.cnas.org/publications/reports/the-influence-of-commercial-space-capabilities-on-deterrence [https://perma.cc/629Z-2H3B] (explaining that "[c]ommercial [s]pace [e]nables [d]eterrence," because the U.S. government's use of distributed and diversified commercial satellites can deter an adversary's aggression).

[141] U.S. JOINT CHIEFS OF STAFF, *supra* note 75, at A-6. Most of the U.S. space collaborations involve engagement with traditional allies, such as the Five Eyes participants, Germany, and Japan. But the Space Force has also been seeking partnership opportunities with other states across the globe, including Argentina, Brazil, and India. *See* Theresa Hitchens, *Space Force Reaches Out to New Partners—Eye on China*, BREAKING DEF. (Jan. 13, 2021), https://breakingdefense.com/2021/01/space-force-reaches-out-to-new-partners-eye-on-china [https://perma.cc/2ULY-2Z4V].

[142] *See* EXEC. OFF. OF THE PRESIDENT, UNITED STATES SPACE PRIORITIES FRAMEWORK

### *C. Defining Intermingling*

In this connection, the analysis must next consider in more detail what might be labeled the "unit of account" question: What exactly counts as "separation" and "intermingling" regarding dual-use spacecraft? Several variations are possible, and they generate disparate legal characterizations and responses.[143]

The first scenario is the "hosted payload," where a civilian satellite "bus" transports and sustains a variety of payloads, including some with civilian and some with military or IC application. Here, the bus provides the essential shared support services, such as power, heat, thrust, and directionality, while each piggybacked payload performs its distinct function, such as remote sensing or communications, for its designated customers.[144] A bus that contains both civilian and military payloads thus has a permanently mixed character, but its ongoing contribution to military

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(December 2021), https://www.whitehouse.gov/wp-content/uploads/2021/12/United-States-Space-Priorities-Framework-_-December-1-2021.pdf [https://perma.cc/B9PG-LLG6]; Nathan Strout, *National Reconnaissance Office Opens Door for More Commercial Services*, C4ISRNET (October 7, 2021), https://www.c4isrnet.com/intel-geoint/2021/10/07/national-reconnaissance-office-opens-door-for-more-commercial-services/ [https://perma.cc/TUJ3-5692] (suggesting the Biden administration's stance toward commercial services is consistent with prior administrations' policies).

[143] *See* Bourbonnière & Lee, *supra* note 37, at 211–12 (discussing the fact that IHL allows "conceptual deconstruction of a target to analyze the legitimacy of an attack," while art. VIII of the OST establishes that jurisdiction and control are determined for the satellite as a whole regardless of hosted payloads); Schmitt & Tinkler, *supra* note 85 (discussing different concepts for identifying the relevant "object" that would constitute a military objective in a multi-use satellite); Stanniland & Curtin, *supra* note 92, at 276–78 (describing various types of contractual relationships between governments and commercial space enterprises); Schmitt & Merriam, *supra* note 13, at 108–09, 120–21 (analyzing when adjacent items, such as buildings or apartments, may be treated as a single target).

[144] *See* Bourbonnière & Lee, *supra* note 37, at 207; Cunningham, *supra* note 119, at 23 (reporting senior military leaders' enthusiasm for increased use of commercially hosted payloads); AIR FORCE SPACE COMMAND, RESILIENCY AND DISAGGREGATED SPACE ARCHITECTURES 10–11 (2013), https://www.afspc.af.mil/Portals/3/documents/AFD-130821-034.pdf?ver=2016-04-14-154819-347 [https://perma.cc/K976-HBAK] [hereinafter SPACE COMMAND WHITE PAPER]; Schmitt & Tinkler, *supra* note 85; Jason Sherman, *MDA: Space-based Kill Assessment Constellation Nearly in Place*, INSIDE DEF. (Sept. 12, 2018), https://insidedefense.com/inside-pentagon/mda-space-based-kill-assessment-constellation-nearly-place [https://perma.cc/7GW5-NFU9] (noting that the Pentagon is placing twenty-two payloads onto commercial satellites for assessing the success of missile defense interception tests).

operations would make it a legitimately-targetable military objective during an armed conflict. In principle, an adversary that acquired very precise intelligence about the nature, the location within the bus, and the susceptibility to attack of each payload, and that also possessed a very fine-grained ability to precisely target individual payloads without damaging their neighbors aboard the bus, would be obligated by the LoAC distinction requirement to attack only the military payloads. But realistically that degree of exquisite information and finesse in the attack may not be attainable, even with cyber specificity.[145]

A second scenario involves the military or IC making extensive use of a private or neutral satellite (or of the satellite's products or services). In that situation, the dual-use satellite becomes a military objective, subject to lawful attack (assuming the attacker complies with the proportionality and other LoAC requirements). The shared uses can be either sequential or simultaneous; that is, the national security employment of the satellite could be comprehensive (engaging the satellite's full capacities) but for only a limited duration, or they could be long-lasting but only partial, allowing the satellite to serve ordinary civilian customers at the same time.[146]

This second scenario admits two sub-variants. In the easier case, the military or IC use of the satellite is conspicuous and sustained for a

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[145] Townsend, *supra* note 102, at 3; Peter B. de Selding, *DoD Takes "Strategic Pause" as Distinctions between Military and Civilian Comsats Blur*, SPACE NEWS (Nov. 8, 2013), https://spacenews.com/38069dod-takes-strategic-pause-as-distinctions-between-military-and-civilian [https://perma.cc/YLY6-AJWK] (observing that for communications satellites, "the frontier between what is military and what is civil/commercial has been blurred almost beyond distinction," due to increased military use of frequency bands that were previously reserved for civilian users); *see* Additional Protocol I, *supra* note 1, art. 51(5)(a) (treating as "indiscriminate" an attack that "treats as a single military objective a number of clearly separated and distinct military objectives located in a city, town, village or other area containing a similar concentration of civilians or civilian objects"); OSLO MANUAL, *supra* note 12, at 78; Schmitt, *Targeting Dual-Use Structures*, *supra* note 34. *Cf*. TALLINN 2 MANUAL, *supra* note 22, at 445 (discussing the civilian or military nature of a cyber server farm that provides value to both military and civilian users); Schmitt & Tinkler, *supra* note 85.

[146] For purposes of this discussion, there is no meaningful legal distinction between military use of a satellite's transponders for communications versus use of the satellite's acquired imagery for reconnaissance, and the degree to which the military customer can direct or task the satellite (instead of passively receiving whatever output it generates) also does not affect the legal analysis. In addition, although this discussion is framed largely in terms of the contrast between civilian and military or IC spacecraft, a similar analysis applies to the difference between neutral and belligerent satellites. Bourbonnière & Lee, *supra* note 37, at 213–16.

continuous duration, as with a publicly-known long-term lease, so the satellite's ongoing contribution to the military effort is clear and consistent. In the more complicated sub-variant, the national security use of the satellite is secret and episodic or intermittent, depending upon the military's fluctuating demands. In that case, the status of the spacecraft as a (protected) civilian object vs. as a (susceptible to attack) military objective may in principle oscillate—and the adversary may not be readily able to determine the satellite's exact applications or future intentions at any particular moment.[147]

The first, hosted payload scenario is rife with legal problems. A hosted payload constitutes a blatant violation of reverse distinction—it is a deliberate insinuation of a military asset into an erstwhile civilian environment.[148] Because it hosts a military component, the satellite bus becomes a military objective, regardless of who owns or operates it, as it is used in direct support of the military operations. The civilian modules, which should remain immune from targeting, are unnecessarily exposed, due to their tight proximity to the military payloads.[149]

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[147] *Id.* at 193, 202, 205–10; Ryan Schradin, *Government Satellite Report: MILSATCOM's Shifting Role*, MILSAT MAG., Sept. 2018, at 27, http://www.satmilmagazine.com/story.php?number=1891424823 [https://perma.cc/3VWN-BT3C] ("A hybrid architecture that combines MILSATCOM and COMSATCOM with the ability to switch rapidly between them would best position the military to overcome attempts to deny satellite communications through jamming and other means."); Stanniland & Curtin, *supra* note 92 , at 278–79, 295–96 (discussing long-term and ad hoc satellite leasing). It might be argued that if a satellite is predominantly used for civilian or neutral services but is also contractually subject to serve military or IC demands on an "as needed" basis, then the persistent availability makes the satellite perpetually a military objective, due to its nature, purpose, or use. Schmitt, *Targeting*, *supra* note 22, at 280; *Cf.* TALLINN 2 MANUAL, *supra* note 22, at 439 (assessing that a civilian cyber asset can become a military objective via its use, but if it thereafter reverts to solely civilian applications, it regains its original protected status; however, if that asset will thereafter again be used for military purposes, it remains a military objective, under the "purpose" criterion).

[148] This hypothetical—but increasingly common—fact pattern is reminiscent of Saddam Hussein parking jets in proximity to a protected archeological site. Johnston, *supra* note 56.

[149] Schmitt & Tinkler, *supra* note 85 (noting the difficulty in characterizing either the entire satellite, or solely the military components, as military objectives). Another variant, beyond the scope of this Article, would be if the military or IC were to deliberately place a military or intelligence satellite into a popular and crowded low-Earth orbit that is principally used by many civilian satellites. In that situation, an adversary's attack on the military satellite could inherently jeopardize nearby civilian satellites, and any orbital debris generated by the attack would also adversely affect many civilian satellites. Therefore, that sort of military satellite deployment could also be a violation of reverse distinction.

The second scenario, in which the military exploits but does not totally commandeer a civilian spacecraft, poses more complicated questions about reverse distinction during an armed conflict. The military use surely changes the character of the spacecraft from civilian to military, rendering it susceptible to attack, at least for the duration of the military usage.[150] If the military is occupying only a portion of the satellite's instruments and capabilities, allowing it to continue to serve civilian customers simultaneously, then there nonetheless is still an impermissible juxtaposition of military and civilian assets—the government has intentionally created a hybrid situation in which a military objective and a civilian object are intimately co-located, not separated as LoAC requires. Alternatively, if the satellite alternates between functioning in its "all civilian" and "all military" modes, there is a somewhat different type of intermingling. As a practical matter—especially in a "fog of war" situation in the remote reaches of space, in which the adversary may not be able to discern with accuracy and timeliness, exactly how a particular satellite is being used moment by moment and how it may be used in the immediate future—the satellite is vulnerable to attack at all times, imperiling its ability to serve civilian functions. Again, the co-location of military and civilian assets defies the principle of reverse distinction.[151]

In the worst case, an adversary might even be tempted to assess that not only was a particular satellite subject to attack because of its dual-use

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[150] Bourbonnière & Lee, *supra* note 37, at 211. An analogy to this situation would be when a person is drafted into the national armed forces: that action would change his or her status instantly and durably from civilian to military. The harder variant, a satellite that is alternately used for either civilian and military purposes, is reminiscent of the controversial phenomenon of a "farmer by day, fighter by night," who rapidly, repeatedly, and secretly changes status, generating uncertainty regarding the person's direct participation in hostilities or continuous combat function. *See* DOD LAW OF WAR MANUAL, *supra* note 1, § 5.8; NILS MELZER, INT'L COMM. OF THE RED CROSS, INTERPRETIVE GUIDANCE ON THE NOTION OF DIRECT PARTICIPATION IN HOSTILITIES UNDER INTERNATIONAL HUMANITARIAN LAW (2009), https://www.icrc.org/en/doc/assets/files/other/icrc-002-0990.pdf [https://perma.cc/Z36J-LVRH].

[151] It would not be sufficient that a particular satellite might be used for military purposes; an attacker would have an obligation to determine how it was actually being used, or at least how it was intended to be used. If there is a known contractual relationship enabling the U.S. military to call at will upon the services of a particular satellite, that relationship could make the satellite a military objective, due to its "purpose." *See* ILA Study Group, *supra* note 2, at 332; Townsend, *supra* note 102 (explaining that changes in communications technology will make it even more difficult for an attacker to differentiate between military and civilian satellite uses); STEER, *supra* note 76, at 28–29 (emphasizing the difficulty of applying the familiar LoAC criteria about an object's nature, purpose, location and use in the context of space).

functions, but that all satellites of that type, configuration, or location could likewise be surreptitiously used for continuous or intermittent military purposes.[152] Indeed, the U.S. Air Force has already determined, in the converse scenario, that it could target *any* of the European Union's Galileo global positioning system satellites if they were utilized by China during wartime.[153]

Military or IC use of civilian launch services providers violates the principle of reverse distinction in similar ways. Placing a military satellite on top of a civilian booster rocket constitutes an intentional intermingling of military objectives and civilian objects, in a situation where it would be feasible to avoid that danger. Moreover, when that civilian booster takes the military satellite into orbit, not only the launch vehicle but also its associated ground stations and other terrestrial support sites become military objectives because of their "use," rendering them likewise subject to attack.[154] If a civilian launch services facility and its equipment are used alternately for both civilian and military applications, their status may fluctuate, but it still places an impossible burden on the attacker to require it to monitor comprehensively those alternating types of launches.[155]

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[152] Additional Protocol I, *supra* note 1, art. 52(3) (establishing that in case of doubt, an object shall be presumed not to be making an effective contribution to military action); Bourbonnière & Lee, *supra* note 37, at 192 (arguing that imposing a high burden on the attacker to determine the true nature of a dual-use object prior to attacking would undercut the opponent's obligation to separate civilians and their objects from military objectives); *see id.* at 211 (LoAC requires that an attacker may not simply assume that a target is a military objective; there is a duty to investigate, to gather relevant information prior to attacking, and in cases of doubt, the attacker may have to presume that it is a civilian object); Schmitt, *Targeting*, *supra* note 22, at 280.

[153] *US Could Shoot Down Euro GPS Satellites if Used by China in Wartime: Report*, SPACE DAILY (Oct. 24, 2004), https://www.spacedaily.com/news/milspace-04zc.html [https://perma.cc/6DTL-ZHBV] (noting that European authorities indicated that they would not switch off or jam Galileo signals even if they were used by a U.S. enemy in war).

[154] Schmitt & Tinkler, *supra* note 85; *see also* TRIEZENBERG, *supra* note 119, at 45–46 (noting the special problem of requiring a "heavy lift" capacity for national security satellites, which entails more powerful booster rockets than are typically necessary for commercial spacecraft).

[155] Hitchens & Clark, *supra* note 117 (noting that when commercial satellites are used for military purposes, the spacecraft and the associated ground stations would become legal, tempting targets); KOSIAK, *supra* note 101 , at 10–12 (analyzing likely future changes in launch capabilities and costs); *see also* Bourbonnière & Lee, *supra* note 37, at 191–92 (noting international disagreement about the extent to which an attacker must investigate to determine the precise nature of an object); *id.* at 212–13 (suggesting that a deliberate effort to obscure the military nature of a satellite may constitute perfidy, in feigning civilian status). The difficulty here is compounded by the persistent failure of the United States and other leading countries to comply fully with the requirements of the Registration

### *D. Theory and Practice of Deliberate Intermingling*

Why has the United States so conspicuously pursued this policy of interweaving the public and private space sectors? Considerations of politics, economics, and military strategy have all played contributing roles, but it is difficult to tease out their respective influences. This section highlights five key factors and then describes what is known about their combined effects to date.

