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# War, Technology, and International Humanitarian Law

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# WAR, TECHNOLOGY, AND INTERNATIONAL HUMANITARIAN LAW

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The views expressed here are those of the author in his personal capacity.

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## SUMMARY

*War, technology, and the norms governing warfare have influenced each other dramatically since the beginning of organized conflict. In the early twenty-first century, the pace of technological change in warfare has quickened. As norms governing war become outdated, law is reinterpreted, ignored, or discarded. How, in that context, are war and law likely to react to, and upon, one another in the near future?*

*Current weapons development programs and overall trends in technology influence international humanitarian law (IHL) in three respects. First, such technologies exacerbate the asymmetry that already challenges certain key IHL principles. Second, they complicate efforts to distinguish combatants and other military objectives from civilians and civilian objects. Third, modern technology empowers militaries to avoid collateral damage, incidental injuries, and mistaken attacks. As it does so, however, expectations that endanger current understandings of IHL are surfacing regarding casualties. Even with high-tech weaponry, it remains impossible to avoid all collateral damage and incidental injury.*

*At the same time, technology often fosters distinction. Transparency will provide a greater quantity of information about the target and its environs, and it will be increasingly reliable. Post-strike battle damage assessment will give commanders a more complete picture, thereby avoiding unnecessary additional attacks that place the civilian population at risk. Improvements in accuracy will steadily reduce the circular error probable and allow the use of smaller charges to achieve the desired level of damage.*

*As the technological gap widens, precautions in attack requirements operate on the belligerents in an increasingly disparate manner. The result is normative relativism whereby the high tech belligerent is held to higher standards vis-à-vis precautions in attack than its opponent. IHL obligations may not impose equivalent burdens in practice, but as a matter of law the parties are on equal footing. With precautions in attack, the law itself, interpreted in a neutral manner, imposes*

*dissimilar duties. This reality creates resentment; the greater the disparity, the greater the dissatisfaction of the belligerent bearing the greater burden of the legal obligation.*

*Technology not only heightens the legal standards to which high-tech forces must conform, but it constitutes expectations which, in turn, create* de facto *standards that states can ill-afford to ignore. These* de facto *standards will influence application and interpretation of* de jure *standards as to what is and is not lawful collateral damage and incidental injury, the nature of the duty of care required of those planning and executing attacks, and the reasonableness of mistakes of war.*

*Although almost never a purpose of technology, the weapons of war are increasingly placing the principles underpinning international humanitarian law at risk. In part, this is the result of an ever-widening divide between the technological "haves" and "have-nots." Faced with prospects of defeat, "have-nots" are rejecting IHL as they compensate for their asymmetrical status. When one side operates in repeated violation of the law, adherence by the other usually deteriorates in lock-step.*

*The technology itself weakens the ability to safeguard the civilian population and other protected individuals and entities during armed conflict. Whether because it has broken the traditional spatial limitations of conflict or simply placed more civilians on the battlefield, technology has proven it is no panacea. It has confused observers of warfare, causing many to adopt unrealistic expectations that seem to be morphing into normative boundaries. Inevitably, militaries will react negatively to this trend, for it places limitations on their activities that are not the product of the careful balancing between military necessity and humanitarian concerns which characterizes the formation of international humanitarian law.*

# War, Technology, and International Humanitarian Law

By Michael N. Schmitt

War, technology, and the norms governing warfare have influenced each other dramatically since the beginning of organized conflict.[1] Technology determines how wars can be fought. When resulting hostilities run counter to prevailing values or interests, law and other prescriptive strictures often emerge to restrain them.[2] This occurs either through treaties or as the consequence of policy decisions by belligerents (generally states) to conduct themselves in a particular manner. In the latter case, the practice matures into customary international law when it becomes "general" (widespread) and "accepted as law" by states.[3] Finally, as the norms

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[1] For an interesting article exploring the relationship between war and technology, see Charles J. Dunlap, Jr., *Technology: Recomplicating Moral Life for the Nation's Defenders*, PARAMETERS, Autumn 1999, at 24.

[2] For instance, in ancient India, the Law Code of Manu proclaimed that when "engaged in battle, (one) must never slay his enemies with weapons that are treacherous, barbed, or laced with poison, or whose tips are ablaze with fire." The Law Code of Manu (India), ch. VII, v. 90 (c. 100 BCE) (Oxford University Press, Patrick Olivelle trans., 2004). In the fifth century BC, the *koina nomina* (common customs of the Hellenes) forbade the use of "unhoplite" arms. Josiah Ober, *Classical Greek Times*, in THE LAWS OF WAR: CONSTRAINTS ON WARFARE IN THE WESTERN WORLD 12, 13 (Yale University Press, Michael Howard et. al. eds., 1994). The Second Lateran Council condemned the use of the arc and crossbow in 1139 because it was seen as less than honorable to attack from a distance [Gerald I.A.P. Draper, *The Interaction of Christianity and Chivalry in the Historical Development of the Law of War*, 5 INTERNATIONAL REVIEW OF THE RED CROSS 3, 19 (1965)], and in 1500 the *Corpus Juris Canonici* outlawed arrows, darts, and catapults on the same rationale. Leslie C. Green, *The Law of War in Historical Perspective*, in THE LAW OF MILITARY OPERATIONS 39, 46 (Naval War College, International Law Studies, vol. 72) (Michael N. Schmitt ed., 1998).

[3] Statute of the International Court of Justice, article 38.1(b). The Court has noted that it is "looked for primarily in the actual practice and *opinio juris* of states." *Continental Shelf (Libyan Arab Jamahiriya/Malta)*, Judgment, 1985 ICJ

governing war become outdated, law is reinterpreted, ignored, or discarded.

In the twenty-first century, the pace of technological change in warfare has quickened. This essay asks how war and law are likely to react to, and upon, one another in the near future. It opens with a survey of the normative architecture governing methods (tactics) and means (weapon systems) of warfare. Technology is then reviewed, with particular emphasis on current weapons development programs and overall trends. The article concludes with an analysis of how this technology may influence the application and interpretation of international humanitarian law (IHL).

## The law relevant to technology

In 1996, the International Court of Justice (ICJ) recognized IHL's two "cardinal" principles in *Legality of the Threat or Use of Nuclear Weapons*.[4] Distinction, the first, provides that "states must never make civilians the object of attack and must consequently never use weapons that are incapable of distinguishing between civilian and military targets." In other words, weapons must be both capable of discrimination and used discriminately. The second principle disallows weapons that cause combatants unnecessary suffering. Nearly all IHL prohibitions related to the conduct of hostilities, whether treaty-based or customary, find their genesis in these principles.

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Rep., para. 27. See also *North Sea Continental Shelf Cases,* Judgment, 1969, ICJ Rep. 3, 44. For an excellent summary of the nature and sources of customary international humanitarian law, see Jean-Marie Henckaerts, *Study on Customary International Humanitarian Law: A Contribution to the Understanding and Respect for the Rule of Law in Armed Conflict,* 87:857 INTERNATIONAL REVIEW OF THE RED CROSS 175 (2005).

[4] "Legality of the Threat or Use of Nuclear Weapons," Advisory Opinion, 1996 ICJ Rep. 226 (July 8), at para. 78.

The 1868 Saint Petersburg Declaration, which dealt with explosive projectiles, ushered in the modern era of limitations on methods and means of warfare with its pronouncement:

> That the only legitimate object which states should endeavour to accomplish during war is to weaken the military forces of the enemy;
>
> That for this purpose it is sufficient to disable the greatest possible number of men;
>
> That this object would be exceeded by the employment of arms which uselessly aggravate the sufferings of disabled men, or render their death inevitable;
>
> That the employment of such arms would, therefore, be contrary to the laws of humanity.[5]

Other efforts to restrict military technology followed[6]: projectiles and explosives dropped from balloons (1899 and 1907); gas and chemicals (1899, 1925, 1993); expanding bullets (1899); submarine mines (1907); biological weapons (1972); environmental modification techniques (1976); non-detectable fragments (1980); mines and booby traps (1980, 1996, and 1997); incendiary weapons (1980); and blinding lasers (1995).[7]

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[5] "Saint Petersburg Declaration Renouncing the Use, in Time of War, of Explosive Projectiles under 400 Grammes Weight," December 11, 1868, reprinted in THE LAWS OF ARMED CONFLICT (Dietrich Schindler Nijhoff and Jiri Toman eds., fourth ed., 2004), at 91.

[6] Generally, these efforts were reactive in nature. For instance, the current prohibition on chemical weapons found its first expression in the 1925 Gas Protocol, a reaction to the 1.3 million gas casualties, including ninety-one thousand deaths, during the First World War. Similarly, the Conventional Weapons Convention's (CCW) anti-personnel mine Protocols of 1980 and 1996, and the 1997 Ottawa Convention, are belated responses to a weapon that had killed some 250,000 individuals since its invention. Occasionally, the international community attempts to constrain technologies before they find their way onto the battlefield. Famously unsuccessful were attempts to limit airpower in the late nineteen and early twentieth centuries. More successful has been the ban on biological weapons in the 1925 Gas Protocol and the 1972 Biological Weapons Convention, and the 1995 Protocol on blinding lasers to the Conventional Weapons Convention. See cites, *infra* note 7.

[7] Hague Declaration (IV, 1) to Prohibit the Launching of Projectiles and

Undoubtedly, further attempts to regulate weaponry will be launched. Possible topics include depleted uranium shells, cluster munitions, computer network attacks, non-lethal weapons, and space-based offensive operations.[8] The prospect of states agreeing to accept limits on their weaponry depends on variables ranging from whether they possess or are likely to be attacked with them to the degree of international and domestic concern about their impact on the civilian population.

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Explosives from Balloons, and Other Methods of Similar Nature, July 29, 1899; Hague Declaration (IV, 2) concerning Asphyxiating Gases, July 29, 1899; Hague Declaration (IV, 3) concerning Expanding Bullets, July 29, 1899; Convention (VIII) relative to the Laying of Automatic Submarine Contact Mines, October 18, 1907; Declaration (XIV) Prohibiting the Discharge of Projectiles and Explosives from Balloons, October 18, 1907; Gas Protocol, June 17, 1925; Biological Weapons Convention, February 6, 1972; Convention on the Prohibition of Military or any Other Hostile Use of Environmental Modification Techniques (arguably a method, not means, of warfare), December 10, 1976; Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which may be Deemed to be Excessively Injurious or to have Indiscriminate Effects (CCW), with its Protocols on Non-Detectable Fragments (I), Mines, Booby Traps and Other Devices (II, amended May 3, 1996), and Incendiary Weapons (III), October 10, 1980; Protocol (IV) to the CCW on Blinding Lasers, October 13, 1995; Chemical Weapons Convention, January 13, 1993; and Ottawa Convention on anti-personnel mines, September 18, 1997. Reprinted in Schindler, *supra* note 5, at 309, 95, 99, 1071, 309, 105, 135, 163, 181, 239, and 285 respectively. Means of warfare have been addressed through other avenues. As noted, in 1996 the ICJ issued an advisory opinion on nuclear weapons. Three decades earlier, the United Nations General Assembly had addressed them in its aspirational 1961 Declaration on the Prohibition of the Use of Nuclear and Thermo-Nuclear Weapons. UNGA Res. 1653 (XVI), November 24, 1961, reprinted in Schindler, *supra* note 5, at 127. Also noteworthy is the 1979 CCW Conference's Resolution on Small-Calibre Weapons. Resolution on Small-Calibre Weapon Systems, adopted by the UN Conference on Prohibitions or Restrictions on the Use of Certain Conventional Weapons, September 28, 1979, reprinted in Schindler, *supra* note 5, at 237.

[8] Various NGOs are seeking a moratorium (or ban) on the use of cluster munitions. See, e.g., Human Rights Watch, "Cluster Munitions and International Humanitarian Law: The Need for Better Compliance and Stronger Rules," prepared for the Convention on Conventional Weapons (CCW) Group of Governmental Experts on Explosive Remnants of War (ERW), July 5-16, 2004.

The international community also regulates methods and means of warfare through non-weapon specific IHL principles. Two early compilations were the Regulations annexed to the 1899 and 1907 Hague Conventions on the Laws and Customs of War on Land.[9] These regulations set forth the most basic limitation on the conduct of hostilities, that "[t]he right of belligerents to adopt means of injuring the enemy is not unlimited."[10] Other relevant provisions include a ban on poison[11] and "arms, projectiles, or material calculated to cause unnecessary suffering;"[12] acceptance of ruses;[13] and a requirement to take "all necessary steps" to "spare, as far as possible, buildings dedicated to religion, art, science, or charitable purposes, historic monuments, hospitals, and places where the sick and wounded are collected, provided they are not being used at the time for military purposes."[14]

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[9] Convention (II) with Respect to the Laws and Customs of War on Land, with Annex of Regulations, July 29, 1899, reprinted in Schindler, *supra* note 5, at 55 [hereinafter HIIR]; Regulations Respecting the Laws and Customs of War on Land, Annex to Convention (No. IV) Respecting the Laws and Customs of War on Land, October 18, 1907, reprinted in Schindler, *supra* note 5, at 55 [hereinafter HIVR].

[10] *Idem,* article 22 (both instruments).

[11] *Idem,* article 23(a) (both instruments).

[12] *Idem,* article 23(d) (both instruments). The text is drawn from the 1907 formula. The 1899 provision prohibited employment of "arms, projectiles, or material of a nature to cause superfluous injury." On this issue and variations in modern texts, see Yoram Dinstein, THE CONDUCT OF HOSTILITIES IN THE LAW OF INTERNATIONAL ARMED CONFLICT 57-61 (Cambridge University Press, 2004).

[13] HIIR, HIVR, *supra* note 9, art. 24. Ruses are defined in Protocol Additional I, art. 37.2: "Ruses of war are not prohibited. Such ruses are acts which are intended to mislead an adversary or to induce him to act recklessly but which infringe no rule of international law applicable in armed conflict and which are not perfidious because they do not invite the confidence of an adversary with respect to protection under that law. The following are examples of such ruses: the use of camouflage, decoys, mock operations and misinformation." These must be distinguished from unlawful perfidy. Protocol Additional (I) to the Geneva Convention of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts, December 12, 1977, reprinted in Schindler, *supra* note 5, at 711 [hereinafter PI].

[14] *Idem,* article 27 (both instruments). Note that historical monuments were added in the 1907 version.

The most comprehensive codification governing methods and means of warfare is the 1977 Protocol Additional I to the 1949 Geneva Conventions, which governs international armed conflict.[15] Although key states such as Israel, India, and the United States are not party to the instrument, they recognize many of the Protocol's provisions as reflective of customary IHL.[16]

Article 35 restates the basic Hague principles that there are limits on methods and means, and that weapons causing superfluous injury or unnecessary suffering are banned.[17] Of greater significance is Article 48, which sets forth the core IHL principle, distinction: "In order to ensure respect for and protection of the civilian 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." Articles 51 and 52 build on this requirement.

> Article 51(2). The civilian population as such, as well as individual civilians, shall not be the object of attack. Acts or threats of violence the primary purpose of which is to spread terror among the civilian population are prohibited. (3). Civilians shall enjoy the protection afforded by this Section, unless and for such time as they take a direct part in hostilities.
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> Article 52(1): Civilian objects shall not be the object of attack or of reprisals. Civilian objects are all objects which are not

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[15] PI, *supra* note 13.