1. Surge Capacity

One primary incentive is surely the need to augment the normal level of available national security space services during a period of suddenly heightened demand, such as a crisis or war. In an emergency, the military and the IC may require a quick supplementation in satellite imagery of a contested location, a greater volume in intercontinental communications services beyond where land lines and submarine cables extend, or a plus-up in the pace of launching additional national security satellites. It might be wasteful for the armed forces to sustain, on a routine day-to-day basis, their own indigenous, dormant excess capacity, capable of such a sudden surge, so they might turn to the marketplace. Having the option of displacing routine commercial customers in a crisis could facilitate a rapid expansion of a crucial national security mission.[156] For

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Convention to provide basic information about the parameters of the satellites they launch. Convention on Registration of Objects Launched into Outer Space, Nov. 12, 1974, 28 U.S.T. 695, https://www.unoosa.org/oosa/sk/ourwork/spacelaw/treaties/introregistration-convention.html [https://perma.cc/S3EK-2W79] [hereinafter Registration Convention]. An adversary could have a difficult task in assessing the character and function of a satellite, and the operator could potentially be charged with attempting to perfidiously disguise a military objective as a civilian object. Bourbonnière & Lee, *supra* note 37, at 196. A "rideshare" operation, in which a single booster simultaneously transports both military and civilian satellites into space, would be subject to a similar legal analysis; it violates reverse distinction because it intermingles the two categories of assets in a situation where it would be feasible to maintain a protective separation. *See* Jeff Foust, *Strong Interest for SpaceX Smallsat Rideshare Launch Services*, SPACENEWS (Feb. 9, 2021), https://spacenews.com/spacex-sees-strong-demand-for-smallsat-rideshare-launch-services/ [https://perma.cc/CG72-EEH5] (reporting a planned rideshare launch by Virgin Orbit to carry payloads for the U.S. Air Force, the Dutch Air Force, and a private Polish company).

[156] GAO HOSTED PAYLOADS, *supra* note 119, at 4; Schmitt & Bettinger, *supra* note 41, at 62 (discussing programs enabling the U.S. government to acquire private sealift and airlift capacity when necessary for a surge). Of course, if the government suddenly demanded a large surge in commercial satellite services, a cost would be imposed upon the satellites' commercial customers who would be suddenly displaced; commercial operators have

example, during the first Gulf War in 1990-91, the U.S. military relied upon Intelsat to carry about 25% of the military communications to and from the theater of operations;[157] by the time of the second Gulf War, starting in 2003, the corresponding figure had risen to 80-95%.[158] By one account, during the 2003-11 fighting in Iraq, the U.S. military reliance upon commercial satellites rose by 560%.[159]

2. Reduced Cost

Sometimes, it is cheaper to turn to the private sector for space capabilities, rather than to rely upon the government's own procurement

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indicated that such disruptions would be unwelcome and inconsistent with their objective of sustaining long-term profitability. ALLISON ASTORINO-COURTOIS, ROBERT ELDER & BELINDA BRAGG, CONTESTED SPACE OPERATIONS, SPACE DEFENSE, DETERRENCE, AND WARFIGHTING: SUMMARY FINDINGS AND INTEGRATION REPORT 3 (2018), https://nsiteam.com/social/wp-content/uploads/2018/11/Space-SMA-Integration-Report-Space-FINAL.pdf [https://perma.cc/VXN4-MB2K]; KOSIAK, *supra* note 101 , at 4–5 (noting reports that the private sector handles as much as 80% of the military's satellite communications requirements).

[157] Waldrop, *supra* note 78, at 169.

[158] Stanniland & Curtin, *supra* note 92 , at 274 (assessing that during the 2003 war in Iraq, the U.S. and NATO military demand for satellite communications exceeded the capacity of dedicated satellites, forcing governments to rely upon commercial providers and creating a fundamental change that has increased since then); J.R. Wilson, *Satellite Communication Key to Victory in Iraq*, MIL. & AEROSPACE ELECTRONICS (Aug. 1, 2003), https://www.militaryaerospace.com/home/article/16709259/satellite-communication-key-to-victory-in-iraq [https://perma.cc/BK2Z-5EHP] ("At some points during Operation Iraqi Freedom, about 60 percent of the communications and data transmitted by the U.S. and its allies went through commercial satellites.").

[159] UNAL, *supra* note 75 , at 4 (citing JOAN JOHNSON-FREESE, SPACE AS A STRATEGIC ASSET 29 (2007)); Bradley Townsend, *At What Cost*, PURVIEW (Apr. 1, 2018), https://purview.dodlive.mil/Home/Story-Display-Page/Article/2618089/at-what-cost [https://perma.cc/HUX7-UU8G] ("Desert Storm set a benchmark for SATCOM usage at the time, averaging 140 bps per deployed soldier. Future conflicts saw further growth. In Kosovo in 1999 average usage was 3,000 bps per soldier. It reached 8,300 bps per soldier in the opening days of Operation Enduring Freedom in Afghanistan and a further 13,800 bps per soldier by 2004 in Operation Iraqi Freedom."). In a similar vein, the Pentagon is increasing its reliance upon diverse commercial providers for satellite-based remote sensing, merging classified governmental data and unclassified private data into a new hybrid structure. Hitchens, *NGA Future*, *supra* note 106 (interviewing David Gauthier, head of the National Geospatial-Intelligence Agency's Commercial and Business Operations Group); Theresa Hitchens, *NRO Cracks Open Commercial Imagery to More Providers*, BREAKING DEF. (Apr. 13, 2020), https://breakingdefense.com/2020/04/nro-cracks-open-commercial-imagery-to-more-providers/ [https://perma.cc/6NNF-69YF] (reporting that the IC will purchase satellite imagery from multiple new commercial sources).

and fabrication practices. There is probably no automatic or sustained advantage for either route in this field—sometimes, competitive instincts will drive private enterprise to undercut established prices; sometimes, market distortions tilt the cost calculations the other way.[160] In the same way, relying on a fleet of civilian or third-country satellites can augment the existing military and IC constellation, providing additional coverage and reduced latency, perhaps at lower cost.

3. Speed of Innovation

One recurrent complaint about governmental space programs concerns the historically slow pace of innovation. Military and IC space efforts have been routinely so burdened with excessive red tape in the approval and contracting processes that by the time a new satellite gets authorized, constructed, and launched, some of its originally cutting-edge technology has already been leapfrogged by newer generations. In contrast, many critics assert, the private sector has been much nimbler, sharply reducing the latency period between research and implementation, and the U.S. national security space sector should swerve to take advantage of that

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[160] Theresa Hitchens, *Griffin: DoD Can't Rely on Commercial Satellite Communications*, BREAKING DEF. (Dec. 3, 2019), https://breakingdefense.com/2019/12/griffin-dod-cant-rely-on-commercial-satellite-communications/ [https://perma.cc/4A86-8WVB] (reporting differences among U.S. military leaders regarding the likely cost comparisons between contracting with the private sector for satellite communications services versus having the Pentagon build that capacity itself); KOSIAK, *supra* note 101, *passim* (analyzing costs of networks of small satellites compared to continued reliance upon larger more expensive satellites); SPACE COMMAND WHITE PAPER, *supra* note 144, at 6 (observing that collections of small, less complex satellites can be more affordable than small numbers of expensive traditional satellites). Collaborations with foreign states can be cost-effective, too. *See* WILSON ET AL., *supra* note 76, at 1–2 (reporting that hosting U.S. communications payloads on Norwegian satellites will generate up to $900 million in savings). In addition, the U.S. government has a legal right to exercise an important degree of "shutter control" to limit the collection and distribution of national security-related imagery collected by private U.S. satellites. *See* 15 C.F.R. § 960.1(b)(4) (2020). The Department of Defense exercised a variant of that power during the 2001 fighting in Afghanistan, in order to purchase exclusive rights to all battle-relevant data acquired by Space Imaging's Ikonos system and to deny the enemy access to those products. Lee & Steele, *supra* note 75, at 82; David Whitehouse, *US Buys Afghan Image Rights*, BBC NEWS (Oct. 17, 2001), https://news.bbc.co.uk/2/hi/science/nature/1604426.stm [https://perma.cc/7HS6-C2FT]; Theresa Hitchens, *NRO Space 'Civil Reserve' Includes Shutter Control Option,* BREAKING DEF. (July 30, 2021), https://breakingdefense.com/2021/07/exclusive-nro-space-civil-reserve-includes-shutter-control-option/ [https://perma.cc/E3P4-P8WQ] [hereinafter Hitchens, *NRO Space Civil Reserve*].

streamlined access.[161]

4. Support the Space Industrial Base

Related to the above considerations is an underlying objective of promoting the growth of a vigorous domestic private sector space enterprise. Maintaining a robust, diverse, profitable global leadership role in the high-tech space industry is enormously advantageous for the U.S. economy. Leveraging public investments in private enterprise, including for national security functions, can promote that fundamental competitive capitalist interest.[162]

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[161] GAO HOSTED PAYLOADS, *supra* note 119, at 1, 4–5; SPACE COMMAND WHITE PAPER, *supra* note 144, at 4 (observing that "current satellite systems have developmental timelines of up to 14 years"); U.S. DEP'T OF AIR FORCE, ALTERNATIVE ACQUISITION SYSTEM FOR THE UNITED STATES SPACE FORCE 2 (2020), https://acqnotes.com/wp-content/uploads/2020/05/Alternative-Acquisition-System-for-the-US-Space-Force.pdf [https://perma.cc/PSE7-CEYX] [hereinafter ALTERNATIVE ACQUISITION] (criticizing current U.S. government space acquisition systems that "typically produce systems that take too long to develop and deploy, cost more than expected, and yield exquisite point solutions to fulfill stable requirements for a closed architecture"); Theresa Hitchens, *Space Force Nears Year Mark, Acquisition Remains a Quagmire*, BREAKING DEF. (Oct. 2, 2020), https://breakingdefense.com/2020/10/as-space-force-nears-one-year-mark-acquisition-remains-a-quagmire/ [https://perma.cc/2FQH-6VWW]; Stanniland & Curtin, *supra* note 92, at 272 (indicating that many countries are changing their space procurement patterns in order to take advantage of the private sector's speed in incorporating new technologies, reducing the military's normal five-year research and development cycle); DEFENSE SPACE STRATEGY SUMMARY, *supra* note 74, at 5 (citing the new Space Development Agency as establishing an improved mechanism for rapid acquisition and fielding of space capabilities); *see generally* Melissa de Zwart & Dale Stephens, *The Space (Innovation) Race: The Inevitable Relationship Between Military Technology and Innovation*, 20 MELB. J. INT'L L. 1 (2019).

[162] STEVEN J. BUTOW, THOMAS COOLEY, ERIC FELT & JOEL B. MOZER, STATE OF THE SPACE INDUSTRIAL BASE 2020: A TIME FOR ACTION TO SUSTAIN US ECONOMIC & MILITARY LEADERSHIP IN SPACE 1–6 (2020), https://aerospace.csis.org/wp-content/uploads/2020/07/State-of-the-Space-Industrial-Base-2020-Report_July-2020_FINAL.pdf [http://perma.cc/3BFZ-BQFZ] (underscoring the importance of the U.S. space industrial base); THOMAS COOLEY, ERIC FELT & STEVEN J. BUTOW, STATE OF THE SPACE INDUSTRIAL BASE: THREATS, CHALLENGES AND ACTIONS 3 (2019), https://aerospace.csis.org/wp-content/uploads/2019/08/AFRL_DIU_Report_State_of_Space_Ind_Base_30May2019_Final.pdf [https://perma.cc/4W8C-2BKA] (emphasizing the challenge of "developing an industrial base that outpaces our international adversaries and competitors in speed and innovation in developing new space capabilities and in continually upgrading existing ones"); Waldrop, *supra* note 78, at 176, 180–85 (discussing the widespread view that a healthy domestic space industrial base is essential to maintaining long-term U.S. access to space); Theresa Hitchens, *HASC Makes Plan to Force DoD Use of Commercial Space*,

5. Complicating the Task of Any Space Adversary

Less frequently expressed overtly is a very different type of incentive for expanding the investment of the national security community in a wide array of private and foreign space service providers. Today, a relatively small number of unprotected, conspicuous, hard-to-replace U.S. government satellites and launchers provides vital national security services, and they are all increasingly vulnerable to the ASAT ambitions of potential predators. It would be inordinately expensive to retrofit those precious assets with defensive armor or high mobility. Active defenses, enabling the putative victim to shoot back at an aggressor, would probably prove futile, too—space is an environment in which the offense has an inherent advantage over the defense.[163]

Instead, the internal remedy to enhance space security must lie in modifying the entire U.S. satellite architecture to promote overall resilience. Fractionation can play a key role, dispersing national security space functions into more platforms, operating at different altitudes and inclinations, so that none of them is uniquely essential. Proliferation of existing capabilities into more numerous, smaller, expendable, networked satellites—in effect, overwhelming the attacker by providing a surfeit of aimpoints—is a leading proposition, empowering a more robust system as a whole to deal effectively with disparate challenges.[164]

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BREAKING DEF. (Sept. 1, 2021), https://breakingdefense.com/2021/09/hasc-makes-plan-to-force-dod-use-of-commercial-space/ [https://perma.cc/XDJ9-55BB] (reporting draft legislation to require the military and IC to use commercial sources for tactically responsive launch services and space domain awareness).

[163] COLBY, *supra note* 75 , at 6 (stressing vulnerability of U.S. satellites); *id*. at 11 (surveying possible approaches to responding to the increased threats); FORREST E. MORGAN, RAND CORP., DETERRENCE AND FIRST-STRIKE STABILITY IN SPACE: A PRELIMINARY ASSESSMENT 2 (2010) ("[S]pace, like the nuclear realm, is an offense-dominant environment with substantial incentives for striking first should war appear probable."); SPACEPOWER, *supra* note 75, at 36–37 (challenging the idea that offense has a persistent advantage in space); Martin, *supra* note 75 (discussing lack of maneuverability for many satellites); Firth, *supra* note 115; Michael P. Gleason & Peter L. Hays, *Getting the Most Deterrent Value from U.S. Space Forces*, CTR FOR SPACE POL'Y & STRATEGY (Oct. 27, 2020), https://aerospace.org/sites/default/files/2020-10/Gleason-Hays_SpaceDeterrence_20201027_0.pdf [https://perma.cc/CF2G-H56L] (observing that "space is perceived as an offensive dominant arena"); Townsend, *supra* note 102; HARRISON, ET AL., DARK ARTS, *supra* note 97, at 22–25.

[164] ASSISTANT SEC'Y DEF. FOR HOMELAND DEF. & GLOB. SEC., SPACE DOMAIN MISSION ASSURANCE: A RESILIENCE TAXONOMY 5– 8 (2015) [hereinafter RESILIENCE TAXONOMY] (outlining strategies including disaggregation, diversification, protection, and proliferation

Governmental exploitation of the mushrooming private space sector aims to improve resiliency, thereby deterring adversaries. As the projected hundreds and thousands of new commercial satellites become available for governmental tasks—either on a daily basis, or as needed for a surge—the challenge confronting any aggressor becomes much more burdensome. Knowing that even a sudden "bolt from the blue" could not disable the newly proliferated satellite network, and that the United States would still have sufficient fallback reconnaissance, communications, and launch capabilities via the seamless integration of the private sector, the attacker would conclude that it was futile to undertake any space aggression—a vivid expression of the concept of "deterrence by denial."[165] Yet even the deep pockets of the U.S. government would find it difficult to establish such a large, variegated satellite constellation and supporting infrastructure on its own, so recourse to private corporations becomes a strategic as well as an economic advantage.[166]

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as methods to enhance the resilience of the satellite constellation); COLBY, *supra* note 75 , at 14 (explaining and critiquing ideas for increasing the resilience of the satellite architecture); SPACE WARFIGHTING CONSTRUCT, *supra* note 95; SPACE COMMAND WHITE PAPER, *supra* note 144, at 3–5 (highlighting disaggregation as a tool for resilience, but also identifying associated concepts); Linville & Bettinger, *supra* note 106, *passim* (promoting the concept of simplicity in satellite design, rather than resilience); Brandon T. Cesul, *Inherent Strategic Considerations of "Massive Multi-Satellite Constellation" Architectures*, 2 SPACE FORCE J. (2021) (supporting movement away from reliance upon "exquisite, large, highly capable, lumbering, expensive, fragile and slow to replace space platforms").

[165] ROBERT JERVIS, RICHARD NED LEBOW & JANICE GROSS STEIN, PSYCHOLOGY AND DETERRENCE 2 (1985); ALEXANDER L. GEORGE & RICHARD SMOKE, DETERRENCE IN AMERICAN FOREIGN POLICY: THEORY AND PRACTICE (1974); A. Wess Mitchell, *The Case for Deterrence by Denial*, AM. INTEREST (Aug. 12, 2015), https://www.the-american-interest.com/2015/08/12/the-case-for-deterrence-by-denial/ [https://perma.cc/G7HR-7QMZ**]**; MORGAN, *supra* note 163, at 30–33, 44–48; Ali Jafri & John A. Stevenson, *Space Deterrence: The Vulnerability-Credibility Tradeoff in Space Domain Deterrence Stability*, NSI CONCEPT PAPER (Nat'l Sec. Innovations, Inc., Arlington, Va.), Apr. 2018, https://apps.dtic.mil/sti/pdfs/AD1096343.pdf [https://perma.cc/9YEB-A8KG]; Cesul, *supra* note 164 (noting U.S. reliance upon just two governmental spaceports, at Cape Canaveral (Florida) and Vandenberg (California)).

[166] ASTORINO-COURTOIS ET AL., *supra* note 156, at 2 (reliance upon commercial space services "would increase the cost and difficulty to the aggressor of initiating attacks on satellites"); COOLEY ET AL., *supra* note 162, at 9 (arguing that a diversified space ecosystem, in which the private industrial base contributes to military space operations "strengthens the defense of space systems and capabilities by greatly increasing the number and complexity of space assets that an adversary must disrupt or destroy to deny capabilities in time of conflict"); MORGAN, *supra* note 163, at 46 (arguing that entangling U.S. national security satellites with spacecraft of other states and of business consortia would reduce the benefit that an attacker would gain and also increase international support

In a similar manner, U.S. exploitation of foreign states' space capabilities can offer another form of defense in depth, safeguarding American capabilities and dissuading enemies. To the extent that the U.S. military and IC can integrate foreign owned and operated satellites into a joint national security architecture, either on a daily or emergency basis, the attacker's job is impeded: there are more targets to account for, and more countries would be brought directly into the conflict as co-belligerents with the United States.[167] In fact, in the modern economy, this sort of internationalization may be almost unavoidable; many commercial satellites have important links to multiple countries, as cross-border consortia develop, finance, insure, operate, and benefit from the services of a broad network.[168]

As then-Deputy Secretary of Defense Bob Work expressed the point

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for the United States in the conflict); Strout, *supra* note 139 (quoting Air Force Chief of Staff David Goldfein saying "We want to get to a point both in conventional and unconventional, or conventional and nuclear, where if some portion of the network is taken out, our answer ought to be 'Peh, I've got five other pathways. And if you want to take out 1,000 satellites of my constellation, of which I have five? Knock yourself out.'"). Enhancing resilience in this way also provides better protection against other dangers in space, including collision with micrometeoroids, accidental collision with debris, and satellite malfunctions. Linville & Bettinger, *supra* note 106, at 44–46.

[167] MORGAN, *supra* note 163, at xi; WILSON ET AL., *supra* note 76, at 2−3 (emphasizing the value of U.S. space partnerships with allied and partner states to deter a potential adversary, who might be daunted by the prospect that its space aggression would result in engagement with multiple countries simultaneously); Theresa Hitchens, *Air Force Funds Hosted Payloads on Japan Sats.*, BREAKING DEF. (Feb. 19, 2020), https://breakingdefense.com/2020/02/air-force-funds-hosted-payloads-on-japan-sats/ [https://perma.cc/2YZA-MK9L] (citing program to host U.S. military space surveillance payloads on a Japanese satellite; recalling that Air Force Secretary Heather Wilson had revived the call for hosted payloads, citing the benefits of "complicating" a potential adversary's judgments about the benefits of launching an ASAT attack).

[168] Stanniland & Curtin, *supra* note 92 , at 290–92 (describing U.S. and other intergovernmental agreements for collaborative national security space activities); Blount, *supra* note 54, at 13–15 (noting that during the first Gulf War, the U.S. military purchased communications services from Inmarsat, a global public-private partnership that is overseen by an international organization comprising many states); Lucien Rapp, *Space Industrial War: Towards a Risk of Creeping Takeovers in the Global Space Industry?*, *in* CONFLICTS IN SPACE AND THE RULE OF LAW 81–116 (Maria Manoli & Sandy Belle Habchi eds., 2017) (describing the complex structure of the global space industry, featuring multiple international entities); ASTORINO-COURTOIS ET AL., *supra* note 156, at 2 (noting that "commercial space actors often have an international customer base" and some embrace a deliberate policy of selling services to disparate customers, in order to stay neutral).

vividly in 2016, "Our allies and partners allow us to add redundancy and resiliency, and they offer opportunities for hosting payloads that will proliferate what we have on orbit. . . This offers huge advantages – as its [sic] one thing to have to deny the U.S. the use of a few government owned imagery systems; it's quite another to take on tens or even hundreds of allied and U.S. government and commercial remote sensing systems all at the same time."[169]

A 2018 report from the Government Accountability Office reached similar judgments, finding that placing military payloads onto commercial spacecraft can offer advantages in deterrence and warfighting. "Distributing capabilities across more satellites increases the number and diversity of potential targets for an adversary," the report found, "and may make it more difficult for an adversary to decide which assets to attack, serving as a deterrent. Additionally, more frequent launches could increase DOD's ability to reconstitute its satellite groups—or constellations—more quickly in case of unexpected losses of on-orbit capabilities."[170]

### *E. The Feasibility of Maintaining Reverse Distinction in Space*

So, is it "feasible" for the United States to preserve separate national security and private satellite systems? Is reverse distinction in space practically sustainable today?

One plausible response is: Yes, of course it is feasible, and we know that it is feasible to persist with (mostly) segregated national security and civilian space programs because that is what the United States has always

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[169] Work, *supra* note 117; *see also* NAT'L ACADS. SCI., ENG'G & MED., PUBLIC REPORT: NATIONAL SECURITY SPACE DEFENSE AND PROTECTION 43 (2016) (discussing "the advantages of enlisting additional participants" in support of U.S. deterrence efforts in space, "by leveraging international coalitions and regimes," and noting that U.S. exploitation of commercial and foreign space assets can "contribute to deterrence by raising the political price of hostile space actions"); Hitchens, *supra* note 106 (discussing U.S. plans to share commercial satellite imagery with allies and their commercial suppliers).

[170] GAO HOSTED PAYLOADS, *supra* note 119, at 4–5; *see also* SPACE COMMAND WHITE PAPER, *supra* note 144, at 11 & n.17 ("Hosting a government payload on a commercial satellite may lower program costs while complicating an adversary's decision calculus regarding attacking a commercial system. . . . Attacking a commercial communications satellite for example, may instill a much different perception in the public eye than interference with a purely military space asset."); NYE ET AL., *supra* note 101 , at 21–23 (calling for reliance upon commercial operators for rapid reconstitution of national security space services).

done, what it continues to do today, and largely what it still envisions for the future.

As detailed in Part III.A, the historical pattern of space age activities has been to sharply isolate the highly classified military and IC space programs from the overt, benign civil, private, and foreign engagement. The programming and budgeting functions have been distinct, and the leadership follows separate chains of command.[171]

Today, notwithstanding the incipient "democratization of space,"[172] the United States continues to rely upon largely separate national security, civil, and private space programs. Moreover, despite the direction of the sequential National Space Policy documents,[173] future space programs will also feature a large measure of reverse distinction. The U.S. military will not rely exclusively or even mostly upon the private sector as the vehicle for achieving the resilience of a proliferated, dispersed national security space architecture. Instead, the Department of Defense is undertaking its own pursuit of small, networked satellites to supplement and to some extent replace the large legacy satellites.[174] Mimicking what is perceived as the

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[171] *See supra* text accompanying notes 89–92 (discussing the traditional separation between national security and private sector space programs); *see also* Werner, *supra* note 119 (suggesting that the U.S. military may be turning away from exploitation of hosted payloads); Stanniland & Curtin, *supra* note 92 , at 279–85 (discussing U.S. and other states' extensive use of dedicated national security satellites).
Note that NASA also increasingly partners with private sector actors in space. This is unproblematic from the perspective of LoAC, which requires separation of military and civilian items, but does not deal with the intermingling of civil and civilian assets. Neel V. Patel, *NASA Will Pay for Moon Rocks Excavated by Private Companies*, TECH. REV. (Sept. 10, 2020), https://www.technologyreview.com/2020/09/10/1008310/nasa-pay-moon-rocks-lunar-samples-excavated-private-companies/ [https://perma.cc/SLY2-39TM] (describing program under which private firms would collect lunar samples and sell them to NASA); Rachel Kraft, *NASA Enlists Commercial Partners to Fly Payloads to Moon*, NASA (Sept. 8, 2020), https://www.nasa.gov/feature/nasa-enlists-commercial-partners-to-fly-payloads-to-moon [https://perma.cc/95K7-KGB9]; *NASA Opens International Space Station to New Commercial Opportunities, Private Astronauts*, NASA (June 7, 2019), https://www.nasa.gov/press-release/nasa-opens-international-space-station-to-new-commercial-opportunities-private [https://perma.cc/8KUR-EGJE]; *see also* Memorandum of Understanding Between the National Aeronautics and Space Administration and the United States Space Force (Sept. 22, 2020), http://www.spaceref.com/news/viewsr.html?pid=54099 [https://perma.cc/5BKQ-4DV7] (describing areas of collaboration between NASA and the Space Force).
[172] *See supra* text accompanying notes 101–106 (discussing the democratization of space).
[173] *See supra* text accompanying notes 121–141 (discussing national space policy documents).
[174] RESILIENCE TAXONOMY, *supra* note 164, at 5 & n.8; Hitchens, *supra* note 111 (quoting

best of business practices, the Pentagon is also already striving to slash bureaucratic red tape and streamline the process of rushing new space capabilities from the drawing board into operational status.[175] Among other

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U.S. military space leaders emphasizing the importance of a more resilient satellite architecture); U.S. JOINT CHIEFS OF STAFF, *supra* note 75, at I-8 to I-10 (describing DoD adaptations to enhance space mission assurance); TRIEZENBERG, *supra* note 119, at iii (concluding that the U.S. Air Force "today stands at a crossroads with respect to its space vehicle launch acquisition strategy"); SPACE WARFIGHTING CONSTRUCT, *supra* note 95; Nathan Strout, *These Eight Satellites Will Track Hypersonic Weapons*, C4ISRNET (May 15, 2020), https://www.c4isrnet.com/battlefield-tech/space/2020/05/15/these-eight-satellites-will-track-hypersonic-weapons/ [https://perma.cc/SUJ2-DSVG] (describing planned launch by Space Development Agency of twenty satellites, to be followed by 150 more, to monitor adversaries' hypersonic weapons); SPACE COMMAND WHITE PAPER, *supra* note 144; Hitchens, *supra* note 160 (reporting that Michael Griffin, then Under Secretary of Defense for Research and Engineering, was skeptical about the reliability of commercial satellite services, and insisted upon a "national security communications substructure" to provide guaranteed, secure military and IC communications; at the same time, military services were urging rapid exploitation of commercial satellite opportunities); Elizabeth Howell, *US Military May Start Moving Towards Launching Fleets of Tiny Satellites*, SPACE.COM (Apr. 1, 2020), https://www.space.com/us-military-small-satellite-cubesat-constellations.html [https://perma.cc/VEJ7-MK4T] (noting U.S. military interest in adopting cubesat technology); David Vergun, *Nanosatellites Could Play Pivotal Role in Defense Against Enemy Missiles*, DOD NEWS (July 12, 2021), https://www.defense.gov/News/News-Stories/Article/Article/2685840/nanosatellites-could-play-pivotal-role-in-defense-against-enemy-missiles/ [https://perma.cc/5UEN-FZL4] (reporting Missile Defense Agency's pursuit of cubesats); Nathan Strout, *Anti-satellite Weapons Push Military to Rethink Where It Puts Missile Sentinels in Space*, C4ISRNET (Aug. 10, 2021), https://www.c4isrnet.com/battlefield-tech/space/2021/08/10/digital-engineering-shows-promise-of-cheaper-more-flexible-missile-warning-constellations/ [https://perma.cc/2CHS-9SZ5] (describing Space Development Agency's pursuit of smaller, cheaper satellites distributed into differing orbits, to enhance survivability); Sandra Erwin, *Space Development Agency to Acquire 144 Satellites from Multiple Vendors*, SPACENEWS (Aug. 30, 2021), https://spacenews.com/space-development-agency-to-acquire-144-satellites-from-multiple-vendors/ [https://perma.cc/G3Z9-6V49] (reporting plans to build a new network of small communications satellites).