[16] One hundred and sixty states were party as of November 2005. The United States position on Protocol I is authoritatively set out in Memorandum for Assistant General Counsel (International), Office of the Secretary of Defense, 1977 Protocols Additional to the Geneva Conventions: Customary International Law Implications, May 8, 1986. See also Michael J. Matheson, *The United States Position on the Relation of Customary International Law to the 1977 Protocols Additional to the 1949 Geneva Conventions*, 2 AMERICAN UNIVERSITY JOURNAL OF INTERNATIONAL LAW AND POLICY 419 (1987).

[17] In unusual placement, the article includes a prohibition on employment of "methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment."

> military objectives as defined in paragraph 2. (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.

In a related prohibition, Article 51(4) bans "indiscriminate" attacks on civilians, defining them as:

> (a) those which are not directed at a specific military objective;
> (b) those which employ a method or means of combat which cannot be directed at a specific military objective; or
> (c) those which employ a method or means of combat the effects of which cannot be limited as required by this Protocol; and consequently, in each such case, are of a nature to strike military objectives and civilians or civilian objects without distinction.

Subpart (a) of the article contemplates the indiscriminate use of a weapon system capable of being aimed or otherwise controlled, i.e., one that is by nature discriminate. Iraq's launch of SCUD missiles against Israeli population centers during the 1990-91 Gulf War constitutes the textbook example.[18] The remaining subparts address indiscriminate weapons, the use of which is prohibited altogether. Subpart (b) is concerned with weapon systems incapable of being aimed directly at a military objective. A long-range missile with a guidance system so rudimentary or unreliable that its chances of striking a military objective are almost happenstance illustrates this category.[19] By contrast, subpart (c) outlaws use of aimable weapons that produce uncontrollable effects. A biological contagion that spreads uncontrollably through a civilian population, albeit initially targeted against combatants, epitomizes such weapons.[20]

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[18] Article 51.5(a)'s ban on "an attack by bombardment by any methods or means which 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" is a variation of this prohibition.

[19] Such as the German Vergeltungswaffe (reprisal) 2 rockets of World War II.

[20] Biological warfare is separately unlawful through specific prohibition. All

Even if an attack is directed at a combatant or other military objective, and the weapon system employed is both discriminate by nature and used discriminately, it must be proportionate. Codified in Article 51(5)(b), the principle of proportionality prohibits attacks 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."[21] IHL styles injury or death of civilians as "incidental injury," whereas damage or destruction of civilian property is labeled "collateral damage."

Finally, attackers must take "precautions in attack" to minimize harmful effects on civilians and civilian objects caused during an otherwise lawful strike. Article 57 sets out the requirements, the bulk of which represent customary IHL.[22] The principle requires "those who plan or decide upon an attack" to do "everything feasible" to ensure they are not attacking civilians, civilian objects, or items or individuals who enjoy special protection; to "take all feasible precautions" when choosing weapons and tactics in order to minimize incidental injury and collateral damage; and to select that military objective from among those yielding a "similar military advantage" that "may be expected to cause the least danger to civilian lives and to civilian objects."

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weapons must be reviewed to assess their legality prior to being fielded. PI, *supra* note 13, art. 36. Although not a party to Protocol Additional I, US policy mandates such reviews. Deputy Secretary of Defense, Interim Guidance, Defense Acquisition, Memorandum, October 30, 2002. Service regulations also require weapons reviews. Army Regulation 27-53, Review of Weapons Under International Law, January 1, 1979; Air Force Instruction 51-402, Weapons Review, May 13, 1994; Secretary of the Navy Instruction 5711.8A, Review of Weapons Under International Law January 29, 1988. See also Isabelle Daoust, Robin Copeland and Rikke Ishoey, *New Wars, New Weapons? The Obligation of States to Asses the Legality of Means and Methods of Warfare*, 84:846, INTERNATIONAL REVIEW OF THE RED CROSS, June 2002, at 345.

[21] The principle is repeated in Article 57.2(a)(iii) and (b).

[22] See, e.g., Jean-Marie Henckaerts and Louise Doswald-Beck, I CUSTOMARY INTERNATIONAL HUMANITARIAN LAW (Cambridge University Press, 2005), ch. 5 [hereinafter CIHL]. For operalization in a Protocol Additional I non-Party State's military manual, see US Navy, Marine Corp, Coast Guard, Commander's Handbook on the Law of Naval Operations, NWP 1-14M, MCWP 5-2.1, COMDTPUB P5800.7, para. 8.1.2.1, 1995, reprinted in its annotated version as Vol. 73 of the International Law Studies (US Naval War College, 1999).

Beyond the general principles, Protocol Additional I extends special protection to specified objects, most notably medical establishments, cultural objects, places of worship, objects indispensable to the civilian population, the natural environment, and works and installations containing dangerous forces.[23] Also proving increasingly significant is the prohibition on perfidy. Perfidy occurs when one party feigns protected status to kill, injure, or capture the enemy.[24] Examples include feigning: an intent to negotiate under a flag of truce or surrender; civilian status; being sick or wounded; and protected status (indicated by uniform or emblem) of the United Nations or a state not Party to the conflict.[25]

In addition to treaty law, customary IHL imposes certain restrictions on methods and means of warfare. Given the fact that the applicability

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[23] PI, *supra* note 13, articles. 12, 53, 54, 55, and 56 respectively. CIHL suggests that the following are especially protected under customary law of war: medical and religious personnel and objects, humanitarian relief personnel and objects, journalists, protected zones, cultural property, works and installations containing dangerous forces, the natural environment, and those who are *hors de combat* (wounded, sick, shipwrecked, those who have surrendered, and prisoners of war). CIHL, *supra* note 22, Parts II and V.

[24] PI, *supra* note 13, article 37: "1. It is prohibited to kill, injure or capture an adversary by resort to perfidy. Acts 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, shall constitute perfidy. The following acts are examples of perfidy: (a) the feigning of an intent to negotiate under a flag of truce or of a surrender; (b) the feigning of an incapacitation by wounds or sickness; (c) the feigning of civilian, non-combatant status; and (d) the feigning of protected status by the use of signs, emblems or uniforms of the United Nations or of neutral or other States not Parties to the conflict."

[25] These examples are contained in Article 37 itself. The 1907 Hague IV Regulations reference "improper use of a flag of truce, of the national flag or of the military insignia and uniform of the enemy, as well as distinctive badges of the Geneva Convention," a prohibition that is now unquestionably customary. HIVR, *supra* note 9, art. 23(f). CIHL, *supra* note 22, ch. 18; International Military Tribunal (Nuremberg), Judgment and Sentences (1946), 41 AMERICAN JOURNAL OF INTERNATIONAL LAW 172, 218 (1947). The reference is to the Geneva Convention of 1864. Convention for the Amelioration of the Condition of the Wounded in Armies in the Field, August 22, 1864, reprinted in Schindler, *supra* note 5, at 365.

provisions found in IHL treaties preclude their operation in many conflicts, customary law provides the key constraints on warfare.[26] In this regard, recall the Martens Clause, the contemporary formulation of which is found in Article 1(2) of Protocol Additional I: "In cases not covered by this Protocol or by other international agreements, civilians and combatants remain under the protection and authority of the principles of international law derived from established custom, from the principles of humanity and from dictates of public conscience."[27]

The dilemma with customary law lies in determining its content. In 2005, the International Committee of the Red Cross released a *Customary International Humanitarian Law* study. Based on extensive surveys of state practice and pronouncements, the work attempts to

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[26] Consider the 2003 war in Iraq. Neither the United States nor Iraq was Party to Protocol Additional I. The United Kingdom's Party status imposed no legal obligations on British forces because Protocol Additional I applies between a party and non-party state only when the latter "accepts and applies the provisions thereof" (article 96). Iraq had not done so. Since Iraq was not a Party to the 1907 Hague Convention (IV), that agreement was inoperative by virtue of its general participation clause (article 2). Only the 1925 Gas Protocol, 1949 Geneva Conventions, and the 1972 Biological Weapons Convention bound all three major belligerents. The 1993 Chemical Weapons Convention also constrained the United States and United Kingdom, even though Iraq was not a Party, because it prohibits using chemical weapons "under any circumstances" (article 1.1).

[27] A provision along these lines appears in numerous IHL conventions. HIIR, *supra* note 9; HIVR, *supra* note 9, pmbl; Gas Protocol, *supra* note 7, pmbl.; Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field, August 12, 1949, article 63, reprinted in Schindler, *supra* note 5, at 459 [hereinafter GCI]; Convention for the Amelioration of the Condition of the Wounded, Sick, and Shipwrecked Members of Armed Forces at Sea, August 12, 1949, article 62, reprinted in Schindler, *supra* note 5, at 485 [hereinafter GCII]; Convention Relative to the Treatment of Prisoners of War, August 12, 1949, article 142, reprinted in Schindler, *supra* note 5, at 507 [hereinafter GCIII]; Convention Relative to the Protection of Civilian Persons in Time of War, August 12, 1949, article 158, reprinted in Schindler, *supra* note 5, at 575 [hereinafter GC IV]; CCW, *supra* note 7, para. 5. In its Nuclear Weapons advisory, the International Court of Justice stated that the "continuing existence and applicability" of the Martens Clause "is not to be doubted." Nuclear Weapons, *supra* note 4, para. 87.

capture current customary IHL in writing.[28] Although somewhat controversial, the study represents the only comprehensive attempt to do so in any systematic, internationally-vetted fashion.

The ICRC document reiterates most norms described above, drawing heavily on the text of Protocol Additional I. Chapter 21 restates the ban on the use of methods or means "of a nature to cause superfluous injury or unnecessary suffering" and on indiscriminate weapons.[29] The subsequent chapters prohibit poison, biological weapons, chemical weapons, riot-control agents as a method of warfare, certain uses of herbicides, expanding bullets, exploding anti-personnel bullets, weapons with non-detectable fragments, specified uses of booby-traps, and laser weapons designed to cause blindness.[30]

Part I of the study sets out the broad IHL prohibitions: attacking or terrorizing civilians (unless directly participating in hostilities);[31] attacking other than military objectives;[32] perfidy;[33] and indiscriminate attacks, including the use of indiscriminate weapons, using discriminate weapons indiscriminately, and treating distinct military objectives in a concentration of civilians or civilian objects as a single target.[34] It further contains the principles of proportionality[35] and precautions in attack.[36] Rules governing medical, religious, humanitarian relief, and peacekeeping personnel and objects; journalists; protected zones; cultural property; works and installations containing dangerous forces; and the natural environment are found in Part II.[37]

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[28] CIHL, *supra* note 22.

[29] *Idem*, rules 70 and 71.

[30] *Idem*, rules 72, 73-80, 86. It further cites landmines and incendiaries as requiring particular care. *Idem*, rules 81-85.

[31] *Idem*, rules 1-2, 6.

[32] *Idem*, rules 7-8 (adopting the Additional Protocol I, article 52.2, definition thereof).

[33] *Idem*, Rule 65.

[34] *Idem*, Rules 11-13.

[35] *Idem*, Rule 14.

[36] *Idem*, Rules 15-21.

[37] *Idem*, Rules 25-30.

The aforementioned instruments and principles represent the core normative boundaries applicable to methods and means of warfare. Before turning to the dynamics of influence, it is useful to consider twenty-first century military technology.

## The technology relevant to law

Too often, thinking about war focuses on weaponry. Yet weapons are but one component of a 'weapon system,' i.e., "a combination of one or more weapons with all related equipment, materials, services, personnel, and means of delivery and deployment (if applicable) required for self-sufficiency."[38] It is the weapon system, often incorporating technology more complex than the weapon itself, which determines success or failure. For instance, in an air-to-ground engagement against a fleeting target, the intelligence assets that allow the target to be identified and the communications, command, and control networks that make rapid attack possible are as essential to mission success as the aircraft and the bomb it drops. Put simply, fully understanding combat operations requires consideration of *all* the technologies having a direct causal relationship to weapons employment. Therefore, this monograph adopts an inclusive approach to the technology of future war, looking first at specific development programs and then at general trends.

### *Specific programs*

Since the United States armed forces enjoys a technological edge over every other military in the world (a gap that will certainly widen), the best indicator of technology's vector lies in US military research and development programs.[39] Within the Department of Defense, the

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[38] Department of Defense Dictionary of Military and Associated Terms, Joint Publication 1-02, as amended through May 9, 2005, www.dtic.mil/doctrine/jel/doddict/.

[39] The US defense budget for 2003 (most recent comparative figures available) was 404.9 billion dollars. Compare this figure with: Germany, 35.1b$; UK, 42b$; France 45.7b$; China, 55.9b$; and Russia, 65.2b$. International Institute of Strategic Studies, STRATEGIC BALANCE 2004-2005. The United States spent 26.2 per cent of this amount on investment (research, development, acquisition).

Defense Advanced Research Projects Agency (DARPA) oversees future technologies.[40] DARPA's current research centers around eight "strategic thrusts."[41] Because they provide a feel for the technology likely to be fielded on the twenty-first century battlefield, it is useful to review briefly each category.

- Detection, precision identification, tracking, and destruction of elusive surface targets.

Today, weapons fielded by advanced militaries are highly accurate. However, target detection, identification, and tracking continue to present major hurdles to even the best-equipped forces. The unsuccessful 'decapitation' campaign against Iraqi leadership during the 2003 war in Iraq offers a classic illustration. US air forces conducted fifty highly accurate strikes, yet failed to kill even a single targeted individual.[42] The problem lay in the unreliability of some intelligence and the inability to leverage reliable information quickly enough.

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Available comparable figures for Germany and the UK are 18.5% and 24.4%, respectively. NATO Press Release 146 (2003).

[40] Initially set up in response to 1957 Soviet launch of Sputnik, DARPA's current mission is twofold: "to prevent technological surprise to the US" and "to create technological surprise" for US adversaries. Defense Advanced Research Agency, *Bridging the Gap*, February 2005, para. 1 [hereinafter DARPA]. The agency was instrumental in conception and development of such systems as the F-117 stealth fighter, and the Global Hawk and Predator unmanned aerial vehicles. Most notably, DARPA created the ARPANet and its network protocol architecture, the precursor to today's Internet. The following discussion of strategic thrusts is drawn primarily from this document. On the organization itself, see www.darpa.mil.

[41] *Idem*, ch. 3. On the agency's programs, see also Statement by Tony Tether, Director of DARPA, to the Subcommittee on Terrorism, Unconventional Threats and Capabilities, House Armed Services Committee, House of Representatives, March 10, 2005, www.darpa.mil/body/news/2005/darpa_hasc_3_10_05_final.pdf; Institute for Defense Analyses, Transformation and Transition: DARPA's Role in Fostering an Emerging Revolution in Military Affairs (Paper P-3698), April 2003.

[42] For a discussion of these strikes and their IHL implications, see Michael N. Schmitt, *The Conduct of Hostilities during Operation Iraqi Freedom: An International Humanitarian Law Assessment*, YEARBOOK OF INTERNATIONAL HUMANITARIAN LAW (forthcoming).

In response to such challenges, DARPA hopes to find ways to collapse the current sequential targeting process (find, fix, track, target, engage, and assess results) into an uninterrupted and continuous one that adapts to battlefield events.[43] For instance, new technologies will blur the traditional distinction between intelligence (gather and process information), plans (determine what to do in response to that information), and operations (execute the plan). Platforms that carry both sensors and weapons, like the Predator, are merely the tip of the iceberg.[44] In the near future, systems will operate without human input; in other words, a single platform will search for, identify, and destroy targets autonomously.[45]

Networking represents the other thread in this strategic thrust. DARPA envisages developing systems that will first "connect more and more sensors, platforms, and weapons with a variety of communications links," and later permit "computers and commanders" to "take advantage of the massive amounts of data available to increase the speed, accuracy, agility, and capability" of combat forces.[46] In a simple illustration, a Predator might use video to track a target. When it enters an area of heavy foliage, the networked system would automatically switch to foliage penetrating radar. In response to the radar returns, 3D LADAR (laser detection and ranging) sensors would produce a detailed three-dimensional image which can be compared to computerized geometric models to accurately identify the target. Technology will have seamlessly linked sensors to shooters.

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[43] DARPA, *supra* note 40, fig. 6.

[44] The RQ-1 Predator is an unmanned aerial vehicle (UAV) that provides surveillance, reconnaissance, and target acquisition services over long periods of time. Its detection capabilities include a TV camera, an infrared camera, and synthetic aperture radar for looking through smoke, clouds, or haze.

[45] RADM Raydon Gates, "Towards 2015: Challenges for a Medium Navy – An Australian Perspective," remarks to the US Naval War College International Law Conference, June 24, 2005.

[46] DARPA, *supra* note 40, para. 3.1.

- Robust, secure self-forming tactical networks

Although this strategic thrust supports the previous one, it is not limited to target destruction. Network centric operations "turn information superiority into combat power so that the U.S. and its allies have better information and can plan and conduct operations far more quickly and effectively than any adversary."[47] Doing so depends on highly advanced command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems integrated into a single network.[48] The goal is an ability to rapidly gather, process, and react to information about an opponent, while hindering its efforts to do the same. In military terms, this is known as "getting inside the enemy's observe-orient-decide-act (OODA) loop."[49] Once inside, you control the flow, pace, and direction of battle. Eventually, disorientation paralyzes your adversary.[50]

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[47] *Idem*, para. 3.2.

[48] Intelligence is "the *product* resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas." Surveillance is the "*systematic observation* of aerospace, surface, or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means." Reconnaissance is "a *mission* undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area." DoD Dictionary, *supra* note 38.

[49] Colonel John R. Boyd, USAF, coined the term. Operating within an opponent's OODA loop is a decision-making concept in which one party, maintaining constant situational awareness, assesses a situation and acts on it more rapidly than its opponent. When this happens, the opponent is forced into a reactive mode, thereby allowing the first party to maintain the initiative. As the process unfolds, the opponent eventually begins to react to actions that no longer bear on the immediate situation. The resulting confusion causes paralysis. Boyd's ideas were set out in a briefing titled "Patterns of Conflict."

[50] The 2004 US National Military Strategy adopts specifically this approach by emphasizing the criticality of decision superiority: "Decision superiority – the process of making decisions better and faster than an adversary – is essential to executing a strategy based on speed and flexibility. Decision superiority requires new ways of thinking about acquiring, integrating, using and sharing information. It necessitates new ideas for developing architectures for command, control, communications and computers (C4) as well as the

DARPA is pursuing a number of systems along these lines. For instance, it has developed prototype self-forming, self-healing networks, such as the Small Unit Operations Situational Awareness System (SUO SAS). SUO SAS will be used at the squad level to allow soldiers in complex physical environments such as cities and jungles to securely communicate with each other and monitor the location of fellow squad members.

- Networked manned and unmanned systems

This networked thrust teams manned and unmanned systems to leverage the unique qualities each offers. An example is the backpack portable Micro Air Vehicle, which will perform intelligence, surveillance, and reconnaissance functions for small units. Another is the Unmanned Ground Combat Vehicle, a system providing fire support missions for ground forces.[51] Unmanned systems are especially useful in high-threat environments or where the alternative (e.g., manned aerial reconnaissance) is labor-intensive, costly, or in short supply.[52]

- Urban area operations

Because of the advantages US forces enjoy on the open battlefield, adversaries increasingly confront them in urban areas where they can take advantage of clutter and proximity to civilians and civilian objects

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intelligence, surveillance and reconnaissance assets that provide knowledge of adversaries. Decision superiority requires precise information of enemy and friendly dispositions, capabilities, and activities, as well as other data relevant to successful campaigns. Battlespace awareness, combined with responsive command and control systems, supports dynamic decision-making and turns information superiority into a competitive advantage adversaries cannot match. Joint Chiefs of Staff, NATIONAL MILITARY STRATEGY OF THE UNITED STATES 17 (2004).

[51] Fire support consists of firing artillery or other weapons in support of forces engaging the enemy.

[52] Robots are also being developed, some of which are already fielded in Iraq to deal with roadside bombs. For a description of the robotics development program, see Tim Weiner, *Arsenal of the Future: Robots in Combat*, NEW YORK TIMES, February 16, 2005, at A1.

to mask their location or shield their activities. Events in 2003-2005 Iraq have shaped the direction of research in this area. Present studies include systems to detect enemy forces, explosives (including suicide bombers and improvised explosive devices), and weapons of mass destruction (WMD); distinguish combatants from civilians and threats from civilian objects in crowded areas; "tag" a potential target (individual or object) to allow it to be monitored; employ weapons of variable effectiveness (non-lethal to lethal) to minimize collateral damage; and make individual soldiers and unmanned systems vertically mobile. An illustrative example is the Boomerang shooter detection system, which calculates the direction from which shots have been fired at a moving vehicle to enable effective return fire. Another is the Command Post of the Future (CPOF). Presently, command and control (C2) is exercised from a distinct physical location — a command post. CPOF creates a virtual, mobile, distributed, collaborative C2 system in which key participants operate from different locations, but still collaborate effectively in real time.

- Detection, characterization, and assessment of underground structures

In light of US capabilities to target accurately aboveground structures, adversaries are using underground facilities for such purposes as hiding weapons (including WMD), protecting leadership, C2, and mustering forces. They range from the caves used by the Taliban and al Qaeda to the vast underground bunkers found in Iraq.[53]

DARPA has responded with the Counter-Underground Facility program. The program will develop ground and airborne seismic, acoustic, electromagnetic, optical, and chemical sensors that locate underground facilities; analyze their construction, layout, and vulnerabilities; and conduct post-attack battle damage assessment to determine the need for re-attack.

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[53] CNN.com, "Huge Underground Hideout Uncovered in Iraq," June 5, 2005, www.cnn.com/2005/WORLD/meast/06/05/iraq.main/. The air-conditioned 503,000 square foot bunker reportedly contained a large supply of weapons and ammunition, and contained living spaces for Iraqi forces.

- Assured use of space

Operations like those taking place in Afghanistan and Iraq in 2001-2005 would be unimaginable without space-based communications, navigation, surveillance, reconnaissance, and weather systems. From satellite imagery to hand-held global positioning system locators, space is integral to every facet of high-tech warfare. To leverage space, and deny enemies the same opportunity, DARPA has focused efforts in five areas: rapid and affordable space access; situational awareness in space (what is there and what it is doing); protecting US spaced-based assets; preventing adversaries from using space based assets; and using space in support of earth-based operations.

Numerous programs are underway. Orbital Express involves automated spacecraft to refuel, upgrade, and maintain other spacecraft. The Space Surveillance Telescope is a ground-based telescope with the capability to search space for small objects. Perhaps most significant is the Falcon program's Hypersonic Cruise Vehicle, which will traverse space to speed travel.

- Cognitive computing

Cognitive computing reverses the process whereby computer users adapt to computers by creating computers that adapt to users. Such computers "learn" from their experiences and adjust their activities accordingly. For instance, they can be used in operations centers to deal with fast-paced, complex situations by using past experiences to filter and prioritize information and craft responses thereto. When this occurs, the possibility of surprise diminishes significantly. An example is the Personalized Assistant that Learns (PAL). PAL will anticipate an individual's (e.g., decision-makers or intelligence analysts) needs based on previous experiences and prepare materials for them before being tasked to do so.

- The bio-revolution

This DARPA strategic thrust envisions technologies that either work with the human body or imitate nature. Examples of the former include programs that maintain physical and mental performance despite stress, environmental conditions like heat or altitude, lack of

sleep, or insufficient nutrients. "Legged" robots able to traverse rough terrain better than wheeled vehicles (in one case modeled on a cockroach), optics based on the eye, and sensors inspired by insects that calculate room temperature exemplify the latter.

- Miscellaneous programs

DARPA works in areas other than its strategic thrusts. Three warrant particular mention. The first is materials.[54] One current effort is the Structural Amorphous Metals program, which studies materials with amorphous microstructures that yield hardness and strength previously unattainable. Such materials might be of use, for example, in replacing the depleted uranium shells that have generated controversy. Other possibilities include an unobtrusive external skeleton for soldiers carrying heavy backpacks and morphing aircraft structures that change shape while airborne to vary the flight envelope (much as the body of a bird does).

Microsystems comprise a second area of interest, one which gives the United States much of its current technological edge. In particular, microtechnology increases dramatically the functions performable by computer chips, thereby enhancing the processing capabilities of military systems. Similarly, smaller weapon systems on aircraft or vehicles yield greater range, mobility, and carrying capacity. This facilitates striking more targets with fewer platforms.

The third area is information technology. Present projects include peta-scale computing,[55] autonomous vehicle navigation, and collaboration between humans and robots or robots and robots. The High Productivity Computing Systems program is improving computer efficacy in activities such as cryptanalysis and weather forecasting by a factor of ten to forty. Similarly noteworthy is the Improving Warfighter Information Intake under Stress program, which non-invasively monitors human cognitive load so information provided to the warfighter does not overload thought processes.

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[54] DARPA was instrumental in developing stealth materials for aircraft.

[55] Peta as a prefix refers to tenth to the fifteenth power. In computing, it is one quadrillion (one thousand million million) bytes.

*General trends*

The aforementioned programs offer a real-world glimpse into the technology of future war. Some are understandable reactions to current challenges, such as the urban warfare and underground facility programs, while others reflect weaponry trends already underway. Since the characteristics of weapon systems, not individual systems, determine conflict's character, it is useful to summarize those trends most likely to persist.

- Precision

Precision must be distinguished from accuracy. Accuracy is the ability of a weapon to strike a specified location, known as the aimpoint.[56] Precision, by contrast, involves identifying targets in a timely fashion and striking them accurately.

Many weapons are highly accurate, with circular error probable (CEP) calculations now measured in feet.[57] Accuracy lessens the risk of causing collateral damage and incidental injury, not only because weapons hit closer to their intended aimpoints, but also because the more accurate they are, the less explosive charge needed to achieve the desired probability of damage (Pd).[58] While we can expect CEPs to improve progressively, the reality is that few states can afford the "precision guided munitions" and associated launch platforms

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[56] An aimpoint is "[a] precise point associated with a target and assigned for a specific weapon impact to achieve the intended objective and level of destruction. [It] may be defined descriptively (e.g., vent in center of roof) by grid reference or geolocation." Joint Chiefs of Staff, "Joint Doctrine for Targeting," Joint Publication 3-60, January 17, 2002, at G-6.

[57] CEP is the radius of a circle within which fifty per cent of the weapons will strike.

[58] Probability of damage (Pd) expresses the statistical probability (percentage or decimal) that specified damage criteria can be met assuming the probability of arrival. United States Air Force, Intelligence Targeting Guide, AF Pamphlet 14-210, February 1, 1998, at 59-60. For non-nuclear weapons, damage criteria include F-Kill (Fire-power kill), M-Kill (Mobility kill), K-Kill (Catastrophic Kill), FC-Kill (Fire Control Kill), PTO-Kill (Prevent Takeoff Kill), I-Kill (Interdiction Kill), SW-Kill (Seaworthiness Kill), and Cut and Block. *Idem*, at 58.

necessary to conduct truly accurate operations.[59] This being so, the task for research and development is *affordable* accuracy.[60]

A more prevalent trend in precision warfare is improved ability to locate, identify, and track targets – transparency of the battlefield. Today's warfighters benefit from an array of information sources: imagery intelligence (IMINT); human intelligence (HUMINT); signals intelligence (SIGINT); measurement and signature intelligence (MASINT); open-source intelligence (OSINT); technical intelligence (TECHINT); and counterintelligence (CI).[61] Moreover, aircraft such as the AWACs, JSTARS, and UAVs offer transparency in real-time,[62]

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[59] For instance, a single cruise missile costs over $1,000,000. Federation of American Scientists, BGM-109 Tomahawk, www.fas.org/man/dod-101/sys/smart/bgm-109.htm. Per unit cost for forces already equipped to employ these systems is approximately $500,000.

[60] The joint direct attack munition (JDAM) is a major first step. JDAMs consist of an existing unguided bomb to which a guidance tail kit is attached. Using global positioning system (satellite) and inertial navigation guidance, the resulting weapon has an unclassified CEP of approximately twenty feet from as far away as fifteen miles. Most aircraft can be modified easily to employ the system. At a cost of roughly $20,000, JDAM brings accuracy within the reach of many nations. During the 2003 Iraq war, 5,086 JDAM GBU-31s (two thousand pound) were dropped between March 19 and April 18, 2003. In addition, US forces dropped 768 JDAM GBU 32s (one thousand pound) and 675 GBU 35s (one thousand pound penetrator). US Central Command Air Forces, Assessment and Analysis Division, Operation Iraqi Freedom — "By the Numbers," April 30, 2003, at 11, www.globalsecurity.org/military/library/report/2003/uscentaf_oif_report_30apr2003.pdf.

[61] Joint Chiefs of Staff, "Doctrine for Intelligence Support to Joint Operations," Joint Publication 2-0, March 9, 2000, fig. II-2

[62] The E-3 Sentry is an airborne warning and control system (AWACS) providing surveillance, command, weapons control, battle management, and communications services in the aerial environment. Defensively, AWACS detect enemy aircraft or missiles and direct fighters to intercept them. Offensively, they can monitor the battlespace, providing real-time location and identification of enemy and friendly aircraft and naval vessels to users at the tactical, operational, and strategic levels of warfare. The E-8C Joint Surveillance Target Attack Radar System (JSTARS) is an airborne battle management, command and control, intelligence, surveillance and reconnaissance aircraft that provides ground and air commanders with information that supports attacks on enemy

while equipment like night vision goggles allow soldiers and airmen to locate and target the enemy in adverse conditions such as darkness and poor weather. All indicators point to continued improvements in this area.

- Coordination, command, and control

Another discernable trend is improved coordination horizontally and better command and control vertically. DARPA's work in network centric warfare is illustrative, for it demonstrates that future high-tech militaries will fight as networked entities, rather than hierarchical organizations.

Networking permits quicker collection, fusion, analysis, and dissemination of critical information (such as the location of a fleeting target); better decisions about the platforms able to respond most effectively to it; greater control over an ongoing operation; increased ability to coordinate operations in real-time with other friendly forces; enhanced responsiveness to unanticipated events that arise as the operation unfolds; less risk of friendly operations interfering with each other; and greater ability to deal with enemy threats. Taken together, networking is one of two keys to operating within the enemy's OODA loop.

An example is Blue-Force Tracker, a satellite-based tracking and communication system that allows computerized data integration and dissemination to troops in the field. With Blue-Force Tracker, all echelons of command and staff can follow a battle and provide combat support. Using a combination of computer maps, real-time automated data updates (on friendly and enemy locations, as well as other battlefield information), and chat room coordination, troops engaging the enemy no longer have to rely on preplanned support or that which happens to be "on-station" (in the vicinity). Instead, they can draw on the full range of theater assets, near simultaneously.[63] Blue-Force

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ground forces. Unmanned Aerial vehicles (UAV) are aircraft without a crew that can (depending on the system) perform surveillance, reconnaissance, and target acquisition, and attack functions.