[175] Theresa Hitchens, *Space Chief Targets Red Tape to Speed New Tech*, BREAKING DEF. (Sept. 15, 2020), https://breakingdefense.com/2020/09/space-chief-targets-red-tape-to-speed-new-tech/ [https://perma.cc/2ZKE-BS78]; Sandra Erwin, *DoD Space Agency to Award Multiple Contacts for up to 150 Satellites*, SPACENEWS (Mar. 4, 2021), https://spacenews.com/dod-space-agency-to-award-multiple-contracts-for-up-to-150-satellites/ [https://perma.cc/L876-LS9R] (describing Space Development Agency plans to solicit bids for 150 low-cost satellites to be launched quickly); Jay Raymond, *Space Dominance Requires Taking Technology and Policy Risks*, BREAKING DEF. (Sept. 14, 2020), https://www.defensenews.com/opinion/commentary/2020/09/14/space-dominance-requires-taking-technology-and-policy-risks/ [https://perma.cc/ST2T-BH67]; KOSIAK, *supra* note 101 , at 5–6 (noting that both the U.S. national security community and the private sector are likely to continue using large, expensive satellites and launchers for some purposes, even as the economics tilt in favor of smaller, less complex systems); Hitchens,

reforms, the newly-established Space Development Agency will be responsible for creating and implementing a radically new system for rapidly designing, building, acquiring, and launching government satellites.[176] Likewise with launch services: the Pentagon has announced plans "to launch hundreds of satellites every other year."[177]

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*supra* note 124 (quoting Air Force Secretary Barbara Barrett saying that the military was changing its internal space acquisition processes in order to mimic the private sector's capabilities); Nathan Strout, *Here's What the Space Development Agency Wants from its First 10 Satellites*, C4ISRNET (May 5, 2020), https://www.c4isrnet.com/battlefield-tech/space/2020/05/05/heres-what-the-space-development-agency-wants-from-its-first-10-satellites/ [https://perma.cc/A92S-BQSL] (describing Pentagon plans for accelerated implementation of a new satellite architecture, including using a "spiral development" process, in which new technology can be incorporated into sequential orbiting platforms as soon as possible).

[176] Nathan Strout, *Gotta Go Fast: How America's Space Development Agency is Shaking Up Acquisitions*, C4ISRNET (Nov. 9, 2020), https://www.c4isrnet.com/battlefield-tech/space/2020/11/09/gotta-go-fast-how-americas-space-development-agency-is-shaking-up-acquisitions [https://perma.cc/N6FQ-K6V2] (discussing Space Development Agency plans to place 1000 satellites into orbit by 2026); Raymond, *supra* note 110 (stressing the Space Force's efforts to "shorten the pathways and timelines for innovative ideas to bubble up"); ALTERNATIVE ACQUISITION, *supra* note 161, at 2–3; Andy Pasztor, *Elon Musk's SpaceX Advances Goal of Becoming Trusted, Long-Term Military Launch Provider*, WALL ST. J. (Aug. 9, 2020), https://www.wsj.com/articles/elon-musks-spacex-advances-goal-of-becoming-trusted-long-term-military-launch-provider-11597010973 [https://perma.cc/JZY4-QV89] (reporting Pentagon's awards to two commercial providers of launch services, to launch three dozen military satellites over the next six years, at a price that could reach $4 billion); Cesul, *supra* note 164 (discussing government national security users exploration of innovative satellite architectures, and quoting Strategic Command's Gen. John Hyten saying "I won't support the development any further of large, big, fat, juicy targets.").

[177] C. Todd Lopez, *Space Agency Hopes to Gain Industry's Trust with Proliferated Satellite Marketplace*, DOD NEWS (Dec. 7, 2020), https://www.defense.gov/Explore/News/Article/Article/2438225/space-agency-hopes-to-gain-industrys-trust-with-proliferated-satellite-marketpl/ [https://perma.cc/GM76-9YHR]; Abraham Mahshie, *Space Force Can Ramp Up Protection of Space Architecture as Launches Hit Light Speed*, WASH. EXAM'R (Nov. 30, 2020), https://www.washingtonexaminer.com/policy/defense-national-security/space-force-can-ramp-up-protection-of-space-architecture-as-launches-hit-light-speed [https://perma.cc/WY58-RL4L]; *U.S. Space Force & the Space Industry Teaming Up to Provide Unparalleled Access to Space*, MILSAT MAG, Oct. 2020, at 34, http://www.milsatmagazine.com/story.php?number=903018544 [https://perma.cc/J2KX-F6TG]; Robert Cardillo, *A Responsive Launch Capability Will Deter Enemies, Boost National Security*, DEFENSE NEWS (Sept. 3, 2021), https://www.defensenews.com/opinion/commentary/2021/09/03/a-responsive-launch-capability-will-deter-enemies-boost-national-security/ [https://perma.cc/KR2F-2XXF](former director of National Geospatial-Intelligence Agency advocates increased attention to responsive launch capability to deter ASAT attacks).

The choice to rely increasingly upon the private actors, therefore, is precisely that: a choice. It is inspired largely by economic considerations, but is not mandated by them—the economic ground has not shifted beneath our feet to such an extent. Even if one course of action is less expensive, that does not mean that other pathways fail the "feasibility" test. The United States could find it feasible to sustain any of several different levels of division of tasks between the national security and the private sectors. To some large extent, the prime motivating force is, instead, the desire to confound the task of Russian and Chinese ASAT planners—to overwhelm them with so many possible targets that they would be even more fully deterred from undertaking any space aggression.[178]

However, it must be acknowledged that in principle, a second, opposite type of response to the question about feasibility could also be plausible. That would be to assert that the forensic economics of space have changed dramatically in recent years, to the degree that prior rigorous separation of national security and private activity—which used to be sustainable as distinct enterprises—must now, as a practical matter become more integrated. From this perspective, the imperatives of cost and technological innovation now compel the government to rely more fully upon commercial actors, even for support of national security missions that were previously jealously cloaked.

In this depiction, reverse distinction in space activities was feasible for many decades, but no longer is, and it will not be economically viable to insist upon strict, old-fashioned segregation in the years to come. This portrait of a revised space economy may be especially applicable in areas such as remote sensing, telecommunications, and launch services, where commercial and governmental satellite operations more frequently overlap. As private enterprise finds profitable inroads into space activities that in previous years were the exclusive province of governments, the genius of capitalist competition may drive costs down and opportunities up to such an extent that the government would pay an exorbitant premium to insist on a completely separate identity.[179]

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[178] *See* Stanniland & Curtin, *supra* note 92 , at 298–300 (forecasting increased use of hosted payloads by governments around the world.) Note that some of the U.S. national space policy documents cited above pre-dated the current surge in apprehension about Russian and Chinese ASAT activities, but the concern about potential hostile action in space has been a longstanding factor within the U.S. national security community.

[179] *See* Schmitt & Bettinger, *supra* note 41, at 66 (noting that analogous programs

In pondering whether cheaper cost, faster service, or quicker uptake of technology are, or are not, *per se* sufficient to demonstrate the infeasibility of reverse distinction, the analysis now returns to scrutinize the actor's *motivations* in departing from a previous pattern of separation. That is, to what extent has the real incentive for the U.S. space policy documents to direct greater reliance upon the private sector for the performance of national security functions been a desire to deter enemy attacks against U.S. satellites through proliferation of potential targets? Has the (or a) real underlying goal been to exacerbate the problems that Russian, Chinese or other ASAT programs might encounter in attempting to negate the salient advantages that the United States now achieves through its excellent military and IC space programs?

If the United States now eschews its traditional terrestrial practice of reverse distinction in order to adopt a different posture in space specifically to achieve a military advantage over an adversary who would be reluctant to attack a dual-use or neutral asset, that decision is directly incompatible with the law of armed conflict. The concept of enhancing the resilience of the national security satellite architecture via satellite proliferation and dissemination is surely a legitimate goal, but it must be pursued in a lawful manner.

Mixed motivations, of course, are a fact of life—a state may have multiple reasons for adopting a particular course of action, some of them legally valid and others less so.[180] But what would have been the reaction of the United States and the world if Saddam Hussein had blithely explained in 1991 that he had chosen to deploy his MiGs along the apron of the Ur-Nammu temple not to toy with U.S. bombardiers, but because that location was simply the cheapest readily-available parking place? What if Slobodan Milosevic had asserted that the civilians who congregated on the key Belgrade bridges were not human shields; they were assembling there simply because those locations offered the most agreeable vantagepoints for

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procuring private resources to supplement the government's own assets started at a time when declining military budgets had made it difficult to sustain an adequate military transportation fleet); Hitchens, *supra* note 160 (reporting divergent views among U.S. defense officials regarding the likely economic feasibility of relying upon private industry for military satellite services).

[180] While of course it is highly artificial to ascribe human attributes such as "intentions" or "motivations" to an abstract entity such as a state or a government, this the traditional method in international relations and political science literature. *See e.g.* GRAHAM T. ALLISON, ESSENCE OF DECISION: EXPLAINING THE CUBAN MISSILE CRISIS 3 (1971).

watching picturesque sunsets over the Danube? As a legal matter, the precise reason why a state fails to honor its reverse distinction obligation may be irrelevant, except insofar as the motivation may shed some light on the question of whether adequate separation is truly feasible.[181]

Finally, is there a meaningful difference between two chronologically distinct situations of declining to separate military and civilian space assets? One context is the emergence of a sudden, unforeseen exigency—an emergency when the national security apparatus has an immediate need for augmentation to respond effectively to a war or crisis. These conditions could inspire unanticipated resort to private sector or foreign assets for an *ad hoc* surge in remote sensing, communications or responsive launch capability. A second, contrasting context is when the military and the IC plan all along to use civilian or foreign satellites for national security and foreign affairs purposes, and routinely integrate them into the standard governmental structures. Here, the long-term planning, programming, and budgeting cycles incorporate these assets and anticipate using them regularly, in peacetime as well as wartime, and perhaps for routine, non-emergency, and lower-priority tasks, as well as in erupting hostilities.[182] The latter context is a more blatant violation of the principle of reverse distinction, but the former context may be unlawful all the same.

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[181] Assessing an actor's motivation in declining to honor the principle of reverse distinction can also inform whether the violation is intentional and knowing, which could affect any potential criminal prosecution. *See infra* Part III.C; *see also* Jensen, *supra* note 10, at 169 (discussing the importance and the difficulty, in pursuing a criminal prosecution, of identifying the actor's intentional violation of reverse distinction); Quéguiner, *supra* note 4, at 812 (stating that the intention to use civilians as human shields will aggravate the LoAC violation); Corn, *supra* note 1, at 123–24 (arguing that if a belligerent has other options, the deliberate decision not to separate military from civilian objects may reveal illegitimate motivations, such as the desire to impede an enemy's attack); Blank, *supra* note 1, at 802 (calling for greater accountability for those fighters who fail to distinguish themselves from civilians).

[182] *See* Hitchens, *NGA Future*, *supra* note 106 (government official describing plans to use commercial satellites to monitor "lower priority countries and targets," and to monitor activities such as illegal fishing and logging); Theresa Hitchens, *New IC Commercial Space Council Hopes to Speed Intel to Users*, BREAKING DEF. (Jan. 12, 2021), https://breakingdefense.com/2021/01/new-ic-commercial-space-council-hopes-to-speed-intel-to-users/ [https://perma.cc/X5LZ-NG7P] (reporting increased efforts by the IC to incorporate data and analysis gleaned from commercial space systems).

## III. ASSESSING LEGALITY

### *A. Anticipatory Breach*

The concept of reverse distinction, like the entirety of the law of armed conflict, is *lex specialis*, applicable during the special circumstances of war, so it might be inappropriate to charge a present, fully ripened U.S. violation regarding these space activities.[183] Instead, the argument in this Article is that the United States is currently committing the customary international law equivalent of the concept of an "anticipatory breach," common in domestic contract law, via an unjustified "repudiation" of its LoAC legal obligations, in two ways.[184]

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[183] The United States considers itself to be in a global armed conflict with al Qaeda, the Taliban, and associated forces, but most other states disagree with that characterization, and in any event, it is not directly relevant to space operations. *See* WHITE HOUSE, REPORT ON THE LEGAL AND POLICY FRAMEWORKS GUIDING THE UNITED STATES' USE OF MILITARY FORCE AND RELATED NATIONAL SECURITY OPERATIONS (2016), https://www.justsecurity.org/wp-content/uploads/2016/12/framework.Report_Final.pdf [https://perma.cc/H3XX-XCMW]; *see also* ICRC 1987 COMMENTARY, *supra* note 9, ¶ 2244 (emphasizing that some LoAC duties require protective measures to be taken in peacetime, in anticipation of the possibility of future armed conflict, although "strictly speaking, the article is addressed to Parties to a conflict." Precautionary measures, such as preventing the construction of certain types of buildings in certain locations, are required prior to the armed conflict.); Jensen, *supra* note 33, at 211 (arguing that reverse distinction "is not only a wartime standard," but also "a standard that applies to nations during peacetime, in anticipation that armed conflict might arise in the future."). Under a DoD Directive and an Instruction from the Chairman of the Joint Chiefs of Staff, "[i]t is DOD policy that . . . Members of the DOD Components comply with the law of war during all armed conflicts, however such conflicts are characterized, and in all other military operations." U.S. DEP'T OF DEF., DIR. CJCSI 5810.01D, IMPLEMENTATION OF THE DOD LAW OF WAR PROGRAM ¶ 4 (Apr. 30, 2010); *accord* U.S. DEP'T OF DEF., DIR. 2311.01, DOD LAW OF WAR PROGRAM ¶ 1.2 (July 2, 2020); *see also* von der Dunk, *supra* note 85, at 214 (describing both space law and the law of armed conflict as *lex specialis*, creating particular rules that would supersede more general rules of international law).

[184] The Vienna Convention on the Law of Treaties defines material breach of a treaty as "a repudiation of the treaty not sanctioned by the present Convention." Vienna Convention on the Law of Treaties, art. 60(3)(a), May 23, 1969, 1155 U.N.T.S. 331 [hereinafter VCLT]. The International Law Commission has observed that the concept of anticipatory breach of a contract is common in domestic law systems, and a similar concept, amounting to a definitive refusal in advance to fulfill commitments, is expressed in the VCLT. *Documents of the Fifty-First Session,* [1999] 2 Y.B. Int'l L. Comm'n 3, 32 n.214, U.N. Doc A/CN.4/SER.A/1999/Add.1 (Part 1). *See* Bruno Simma & Christian J. Tams, *Reacting Against Treaty Breaches*, *in* 1 OXFORD GUIDE TO TREATIES 576, 583 (Duncan B. Hollis ed., 2012) ("Article 60(3) [of the VCLT] 'defines' a material breach by distinguishing two cases. The first of these is an obvious one: pursuant to Article 60(3)(a), the repudiation of a treaty (i.e., any attempt by a State to relieve itself from its obligations) will generally

First, as a verbal or expressive matter, in sequential presidential U.S. space policies and associated documents promulgated over the past twenty years, the United States has officially asserted that it will not fulfill the legal obligation of reverse distinction during a future armed conflict. It has instead adopted a formal policy incompatible with future good faith performance of that legal requirement. This confirmation of a deliberate prospective violation has been issued publicly at the highest level of government, and it has been consistently maintained by successive administrations of different political parties over a sustained period of time. There is no ambiguity about the clearly stated intentions of the government.