[63] Interview with senior US Army officer with recent combat experience.

tracker, currently fielded in Afghanistan and Iraq, is merely the tip of the iceberg in terms of the networking likely to characterize tomorrow's battlefield.[64]

- Transparency

Transparency is the current focus of efforts to improve precision attack. Yet transparency also allows warfighters to anticipate enemy actions and counter them proactively. It is the second key to getting inside an adversary's OODA loop. Equipped with improved command and control, transparency, precision, and the ability to operate at night and in all-weather conditions, the high-tech military can sculpt the course of most ongoing battles against lesser-equipped foes.

Space enjoys particular importance in this regard, not only as the ultimate 'high ground' from which to observe the enemy, but also as a medium through which information can be transmitted (e.g., by communications and navigation satellites); hence the centrality of space in US development programs. Transparency also undergirds efforts to link sensors for persistent battlefield coverage, as well as the fielding of unmanned systems to maintain coverage in high threat environments.

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DARPA has also demonstrated the capability for establishing Internet connectivity with tactical aircraft that will allow ground station operators to access, as needed, data from sensors (e.g., electro-optical and infrared video) on the aircraft. DARPA, "DARPA Demonstrates Internet Connection for Tactical Aircraft," news release, June 28, 2004.

[64] Networking affects command and control significantly. On the one hand, it pushes authority and responsibility down the chain of command because the underlying premise of a networked system is rapid response to information through enhanced horizontal cooperation (e.g., by passing data directly from the sensor to the "shooter"). Yet, the technology that makes transparency possible and improves communications speed and reliability also allows those up the chain to become involved in even minor tactical engagements. Senior commanders can literally watch soldiers enter buildings from thousands of miles away and talk to those soldiers as they do so.

- Soldier effectiveness

Several of the programs described earlier will improve dramatically the effectiveness of individual soldiers relative to their opponents. The bio-revolution and cognitive computing thrusts are illustrative, with potential further gains garnered from research in tactical networking, manned-unmanned collaboration, materials, and microsystems. These programs cap a lengthy record of providing individual soldiers competitive advantages over their foes, represented by such currently fielded systems as night-vision goggles, light weight body armor, global positioning systems, individual weapons equipped with advanced sighting, and hand-free communications capability. The relative effectiveness and survivability of the individual soldier in militaries capable of acquiring such technology will only increase over time.

- Unmanned and man-out-of-the-loop systems

Unmanned systems have become common on the modern battlefield (and off in the 'global war on terror'). Although early systems provided rudimentary battlefield surveillance and reconnaissance,[65] Unnamed Aerial Vehicles (UAVs) are evolving into weapons platforms. A variant of the Predator, the MQ-1, is now armed with two Hellfire missiles, allowing it to directly engage targets it locates, as in the CIA controlled strike on a car carrying Ali Qaed Senyan al-Harthi, al-Qaeda's alleged senior operative in Yemen, in 2002.[66] It is only a matter of time before UAVs and other unmanned systems conduct attacks without the involvement of a human decision-maker.

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[65] Over time, UAVs have become more robust. For instance, the Global Hawk can fly to an area over one thousand miles away and remain on station for twenty-four hours. Equipped with synthetic aperture radar, a ground moving target indicator, and high-resolution electro-optical and infrared sensors, it collects information that is transmitted to users in near real-time. Because it operates at high altitude, the Global Hawk is highly survivable and can monitor huge areas on earth.

[66] Anthony Dworkin, "The Yemen Strike," November 14, 2002, www.crimesofwar/onnews/news-yemen.html.

- Variable lethality and destructiveness

As noted, DARPA is assessing weapons of variable lethality for use in urban areas. This effort builds on the extensive non-lethal systems (more accurately labeled less-than-lethal) research done to date.[67] The difference is that in the past such systems were viewed primarily as useful in crowd control and other low-intensity situations. However, urban combat in Iraq has demonstrated the utility of weapons with differing destructiveness and lethality even in relatively intensive combat. This is particularly true when civilians and civilian objects are used as shields. Thus, field commanders are actively seeking ways to effectively attack the enemy in an urban setting while limiting collateral damage and incidental injury.

- Other significant trends

As warfare becomes more complex, technology may outpace the ability of uniformed personnel to develop and maintain proficiency in its operation. Some technologies, such as computer network or space operations, require education that the average member of the armed forces lacks. Alternatively, given the limited numbers of a particular system in the inventory, it may be cost-prohibitive to develop training programs for military personnel. Whatever the case, technological complexity suggests a greater civilianization of the battlefield and a closer nexus between civilians and the conduct of hostilities.

Future battlefields will also be less cluttered with military personnel and equipment. Simple cost calculations put massive inventories of equipment beyond the reach of most countries, as does the per item cost of advanced weapon systems. A B-2 bomber, for instance, has a

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[67] Non-lethal weapons are "[w]eapons that are explicitly designed and primarily employed so as to incapacitate personnel or material, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment. DOD Dictionary, *supra* note 38. The United States has established the Joint Non-Lethal Weapons Program to "provide warfighters a family of Non-Lethal Weapon (NLW) systems with a range of optional non-lethal capabilities across the full spectrum of threats and crisis." See generally, NLWP website, www.jnlwd.usmc.mil/mission.asp.

life cycle cost of 2.5 billion dollars.[68] At this price, only the United States can field the aircraft in sufficient numbers to make risking it in combat reasonable. High-tech weapons are much more effective than their low-tech counterparts, thereby requiring the use of fewer weapons platforms to achieve a given objective.

At the same time, militaries throughout the world are downsizing, usually for political and economic reasons. Compensatory technology has also made reductions possible. Unmanned systems are but one example. Additionally, the more technology allows penetration of an enemy's OODA loop, the less important raw troop strength becomes to effective combat operations.

Finally, although not a specific DARPA focus, future weapons will be employable from ever-greater distances and altitudes. Current systems are frequently launched beyond visual range (BVR).[69] For instance, during the 2003 war in Iraq, US naval vessels launched eight hundred and two Tomahawk Land Attack Missiles (BGM-109), which have a range of six hundred and ninety miles. US forces also launched, *inter alia*, some nine hundred AGM-65 Maverick air-to-ground missiles, with a range of over seventeen miles, and four hundred and eight AGM-88 HARM (high speed anti-radiation missile), with a thirty-mile range.[70] The frequency of BVR engagements will only increase as those with long-range precision systems leverage them to stay outside the enemy's threat envelope.

Range, the ability to locate and fix distant enemies, and penetrable enemy defenses,[71] have made battlefields four-dimensional (land, sea,

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[68] In then-year dollars. "B-2 Bomber: Status of Cost, Development, and Production," General Accounting Office, GAO/NSIAD-95-164, August 1995.

[69] Namely, without the shooter actually seeing the target. Also labeled an "over the horizon" attack.

[70] Through April 18, 2003. By the Numbers, *supra* note 60. Or consider computerized counter-battery radar systems that identify an incoming shell at the apex of its flight and immediately calculate its source. Fire is returned quickly, presumably before the enemy has an opportunity to relocate.

[71] Using advanced defensive and offensive technologies such as stealth aircraft (e.g., B-2 Spirit and F-117 Nighthawk), anti radar missiles (e.g., AGM-88 HARM high speed anti-radiation missile), and jamming (e.g., with an EA6-B Prowler aircraft).

air/space, and cyberspace) and spatially unlimited. War is no longer necessarily linear, i.e., fought along fixed lines of troops; instead, it may encompass the opponent's entire territory — from day one. Battlefields are being replaced by "battlespaces."

## The impact of technology on law

The technologies described above are influencing dramatically the application and interpretation of IHL. They will, arguably, continue to do so in the future. First and foremost, such technologies exacerbate the asymmetry that already challenges certain key IHL principles. Second, they complicate efforts to distinguish combatants and other military objectives from civilians and civilian objects. Third, and somewhat paradoxically, modern technology empowers militaries to avoid collateral damage, incidental injuries, and mistaken attacks. As it does so, however, troubling expectations regarding casualties are surfacing, expectations that endanger current understandings of IHL.

### *Asymmetry*

The technologies of war already on the battlefield, and development programs like those described above, will create a degree of asymmetry between high and low-tech forces that has seldom been observed in military history.[72] High-tech forces locate their enemies

[72] Steven Metz and Douglas Johnston have usefully described asymmetry as follows: "In the realm of military affairs and national security, asymmetry is acting, organizing, and thinking differently than opponents in order to maximize one's own advantages, exploit an opponent's weaknesses, attain the initiative, or gain greater freedom of action. It can be political-strategic, military strategic, or a combination of these. It can entail different methods, technologies, values, organizations, time perspectives, or some combination of these. It can be short-term or long-term. It can be deliberate or by default. It can be discrete or pursued in combination with symmetric approaches. It can have both psychological and physical dimensions." Steven Metz and Douglas V. Johnson II, ASYMMETRY AND U.S. MILITARY STRATEGY: DEFINITION, BACKGROUND, AND STRATEGIC CONCEPTS (US Army War College, Strategic Studies Institute, January 2001). The instant monograph limits discussion to technological asymmetry. Other useful material on asymmetry includes

more easily; observe their actions with better understanding; anticipatorily react to those actions with greater speed, coordination, and effectiveness; field weapons systems and soldiers that are infinitely more survivable and better able to neutralize enemy defenses; employ weapons that strike their aimpoint with a degree of force metered precisely to achieve the desired level of destruction; and assess the results of their actions, and readjust if necessary, quickly and with a high degree of reliability. As first demonstrated during the 2001-2002 war in Afghanistan, technology has reached the point where these tasks can be performed around-the-clock.[73]

Even numerically superior low-tech militaries with positional advantage cannot prevail against such forces in conventional combat. At the start of the recent conflict, Iraq fielded a ground force of nearly four hundred thousand.[74] It was defeated in six weeks by a force less than half its size.[75] Further demonstrating the impact of asymmetry, the Iraqi air force never left the ground. Meanwhile, Coalition aircraft flew 20,733 fighter/bomber sorties over territory with an air defense system that was robust by contemporary standards. Only one fixed wing aircraft, an A-10 Warthog, was lost to hostile fire.[76] In its most inhospitable environment, the urban battlefield, technology prevailed.

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Stephen J. Blank, RETHINKING ASYMMETRIC THREATS, (US Army War College, Strategic Studies Institute, September 2003); Ivan Arrequin-Toft, *How the Weak Win Wars: A Theory of Asymmetric Conflict*, INTERNATIONAL SECURITY, Summer 2001, at 19; Steven J. Lambakis, *Reconsidering Asymmetric Warfare*, JOINT FORCE QUARTERLY, December 2004, at 102; Montgomery C. Meigs, *Unorthodox Thoughts about Asymmetric Warfare*, PARAMETERS, Summer 2003, at 4; R.V. Gusentine, *Asymmetric Warfare – On Our Terms*, PROCEEDINGS OF THE UNITED STATES NAVAL INSTITUTE, August 2002, at 58.

[73] Norman Friedman, TERRORISM, AFGHANISTAN, AND AMERICA'S NEW WAY OF WAR 166 (Naval Institute Press, 2004).

[74] International Institute for Strategic Studies, THE MILITARY BALANCE 2002-2003 (Oxford University Press, 2003), at 97.

[75] 183,000. Bob Woodward, PLAN OF ATTACK 401 (Simon and Schuster, 2004).

[76] "By the Numbers," *supra* note 60, at 3, 7-8. Losses also included four Apache and two Cobra helicopters. *Idem.* Iraqi air defenses had been degraded by Operations Northern Watch and Southern Watch air strikes prior to commencement of Operation Iraqi Freedom. These operations monitored the no-fly zones in northern and southern Iraq.

For instance, during the battle for Fallujah, US Marines killed nearly 1,200 insurgents while suffering only fifty casualties.[77]

Weaponry advances historically either find their way to the enemy or soon fall victim to effective countermeasures.[78] As an example, Iraqi insurgents are using mobile phones and lasers to rapidly coordinate attacks on Coalition forces and detonate roadside bombs. Similarly, complex Department of Defense systems are regularly the target of cyberattacks. However, the prospects of disadvantaged forces turning the tables on their high-tech opponents in the near term remain slight.

Low-tech forces face two basic challenges in modern warfare: (i) how to perform the most basic function in combat, survival; and (ii) how to engage the enemy, either to defeat it or to so alter its cost-benefit calculations that it withdraws from the fray voluntarily.

Consider survival. Facing an adversary armed with advanced C4ISR and immediately available precision weaponry, the best survival option is to avoid being spotted in the first place. Lawful methods to discovery include, *inter alia*, camouflage, ruses, jamming, and spoofing.[79] As demonstrated during the unsuccessful Coalition decapitation strikes, simply staying on the move can frustrate

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[77] November 2004. Estimates of casualties vary somewhat. See, e.g., Anthony Shadid, *Baghdad Suffers a Day of Attacks*, WASHINGTON POST, November 21, 2004, at A30; *US Casualties Surge in Iraq, but Public Impact is Muffled*, AGENCE FRANCE PRESSE, November 30, 2004; Iraq Coalition Casualty Count, icasualties.org/oif/Stats.aspx (filter by place and month).

[78] The United States specifically noted this possibility in its 2004 National Military Strategy: "Dual-use civilian technologies, especially information technologies, high-resolution imagery and global positioning systems are widely available. These relatively low cost, commercially available technologies will improve the disruptive and destructive capabilities of a wide range of state and non-state actors. Advances in automation and information processing will allow some adversaries to locate and attack targets both overseas and in the United States. Software tools for network-attack, intrusion and disruption are globally available over the Internet, providing almost any interested adversary a basic computer network exploitation or attack capability." NMS, *supra* note 50, at 6.

[79] Jamming impedes the enemy's use of the electromagnetic spectrum. Spoofing involves creating signals that imitate those of the enemy or others.

advanced detection systems.[80] Indeed, militaries have always used physical features such as jungle canopy, mountainous areas, caves, underground bunkers and tunnels, and urban areas, as well as night and weather, to mask their presence.

Yet, as noted, research is underway on systems to counter each of these tactics, from jam resistant networked information networks to chemicals capable of mapping caves. How does the out-teched side survive? Increasingly, it does so by blurring or even discarding IHL principles. Iraq is the paradigmatic example. During the 1991 Gulf War, Coalition forces defeated Iraqi military units when they met in open battle.[81] By 2003, the technology available to US forces had improved significantly, while the Iraqi military had not recovered from its earlier defeat and the ensuing sanctions regime. Consequently, the Iraqi army avoided open confrontations.

To keep the Coalition troops from identifying them, many Iraqi soldiers discarded their uniforms.[82] The tactic has no *de jure* relationship to the prohibition on attacking civilians, but it endangered them in the sense that Coalition soldiers were less certain about who posed a threat, thereby heightening the risk of mistaken uses of force against innocents. Because such mistakes of fact are more reasonable than would be the case where civilians and combatants are clearly distinguishable, IHL's deterrent effect was weakened effectively.

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[80] In this case, intercepting mobile phone signals.

[81] See generally Department of Defense, Final Report to Congress: Conduct of the Persian Gulf War (1992).

[82] Human Rights Watch, "Off Target: The Conduct of the War and Civilian Casualties in Iraq," December 2003, at 78-79. Since the denial of combatant status to Taliban fighters and publication of photos of US Special Forces soldiers attired in indigenous clothing during the 2001-2002 war in Afghanistan, the 'requirement' to wear uniforms has evoked much discussion. See, e.g., Michelle Kelly and Morten Rostrup, *Identify Yourselves: Coalition Soldiers in Afghanistan are Endangering Air Workers*, GUARDIAN, February 1, 2002, at 19. For a comprehensive legal analysis of the subject, see W. Hays Parks, *Special Forces' Wear of Non-Standard Uniforms*, 4 CHICAGO JOURNAL OF INTERNATIONAL LAW 493 (2003).