Second, as a physical matter, the United States has positioned itself such that future fidelity to the legal obligation would be exceedingly difficult, if not impossible, logistically. By intentionally entangling the national security and private space sectors, making contractual commitments to deepen that integration during future crises and wars, and partially disabling itself from competing with the private sector in the procurement of space capabilities, the United States has, as a practical matter, foreclosed the option of future compliance.[185]

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constitute a material breach. While practice applying paragraph 3(a) is sparse, the *Namibia* case provides an illustration. There, the ICJ held that by disregarding obligations deriving from the 1922 agreement, South Africa had 'disavowed' the mandate, which the majority considered to amount to a repudiation."); Legal Consequences for States of the Continued Presence of South Africa in Namibia (South West Africa) Notwithstanding Security Council Resolution 276 (1970), Advisory Opinion, 1971 I.C.J. 16, 47 (June 21) (ICJ assesses that South Africa's apartheid policy constituted both a disavowal and an ongoing violation of the terms of its mandate over Namibia); Case Concerning the Gabčikovo-Nagymaros Project (Hungary/Slovakia), Judgment, 1997 I.C.J. 7, 57 (Sept. 25) (ICJ determines that action by Czechoslovakia did not constitute a repudiation of the treaty with Hungary, because the action did not "predetermine the final decision" still to be taken by Czechoslovakia); *see also* VIENNA CONVENTION ON THE LAW OF TREATIES: A COMMENTARY 1105 (Oliver Dorr & Kirsten Schmalenbach eds., 2d ed. 2018) (asserting that the VCLT provision regarding treaty breach by repudiation "must be interpreted narrowly"). Detailed analysis of the question of anticipatory breach of a customary international law obligation, as applicable to a state that has not joined AP I, is beyond the scope of this Article.

[185] *See* ASTORINO-COURTOIS ET AL., *supra* note 156, at 2 (suggesting that optimal exploitation of commercial satellites for military purposes would require installation of compatible equipment on military platforms, so a governmental determination to allocate funding for this equipment would therefore clearly demonstrate an advance decision to pursue the option); Sandra Erwin, *Air Force Enlists Viasat to Help Integrate Commercial and Military Satellite Networks*, SPACENEWS (Mar. 15, 2021), https://spacenews.com/air-force-enlists-viasat-to-help-integrate-commercial-and-military-satellite-networks/

### *B. Neutrality Law*

Special considerations attend the U.S. military and IC reliance upon other countries' space assets. For states that are formal U.S. allies (e.g., members of the NATO alliance) or that are co-belligerents alongside the United States in a particular armed conflict, the analysis is relatively straightforward. Military or IC use of those assets (e.g., for reconnaissance, communications, or space launch) to assist in the prosecution of the war effort would categorize them as military objectives, subjecting them to direct targeting by the enemy, regardless of whether the asset was owned and operated by the foreign state or by one of its private entities. Conversely, if the space asset remained entirely civilian in nature, location, purpose, and use, it should enjoy continued exemption from targeting as a civilian object.

For foreign states that are not U.S. allies or co-belligerents in a conflict, the analysis is more complicated, and the application of traditional neutrality rules in space is still somewhat indefinite. Ordinarily, any state A that sought to remain neutral during an armed conflict between states B and C would be required to practice "abstention" and "impartiality"—it must neither participate in the fighting nor demonstrate favoritism toward either belligerent, but must treat them equally. To the extent that familiar terrestrial neutrality rules would also apply in space, these relationships would imply that if A provides satellite reconnaissance or communications services to support B, it must extend corresponding privileges to C. Failure to do so would constitute a violation of A's obligations as a neutral, jeopardizing that status.[186]

Regarding space, however, this relationship is further complicated

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[https://perma.cc/LA9C-QLNT] (describing new efforts to resolve longstanding incompatibilities between governmental and satellite communications networks and create a seamlessly integrated network; noting efforts to "augment and replace" existing Air Force communications satellites).

[186] *See* DOD LAW OF WAR MANUAL, *supra* note 1, § 15.3; Waldrop, *supra* note 78, at 227–28 (distinguishing between a neutral's abstention obligations regarding communications services and other satellite functions; a neutral is not required to restrict belligerents' access to communications apparatus); COMMANDER'S HANDBOOK, *supra* note 10, at 7-1 to 7-2; Peter Hulsroj & Anja Nakarada Pecujlic, *Space Through the Lens of Neutrality*, *in* CONFLICTS IN SPACE AND THE RULE OF LAW 437, 446–47 (Maria Manoli & Sandy Belle Habchi eds., 2017); von der Dunk, *supra* note 85, at 221–25; OSLO MANUAL, *supra* note 12, at 15–16 (applying neutrality rules to military operations in space).

by unique rules governing the attribution to a state of the space activities of its private actors, noted *supra*.[187] That is, the normal standard, prevailing in most realms of international law, provides that a state is not ordinarily responsible for the wrongful acts of its private citizens or corporations—they are distinct legal persons, with their own legal liabilities.[188] But OST art. VI departs from that convention, specifying that state A "shall bear international responsibility" for activities in space undertaken by its non-governmental entities.[189] Thus, if a corporation possessing A's nationality[190] undertakes to provide important support to B's national security apparatus during an armed conflict between B and C, and if that corporation does not treat C identically, performance of that "non-impartial" arrangement may be imputed to A and may risk A's claimed neutrality.[191] Although there is to date no state practice to clarify the relationship between art. VI and traditional neutrality law, private actors may thus vicariously ensnare a state in an armed conflict, even without its knowledge or control.[192]

By this analysis, if the United States military were to rely upon surveillance services from a privately-owned and -operated Swedish,

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[187] *See supra* text accompanying notes 86–88 (regarding OST art. VI). *But see* Wolff Heintschel von Heinegg, *Neutrality and Outer Space*, 93 INT'L. L. STUD. 526, 546–47 (2017) (arguing that neutrality law is territorial in nature and does not apply in space).

[188] *See General Commentary on Responsibility of States for Internationally Wrongful Acts*, *Report of the International Law Commission on the Work of its Fifty-Third Session*, [2001] 2 Y.B. Int'l L. Comm'n 38–39, U.N. Doc. A/CN.4/SER.A/2001/Add.1 (Part 2) (assessing that it is generally not appropriate under international law to attribute to a state the legal responsibility for the actions of its persons, corporations, or other non-governmental entities); Joshua J. Wolff, *Space Law: What it is and Why it Matters*, 5 ARMY LAW. 67, 69 (2020).

[189] Outer Space Treaty, *supra* note 79, art. VI.

[190] Beyond art. VI of the OST, space law is complicated regarding the necessary juridical link between a state, a particular non-governmental entity, and a satellite. To some extent, the key element is to determine which state has registered the satellite, pursuant to art. II of the Registration Convention. *See supra* note 155. At the same time, additional states could qualify as "launching states" pursuant to art. I of the Convention on International Liability for Damage Caused by Space Objects. Mar. 29, 1972, 961 U.N.T.S. 187. In addition, in particular situations, the state exercising (or whose nationals exercise) ownership, control, or use of the satellite may be implicated.

[191] *See* Blount, *supra* note 54, at 12–13 (questioning the legal characterization of a privately owned satellite, registered in a neutral state, that provides militarily-valuable imagery to one belligerent—the satellite may become a legitimate military target, but does that also jeopardize the neutral status of the state?); Waldrop, *supra* note 78, at 226–28 (discussing a belligerent's right not to have satellites from neutral states, public or private, assist an opposing belligerent).

[192] *See* Outer Space Treaty, *supra* note 79, art. VI (obligating the state to exercise "continuing supervision" of the space activities of its non-state entities).

Brazilian, or UAE satellite, for example, not only may the adversary regard the spacecraft as a military objective, but if the violation of abstention and impartiality is sustained and significant, then the legal neutrality of the sponsoring state may be jeopardized.[193]

### *C. Consequences of a Breach*

The first, most obvious consequence of a failure of reverse distinction is that the mixed-use satellite loses its protected civilian status; it is converted into a legitimate military objective that the enemy may legally fire upon (provided that the belligerent complies with other governing LoAC rules, such as the principle of proportionality.[194]) Associated ground launch and control facilities also become subject to attack, as they are directly engaged in and supporting the hostilities.[195] In the same way, satellites belonging to a neutral state that are employed for the benefit of only one belligerent may also be lawfully targeted by the opposing party, and if the departure from the standard of impartiality is sufficiently egregious, the state may sacrifice its status as a neutral.[196]

Some satellite owners and operators would reject that path; they would not want to risk becoming legitimate targets of hostile fire during wartime, so they would not accept contracts with the U.S. government to provide national security services. Others, however, might calculate the odds differently; they would welcome profitable engagement with the military and IC, reasoning that the odds would run against an outbreak of war in space, and against their particular satellites being targeted even in those extreme circumstances. (Alternatively, they might predict that if a vigorous war in space did break out, the enemy might illegally assault even wholly civilian satellites, as well as military and dual-use orbiters.[197])

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[193] Special rules apply to communications services, perhaps including satellite communications. *See* INT'L COMM. OF THE RED CROSS, THE LAW OF ARMED CONFLICT: NEUTRALITY 8 (2002), https://www.icrc.org/en/doc/assets/files/other/law8_final.pdf [https://perma.cc/J2NX-M826].

[194] *See* OSLO MANUAL, *supra* note 12, at 9–10 (discussing how civilian satellites can become military objectives through their nature, location, purpose, or use); *supra* text accompanying note 8 (discussing the principle of proportionality).

[195] Unlike an attack on spacecraft, an attack on the associated ground stations would directly penetrate the territorial sovereignty of the state, and would likely inflict human casualties, so it might be viewed as improperly disproportionate and escalatory.

[196] *See supra* text accompanying notes 186–193 (discussing neutrality).

[197] Hitchens & Clark, *supra* note 117 (quoting then-Secretary of Defense Mark Esper, "We anticipate that adversary nations are unlikely to discriminate between U.S. military satellites and commercial satellites providing services to the U.S. government in the event

Again, similar risk/reward calculations would be required of foreign corporations that might contract to serve the U.S. national security agencies.[198]

The larger point, however, runs beyond the exposure of particular dual-use satellites. The U.S. failure to abide by the concept of reverse distinction is an illegal act —a purposeful, conspicuous breach of the law of armed conflict, constituting a premeditated departure from adherence to a body of law that the United States is committed to uphold and that it has righteously criticized others for violating.[199]

It is beyond the scope of this Article to assess when a violation of reverse distinction might constitute a war crime (chargeable against particular individuals or institutions) in addition to being a violation of LoAC (chargeable against the state).[200] Taking human shields is a war

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of a conflict" and citing another Department of Defense official saying that it would be surprising if China made any distinction in its war planning between U.S. military and civilian satellites, since China does not differentiate between its own satellite providers in that way).

[198] *See* Lee & Steele, *supra* note 75 , at 80 (observing that for Intelsat, a leading provider of communications services, the U.S. government is the largest single customer, but still represents only 12% of the company's business); Sassòli & Quintin, *supra* note 1, at 116 (discussing the view that a "party to a conflict which chooses to use its civilian population for military purposes . . . cannot complain when inevitable, although regrettable, civilian casualties result," but even if the state "cannot complain," the civilians do not lose their protected status (citing U.S. DEP'T OF AIR FORCE, PAMPHLET 110-31, INTERNATIONAL LAW - THE CONDUCT OF ARMED CONFLICT AND AIR OPERATIONS (Nov. 19, 1976))). Additional complications could arise when a satellite is launched or owned by a multi-national corporation or consortium, perhaps implicating several states that maintain different statuses with respect to the armed conflict. *See* LYALL & LARSEN, *supra* note 78, at 417; KLEIN, *supra* note 140, at 3 (suggesting that private companies will desire to honor their contractual commitments to provide continuous service to their customers, regardless of an outbreak of international hostilities, and may not be willing to accept instructions from the U.S. government to deny services to an opposing state); Hitchens, *supra* note 160 (reporting that for some space companies, the business case for offering continuous service to commercial customers might overwhelm the interest in securing government contracts).

[199] *See supra* text accompanying notes 19–20 (citing U.S. military's formal commitment to adhere to LoAC).

[200] *See generally* Jensen, *supra* note 10, at 167–69 (arguing that criminal responsibility for violation of reverse distinction has rarely been invoked; greater enforcement of the provision would significantly aid in protecting civilians); Quéguiner, *supra* note 4, at 816 (concluding that a violation of AP I art. 51(7)—such as via the use of human shields—would entail individual criminal liability, but a violation of AP I art. 58—requiring reverse distinction—would not); Blank, *supra* note 1, at 795–97 (noting that violations of AP I art. 58 are not war crimes and that international tribunals have very rarely prosecuted those

crime, but the gravamen of that offense rests upon the immediate misuse of human beings, rather than the risk to non-human protected private and neutral property.[201]

Special considerations could apply if the national security use of a putatively commercial satellite were kept secret. Mislabeling a military satellite as a civilian object could constitute perfidy,[202] since it seeks to

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who violate the reverse distinction obligation; calling for greater accountability for fighters who illegally fail to distinguish themselves from civilians, because otherwise these violations will continue and civilians will be jeopardized).

[201] HENCKAERTS & DOSWALD-BECK, *supra* note 1, at 337 (Rule 97: the prohibition against the use of involuntary human shields); *id.* at 584 (observing that the use of human shields "has also been recognised as a war crime by the International Criminal Tribunal for the Former Yugoslavia, either as inhuman or cruel treatment, or as an outrage upon personal dignity," and that "[i]ts inclusion in the Statute of the International Criminal Court was uncontroversial" because "[u]sing human shields constitutes a criminal offence under the legislation of many States."); Rome Statute, *supra* note 66, art. 8(2)(b)(xxiii) (identifying use of human shields as a war crime).

A voluntary human shield would not ordinarily be acting in violation of international law, but might be considered to be "directly participating in hostilities," thereby sacrificing civilian immunity. Individual criminal liability is unclear for a leader who solicits, encourages, or demands the use of voluntary shields, or who creates the conditions generating unwitting human shields. MELZER, *supra* note 150, at 56–57; INT'L COMM. OF THE RED CROSS, THE LAW OF ARMED CONFLICT: CONDUCT OF OPERATIONS – PART A 6, 14–15 (2002), https://perma.cc/LH2G-SP6P; DOD LAW OF WAR MANUAL, *supra* note 1, § 5.16; Adil Ahmad Haque, *Human Shields in the (Updated) Dept of Defense's Law of War Manual*, JUST SEC. (Dec. 15, 2016), https://perma.cc/JND4-PPCU; Corn, *supra* note 1, at 125–28; Sassòli & Quintin, *supra* note 1, at 114 (arguing that a human shield is not ordinarily directly participating in hostilities); Bosch, *supra* note 73, at 451, 457, 463 (noting that experts are divided about whether a voluntary human shield is directly participating in hostilities; the answer might depend on the specific circumstances).

[202] Under AP I, art. 37, perfidy is defined as "[a]cts inviting the confidence of an adversary to lead him to believe that he is entitled to, or is obliged to accord, protection under the rules of international law applicable in armed conflict, with intent to betray that confidence," including "the feigning of civilian, non-combatant status." That article directly prohibits perfidy only when it is used "to kill, injure or capture an adversary," suggesting limited applicability to contemporary space operations. Perfidy is distinguished from a lawful ruse of war, which similarly intends "to mislead an adversary or to induce him to act recklessly," but which does not involve a misrepresentation of status or other legal protection. Additional Protocol I, *supra* note 1, art. 37(1); HENCKAERTS & DOSWALD-BECK, *supra* note 1, at 221; DOD LAW OF WAR MANUAL, *supra* note 1, §§ 5.21–22; SOLIS, *supra* note 1, at 457–69 (differentiating between perfidy and ruses); ICRC 1987 COMMENTARY, *supra* note 9, at 430–44 (defining perfidy and differentiating it from lawful ruses of war); Heller, *supra* note 55, *passim*; Sean Watts, *Law-of-War Perfidy*, 219 MIL. L. REV. 106, *passim* (2014); TALLINN 2 MANUAL, *supra* note 22, at 491–95 (discussing the concept of perfidy in cyber operations). Regarding secrecy in the misidentification of a spacecraft, see Schmitt & Bettinger, *supra* note 41, at 68.

exploit for military benefit an enemy's adherence to its LoAC obligations. Intentionally misleading the world about the true nature and function of a dual-use satellite or a component could trick an enemy into believing that the object was entitled to protection, and could deprive the enemy of the opportunity to conduct an accurate proportionality assessment prior to any attack. That opacity would be inconsistent with the standard commitment to adhere to LoAC in good faith, and may be indicative of a *mens rea* that would be relevant to criminal prosecution.[203]

## IV. OPTIONS

Much of the blossoming U.S. reliance upon civilian and neutral satellites for national security purposes is illegal, unwise, or both. In terms of the legal analysis, the easiest case is where the military or IC comprehensively and overtly occupies all of a privately-owned (or foreign) satellite's capabilities, such as through a publicly-disclosed long-term lease of the vehicle's complete reconnaissance or communications capabilities. In that situation, the satellite is converted from a civilian object into a military objective, through its use or projected use, and the enemy may legitimately attack it during an armed conflict (assuming faithful compliance with other LoAC obligations). This sort of military occupation of a formerly civilian object is not illegal, but it jeopardizes the security of the satellite, whose owners have voluntarily assumed that much greater risk inherent in the changed legal identity.[204]

A second scenario is likewise clear-cut, but this time blatantly illegal. Hosted payloads constitute a deliberate, illegitimate insertion of military and intelligence functions into erstwhile civilian spacecraft. When a military payload is stashed into a private satellite bus, juxtaposed with

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[203] *See* HENCKAERTS & DOSWALD-BECK, *supra* note 1, at 568–603 (defining a war crime as a serious violation of international humanitarian law that endangers protected persons or objects or that breaches important values, and discussing the circumstances under which individual criminal responsibility is appropriate, including "extensive destruction or appropriation of property, not justified by military necessity and carried out unlawfully and wantonly"); Rome Statute, *supra* note 66, art. 8(2)(b)(xxiii) (defining the war crime of taking human shields as involving "utilizing . . . protected persons as shields").

[204] In some situations, a system of conspicuous, distinctive markings (such as personal uniforms or prominent logos on buildings or equipment) can provide a partial substitute for physical separation of military and civilian objects. DOD LAW OF WAR MANUAL, *supra* note 1, § 2.5.3.1. For satellites, any such visual 3differentiation would be essentially invisible from Earth and therefore legally ineffective, but perhaps civilian satellites could continuously transmit a distinctive electronic identification code (comparable to the "squawk" of civilian aircraft) for similar purposes.

legally-protected commercial components, there is a conscious, unmistakable failure of the legal obligation of reverse distinction.[205]

A third scenario is more complicated. When national security agencies engage only a part of a satellite's total operations, or when they do so for only a limited period of time, the legal analysis requires more nuance. Of course, the hybrid satellite immediately becomes a targetable military objective—its nature and purpose provide the U.S. government with a definite military advantage that the enemy is entitled to try to negate. But in addition, even this partial occupation is a violation of reverse distinction, because through this operation, the government has conspired to create a situation in which civilian and military assets and functions are impermissibly intertwined.[206] A similar analysis applies to ground stations: if the Pentagon's Space Development Agency proceeds with plans to rent commercial earthbound control stations from private industry, the facilities would begin to simultaneously serve both national security and civilian functions, in disregard of reverse distinction.[207]

This third practice is not quite the same as the government bringing

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[205] *Cf.* Waldrop, *supra* note 78, at 228–30; SPACE COMMAND WHITE PAPER, *supra* note 144, at 11 & n.17 (observing that hosting a military payload on a commercial spacecraft would complicate an adversary's decision calculus about attacking, and analogizing that tactic to Iraq's practice of placing signs reading "Baby Milk Factory" onto valid military targets).

[206] Charlie Dunlap, *Are Commercial Satellites Used for Intelligence-gathering in Attack Planning Targetable?* LAWFIRE (March 5, 2021), https://sites.duke.edu/lawfire/2021/03/05/are-commercial-satellites-used-for-intelligence-gathering-in-attack-planning-targetable/ [https://perma.cc/8EVJ-5JYC]. There could be numerous variations on the theme of a partial or temporary use of a civilian or neutral satellite by the military or IC. Regarding a reconnaissance satellite, for example, the national security agencies could undertake to procure all or only some of the imagery collected, perhaps from a particular country or theater of operations, for a specified or extended period of time; they could seek exclusive, or only shared, access to that material; and they could (or not) have the ability to task the satellite system to pursue specified opportunities. Regarding a communications satellite, the military or IC could similarly contract to consume some or all of the satellite's capacity, excluding or permitting some or all other contemporaneous users; this sort of option could be for a fixed or indefinite period of time, and for only a segment of the satellite's orbital path. Regarding launch services, the government could seek a specified or variable number of launches within a particular window of time, with specified or open parameters regarding the size and characteristics of the satellites and the orbits into which they would be deposited.

[207] Theresa Hitchens, *SDA to Rent Commercial Ground Stations*, BREAKING DEF. (June 19, 2020), https://breakingdefense.com/2020/06/sda-to-rent-commercial-ground-stations [https://perma.cc/Q6DV-G825].

a military asset into a civilian location (as with Saddam Hussein's jets), nor is it exactly identical to bringing civilians and other protected persons into proximity with a military objective (as with Milosevic's bridges), but it accomplishes a similar, improper mixing. In the language of Additional Protocol I, the U.S. government here did not "endeavor to remove" civilian objects from the vicinity of military objectives,[208] did not "take the other necessary precautions" to protect civilian objects against the dangers resulting from military operations,[209] and did not exercise "constant care" to spare the civilian objects.[210] Better fidelity to international legal standards that the United States otherwise champions must be regarded as "feasible."[211]

As this pattern of use expands, it could become easier for a belligerent to characterize many communications and reconnaissance satellites, and the associated launch vehicles and stations, as military objectives, based on their intended (and their contractual) potential function of being exploited for military or IC purposes. Vast fleets of spacecraft that are now widely labeled as commercial in character could therefore lose their LoAC privilege, and one important safeguard against a potential all-out space war would crumble.[212]

Logically, there could be four types of alternative policy responses to the contradiction between the LoAC principle of reverse distinction and the longstanding U.S. space practice of increasing the entanglement of civilian and third-country space assets within the national security structure.

The first possibility would be for the United States to reverse the improper policy, and commit to spending the extra money necessary to construct an adequately robust military and IC space architecture without planning to integrate commercial and neutral orbiters, launchers, and ground stations into the warfighting. It is impossible to estimate at this point how much time and additional spending would be required for this transformation, to return to the traditional separation of military and civilian

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[208] Additional Protocol I, *supra* note 1, art. 58(a).
[209] *Id.* art. 58(c).
[210] *Id.* art. 57(1).
[211] *See supra* text accompanying note 19 (discussing feasibility).
[212] Use of this sort of dual-use civilian satellite may be characterized as being even more assertive than the exploitation of a voluntary or involuntary human shield, because the satellite has deliberately foregone its ordinary legal protection and is clearly directly engaged, or available for direct engagement, in the hostilities. *See* Bosch, *supra* note 73, at 465–66.

space functions. But if the United States experienced such an epiphany, it could achieve a self-sufficient, diversified, survivable, and legal national security space program, fully under governmental control, in peacetime and in wartime, and would potentially reduce the risk of significant collateral damage and the devastating impact on civilian life from outbreak of limited conflict in space. Notably, this is the posture that continues to be implemented in the non-space theaters; on land, sea, and air, U.S. military and IC components do not routinely depend upon integral augmentation from civilian assets during times of peace, crisis, or war.[213]

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[213] BRYAN FREDERICK & DAVID E. JOHNSON, RAND CORP., THE CONTINUED EVOLUTION OF U.S. LAW OF ARMED CONFLICT IMPLEMENTATION: IMPLICATIONS FOR THE U.S. MILITARY 73–74 (2015) (observing that "the fact that dual-use satellites may deter states from attacking them out of concern for collateral civilian damage suggests that some states or other actors may argue that the continued—or potentially even increasing—reliance on dual-use satellites should be viewed as incompatible with the principle of distinction. Particularly if it becomes increasingly cost-effective, and therefore feasible, to launch separate military and civilian satellites, the United States may come under some degree of political and legal pressure to separate its military capabilities in order to minimize the potential for collateral damage to civilian space assets in the event of a conflict."). *But see* Schmitt & Bettinger, *supra* note 41, at 63 (citing two examples since 1952 of U.S. military reliance upon civilian air assets—in Operations Desert Storm and Desert Shield and in Operation Iraqi Freedom). In addition, private military contractors have been increasingly used by the United States and others for a variety of combat support and even combat functions. U.S. Federal Acquisition Regulations prohibit private military contractors from performing inherently governmental functions, including combat missions. However, OMB Circular A-76 allows contractors to conduct "guard services, convoy security services, pass and identification services, plant protection services, [and] the operation of . . . detention facilities." OFF. OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, CIRCULAR NO. A-76 (Revised) (2003). Contractors are also authorized to use deadly force, if necessary, for mission fulfillment or force protection. *See generally* JENNIFER K. ELSEA, CONG. RSCH. SERV., R40991, PRIVATE SECURITY CONTRACTORS IN IRAQ AND AFGHANISTAN: LEGAL ISSUES (Jan. 7, 2010), https://fas.org/sgp/crs/natsec/R40991.pdf [https://perma.cc/3WB6-8848]; *Private Security Monitor*, UNIV. OF DENV., http://psm.du.edu/index.html (last visited Nov. 20, 2021) [https://perma.cc/ZEJ3-4BMF]; OMB CIRCULAR A-76, *supra*; Gary Therkildsen, *OMB Watch Partners with CREDO Action to Stop Reckless Outsourcing*, CTR. FOR EFFECTIVE GOV'T (May 17, 2010), https://www.foreffectivegov.org/node/10998 [https://perma.cc/M2LS-9CHB]; Alex Horton & Aaron Gregg, *Use of Military Contractors Shrouds True Costs of War. Washington Wants it That Way, Study Says*, WASH. POST (June 30, 2020), https://www.washingtonpost.com/national-security/2020/06/30/military-contractor-study [https://perma.cc/9WCJ-5JUX].

The U.S. government has negotiated contracts with several U.S. civil air carriers to make some of their aircraft temporarily available for military support purposes during a defense-related crisis. This Civil Reserve Air Fleet has been formally activated only three times, during the 1990 and 2003 wars in the Persian Gulf, and in 2021 regarding the U.S. withdrawal from Afghanistan. *Civil Reserve Air Fleet*, U.S. AIR FORCE, https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104583/civil-reserve-air-fleet [https://perma.cc/Y77L-AK7A] (last visited Nov. 26, 2021); *Civil Reserve Airfleet*, U.S.

As a second option, the United States could repudiate the principle of reverse distinction, at least as applied in this special context of space. The United States could undertake an international effort to negotiate a revised understanding of the concept of separation, particularly as relevant to satellites. There have been no sustained multilateral efforts to elaborate and expand the law of armed conflict since the conclusion of the 1977 Additional Protocols to the 1949 Geneva Conventions, and there is no indication that the world may be ready today to codify the rights and responsibilities attendant to the surge of military operations in space. So, again, it is premature to try to estimate the likelihood of the other leading spacefaring states agreeing to accommodate this sort of proposed amendment to well-established LoAC principles in the milieu of space.

The third option would be for the United States to declare that in a time of armed conflict, all its dual-use satellites and ground stations will no longer be viewed as civilian objects; they become military objectives, subject to lawful attack.[214] Such an expansion of the battle space, exposing thousands of currently-immune spacecraft and control stations to enemy

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DEP'T OF TRANSP., https://www.transportation.gov/mission/administrations/intelligence-security-emergency-response/civil-reserve-airfleet-allocations [https://perma.cc/3YPN-Z79J] (last visited Nov. 26, 2021); Ellie Kaufman, Oren Liebermann, Veronica Stracqualursi & Alexis Benveniste, *Pentagon Activates US Airlines to Assist with Evacuation Efforts from Afghanistan*, CNN (Aug. 22, 2021), https://www.cnn.com/2021/08/22/politics/pentagon-us-airlines-american-delta-united-afghanistan-evacuation/index.html [https://perma.cc/FBC3-8G7P] (describing the August 2021 mobilization of the Civil Reserve Air Fleet program, in which the Department of Defense contracted with U.S. airlines for up to eighteen planes to assist in the forward movement of U.S. and Afghan civilians who had been airlifted by the U.S. military away from Afghanistan); Oriana Pawlyk, *Biden Administration Activates U.S. Airlines for Afghanistan Evacuations*, POLITICO (Aug. 22, 2021), https://www.politico.com/news/2021/08/22/civil-reserve-air-fleet-afghanistan-evacuations-506516 [https://perma.cc/G732-TZSS] (noting the two previous exercises of this program, in temporary support of Operation Desert Shield in 1990 and of Operation Iraqi Freedom in 2003); *see also National Defense Reserve Fleet (NDRF)*, U.S. DEP'T OF TRANSP., https://www.maritime.dot.gov/national-defense-reserve-fleet [https://perma.cc/7QFA-FHKH] (last visited Nov. 26, 2021) (describing a somewhat similar provision regarding access to "mothballed" merchant vessels, which are now owned by the government); Hitchens, *NRO Space Civil Reserve*, *supra* note 160 (reporting proposals to create a "Civil Reserve Space Fleet").

[214] Alternatively, the United States might seek to designate some satellites as exclusively civilian objects, and others as military, in view of their different dedicated "nature, location, purpose or use." *See supra* text accompanying note 34 (defining civilian object). It might, however, prove impossible for the adversary to verify such a differentiation in practice.

strikes, would be inconsistent with a fundamental LoAC purpose of endeavoring to limit the destructiveness of the combat.[215] The questionable status of third-country satellites and installations would pose another obstacle to this potential path.

The fourth option would be to lie about it. The United States could assert that the sole reason why it is eschewing the application of reverse distinction in this context is because it is no longer economically and technologically feasible to maintain the traditional separation of military and civilian satellites. The United States could deny that it is making a deliberate, strategic military choice to integrate the heretofore distinct space networks, pretending that it is just a coincidence that the intermingling has a side-effect of complicating the challenges confronting any enemy ASAT program. Once again, it is hard to know in advance whether this feasibility subterfuge would fool outside observers, or whether they would readily see through it (being assisted by the occasional U.S. government statement that has overtly acknowledged the multiple motivations) and consider it an illegitimate ploy to cloak military and intelligence assets in civilian garb.