Members of the military who merely wear civilian clothes do not violate IHL. Rather, they lose combatant status because they lack the prerequisites thereof set forth in Article 4 of the Third Geneva Convention.[83] Article 4(A)(1) provides that members of the armed forces enjoy combatant status. Article 4(A)(2) sets forth four cumulative conditions which members of a militia not forming part of the armed forces (and members of other volunteers corps, including resistance fighter) must meet to be lawful combatants. Because these conditions are inherent in the meaning of "armed forces," they apply equally to those encompassed in Article 4(A)(1).[84] The relevant criterion in this context is "having a fixed distinctive sign recognizable at a distance," one typically met through uniform wear.

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[83] The relevant provisions of Article 4 exclude the following from civilian status: "(1) Members of the armed forces of a Party to the conflict, as well as members of militias or volunteer corps forming part of such armed forces. (2) Members of other militias and members of other volunteer corps, including those of organized resistance movements, belonging to a Party to the conflict and operating in or outside their own territory, even if this territory is occupied, provided that such militias or volunteer corps, including such organized resistance movements, fulfill the following conditions: (a) that of being commanded by a person responsible for his subordinates; (b) that of having a fixed distinctive sign recognizable at a distance; (c) that of carrying arms openly; and (d) that of conducting their operations in accordance with the laws and customs of war. GC III, *supra* note 27. On the wear of "distinctive" attire, see also HIVR, *supra* note 9, article 1.2; GCI, *supra* note 27, article 13(2)(b); GCII, *supra* note 27, article 13(2)(b). Article 44.3 of Protocol Additional I relaxes the uniform requirement in "situations in armed conflicts where, owing to the nature of hostilities an armed combatant cannot so distinguish himself." In such circumstances, he or she must carry arms openly during military engagements and while visible to the adversary during "a military deployment preceding the launch of an attack." This provision is not customary IHL, and therefore does not supercede the Geneva criteria for non-party states.

[84] Michael Bothe (et. al.) have noted that, "[i]t is generally assumed that these conditions were deemed, by the 1874 Brussels Conference and the 1899 and 1907 Hague Peace Conferences, to be inherent in the regular armed forces of States. Accordingly, it was considered unnecessary and redundant to spell them out in the Conventions." Michael Bothe et. al., NEW RULES FOR VICTIMS OF ARMED CONFLICT 234 (1982). See also discussion in CIHL, *supra* note 22, at 15. Case law is supportive. See, e.g., Mohammed Ali et al. v. Public Prosecutor (1968), [1969] AC 430, 449; *Ex parte Quirin* et. al., 317 U.S. 1 (1942). For a superb analysis of the subject, see Kenneth Watkin, WARRIORS WITHOUT RIGHTS? COMBATANTS, UNPRIVILEGED BELLIGERENTS, AND THE STRUGGLE OVER LEGITIMACY, Program on Humanitarian Policy and Conflict Research Occasional Paper No. 2, Winter 2005.

Two consequences attach to the loss of this status. First, those captured do not qualify as prisoners of war.[85] Second, because only combatants have the right to "directly participate" in hostilities,[86] others enjoy no combatant immunity for their actions during the hostilities. While it is not a war crime to attack the enemy, doing so may amount to a criminal offence (e.g., murder) under the national law of capturing forces. Lacking immunity, they may be prosecuted in the courts of any state with subject matter over the offence and personal jurisdiction over the offender.[87]

Another technique for avoiding identification is feigning specially protected status. Iraqi regular and irregular forces did so, for instance, by misusing protective emblems. One recurring tactic was to seize ambulances and use them as scout vehicles. Iraqi militia forces also marked the Ba'ath Party building in Basra with the ICRC emblem. Party buildings were regularly used as military supply depots and mustering points.[88] IHL prohibits expressly the display of the distinctive emblems of medical and religious personnel, transports, and units, or the personnel, property, and activities of the International Movement of the Red Cross and Red Crescent, for other than their intended purposes.[89]

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[85] This point is reflected in CIHL, *supra* note 22, Rule 106.

[86] "Members of the armed forces of a Party to a conflict (other than medical personnel and chaplains covered by Article 33 of the Third Convention) are combatants, that is to say, they have the right to participate directly in hostilities." PI, *supra* note 13, art. 43.2:

[87] The classic article on the subject is Richard R. Baxter, *So-called "Unprivileged Belligerency": Spies, Guerrillas and Saboteurs*, 1952 BRITISH YEARBOOK OF INTERNATIONAL LAW 323, reprinted in MILITARY LAW REVIEW (Bicentennial Issue) 487 (1975). For a contemporary treatment of the issue of direct participation, see Michael N. Schmitt, *Humanitarian Law and Direct Participation in Hostilities by Private Contractors or Civilian Employees*, 5 CHICAGO JOURNAL OF INTERNATIONAL LAW 511 (2005); Michael N. Schmitt, *"Direct Participation in Hostilities" and 21st Century Armed Conflict*, in CRISIS MANAGEMENT AND HUMANITARIAN PROTECTION: FESTSCHRIFT FUR DIETER FLECK (BWV, Horst Fischer et al eds., 2004), at 505-529.

[88] Off Target, *supra* note 82, at 70.

[89] The prohibition dates from the 1863 Lieber Code, and appears in the 1899 and 1907 Hague Regulations; 1906, 1929, and 1949 Geneva Conventions; and Protocol Additional I. General Order No. 100, U.S. Department of Army, Instructions for the Government of Armies of the United States in the Field (Lieber Code), article 117, reprinted in Schindler, *supra* note 5, at 3; HIIR, *supra*

Sometimes one cannot avoid being identified by the enemy. When that is the case, an increasingly common survival tactic is "counter-targeting," i.e., the use of civilians and civilian objects as shields.[90] Shields may serve voluntarily or involuntarily, an important distinction vis-à-vis IHL.

The war in Iraq is illustrative. Iraqi forces, especially the paramilitary Fedayeen, frequently forced humans, including women and children, to shield their activities. For instance, in one common tactic, they drove their vehicles next to those of civilians whenever they observed Coalition helicopters in the area.[91]

Article 51(7) of Protocol Additional I forbids the use of "[t]he presence or movements of the civilian population or individual civilians ... to render certain points or areas immune from military operations, in particular in attempts to shield military objectives from attacks or to

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note 9, art. 23(f); HIVR, *supra* note 9, art. 23(f); Convention for the Amelioration of the Condition of the Wounded in Armies in the Field, July 6, 1906, arts. 27-28, reprinted in Schindler, *supra* note 5, at 385; Convention for the Amelioration of the Condition of the Wounded in Armies in the Field, July 27, 1929, articles 24 and 28, reprinted in Schindler, *supra* note 5, at 409; GCI, *supra* note 27, articles 39, 44, 53, 54; GCII, *supra* note 27, articles 41, 44, 45; PI, *supra* note 13, article 38.1. See also the military manuals of many nations. E.g., NWP 1-14M, *supra* note 22, para. 11.9.6; UK Ministry of Defence, THE MANUAL OF THE LAW OF ARMED CONFLICT (Oxford University Press, 2004), para. 5.10(a). Permitted purposes are set forth in GCI, *supra* note 27, articles 24-27, 38-44; GCII, *supra* note 27, articles 22, 24-25, 27, 36-39, 41-44; GCIV, *supra* note 27, articles 18-22; PI, *supra* note 13, articles 8, 18, 22-23. The prohibition is self-evidently customary in nature today. See, e.g., CIHL, *supra* note 22, rule 59. When the purpose of the misuse goes beyond merely 'hiding' from the enemy to the use of the emblem to treacherously attack, the separate violation of perfidy occurs. See, e.g., NWP 1-14M, *supra* note 22, para. 12.2.; Federal Ministry of Defense (Germany), Humanitarian Law in Armed Conflicts Manual (1992), sec. 640.

[90] Counter-targeting is "preventing or degrading detection, characterization, destruction, and post-strike assessment." Defense Intelligence Agency, "Saddam's Use of Human Shields and Deceptive Sanctuaries," February 26, 2003.

[91] Todd S. Purdum, *Night Time Ambush in Iraqi City*, NEW YORK TIMES, April 5, 2003, at 1; Dexter Filkins, *In the Field Choosing Targets: Iraqi Fighters Or Civilians? Hard Decision for Copters*, NEW YORK TIMES, March 31, 2003, at 5.

shield, favor or impede military operations."[92] This represents a prohibition which is unquestionably customary.[93] Violation of this norm by one side does not impose an absolute obligation on the other to refrain from attacking the shielded object or persons, but neither does it release the attacker from its own obligations.[94] Therefore, the principle of proportionality applies to attacks on shielded targets; if the likely injuries to (or death of) the shields, together with any other incidental injury or collateral damage caused, is excessive in relation to the resulting concrete and direct military advantage, attack is prohibited.[95] Voluntary shields are an exception, for they lose their IHL

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[92]This prescription tracks that found in the 1949 Fourth Geneva Convention, article 28: "The presence of a protected person may not be used to render certain points or areas immune from military operations." The prohibition only applies vis-à-vis those who "find themselves...in the hands of a Party, to the conflict or Occupying Party of which they are not nationals." It would not apply to Iraqi forces using Iraqis as shields. GCIV, *supra* note 27, article 4.

[93] CIHL, *supra* note 22, Rule 97. See also NWP 1-14M, *supra* note 22, para. 11.2; Rome Statute of the International Criminal Court (Rome Statute), July 17,1998, art. 8.2(b)(xxiii), reprinted in Schindler, *supra* note 5, at 1309. The customary nature is further evidenced by the widespread condemnation that results whenever shields are used. The UN General Assembly labeled Iraq's use of human shields during the first Gulf War as a "most grave and blatant violation of Iraq's obligations under international law" GA Res. 46/134 (December 17, 1991). In May 1995, Bosnian Serbs seized UNPROFOR peacekeepers and used them as human shields against NATO air strikes. In response, the UN condemned the action, demanded release, and authorized the creation of a rapid reaction force to handle such situations. SC Resolution 998 (June 16, 1995).

[94] A principle enshrined in Article 51.8 of Protocol Additional I: "Any violation of these prohibitions [includes the prohibition on shielding] shall not release the Parties to the conflict from their legal obligations with respect to the civilian population and civilians."

[95] Those taking the opposite stance on involuntary shields reasonably and accurately point out that it creates an incentive for the use of shields because an opponent can effectively render a military objective immune from attack simply by placing enough civilians at risk (by virtue of operation of the proportionality principle). APV Rogers has argued that: "a tribunal considering whether a grave breach has been committed [a disproportionate attack] would be able to take into account when considering the rule of proportionality the extent to which the defenders had flouted their obligation to separate military objectives from civilian objects and to take precautions to protect the civilian population ... the proportionality approach taken by the tribunals should help to redress the

immunity from attack by "directly participating" in hostilities.[96] Obviously, since direct participants may be attacked, it would be incongruent to suggest they should nevertheless count in proportionality calculations.[97]

Civilian objects are also useful in counter-targeting. Iraqi forces often located military equipment and troops in or near civilian buildings, including specially protected locations. For instance, as Coalition forces moved north the Fedayeen used such protected locations as al-Nasiriyya Surgical Hospital, the Baghdad Red Crescent Maternity Hospital, the Imam Ali mosque in al-Najaf, and the Abu Hanifa mosque as bases for operations.[98] Later, during the November 2004 battle of Fallujah, sixty of the city's one hundred mosques and three medical facilities were so used.[99]

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balance which would otherwise be tilted in favor of the unscrupulous." Rogers, LAW ON THE BATTLEFIELD 129 (second edition, Juris Publ., 2004). See also W. Hays Parks, *Air War and the Law of War*, 32 AIR FORCE LAW REVIEW 1, 163 (1992).

[96] As noted in Article 51.3 of Protocol Additional I, "[c]ivilians shall enjoy the protection afforded by this Section, *unless and for such time as they take a direct part in hostilities."* The Rome Statute adopts this standard by making it a war crime to intentionally attack civilians unless they are "taking direct part in hostilities." *Supra* note 93, art. 8.2(b)(i). The United States takes the position that as direct participants, they become targetable (although there will seldom be any reason to directly attack them) and, more important, are excluded in the estimation of incidental injury when assessing proportionality. See Department of Defense, "Background Briefing on Targeting," March 5, 2003, www.defenselink.mil/news/Mar2003/t03052003_t305targ.html. Human Rights Watch takes the opposite position. Human Rights Watch, "International Humanitarian Law Issues in a Potential War in Iraq," February 20, 2002, www.hrw.org/backgrounder/arms/iraq0202003.htm#1. Children legally lack the mental capacity to form the intent to voluntarily shield military objectives. Israeli forces do not use live ammunition against children. Justus R. Weiner, *Co-existence Without Conflict: The Implementation of Legal Structures for Israeli-Palestinian Cooperation Pursuant to the Interim Peace Agreements*, 26 BROOKLYN JOURNAL OF INTERNATIONAL LAW 591, at n. 407 (2000).

[97] International volunteer shields traveled to Iraq prior to Operation Iraqi Freedom. Those who suggest that shielding is not direct participation forget that, in the CNN age, shielding may be a more effective defense against attack than weaponry.

[98] "Off Target," *supra* note 82, at 72-73.

[99] Marine Expeditionary Force and Multi-National Corps-Iraq, "Telling the

Although no express provision on using civilian objects as shields exists in IHL, such actions violate Protocol Additional I's Article 58 obligations to "endeavour to remove the civilian population, individual civilians and civilian objects under their control from the vicinity of military objects; avoid locating military objectives within or near densely populated areas; [and] take the other necessary precautions to protect the civilian population, individual civilians, and civilian objects under their control against the dangers resulting from military operations," albeit only "to the maximum extent feasible."[100] It is always "feasible" to refrain from intentionally placing military equipment and personnel in or near civilian objects in order to keep the former from being attacked.

Even more clearly an IHL violation is misuse of specially protected objects to compensate for technological disadvantage. The First Geneva Convention provides, in Article 19, that "responsible authorities shall ensure that ... medical establishments and units are, as far as possible, situated in such a manner that attacks against military objectives cannot imperil their safety." Protocol Additional I is plainer still: "Under no circumstances shall medical units be used in an attempt to shield military objectives from attack."[101] Further, "historic monuments, works of art or places of worship which constitute the cultural or spiritual heritage of peoples" receive analogous protections under the Protocol.[102] The Imam Ali and Abu Hanifa Mosques, mentioned above, qualify, for they are important Shia and Sunni shrines respectively.[103]

Absent special protection, civilian objects can become military objectives due to their militarily significant *location*, through *use* for

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Fallujah Story to the World," Briefing Slides, November 20, 2004.

[100] See also CIHL, *supra* note 22, ch. 6.

[101] PI, *supra* note 13, article 12.4.

[102] PI, *supra* note 13, article 53(b). See also HIVR, *supra* note 9, article 27.

[103] "Off Target," *supra* note 82, at 72-73. On misuse of religious locations, see also *Regime Shows Disregard for Historical, Religious Sites in Holy City*, US Central Command News Release No. 03-04-28, April 2, 2003; *Regime Use of Baghdad Mosques And Hospitals*, US Central Command News Release No. 03-04-65, April 6, 2003.

military actions, or when their future *purpose* is military.[104] Moreover, each treaty granting specially protected status withdraws it upon misuse.[105] Thus, as a matter of *law*, shielding with civilian objects has little effect aside from influencing proportionality calculations.