In any of these approaches, it is noteworthy that the exploitation of dual-use satellites will increase the exposure of *all* civil, commercial, and neutral space assets, because a prospective enemy may not be able swiftly and reliably to discern which satellites are reserved for benign and impartial applications and which covertly play a military or IC role. It is inevitable that "worst case planning" will tempt an enemy, in real time and in the fog of space war, to conclude (or at least to suspect) that an ambiguous orbiter is (or will soon be) manipulated to its military disadvantage and has become a legal military objective.[216]

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[215] *See* Charles J. Dunlap, Jr., *Organized Violence and the Future of International Law: A Practitioner's View of the Emerging Issues*, 93 *AM. SOC'Y INT'L L. PROCS.* 6, 9–10 (1999) (highlighting the problematic moral and legal responsibility arising from a decision to convert civilian and neutral spacecraft into military objectives subject to enemy targeting). This strategy would also depart from the approach that the United States has traditionally exercised in other warfighting domains, where the United States has conspicuously not declared that all civilian aircraft, boats, or land vehicles are military objectives.

[216] Worst case planning, or making an adverse assumption about the current or future application of a particular satellite, is not a valid basis for considering it to be a military objective. ILA Study Group, *supra* note 2, at 332, 381–84; Sassòli & Quintin, *supra* note 1, at 84–85 (discussing the attacker's duty to verify that a target is a military objective and concluding that if there is no evidence that a particular object contributes to enemy military action, it must not be attacked).

In a nutshell, this is the "price" for intermingling military and civilian space assets—it enlarges the scope of the potential harm that might be inflicted in wartime. One of the fundamental objectives of the law of armed conflict is to cabin the anticipated devastation inherent in combat—in particular, to shield civilians from some of the worst consequences. But this avoidable juxtaposition of military and civilian satellite functions undercuts that objective.

In addition, careful dynamic analysis must anticipate that other states may sooner or later emulate the U.S. practice of making greater national security use of civilian or third-country satellites. If such a denial of reverse distinction provides advantages to the United States, in terms of cost, technology, or befuddlement of potential adversaries, the strategy may exert a similar allure for others. As they proceed down that benighted path, they, too, would be transgressing traditional LoAC principles. How would the United States respond in an armed conflict, if an opponent illegally violated reverse distinction? Would the United States shoot at the multi-purpose offending satellite, or run the risk that a legal target was escaping?[217]

This Article has focused on the U.S. practices in failing to honor reverse distinction, because the United States is the leading spacefaring state and has to date pushed the explicit official policy of integrating private satellites into the national security structure more fully and more overtly than others, and also because the United States regards itself as a leading exponent and champion of LoAC.[218] But it is also noteworthy that some of

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[217] See, for example, these sources discussing these kinds of multipurpose satellites. Hallex & Cottom, *supra* note 106, at 22–23 (noting that China is developing an ostensibly private constellation of proliferated small satellites comparable to commercial enterprises in the United States); Andrew Jones, *Chinese Rocket Company Space Pioneer Secures Major Funding Ahead of First Launch*, SPACENEWS (July 27, 2021), https://spacenews.com/chinese-rocket-company-space-pioneer-secures-major-funding-ahead-of-first-launch [https://perma.cc/MAS2-FTUU] (asserting that "[China] is looking to both state-owned and commercial companies" for space launch services); *see also* TALLINN 2 MANUAL, *supra* note 22, at 440 (concluding that LoAC provides no standard for assessing how likely the possible military applications would have to be, in order for a particular civilian object to be considered a military objective).

[218] Although the United States has not ratified the two Additional Protocols to the Geneva Conventions, U.S. authorities consistently note the country's leading role in developing LoAC and have acknowledged that portions of the content of those instruments are binding as customary international law. *See, e.g.*, MESSAGE FROM THE PRESIDENT OF THE UNITED STATES REGARDING PROTOCOL II ADDITIONAL TO THE 1949 GENEVA CONVENTIONS, AND RELATING TO THE PROTECTION OF VICTIMS OF NON-INTERNATIONAL ARMED CONFLICTS, S.

the other key space states, especially Russia and China, have structured their domestic political and economic systems very differently from the Western capitalist states. The daunting costs of space operations have driven even many countries in the latter category to adopt various forms of public-private partnerships eliding the categorical distinctions established in the United States. In many societies, therefore, the contrast between the public and private sectors is elusive, especially in the capital- and technology-intensive sectors such as space. The task of differentiating between their private and commercial satellites vs. military and IC assets is therefore daunting and perhaps meaningless. Reformation of the legal standards for reverse distinction—especially as applied in space—may be ripe; but until that new global lawmaking occurs, it is incumbent upon the United States to remain faithful to existing law that it has rigorously championed in prior occurrences.[219]

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TREATY DOC. NO. 100-2, at III (1987), https://casebook.icrc.org/case-study/united-states-president-rejects-protocol-i [https://perma.cc/J5E3-HBM2 ] ("The United States has traditionally been in the forefront of efforts to codify and improve the international rules of humanitarian law in armed conflict, with the objective of giving the greatest possible protection to victims of such conflicts, consistent with legitimate military requirements. The agreement that I am transmitting today is, with certain exceptions, a positive step toward this goal."); Sassòli & Quintin, *supra* note 1, at 119 (noting that the United States has been a supporter of AP I art. 58(b) in particular).

[219] *See* Bruce McClintock, *The Russian Space Sector: Adaptation, Retrenchment, and Stagnation*, 10 SPACE & DEF. 1, at 3 (2017) (describing Russia's space sectors as being government controlled); POLLPETER ET AL., *supra* note 76, at 77–85 (profiling Chinese commercial space companies); STOKES ET AL., *supra* note 112 , at 59–72 (describing "military-civil fusion" in China's space activities); CHALLENGES TO SECURITY IN SPACE, *supra* note 110, at 15 (discussing civil-military fusion of China's space activities); PRC MILITARY DEVELOPMENTS, *supra* note 112, at 143–48 (discussing integration of China's public and private space activities); W. Aviles, B. Bragg, N. Peterson & G. Popp, *Ally, Adversary, and Partner Use of Space*, NAT'L SEC. INNOV., INC. (Jan. 2018), https://nsiteam.com/ally-adversary-and-partner-use-of-space [https://perma.cc/7S4V-4MR2] *(describing both Russia and China as having commercial space programs that are essentially under government control, especially where military and security concerns arise)*; Emily de La Bruyère & Nathan Picarsic, *How to Beat China's Military-Civil Fusion*, AM. INTEREST (June 22, 2020), https://www.the-american-interest.com/2020/06/22/how-to-beat-chinas-military-civil-fusion [https://perma.cc/37DW-LWFT] (describing the thorough integration of Chinese military and civilian enterprises, especially in high-tech areas); IRINA LIU, EVAN LINCK, BHAVYA LAL, KEITH W. CRANE, XUEYING HAN & THOMAS J. COLVIN, INST. DEF. ANALYSES, EVALUATION OF CHINA'S COMMERCIAL SPACE SECTOR (Sept. 2019), https://www.ida.org/research-and-publications/publications/all/e/ev/evaluation-of-chinas-commercial-space-sector [https://perma.cc/43F6-3THU] (describing Chinese commercial space sector and analyzing the emerging private space industry in China); Pavel Luzin, *Endless Rumbles of Roscosmos Reform*, RIDDLE (Aug. 26, 2020), https://www.ridl.io/en/endless-rumbles-of-roscosmos-reform [https://perma.cc/RM5Q-7FSY] (describing the status of Russia's state-

A final comparison to urban warfare may be instructive: In a city, the defender will ordinarily have much more information than does the attacker about where the civilians and their property are located, and it will have better ability to move them, and to maneuver its own personnel and assets, to achieve separation. So it is appropriate that much of the precautionary onus of reverse distinction rests upon the defender, so the attacker can vindicate its obligation of distinction, even though the treaty provisions are largely framed in terms of the obligations incumbent when making an attack.[220] Likewise, in space, the state that is employing a dual-use satellite will ordinarily have a monopoly on the information about which components of the satellite it is using, for what purposes, over what period of time, and that state will be uniquely positioned to achieve lawful separation (or not).[221]

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run space corporation). This political and economic reality suggests that most or all Russian and Chinese satellites are government-owned or -controlled, and perhaps that all of them are available for government service, especially during a crisis or war. The concept of reverse distinction may thus operate asymmetrically in space, immunizing some private U.S. satellites from attack, and providing the U.S. economy an ongoing benefit that would not be fully operational in Russia or China. Abandoning the concept of reverse distinction in the space milieu would sacrifice that one-sided U.S. advantage. *See* ASTORINO-COURTOIS ET AL., *supra* note 156, at 6 (indicating that the United States is unusual in maintaining such a clear distinction between civil, military and commercial space operators); JEFF KUETER & JOHN B. SHELDON, HERITAGE FOUND., AN INVESTMENT STRATEGY FOR NATIONAL SECURITY SPACE 15 (Feb. 20, 2013), https://www.heritage.org/space-policy/report/investment-strategy-national-security-space [https://perma.cc/6GFN-MUQ2] (observing that in the United Kingdom and elsewhere, public-private partnerships are necessary to support costly space activities, departing from the standard U.S. pattern). *But see* WALSH ET AL., *supra* note 106, at 7 (identifying the rising Chinese commercial space sector); *see also* Aschbacher, *supra* note 125 (discussing increased role of European Space Agency in engaging the private sector).

[220] Charlie Dunlap has proposed that space could be made into a type of sanctuary, enjoying something akin to the protection that LoAC has long afforded to communications facilities located on the territory of a neutral state, so any state could freely use satellites for communications, surveillance, and other militarily valuable functions, even during an armed conflict, while remaining immune to attack from any belligerent. *See* Charles J. Dunlap, Jr., *Technology: Recomplicating Moral Life for the Nation's Defenders*, 29 PARAMETERS 24, 24–26 (1994).

[221] Parks, *supra* note 1, at 112, 137, 163–64, 168 (arguing against the tendency in AP I to shift from the defender to the attacker the primary responsibility for protecting the civilian population, concluding, "The defender's responsibility is to exercise an equal degree of care to separate individual civilians and the civilian population as such from the vicinity of military objectives. Where a defender purposely places military objectives in the vicinity of the civilian population or places civilians in proximity to military objectives, in either case for the purpose of shielding military objectives from attack, an attacker is not relieved from his obligation to exercise ordinary care. Responsibility for death or injury resulting from

## CONCLUSION

The burgeoning democratization of space offers both profound opportunities and stark dangers. As the costs of creating, launching, and operating satellites dwindle, the opportunities for private sector investment, innovation, and leadership will multiply. The national security space community, as everyone else, will be transformed, and governmental actors in the United States and elsewhere, will struggle to adapt to the modern circumstances.

Yet international law, and the law of armed conflict in particular, will continue to apply in space,[222] and the fundamental principles of distinction, proportionality, and reverse distinction will remain as bulwarks against indiscriminate and excessive use of armed force. The obligation to separate military objectives from civilian objects is as applicable in space as in all other domains and for the same reasons: it provides a modicum of humanitarian protection to civilians, neutrals, and other protected persons, places, and objects, and it seeks to confine the ravages of war within some civilized limits.

The principle of reverse distinction is hard law, but it is traditionally expressed in conspicuously soft form: a belligerent is obliged to maintain precautionary separation "to the maximum extent feasible";[223] it is required to "take other necessary precautions"[224] to protect civilians and civilian objects; and it is to exercise "constant care"[225] to spare civilians and their objects from the effects of military operations. Those obligations are imprecise, but they must be implemented in good faith;[226] the indefinite language does not provide an open-ended excuse for intermingling military and civilian satellite components, unless required by genuine military necessity.[227] The LoAC on precautions may thus be regarded as rudimentary and imprecisely defined, but its central postulates are fully

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the illegal action of the defender lies with the defender, however."); Blank, *supra* note 1, at 792 (arguing that both attacker and defender have obligations to protect the civilians); TALLINN 2 MANUAL, *supra* note 22, at 487, Rule 121, (stressing a defender's obligations).

[222] Outer Space Treaty, *supra* note 79, art. III.

[223] Additional Protocol I, *supra* note 1, art. 58.

[224] *Id.* art. 58(c).

[225] *Id.* art. 57.1.

[226] VCLT, *supra* note 184, art. 26.

[227] Corn, *supra* note 9, at 158–59.

binding nonetheless.[228]

During the 1960s negotiation of the Outer Space Treaty, the Soviet Union sought to prohibit corporations and other non-governmental organizations from participating in space activities, attempting to reserve that environment exclusively for government operations. Article VI of the treaty rebuffed that orientation,[229] and today, thanks to the mania for outsourcing government functions and the relentless advance and diffusion of space technology, private actors have become the most prolific, dynamic satellite participants. Nevertheless, the burden of maintaining suitable separation between private and public assets remains legally mandatory, and it now confounds policy and practice.

It can be acknowledged that there could be some positive deterrent value in the promiscuous engagement of civilian and neutral spacecraft for military and IC purposes. Such entanglement can enhance the resilience of the nation's space architecture, and an opposing belligerent may be reluctant to widen the battle by engaging more diverse sets of targets.[230] Indeed, violations of reverse distinction often have that type of effect; they transfer some of the risk of armed conflict from belligerents to civilians, and put additional pressure on the opponent in complying with its LoAC humanitarian obligations. But doing so is fundamentally inconsistent with the basic premise underpinning the mandate of distinction, which is the starting point for all of LoAC: the concept that belligerent forces are obliged to accept greater costs and risks, in order to spare civilians and their objects. The commitment of honor is to mitigate the risk to civilians, not to exacerbate it.[231]

Similar considerations apply to the use of space assets affiliated with other states. If state A draws upon the communications, remote sensing, and launch services of state B, that relationship could help deter state C from attacking. But a basic purpose of the international law of neutrality is to

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[228] Quéguiner, *supra* note 4, at 817.

[229] Outer Space Treaty, *supra* note 79, art. VI.

[230] *But see* Schmitt & Bettinger, *supra* note 41, at 68 (suggesting that if an enemy is deterred from employing traditional ASAT weapons because there are now too many potential targets to account for, it might respond by embracing even more destructive counterspace capabilities, such as high-altitude nuclear detonations, which would indiscriminately damage or destroy all spacecraft).

[231] Corn, *supra* note 1, at 119–20; Bosch, *supra* note 71, at 465–66 (noting that voluntary human shields have decided to expose themselves to increased risk of being victimized as collateral damage; they may *de facto* compromise their own legal protection).

allow states to opt out of a war (and thereby to avoid widening and escalating the combat). In a regime where state B is internationally responsible for the space actions of its non-governmental entities,[232] the contractual network of transnational private sector relationships risks dragging a state into a conflict against its will.