Assuming the technologically weaker forces survive, they still need to attack the enemy. One logical, albeit unlawful, tactic for doing so is perfidy. Iraqi forces adopted a number of other perfidious tactics to offset the Coalition's technological superiority. Recall that Iraqi forces fought often in civilian clothes, a perfidious act if done as an element of an attack tactic. This is precisely why soldiers usually don civilian clothes. Additionally, they reportedly feigned surrender and used stolen ambulances to approach Coalition forces, hoping their opponents would make themselves more vulnerable by lowering their guard.[106]

Another tactic adopted in Iraq is suicide bombing. The increasing frequency of bombings attests to the success of the tactic against

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[104] PI, *supra* note 13, article 52.2. According to the ICRC Commentary on the definition of military objective, "[t]he criterion of purpose is concerned with the intended future use of an object, while that of use is concerned with its present function." COMMENTARY ON THE ADDITIONAL PROTOCOLS OF 8 JUNE 1977 TO THE GENEVA CONVENTIONS OF 12 AUGUST 1949 (Yves Sandoz, Christophe Swinarki and Bruno Zimmerman eds., ICRC, 1987), para. 2022. For instance, an apartment building's use as a unit headquarters transforms it into an attackable military facility. Any collateral damage or incidental injury that might be caused during an attack thereon would be governed by the principle of proportionality.

[105] See also Rome Statute, *supra* note 93, article 8.2(b)(ix).

[106] See, e.g., Glenn Collins, *Allied Advances, Tougher Iraqi Resistance, and a Hunt in the Tigris*, NEW YORK TIMES, March 24, 2003, at 1. The prohibition is set forth in Protocol Additional I, article 37.1(a). See also Lieber Code, *supra* note 89, article 71; Project of an International Declaration concerning the Laws and Customs of War (1874 Brussels Declaration), art. 13, reprinted in Schindler, *supra* note 5, at 21; The Laws of War on Land (1880 Oxford Manual), at 9(b), reprinted in Schindler, *supra* note 5, at29; HIIR, *supra* note 9, art. 23(c); HIVR, *supra* note 9, art. 23(c); PI, *supra* note 13, art. 41.2(b). Violation is a grave breach pursuant to PI, *supra*, art. 85.3(e). A flag is not the sole means of communicating intent to surrender; any technique that so informs the enemy suffices. Surrendering forces are *hors de combat* and entitled to immunity from attack.

superior forces or the relative lack of alternatives in the face of such superiority.[107] Although lawful if directed against combatants and military objectives,[108] when the bomber feigns protected status to approach targets, as is the norm, the attack is perfidious. Typically, though, civilians (unlawful combatants) carry out suicide attacks. Their *mens rea* determines whether doing so constitutes perfidy. If merely attacking, their actions comprise direct participation in hostilities. On the other hand, if the wearing of civilian clothing forms an integral part of their attack tactics, i.e., they have committed perfidy.[109]

Eventually, the technologically disadvantaged side may conclude that it is unlikely to prevail and reframe the conflict by shifting attention towards a center of gravity other than the military.[110] As Von Clausewitz recognized, war is the continuation of politics by other means. This being so, when facing overwhelming odds, it is quite rational to abandon the principle of distinction altogether and attack civilians as a center of gravity.

Both practicalities and objectives compel adoption of such a strategy. From a practical perspective, it is impossible to protect the civilian population effectively, no matter how robust one's technological

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[107] On the increasing use of suicide bombings in Iraq, see Robert A. Pape, *Blowing Up an Assumption*, INTERNATIONAL HERALD TRIBUNE, May 19, 2005, at 8. See also Robert A. Pape, DYING TO WIN: THE STRATEGIC LOGIC OF SUICIDE TERRORISM (Random House, 2005). Pape looked at 315 suicide bombings, concluding that suicide bombers are seldom religious fanatics. On the contrary, the majority of bombings are conducted as part of a political or military campaign, often intended to motivate democracies to leave territory that the bombers consider their homeland. See also Dan Eggen and Scott Wilson, *Suicide Bombs Potent Tools of Terrorist*, WASHINGTON POST, July 17, 2005, at A1.

[108] As illustrated by the kamikaze in the Second World War. See Yoram Dinstein, *Jus in Bello Issues Arising in the Hostilities in Iraq in 2003*, 34 ISRAEL YEARBOOK ON HUMAN RIGHTS 1, 4-5 (2004), for a discussion of the legal issues in the context of the war in Iraq.

[109] See Schmitt, Humanitarian Law and Direct Participation, *supra* note 87, at 520-21.

[110] Centers of gravity consist of "[t]hose characteristics, capabilities, or sources of power from which a military force derives its freedom of action, physical strength, or will to fight." DoD Dictionary, *supra* note 38.

wherewithal. Crippled by technology in a classic fight, the disadvantaged side responds asymmetrically by attacking its opponent's vulnerabilities.

Attacking civilians is also appealing when the objective is to take the fight out of an enemy without defeating it militarily. For instance, the goal may be to rupture a coalition, as in the Iraqi targeting of Israeli cities in 1991.[111] Attacking civilians may also be intended to affect non-governmental and intergovernmental organizations. In Iraq, for instance, insurgents attacked the UN and ICRC headquarters in an effort to force their withdrawal. Similarly, civilian targeting can make the conflict appear too costly to belligerent states and citizens. The kidnapping and murder of foreign hostages in Iraq was designed to convince US partners to leave Iraq; such crimes are proving effective. Additionally, the "target" population might be the attacker's own. One goal of the attacks against Iraqi civilians is, arguably, to convince the population it will be safer without Coalition forces. More directly, attacks against civilian politicians, judicial officials, and law enforcement personnel are designed to deter cooperation with the Coalition. Whatever the motivation, attacking civilians is a sadly frequent asymmetrical method of countering battlefield technological advantage.

Beyond unlawful *methods*, the technologically weaker side may resort to compensatory *means* of warfare. Two at the center of discussion are computer network attack (CNA)[112] and weapons of mass destruction.

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[111] To draw Israel into the conflict, thereby disrupting the Coalition, which included Arab states such as Syria.

[112] CNA consists of "[o]perations to disrupt, deny, degrade, or destroy information resident in computers and computer networks, or the computers and networks themselves....CNA relies on the data stream to execute the attack." An example is "sending a code or instruction to a central processing unit that causes the computer to short out the power supply." DOD Dictionary, *supra* note 38. On computer network attack, see COMPUTER NETWORK ATTACK AND INTERNATIONAL LAW (Naval War College International Law Studies, Michael N. Schmitt and Brian O'Donnell eds., 2002); Michael N. Schmitt, *Wired Warfare: Computer Network Attack and International Law*, 84 (No. 846) INTERNATIONAL REVIEW OF THE RED CROSS 365 (June 2002); Michael N. Schmitt, Heather A. Harrison-Dinniss and Thomas C. Winfield, *Computers and War:*

CNA represents "war on the cheap" for an otherwise technology starved belligerent, since cost is limited to acquisition of off-the-shelf computers and exploitation software, access to the target network, and computer expertise. Moreover, the higher-tech an opponent, the more vulnerable it is to such attacks. Terrorist groups are already effectively using websites to conduct information campaigns; the broadcast of beheadings representing the extreme example. Concerted, organized offensive use of information technology will in all likelihood follow.

There is nothing unlawful per se about cyberattacks. On the contrary, when computer network attack assets are readily available, IHL's precautions in attack requirements may sometimes mandate their use because CNA usually risks less collateral damage and incidental injury than kinetic weapons.[113] That said, the proportionality principle applies to CNA, as it does in all attacks. This is a particularly meaningful limitation on CNA because civilian systems are often linked to military networks (thereby risking the spread of viruses and other computer contagions),[114] and because many potential CNA targets are dual-use entities (e.g., power).[115]

As suggested by DARPA's programs, high-tech militaries have recognized this threat and are developing robust defenses. This may have the ironic effect of turning attention towards more penetrable civilian networks. In a networked world, the consequences of such attacks could be disastrous. Imagine cyberattacks against global

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*The Legal Battlespace*, Program on Humanitarian Policy and Conflict Research, International Humanitarian Law Research Initiative Briefing Paper (June 2004), www.ihlresearch.org/ihl/pdfs/schmittetal.pdf; Michael N. Schmitt, *CNA and the Jus in Bello: An Introduction*, in INTERNATIONAL EXPERTS CONFERENCE ON COMPUTER NETWORK ATTACK AND THE APPLICABILITY OF INTERNATIONAL HUMANITARIAN LAW: PROCEEDINGS 101 (Swedish National Defence College, Karin Brystrom ed., 2005).

[113] Recall that Article 57.2(a)(ii) of Protocol Additional I requires those who plan or decide upon an attack to "take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss or civilian life, injury to civilians and damage to civilian objects."

[114] If the computer contagions are designed to spread randomly in a way that may cause injury to civilians or damage to civilian objects, they constitute prohibited indiscriminate weapon.

[115] Dual-use objects are those used for both military and civilian purposes.

financial networks, air traffic control systems, water treatment and distribution facilities, nuclear power plants, oil refineries and pipelines, or medical data systems.

The issue of whether attacks on civilian networks violate IHL has generated a debate. Some experts argue that all CNA operations against civilian networks violate the principle of distinction.[116] The better view is that IHL only prohibits those rising to the level of an "attack." Although Article 48 of Protocol Additional I requires Parties to "direct their *operations* only against military objectives," every other relevant Protocol prohibition cites "attack" as its operative criterion.[117] "Attack" is a term of art defined in Article 49 as "acts of violence against the adversary, whether in offence or in defence."

Given advances in military technology, it would be unreasonable to further interpret "attacks" as limited to those conducted through kinetic means. Indeed, universal consensus exists that non-kinetic biological, chemical, and radiological operations qualify as attacks. At the same time, the express reference to violence can only be interpreted as implying violent *consequences*.[118] Thus, a military operation causing injury to humans (or severe mental suffering) or physical damage to property is an attack.[119] Mere inconvenience would not suffice. Universal acceptance of the proportionality principle as considering

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[116] See, e.g., Knut Dormann, *Applicability of the Additional Protocols to Computer Network Attack*, in Bystrom, *supra* note 112, at 139, 145.

[117] For instance, "the civilian population as such, as well as individual civilians, shall not be the object of attack" (51.2); "civilian objects shall not be the object of attack" (52.1); "indiscriminate attacks are forbidden" (51.4); "attacks shall be limited strictly to military objectives" (52.2).

[118] This position is consistent with other aspects of Protocol Additional I. For instance, Article 51, which provides that the "civilian population and individual civilians shall enjoy general protection against *dangers* arising from military operations," and which prohibits "acts or threats of *violence* the primary purpose of which is to spread terror among the civilian population," as well as the commentary to Article 48, which notes that "the word 'operation' should be understood in the context of the whole of the Section; it refers to military operations during which violence is used." PI, *supra* note 13, article 51.1-2; Commentary, *supra* note 104, para. 1875.

[119] A point supported by the prohibition on attacks intended to terrorize the civilian population in Protocol Additional I, article 51.2.

"incidental loss of civilian *life, injury* to civilians [and] *damage* to civilian objects" supports this interpretation.

In addition to exploiting the cyber-vulnerabilities of technology dependent societies, disadvantaged foes may fight asymmetrically with WMD. A number of states are acquiring WMD to deter attack by technologically advantaged militaries, most notably North Korea.[120] Doing so is a predictable response on the part of those facing militarily dominant rivals.

IHL outlaws chemical and biological weapons use for states party to the various instruments cited above. Arguably, customary law does the same for the rest.[121] That states do not have great confidence in these normative prohibitions is attested to by the extensive efforts they take to be able to operate in contaminated environments. This is understandable, for biological and chemical weapons are relatively low-tech, inexpensive, accessible, and easily deployable.[122]

However, it is not battlefield use that generates the greatest concern. The dynamic of asymmetry operates in the biological and chemical context in much the same way it does vis-à-vis CNA. Facing militaries equipped to withstand biological and chemical attacks, opponents may decide civilians pose the more attractive target. Thus, beyond the general prohibition on use, violation of the distinction principle logically (albeit not lawfully) results from severe disadvantage in conventional weapons systems.

The case of nuclear weapons is more complicated. In its 1996 advisory opinion on *The Threat or Use of Nuclear Weapons*, the International Court of Justice opined that their use "would generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law." However, it

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[120] See, e.g., James Brooke, *North Koreans Claim to Extract Weapons Grade Fuel for Bombs*, NEW YORK TIMES, May 12, 2005, at 1.

[121] This is the position taken by the Customary International Humanitarian Law study.

[122] For a threat analysis of biological weapons, see Milton Leitenberg, *Biological Weapons and "Bioterrorism" in the First Years of the 21st Century*, 21:2, POLITICS AND THE LIFE SCIENCES, Sept. 2002, at 3.

added the caveat that it could not "conclude definitively whether the threat or use of nuclear weapons would be lawful or unlawful in an extreme circumstance of self-defence, in which the very survival of a state would be at stake."[123]

These conclusions demonstrate a relative misunderstanding of nuclear warfare.[124] Cleary, there are circumstances in which the use of such weapons would comply with the principle of distinction, including proportionality.[125] That there are probably nine nuclear powers, including all five of the permanent members of the Security Council, further draws the Court's conclusions into question.[126] For these and related reasons, the ICRC *Customary International Humanitarian Law* study refrained from asserting that the use of nuclear (in contrast to chemical and biological) weapons violates customary IHL.[127]

The days of imagining nuclear warfighting generally faded away with the Cold War. Today, a limited number of nuclear weapons would not be decisive in a battle against determined high-tech forces like those of the United States. Therefore, beyond deterrent saber-rattling, the most likely nuclear scenario in the early twenty-first century is use of a small, low-yield, unsophisticated weapon against a population center, for holding the population at risk (or attacking it) offers the greatest leverage over an opponent. The logic of technological asymmetry yet again leads, at least in theory, the disadvantaged belligerent towards extreme measures in violation of IHL.

Each of the dynamics of asymmetry sketched out thus far centers on technology possessed by one side impelling its lesser-equipped opponent beyond the boundaries of IHL. Yet the effect of technological asymmetry may be subtler, resulting in shifting interpretations of IHL,

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[123] Nuclear Weapons, *supra* note 4, para. 105E.

[124] See generally, Michael N. Schmitt, *The International Court of Justice and the Use of Nuclear Weapons*, NAVAL WAR COLLEGE REVIEW, Spring 1998, at 91, reprinted in 7 USAFA JOURNAL OF LEGAL STUDIES 57 (1997).

[125] For instance, use of nuclear mines in remote areas of the high seas against enemy ballistic missile submarines or low-yield battlefield nuclear weapons employed against armor forces in remote parts of the desert when there is no wind. The situations are rare, but not unimaginable.

[126] Additional states include Israel, Pakistan, India, and North Korea.

[127] See CIHL, *supra* note 22, ch. 22.

rather than outright violation. Most significantly, the scope of military objectives and the principle of proportionality are likely to be so affected.

Recall that the principle of distinction limits attacks to combatants and military objectives.[128] Military objectives are objects that "make an effective contribution to military action," the attack on which will yield a "definite military advantage." Typically, the concept is interpreted narrowly, requiring a relatively direct nexus between the object attacked and the conduct of hostilities.[129] To the extent military assets are difficult to attack due to an adversary's technological edge, an incentive exists to characterize entities with a weaker nexus to combat, but which are more vulnerable, as military objectives. Thus, for instance, while all would agree that a munitions factory qualifies, a disadvantaged side might argue that other industries providing income to finance the war effort do as well.

In fact, the United States may have strengthened inadvertently the position of those who would so argue by adopting a broad interpretation of military objectives in the Navy, Marine Corps and Coast Guard's *Commander's Handbook on the Law of Naval Warfare*. In that manual, military objectives are described as objects contributing to the enemy's warfighting or war sustaining capability. The Handbook goes on to note that "[e]conomic targets of the enemy that indirectly but effectively support and sustain the enemy's war-fighting capability may also be attacked." In light of this interpretation, which is labeled customary, it is difficult to contest adoption of a similar approach by a technologically weaker opponent determined to impose costs on its superior enemy.[130]

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[128] The term extends to members of the armed forces. It is not limited to objects. Commentary, *supra* note 104, at para. 2017.

[129] The official ICRC Commentary, discussing the term "definite military advantage," states "it is not legitimate to launch an attack which offers only potential or indeterminate advantages." Commentary, *supra* note 104, para. 2024.

[130] NWP 1-14M, *supra* note 22, para. 8.1.1. This assertion is labeled a "statement of customary international law." The Handbook cites General Counsel, Department of Defense, Letter of September 22, 1972, reprinted in 67 AMERICAN JOURNAL OF INTERNATIONAL LAW 123 (1973), as the basis for this characterization. US joint doctrine reinforces this approach by providing that "[c]ivilian objects consist of all civilian property and activities other than those used to support or sustain the adversary's warfighting capability." Joint

Paradoxically, militaries that outclass their adversaries may also see merit in a broad interpretation of the concept of military objectives. Technology, particularly when not possessed by an opponent, makes possible strategies that otherwise might not be viable. Most notable in this regard are coercive strategies, which seek not to defeat the enemy militarily, but rather to coerce it into engaging in a particular course of conduct (or desisting from one) through imposition of unacceptable costs. The archetypal example is Operation Allied Force, NATO's 1999 air campaign to force the Federal Republic of Yugoslavia to quit killing Kosovar Albanians and negotiate a political settlement on the basis of the Rambouillet Accords.[131] NATO never harbored a desire to defeat Yugoslavia militarily. On the contrary, President Clinton famously announced that NATO had no intention of sending in ground forces.[132] Instead, the aim was to employ force to alter the cost-benefit calculations of the Yugoslavian leadership, particularly Slobodan Milosevic.

From an IHL perspective, the predicament with coercive campaigns is that destruction of military targets may not affect the enemy leadership as much as holding its political power base, the civilian population, or personal financial assets at risk. This being so, there is an incentive to define military objectives as encompassing attractive coercion targets. Indeed, one commentator has gone so far as to suggest that elements of

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Publication 3-60, *supra* note 56, at A-2. The term "war sustaining" also appears in the Instructions for the US Military Commission at Guantanamo. Department of Defense, Military Commission Instruction No. 2, Crimes and Elements for Trials by Military Commission, April 30, 2003, para. 5D.

[131] NATO's demands were set forth in a Statement of the Extraordinary Meeting of the North Atlantic Council on April 12, 1999, and reaffirmed by the Heads of State and Government at Washington on April 23. They included a cessation of military action, as well as ending violence and repression of the Kosovar Albanians; withdrawal from Kosovo of military, police, and paramilitary forces; an international military presence in Kosovo; safe return of refugees and displaced persons and unhindered access to them by humanitarian aid organizations; and the establishment of a political framework agreement on the basis of the Rambouillet Accords. Press Release M-NAC-1(99)51, April 12, 1999, www.nato.int/docu/pr/1999/p99-051e.htm; Press Release S-1(99)62, April 23, 1999, www.nato.int/docu/pr/1999/p99-062e.htm.

[132] Christopher Marquis, *In Wartime, Some Argue, Commanders in Chief Do Best When They Really Command*, NEW YORK TIMES, February 10, 2004, at 18.

the principle of distinction should be abandoned altogether to permit targeting along these lines.[133]

The adoption of effects-based operations (EBO) - a targeting approach that replaces attrition strategies that progressively destroy enemy forces with surgical strikes designed to achieve particular well-defined effects - coincided with the rise of thinking about coercive strategies.[134] Advanced technology, especially precision, stealth, and C4ISR, has rendered effects-based operations feasible by making it possible to reliably deconstruct enemy systems, identify those aspects thereof that can yield a defined effect, and penetrate enemy territory to conduct precision strikes.[135]

Inevitably, concentrating on effects will lead to strategies aimed at achieving them without necessarily destroying the enemy's military as the means of doing so. As discussed, there are already suggestions

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[133] See, e.g., Charles J. Dunlap, Jr., *The End of Innocence: Rethinking Noncombatancy in the Post-Kosovo Era,* STRATEGIC REVIEW 14 (Summer 2000).

[134] Effects based operations are "[a]ctions taken against enemy systems designed to achieve specific effects that contribute directly to desired military and political outcomes." US Air Force, Air Force Glossary (AF Doctrine Document 1-2), August 24, 2004, at 26. Consider electrical power. Command and control relies usually to some degree on the civilian electrical grid. Therefore, in the past, neutralizing C2 led often to strikes against power substations and generating plants. However, the effect sought was not destruction of the electrical grid, but merely interference with command and control. An effects-based analysis would deconstruct the electrical grid to identify that discrete component thereof depriving C2, and little more, of electricity. Only that component would be attacked. A focus on effects has now been included in the National Military Strategy: "Force application focuses more on generating the right effects to achieve objectives than on generating overwhelming numbers of forces." NMS, *supra* note 50, at 15.

[135] On effects-based operations, see Brigadier General David A. Deptula, EFFECTS-BASED OPERATIONS: CHANGE IN THE NATURE OF WAR (Aerospace Education Foundation 2001); Department of Defense, Effects-based Operations Briefing, March 19, 2003, www.defense link.mil/news/Mar2003/g030318-D-9085.html. On EBO and law, see Michael N. Schmitt, *Aerial Effects-Based Operations and the Law of Armed Conflict,* paper presented at a conference to mark the launch of the UK Manual of the Law of Armed Conflict, Oxford University, July 2004. The articles presented appear in a compilation edited by Steven Haines and published by Oxford University Press.

along these lines with overtly coercive campaigns. A closely related doctrine with the potential for operationalizing this tendency is axiological targeting. Made possible by advanced technologies, axiological operations distinguish between utility and value targets.[136] Utility is the future usefulness of a prospective target to the enemy, whereas value constitutes its relative worth. In utility targeting, the attacker seeks to deny enemy forces what they need to operate by striking military objects such as airfields, vehicles, troops, headquarters, and command and control.[137] By contrast, axiological operations (although including utility targets) focus on objects the enemy leadership values, prioritizing targets based on the extent to which their destruction (or neutralization) is likely to affect decision-making.[138]

Although affecting cost-benefits calculations is often one mission planning goal, axiological operations elevate it to the central purpose. As with coercive strategies, viewing military operations in this manner drives one towards interpreting the concept of military objectives very liberally or, perhaps, even ignoring the principle of distinction.

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[136] See generally Peter W.W. Wijninga and Richard Szafranski, *Beyond Utility Targeting: Towards Axiological Operations,* AEROSPACE POWER JOURNAL 45 (Winter 2000).

[137] Proponents of axiological operations cite Colonel John Warden's model, in which the enemy is attacked as a system consisting of five concentric circles (leadership, organic or system essentials, infrastructure, population, and fielded forces), as an example of sophisticated utility targeting. In Warden's approach, the intent is to cause the system to malfunction such that paralysis sets in. On Warden's theory, see John A. Warden III, THE AIR CAMPAIGN: PLANNING FOR COMBAT (Brassey's, rev. ed., 1998).

[138] Recall the comments by NATO air commander, Lieutenant General Michael Short, regarding Operation Allied Force air attacks against Belgrade: "I felt that on the first night the power should have gone off, and major bridges around Belgrade should have gone into the Danube, and the water should be cut off so the next morning the leading citizens of Belgrade would have got up and asked 'Why are we doing this?' and asked Milosevic the same question." Short realized that Milosevic most feared losing the support of the population, and thereby political power; in axiological operations terms, popular support for the regime was the value to be attacked to most effectively create the effects sought — incentivizing compliance with NATO demands. C.R. Whitney, *The Commander; Air Wars Won't Stay Risk-Free, General Says,* NEW YORK TIMES, June 18, 1999, at A1.

Application of the proportionality principle may also be affected in subtle ways by technological disadvantage. Understandably, the technologically weaker side tends to view all victories over its superior opponent as momentous. To some extent they may be, for even minor successes by the weaker side embolden one's own troops and can demoralize an adversary. As a result, the weaker side might overvalue military advantage when determining whether incidental injury and collateral damage are excessive. Too, facing defeat, the weaker side may undervalue collateral damage and incidental injury, for risk to enemy civilians is unlikely to resonate as forcefully given its own dire straits.

The technologically superior side is liable to reverse these tendencies. Nearly certain of ultimate victory, the importance of any one military success will weigh less heavily in the proportionality calculation. Casualty aversion on the part of dominant forces reflects this dynamic in a slightly different context; the greater the likelihood of victory, the less willing the prevailing side is to place its forces at risk. Similarly, the advantaged belligerent may attribute considerable value to enemy collateral damage and incidental injury because it has more leeway to avoid them without jeopardizing its pending victory. This is particularly true given the media's ability to globally report civilian losses in near real time.

It is impossible to relate objectively the value of military advantage to collateral damage and incidental injury; they are dissimilar values that cannot be compared meaningfully except in extreme cases. Be that as it may, the proportionality principle does cause warfighters pause when planning and executing attacks. The degree to which it does so depends in part on the extent of one's combat wherewithal relative to the enemy.

Finally, as we have seen in Iraq and as recognized by DARPA, technological disadvantage drives one from the open battlefield into either terrain that masks location or urban areas. In the case of the former, such as jungle or mountainous terrain, there is seldom risk to civilians, for it is the very remoteness of the areas that appeals to the vulnerable side. As noted, DARPA is working to develop systems that deny the enemy the protection of jungle canopies, caves, and so on. As this occurs, disadvantaged forces will be pushed into urban areas

where, despite emerging urban warfare technology, the proximity to civilians and the difficulty in distinguishing combatants (who will often wear civilian attire) from civilians will offer greater hope of survival.

It is apparent that technological asymmetry creates faultlines in international humanitarian law. Yet, advanced technology will affect the interpretation and application of IHL in ways wholly distinct from asymmetrical warfare.

*Hindering distinction*

Technology complicates application of the principle of distinction, but not always as advertised. Much is often made of the fact that many weapons are launched BVR. Furthermore, as described above, systems are now being developed in which an attack occurs without direct involvement of humans. There is a persistent tendency to characterize both BVR and "man-out-of-the-loop" technologies as weakening the ability to distinguish. Their use, so the argument goes, violates the precautions in attack requirements to "do everything feasible to verify that the objectives to be attacked are neither civilians nor civilian objects and are not subject to special protection" and to "take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects."[139] For instance, some have claimed that an accidental attack on an Albanian refugee column during the 1999 NATO intervention in Kosovo and the bombing of marked ICRC warehouses during the 2001-2002 war in Afghanistan could have been averted had the pilots flown low enough to see the targets.[140]

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[139] PI, *supra* note 13, art. 57.2.

[140] For example, HRW specifically discussed the Djakovica Road incident in its report on Operation Allied Freedom, concluding that because "higher altitude seems to have impeded a pilot from adequately identifying a target"..."inadequate precautions were taken to avoid civilian casualties." Human Rights Watch, "Civilian Deaths in the NATO Air Campaign," February 2000, www.hrw.org/reports/2000/nato/index.htm#TopOfPag.

While it may be true in individual cases that human involvement enhances target identification and verification and lowers the probability of collateral damage and incidental injury, this is not always true. Most significantly, getting close enough to actually see the enemy brings with it vulnerability to enemy fire. This fact alone affects one's ability to perceive accurately. So too does taking the evasive maneuvers necessary to avoid being hit, for some precision weapons require a stable launch platform and sufficient time to acquire and lock onto a target. Further, certain precision weapons become more accurate with distance and altitude because there is greater opportunity for the weapon to be guided to the target. Finally, there is no scientific basis for concluding that human perception and judgment are necessarily more acute or reliable than that of machines. Even if such base existed, it is appropriate to consider the safety of one's own forces when assessing the propriety of a strike. Force protection cannot alone outweigh any degree of collateral damage and incidental injury, but it is certainly a proper consideration for the attacker.[141]

A greater obstacle to application of the distinction principle is the growing proximity of military objectives to civilians and civilian objects, a phenomenon caused in part by technology. Perhaps most significantly, the range and precision of weapons, the transparency of the battlefield made possible by advanced ISR, and the ability to generate attacks very quickly using networked C4 have transformed traditional battlefields, on which forces typically engaged along a relatively identifiable line know as the FEBA (forward edge of the battle area). Linearity allowed civilians to distance themselves from the hostilities to some extent, although the advent of airpower dramatically limited their ability to do so.

As noted, current technologies have transformed the linear battlefield into a battlespace, with combat operations often occurring simultaneously on the ground and high seas, in air and space, and

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[141] As noted by Michael Bothe et al., "[t]he term military advantage involves a variety of considerations, including the security of the attacking force." Bothe, *supra* note 84, para. 2.4.4. See also, A.P.V. Rogers, *Zero-Casualty Warfare*, 92:837 INTERNATIONAL REVIEW OF THE RED CROSS, March 2000, at 165.

through cyberspace.[142] Distance is no longer an obstacle; hi-tech militaries such as those of the United States can mount attacks quickly almost anywhere. During the 2003 war in Iraq, for instance, there was no part of Iraq that the Coalition could not monitor and attack.

The distinction implications are momentous. Because hostilities can take place everywhere, a location to which civilians flee may itself become the site of attacks. In particular, precision has made strikes against targets within populated areas viable. Imprecision ironically protected civilians, for many attacks, especially in urban areas, could not be mounted due to the potential for unacceptable impact on the civilian population. With modern weaponry, this *de facto* protection disappears since strikes against military objectives near civilians and civilian objects are often possible without causing "excessive" collateral damage and incidental injury. Yet, even with high-tech weaponry, it remains impossible to avoid all collateral damage and incidental injury. Therefore, by opening populated areas to military operations, precision denies civilians risk-free sanctuary therein.

Other aspects of modern weaponry increase the presence of civilians or civilian objects near combat operations. For instance, there are more civilian employees and contractors on the modern battlefield. Downsizing, cost-cutting measures, and unanticipated demands for troops are partially responsible. Advanced technology also drives civilianization. In some cases, there may not be sufficient numbers of advanced systems in the inventory for the military to develop training programs for its own personnel. Thus, weapon systems contracts often include maintenance and operations personnel. Alternatively, the systems may simply be so complex that few in the military have the background necessary to be trained to handle them.

Additionally, because of the prohibitive cost of developing high-tech systems, armed forces are turning to "off-the-shelf" (civilian) equipment. Thus, a factory producing items used by the military is a valid target despite its civilian production, unless a strike thereon would violate the principle of proportionality. The same applies to

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[142] The term "battlespace" has been formally adopted in the National Military Strategy. NMS, *supra* note 50, at 16.

locations where the items are stored. Militaries also increasingly use civilian facilities and functions (such as airfields, electrical generation, civilian transport, communications assets) for their military needs. All such objects and dual-use locations are military objectives by the "use" criterion. To the extent they are planned for use, they become military objectives by virtue of "purpose." In all these cases, attacks will by definition result in collateral damage, and, in many cases, incidental injury to civilians.[143]

*Enhancing distinction*

At the same time, technology often fosters distinction. In the first place, collateral damage and incidental injury are caused typically by: incomplete knowledge about what is being attacked; a lack of understanding of how civilians will be affected; inaccuracy; an inability to precisely meter the force applied to ensure no more than necessary is used; and restriking a target because one is unsure whether the desired level of destruction or neutralization has been achieved. The advanced technologies described above, as well as the general trends noted, will counteract these causal factors to varying degrees. Transparency will provide a greater quantity of information about the target and its environs, and it will be increasingly reliable. Similarly, post-strike battle damage assessment will give commanders a more complete picture of when and whether they need to restrike a target, thereby avoiding unnecessary additional attacks that place the civilian population at risk. Improvements in accuracy will steadily reduce the circular error probable and allow the use of smaller charges to achieve the desired level of damage.