For those reasons, a violation of reverse distinction, such as through the practice of hosted payloads (opportunistically insinuating a military or IC device into a satellite that simultaneously houses other, purely civilian components) gets close to the war crime of perfidy. It relies cynically upon the enemy's faithful adherence to its LoAC distinction and proportionality obligations, and exploits that lawful respect for civilian objects in order to pursue an undeserved impunity for military advantage. Such violations of reverse distinction are rarely prosecuted as individual offenses, but if a defender refuses to achieve separation, in circumstances where it would be feasible to do so, greater accountability should be imposed.[233]

There are two salient aspects of U.S. hypocrisy here. First, as a general matter, the United States has routinely complained about other actors' failures to respect reverse distinction. U.S. authorities righteously condemned Saddam Hussein depositing fighter aircraft adjacent to treasured archeological sites, Milosevic transporting civilian supporters to strategic bridges, multiple other uses of human shields, and diverse other treacherous stratagems to co-locate artillery and weapons depots in civilian neighborhoods. But here, the roles are reversed; it is the United States that is violating the norms.[234]

Second, as a more specific matter, U.S. authorities have customarily argued that a big share (maybe the biggest share) of the responsibility for achieving reverse distinction should ordinarily lie with the defender, who

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[232] Outer Space Treaty, *supra* note 79, art. VI.

[233] Additional Protocol I, *supra* note 1, art. 37.1(c); Blank, *supra* note 1; Aurel Sari, *Urban Warfare: The Obligations of Defenders*, LAWFARE (Jan. 24, 2019), https://www.lawfareblog.com/urban-warfare-obligations-defenders [https://perma.cc/HA7Q-4A6V] (endorsing the concept of individual criminal liability for violations of reverse distinction).

[234] Hays Parks has suggested that a combatant's failure to remove civilian persons and objects from proximity to military objectives may be problematic, but much worse is a combatant's deliberate choice to move civilians into harm's way or to affirmatively locate military items in areas occupied by civilians or their objects. Parks, *supra* note 1, at 159–60. Use of hosted payloads – explicitly putting military components into civilian spacecraft – constitutes the latter, more egregious sort of violation.

has the knowledge and the ability to control the civilian population and infrastructure. (Not coincidentally, the United States has most often been in the role of the attacker in these terrestrial scenarios, subjected to the articulated rigors of "constant care" for civilians in combat locations.) When it comes to space, however (where the United States might suddenly find itself predominantly in the role of the defender who has knowingly stashed military and IC assets in close proximity to protected civilian and neutral objects) the United States seems to be acting as if the defender's reverse distinction obligations should be relatively minor and easy to slough off.[235]

Beyond these critiques, the U.S. practice of deliberately increasing the dual-use phenomenon in existing and future satellites will also have an adverse extended effect in complicating any future efforts at arms control in space. As noted above, the perceived threats to the safety and security of space are widely seen as starkly worsening today, amidst inimical trends in the testing of weapons, the bloviating of hostile rhetoric, and the inauguration of military structures devoted to the domination and control of space.[236] Judicious measures of arms control can provide a partial solution to those problems,[237] but such diplomatic efforts regarding space have

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[235] Jensen, *supra* note 10, at 157; Parks, *supra* note 1, at 28–29, 55, 153–56; *see also* Blank, *supra* note 1, at 784 (contending that in contemporary conflicts, it is usually the weaker belligerent that resorts to violations of the reverse distinction obligation).

[236] *See supra* text accompanying notes 107–115 (discussing threats to the security of space).

[237] Regarding proposals for arms control in space, *see, e.g.*, Patrick Tucker, *Nobody Wants Rules in Space*, DEF. ONE (May 6, 2021), https://www.defenseone.com/technology/2021/05/nobody-wants-rules-space/173870/ [https://perma.cc/S99R-GQAK] (reporting lack of progress toward arms control in space); COLBY, *supra* note 75 , at 21–25; DANIEL PORRAS, UNITED NATIONS INST. FOR DISARMAMENT RSCH., TOWARDS ASAT TEST GUIDELINES (2018); Jack Beard, *Soft Law's Failure on the Horizon: The International Code of Conduct for Outer Space Activities*, 38 U. PA. J. INT'L L. 335, 385–94 (2017); Alex B. Englehart, *Common Ground in the Sky: Extending the 1967 Outer Space Treaty to Reconcile U.S. and Chinese Security Interests*, 17 PAC. RIM L. & POL'Y J. 133 (2008); *Recommendations to Promote the Practical Implementation of Transparency and Confidence-building Measures in Outer Space Activities with the Goal of Preventing an Arms Race in Outer Space, in Accordance with the Recommendations Set Out in the Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities*, U.N. Office of Disarmament Affairs, U.N. Disarmament Comm'n, U.N. Doc. A/CN.10/2019/WP.1 (2019) (prepared by Nigeria, on behalf of the African Group) (containing the draft report of the U.N. Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities); Brian G. Chow, *Stalkers in Space: Defeating the Threat*, 11 STRATEGIC STUD. Q. 82 (2017); THERESA HITCHENS, CTR. FOR INT'L & SEC.

always foundered in the face of unique difficulties. High on the list of those impediments has been the definition problem: what exactly should count as

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STUD. AT MARYLAND, FORWARDING MULTILATERAL SPACE GOVERNANCE: NEXT STEPS FOR THE INTERNATIONAL COMMUNITY 16–36 (2018), https://cissm.umd.edu/sites/default/files/2019-07/ForwardingMultilateralSpaceGovernance%20updated82018.pdf [https://perma.cc/PCV7-D9GP]; Patricia Lewis, *Create a Global Code of Conduct for Outer Space*, CHATHAM HOUSE (June 12, 2019), https://www.chathamhouse.org/expert/comment/create-global-code-conduct-outer-space# [https://perma.cc/MN9K-RAF5]; THERESA HITCHENS & JOAN JOHNSON-FREESE, ATL. COUNCIL, TOWARD A NEW NATIONAL SECURITY SPACE STRATEGY: TIME FOR A STRATEGIC REBALANCING (2016), https://www.atlanticcouncil.org/wp-content/uploads/2015/08/AC_StrategyPapers_No5_Space_WEB1.pdf [https://perma.cc/2RJ3-M8A8]; David A. Koplow, *The Fault is Not in Our Stars: Avoiding an Arms Race in Outer Space*, 59 HARV. INT'L L.J. 331 (2018); LAURA GREGO & DAVID WRIGHT, UNION OF CONCERNED SCIENTISTS, SECURING THE SKIES: TEN STEPS THE UNITED STATES SHOULD TAKE TO IMPROVE THE SECURITY AND SUSTAINABILITY OF SPACE (2010), https://www.ucsusa.org/sites/default/files/2019-10/securing-the-skies-full-report-1.pdf [https://perma.cc/WH7X-YSAE]; Michael C. Mineiro, *The United States and the Legality of Outer Space Weaponization: A Proposal for Greater Transparency and a Dispute Resolution Mechanism*, 33 ANN. AIR & SPACE L. 441 (2008); James Clay Moltz, *Breaking the Deadlock on Space Arms Control*, ARMS CONTROL TODAY (Apr. 2002), https://www.armscontrol.org/act/2002-04/features/breaking-deadlock-space-arms-control [https://perma.cc/FV84-9ZCF]; Cheng Jingye, *Treaties as an Approach to Reducing Space Vulnerabilities*, *in* FUTURE SECURITY IN SPACE: COMMERCIAL, MILITARY, AND ARMS CONTROL TRADE-OFFS 48 (James Clay Moltz ed., 2003); Rebecca Johnson, *NGO Approaches and Initiatives for Addressing Space Security*, *in* FUTURE SECURITY IN SPACE: COMMERCIAL, MILITARY, AND ARMS CONTROL TRADE-OFFS, *supra*, at 61; Nina Tannenwald, *Law Versus Power on the High Frontier: The Case for a Rule-Based Regime for Outer Space*, 29 YALE J. INT'L L. 363 (2004); PAVEL PODVIG & HUI ZHANG, AM. ACAD. ARTS & SCIS., RUSSIAN AND CHINESE RESPONSES TO U.S. MILITARY PLANS IN SPACE 66–76 (2008); Icho Kealotswe, *The Rule of Law in Outer Space: A Call for International Cooperation* (2018), https://www.law.upenn.edu/live/files/7811-kealotswethe-rule-of-law-in-outer-spacepdf [https://perma.cc/556A-8AXP]; Daniel Porras, *Anti-Satellite Warfare and the Case for an Alternative Draft Treaty for Space Security*, 75 BULL. ATOMIC SCIENTISTS 142 (2019); Alexey Arbatov, *Arms Control in Outer Space: The Russian Angle, and a Possible Way Forward*, 75 BULL. ATOMIC SCIENTISTS 151, 151–52 (2019); Gérardine Meishan Goh, *Keeping the Peace in Outer Space: A Legal Framework for the Prohibition of the Use of Force*, 20 SPACE POL'Y 259 (2004); NANCY GALLAGHER & JOHN D. STEINBRUNNER, AM. ACAD. ARTS & SCIS., RECONSIDERING THE RULES FOR SPACE SECURITY 76–83 (2008); Victoria Samson & Brian Weeden, *Enhancing Space Security: Time for Legally Binding Measures*, ARMS CONTROL TODAY (Dec. 2020), https://www.armscontrol.org/act/2020-12/features/enhancing-space-security-time-legally-binding-measures [https://perma.cc/N9TY-Q36S]. *But see* Christopher A. Ford, *Arms Control in Outer Space: History and Prospects*, 1 ARMS CONTROL & INT'L SEC. PAPERS 1, 1 (2020), https://2017-2021.state.gov/wp-content/uploads/2020/07/T-Paper-Series-Space-Norms-Formatted-T-w-Raymond-quote-2543.pdf [https://perma.cc/W5Z2-7ZJW] (critiquing proposals for arms control in space).

a "space weapon," to be regulated or banned by treaty?[238] That puzzle has confounded arms control efforts, and it will only be exacerbated when additional dual-use assets mix civilian and military or IC identities. The durable separation required by reverse distinction can make a bit more tractable any future negotiation enterprises aimed at resolving the persistent and novel space threats.

Two other applications of LoAC in space deserve special consideration in the context of defensive tactics that might be available regarding certain high-value satellites. First, some have proposed equipping the most precious U.S. space assets with a "shoot back" capability, or with an accompanying "bodyguard" satellite, to resist an enemy's ASAT predations; other analysts cast doubt on the viability of those schemes.[239] But the LoAC analysis also reminds us that a violation of reverse distinction would be especially blatant if a dual-capable satellite, combining both civilian and military or IC components, were to fire projectiles or directed energy at an opponent. Any sheltering alongside protected civilian objects, while simultaneously engaging in attacks against others, would be especially outrageous.[240]

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[238] TODD HARRISON, CTR. FOR STRATEGIC & INT'L STUD., INTERNATIONAL PERSPECTIVES ON SPACE WEAPONS (May 27, 2020), https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/200527_Harrison_IntlPerspectivesSpaceWeapons_WEB%20FINAL.pdf [https://perma.cc/J859-Y7Z2] (highlighting the problem of defining a space weapon); STEER, *supra* note 76, at 21; Ford, *supra* note 237, at 2–3 (labelling the definition issue an "insoluble problem" for space arms control).

[239] *Transcript of a Discussion between Dr. Brian Chow and Dr. Brian Weeden on Space Zones and Bodyguards for Proximity Operations*, NONPROLIFERATION POL'Y EDUC. CTR. (Mar. 2, 2020), http://npolicy.org/article.php?aid=1465&tid=2 [https://perma.cc/C6VC-M9XK] (assessing the value of defensive "shoot-back" satellites to protect the most valuable national security spacecraft); MORGAN, *supra* note 163, at 32–33 (critiquing the concept of active defense via escort satellites); Yousaf Butt, *Can Space Weapons Protect U.S. Satellites?*, BULL. ATOMIC SCIENTISTS (July 22, 2008), https://thebulletin.org/2008/07/can-space-weapons-protect-u-s-satellites/ [https://perma.cc/47SZ-583G]; HARRISON, ET. AL., *supra* note 97, at 18–21.

[240] *See* Jensen, *supra* note 10, at 167, 174; Klein, *supra* note 140, at 3 (noting that commercial satellites could be employed to facilitate the application of force in response to aggression, such as by providing information to identify targets). For comparison, *see* Additional Protocol I, *supra* note 1, art. 56(5) (dealing with installations and works containing dangerous forces such as dams or nuclear power plants). "The Parties to the conflict shall endeavour to avoid locating any military objectives in the vicinity of the works or installations mentioned in paragraph 1. Nevertheless, installations erected for the sole purpose of defending the protected works or installations from attack are permissible and shall not themselves be made the object of attack, provided that they are not used in hostilities except for defensive actions necessary to respond to attacks against the protected works or installations and that their armament is limited to weapons capable only of

Second, some high-value "black" satellites seek protection by becoming essentially invisible and untrackable to foreign observers (although some skeptics discount the feasibility of that avenue in an era of enhanced space domain awareness capabilities).[241] Familiar LoAC provisions tell us that use of camouflage and evasion tactics are generally legal, if the military or IC asset is attempting to become invisible or to look like vegetation or other legally unprivileged items. But it is not legitimate for military objectives to masquerade as civilians, neutrals, or others entitled immunity from attack. In the same way, a low-observable satellite can seek to protect itself from identification or localization, but cannot disguise itself as a civilian object or hide amongst legally-protected space vehicles.[242]

This Article ends where it began, by offering a modest analogy to the practice of "social distancing" in the context of COVID-19, where the requirement for physical separation proved to be, oddly, both controversial and essential to communal well-being. Regarding satellite operations, too, the legal obligation of distinct separation imposes costs upon the community, but it is required by fidelity to legal and common-sense standards.

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repelling hostile action against the protected works or installations." *Id.*

[241] *See* SPACEPOWER, *supra* note 75, at 38–40 (discussing space domain awareness, formerly known as "space situational awareness"—the ability to detect, identify, and track space objects and debris in space); Sandra Erwin, *U.S. Military Keeps Sharp Eyes on Orbit as Congestion Grows*, SPACENEWS (Nov. 3, 2020), https://spacenews.com/u-s-military-keeps-sharp-eyes-on-orbit-as-congestion-grows/ [https://perma.cc/R3HN-8GT7] (describing U.S. Space Command system of sensors that track space objects and provide warning about possible collisions); Wilson, *supra* note 76, at 123 (emphasizing the increasing transparency of space); James Kirby, *From SSA to Space Recon: Setting the Conditions to Prevail in Astrodynamic Combat*, SPACE REV. (Aug. 31, 2020), https://www.thespacereview.com/article/4013/1 [https://perma.cc/46VF-B6D6] (explaining the transition from "space situational awareness" to "space domain awareness" and the growing U.S. and other capabilities to monitor objects in orbit).

[242] *See* Blank, *supra* note 1, at 786; Corn & Schoettler, *supra* note 9, at 830, 835–37 (emphasizing that while a military force is required to separate itself from civilians, it is not required to make itself conspicuous in ways that would assist enemy attackers); Heller, *supra* note 55.