Moreover, technological advances are making possible non-kinetic (or non-lethal) alternatives to destructive kinetic attacks. For instance, rather than destroying components of an electrical grid, which may be located near civilians or upon which they depend for power, it is now possible to drop carbon-fiber filaments on power lines to interrupt

[143] Some argue (albeit contentiously) that even future potential use meets the purpose criterion, although the better position is that there must be a reasonable belief that such use is highly likely before an object or location may be characterized as a military objective and attacked.

electricity to a particular military objective, such as a command and control facility. Offering even greater possibilities is computer network attack. Using CNA, power to the target could simply be shut off. It might even be possible to exert some control over enemy command and control (rather than merely disrupting it) by altering, adding, or deleting select information within the system. Doing so might be more advantageous than simply turning off power, for it could create a false picture of the battlespace such that the enemy actually places itself at risk. Obviously, CNA and other technological alternatives to attack with kinetically destructive weapons present the possibility of dramatically limiting collateral damage and incidental injury, while attaining the same or greater military advantage.

Finally, as noted, technology can compensate for numbers in warfare. During World War II, the circular error probable (CEP) of a B-17 dropping gravity bombs was roughly 3,300 feet. This required 1,500 sorties dropping nine thousand bombs before achieving a high probability of damage against a point target.[144] An F-117 armed with laser-guided munitions, by contrast, can now strike its target with an unclassified CEP of approximately ten feet. Obviously, the impact on civilians produced by hundreds of sorties dwarfs that caused by one. Moreover, because technology decreases the number of troops necessary to conduct combat operations, there is less intermingling with the civilian population, and less opportunity for collateral damage and incidental injury.

Technology's ability to enable one to operate within the enemy's OODA loop is also generating positive effects. By controlling the course of battle, the advantaged side can avoid engagements that slow the pace of operations. This is what happened in Iraq. The Coalition, operating within the Iraqi OODA loop, was able to quickly speed

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[144] Effects-based Operations Briefing, *supra* note 135. To take another example, during Operation Cobra, the breakout from Normandy, US air forces dropped 14,600 five hundred-pound bombs on one German division, destroying sixty-six tanks and eleven heavy guns. During Desert Storm, the US dropped 9,800 precision guided munitions, destroying 2,500 tanks, heavy artillery pieces, and armored personnel carriers – a ratio of bombs to equipment destroyed fifty times that of Operation Cobra. Robert A. Pape, *Hit or Miss: What Precision Air Weapons do Precisely*, FOREIGN AFFAIRS, September/October 2004, at 160, 163.

north, bypassing urban areas where fighting would have both bogged it down and endangered the civilian population.[145] Since the best way to minimize the impact of combat on civilians is to limit its duration, the technology that makes speedy defeat possible enhances the protections of civilians and other protected persons and objects.[146]

The greatest impact of technology on IHL lies in the area of precautions in attack. Recall that those who plan or decide on an attack have to do everything feasible to verify targets are military objectives, choose methods and means of warfare with an eye towards minimizing collateral damage and incidental injury, provide a warning if the circumstances permit, and select that target from among those yielding a similar military advantage that causes the least collateral damage and incidental injury. As discussed, technology is expanding the opportunities for militaries equipped with state-of-the-art equipment to avoid collateral damage and incidental injury by complying with these requirements. They possess more robust systems for reliably locating and tracking military objectives and distinguishing them from civilians and civilian objects, have a greater variety of weapons systems with which to strike the target, can choose from a larger set of possible targets (in part because they have a greater ability to penetrate enemy defenses), and will often have more opportunity to warn because, given their superiority, surprise is not as valuable a commodity to them as it is to their lower-tech adversaries.

As the technological gap widens, the precautions in attack requirements operate on the belligerents in an increasingly disparate manner. After all, the standards are subjective, not objective; a belligerent is required solely to do what is feasible, and feasibility depends on the available technology. The result is normative relativism — the high tech belligerent is held to higher standards vis-à-

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[145] For general discussions of the conduct of the war in Iraq, see John Keegan, THE IRAQ WAR (Knopf, 2004); Anthony H. Cordesman, THE WAR IN IRAQ: STRATEGY, TACTICS, AND MILITARY LESSONS (Praeger, 2003); Williamson Murray and Robert H, Scales, Jr., THE IRAQ WAR: A MILITARY HISTORY (Harvard University Press, 2003).

[146] This temporal aspect was recognized in the Lieber Code, which noted "[t]he more vigorously wars are pursued the better it is for humanity. Sharp wars are brief." Lieber Code, *supra* note 89, art. 29.

vis precautions in attack than its opponent. It is, of course, normative relativism by choice because states are under no legal obligation to acquire assets that will permit them to better distinguish between military objectives and the civilian population.

The problem with normative relativism is that states comply with IHL in part due to reciprocity, i.e., they agree to be bound because their opponents shoulder identical obligations. The obligations may not impose equivalent burdens in practice, but at least as a matter of law the parties are on equal footing. With precautions in attack, however, the law itself, interpreted in a completely neutral manner, imposes dissimilar duties. This reality creates resentment; the greater the disparity, the greater the dissatisfaction of the belligerent bearing the greater burden of the legal obligation.

Complicating matters are exaggerated expectations on the part of many as to the ability of high-tech forces to avoid either mistakes or collateral damage and incidental injury. Advanced militaries bear part of the responsibility for creating such expectations. Since at least Operation Desert Storm, they have mounted aggressive public affairs campaigns designed to convince the domestic and international public that they are doing everything possible to avoid harming civilians and their property. In the process, they have created the impression that high-tech militaries have an endless supply of precision munitions, when in fact the inventories remain limited.[147]

Moreover, they also inadvertently caused an impression that weapons are flawless. Yet, even when working perfectly, they are not perfectly accurate. The most commonly employed precision munitions used in Iraq were laser guided. Among these, the most frequently dropped was the GBU-12 Paveway II, which has a circular error probable of

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[147] For instance, during Desert Storm, a mere 8.8 per cent of the munitions dropped were precision. William M. Arkin et al., ON IMPACT: MODERN WARFARE AND THE ENVIRONMENT, A CASE STUDY OF THE GULF WAR 78 (1991). By Operation Iraqi Freedom this figure had only grown to 68 per cent. By the Numbers, *supra* note 60. For an excellent summary of the precision aspects of the campaign in Kosovo, see Department of Defense, Report to Congress, Kosovo/Operation Allied Force After-Action Report, January 31, 2000.

nine meters.[148] Although such accuracy is extraordinary, it is far from perfect.

At the same time, tales of satellite photos of individuals taken from space and eavesdropping on cell phones conversations from aircraft circling overhead cause many to believe the battlespace transparency enjoyed by high-tech militaries is comprehensive and fully accurate. Although it is true that transparency is at level unimaginable even a decade ago (and improving rapidly), it is equally true that it is not absolute, a fact demonstrated by incidents ranging from the attack on the Chinese Embassy in Belgrade to two strikes against an ICRC warehouse in Afghanistan to the attack on a wedding party in Iraq.

Critics of recent campaigns, who tend to overrate the ability of high-tech forces, often overlook the fog of war. Increasingly, they view collateral damage and incidental injury (or mistaken attacks) as *prima facie* evidence of a failure to take precautions in attack. After all, given the high-tech systems at the disposal of advanced militaries, civilian loss 'must' have been caused by either a failure to take the necessary precautions or outright recklessness. A rebuttable presumption of negligence in serious collateral damage/incidental injury incidents seems to be emerging vis-à-vis attacks conducted by high-tech attackers, who increasingly bear the burden of persuasion as to having taken appropriate precautions.[149]

Consider the reports written on the air campaigns during Operations Allied Force and Iraqi Freedom.[150] While occasionally questioning

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[148] 7,114 of the 19,948 guided munitions dropped. "By the Numbers," *supra* note 60, at 11.

[149] For a discussion of Operation Iraqi freedom, including analysis of criticism of Coalition operations, see Michael N. Schmitt, *The Conduct of Hostilities during Operation Iraqi Freedom: An International Humanitarian Law Assessment*, YEARBOOK OF INTERNATIONAL HUMANITARIAN LAW (forthcoming).

[150] Office of the Prosecutor, International Criminal Tribunal for the Former Yugoslavia, Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign Against the Federal Republic of Yugoslavia, June 13, 2000, reprinted in 39 ILM 1257, 1258 (2000); Amnesty International, "'Collateral Damage' or Unlawful Killings? Violations of the Laws of War by NATO during Operation Allied Force," AI Index: EUR

attacks on the basis of whether the target was a military objective (most notably media facilities), the bulk of the criticism alleged failure to take adequate precautions in attack. For instance, with regard to Allied Force, Human Rights Watch (HRW) expressed uneasiness over "whether every feasible precaution was taken to accurately distinguish civilians from combatants" and felt there were "questions regarding the decisions to attack on the basis of incomplete and/or seriously flawed information."[151] Commenting on the Dubrava Prison incident, in which twenty prisoners died during NATO attacks on nearby military facilities, HRW argued that "NATO did not apply adequate precautions in executing its airstrikes on nearby military objectives, and therefore must be held accountable for the civilian deaths that occurred as a direct result of those attacks." The organization failed to cite those precautions the attackers should have taken, beyond a general comment earlier in the report about bombing from altitude.

The same tact was taken vis-à-vis Iraqi Freedom. HRW opined that continuing the decapitation campaign despite the lack of success "can be seen as a failure to take 'all feasible precautions' in choice of means and methods of warfare in order to minimize civilian losses as required by international humanitarian law."[152] Yet, the organization offered no alternatives to those precautions taken, other than not striking at all. This suggestion misstates the law, for the precautions in attack principle only applies to an attack that is otherwise lawful.[153] The central issue is whether the attacker could have done something differently that would have lessened harm to the civilian population without forfeiting military advantage.

Many have been so captured by the wizardry of modern weaponry and so exposed to the horror of civilian suffering through the media that entire campaigns now become tainted by individual incidents. Indeed, scholarly, NGO, and journalistic comment often focuses on specific incidents, such as the Grdelica Gorge Bridge attack in

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70/18/00, June 2000, www.amnesty.org/ailib/intcam/kosovo/docs/natorep_all.doc.; "Civilian Deaths," *supra* note 140; "Off Target," *supra* note 82.

[151] "Civilian Deaths," *supra* note 140.

[152] "Off Target," *supra* note 82, at 40.

[153] Although the article does restate the proportionality principle, proportionality is already dealt with in Article 52.

Yugoslavia or the wedding party incident in Iraq, forgetting in the process that overall high-tech warfare is yielding campaigns that are ever-more discriminate.[154] Recall, that the number of weapons dropped during Operation Iraqi Freedom exceeded ten thousand and Allied Force involved the employment of more than twenty thousand. Yet, Human Rights Watch labeled its report on the former *Off Target* and the latter *Civilian Deaths in the NATO Air Campaign.*

Technology not only actually heightens the legal standards to which high-tech forces must conform, but it creates expectations which, albeit initially without legal valence, create *de facto* standards which states operating under the media microscope can ill-afford to ignore. Very subtlely, these *de facto* standards will influence application and interpretation of *de jure* standards as to what is and is not lawful collateral damage and incidental injury, the nature of the duty of care required of those planning and executing attacks, and the reasonableness of mistakes of war.

## Conclusions

What is striking about the relationship between technology, warfare, and international humanitarian law is that all the news is not good. One would expect technology to increasingly limit the impact of warfare on the civilian population. It certainly does so to an extent, and a number of the technologies described will further distance war from civilians.

Yet technology has a negative face as well. Although almost never a purpose of technology, the weapons of war are increasingly placing the principles underpinning international humanitarian law at risk. In great part, this is the result of an ever-widening divide between the technological 'haves' and 'have-nots.' Faced with near certain defeat, 'have-nots' are understandably (albeit inexcusably) rejecting IHL as they compensate for their asymmetrical weakness. When one side

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[154] On the Grdelica attack, see Final Report, *supra* note 150; "Civilian Deaths," *supra* note 140; "Collateral Damage," *supra* note 150. On the wedding party incident, see Dexter Filkins and Edward Wong, *Disputed Strike by U.S. Leaves 40 Iraqis Dead,* NEW YORK TIMES, May 20, 2004, at 1.

operates in repeated violation of the law, adherence by the other usually deteriorates in lock-step.

Even the technology itself weakens the ability to safeguard the civilian population and other protected individuals and entities during armed conflict. Whether because it has broken the traditional spatial limitations of conflict or simply placed more civilians on the battlefield, technology has proven it is no panacea.

Technology has confused many observers of warfare, causing them to adopt unrealistic expectations that seem to be morphing into normative boundaries. Inevitably, militaries will react negatively to this trend, for it places limitations on their activities that are not the product of the careful balancing between military necessity and humanitarian concerns which typically characterizes the formation of international humanitarian law. This division does not bode well for either the military or those who seek to limit its use.

Sadly, we are living through a period when international humanitarian law, international human rights law and international refugee law are all flouted with impunity. Civilians are targeted deliberately, rules of combat are ignored, people are detained and imprisoned outside of legal frameworks, some fourteen million have taken refuge, some twenty four million have been internally displaced, and humanitarian, human rights, and refugee personnel are agonizing about how respect for the law can be restored.

## ABOUT THE SERIES

The Occasional Papers Series of the Program on Humanitarian Policy and Conflict Research at Harvard University is a periodical publication on current important topical issues in the field of International Humanitarian Law (IHL).

Each essay focuses on a specific IHL issue, defines and describes the problem at hand, reviews and comments on the relevant aspects of the problem, sets it in the context of existing literature on the topic providing a summary of main positions and arguments, outlines a general argument or approach, and draws conclusions that would inform practical work.

The essays are written in a clear, concise, academic yet accessible style. The statements are authoritative and pithy, so as to inform the work of policy-makers and practitioners. The language and argument of the essays seek particularly to address these groups.

The aim of the series is that a careful exploration of the facts and issues, and an insightful, forward-looking analysis will help to advance current difficult IHL issues. The purpose is to produce information and analysis that will clarify legal and conceptual issues, encourage solid and novel thinking about international humanitarian law questions, and strengthen practical policy work.

## HPCR

The Program on Humanitarian Policy and Conflict Research at Harvard University (HPCR) was set up in 2000 with a view to serve international organizations with research and policy input on humanitarian law, human security, and conflict management.

The Program is engaged in research and advisory services on conflict prevention strategies, the management of humanitarian crises and the protection of civilians in conflict areas. It advises international organizations, governments and non-governmental actors, and focuses on the protection of vulnerable groups, conflict prevention strategies, and the role of information technology.

HPCR has developed several regional and thematic website portals whose primary objective is to enhance the capacity of organizations and governments to develop preventive strategies in addressing conflict situations. These websites provide an interactive virtual platform for policy and decision-makers to gain access to information and academic resources, integrated linking systems, and online discussion fora related to international humanitarian law and to human security in their respective regions.

The Program rests on the joint efforts of Harvard University, the Federal Department of Foreign Affairs of Switzerland, and the Executive Office of the United Nations Secretary-General, and it seeks to cooperate closely with operational and academic institutions around the world.

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