### INTRODUCTION

Imagine having the ability to become invisible by blending perfectly into your surroundings and to move before someone’s eyes completely unseen. No longer is this capability limited to the worlds of Harry Potter, comic books, and sci-fi thrillers. Invisibility is the future of military technology. But is invisibility technology a lawful tool of war?

The United States (U.S.) Department of Defense (DOD) is currently funding research in invisibility technology for use in military operations. At least one defense contractor has recently released a prototype of an “invisibility cloak,” academic researchers have unveiled lenses that render the objects behind them undetectable to the human eye, and other companies are developing adaptive technologies for military vehicles that allow them to move unnoticed in any terrain. Once perfected, such technologies will make it possible for ordinary soldiers and special forces alike to advance toward the enemy and operate within its territory undetected. These tools have great potential to reduce the risk of casualties during military operations, enhance the ability to launch...
surgical and surprise attacks, and collect better intelligence by making soldiers and military equipment visually undetectable to the enemy. However, before the U.S. Armed Forces can realize the benefits of these technologies or share them with other states, customary international law and DOD policy require that qualified attorneys conduct an extensive legal review to ensure that the technology is consistent with the law of armed conflict (LOAC).

This Note argues that in most land warfare contexts, soldiers can lawfully utilize invisibility technology to hide themselves or their military equipment without violating LOAC. However, invisibility technology has greater potential for misuse than traditional forms of camouflage, particularly in urban environments, and the United States should be cognizant of the potential for, and proactive in preventing, such misuse in military operations.

Part I of this Note describes the invisibility technology currently in development. Part II explains the obligation of the U.S. Armed Forces to test such technology before its adoption, use, or sale. Part III argues that the use of invisibility technology will not ordinarily pose problems of distinction. Part IV argues that invisibility techniques will normally constitute lawful ruses, as do more traditional forms of camouflage, but also highlights the potential for such technology to be used to commit unlawful perfidy. Finally, Part V explores the utility of invisibility technology in reconnaissance operations and the likely consequences for soldiers captured while employing such techniques.

I. THE TECHNOLOGY

Invisibility, or “cloaking,” technology hides an object either by manipulating light waves to force them around the cloaked object or by sensing and projecting images from the object’s surroundings onto the object itself. At its present stage of development, this technology cannot yet render perfect invisibility in all conditions and from all viewpoints, at least according to open sources. However, multiple companies and researchers have developed advanced prototypes of invisibility products, all of which have apparent military applications and are likely to improve with further development.

HyperStealth Biotechnology Corporation, a Canadian company, has developed a fabric called Quantum Stealth, which, when draped over or placed in front of an object, renders the object virtually invisible, even removing its

1. This Note’s analysis is limited to the use of invisibility technology in land warfare. It does not address invisibility in cyberspace, which is an unsettled area of LOAC. Nor does it address war at sea, where “the legality of certain type[s] of camouflage is controversial.” Claude Pilloud et al., Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949, at 444 (Yves Sandoz et al. eds., 1987) [hereinafter Protocols Commentary]; see also Matthew G. Morris, “Hiding Amongst A Crowd” and the Illegality of Deceptive Lighting, 54 Naval L. Rev. 235, 238 (2007).

shadow.\textsuperscript{3} Put simply, Quantum Stealth is an invisibility cloak. Quantum Stealth reportedly can render an object or person ninety-five to ninety-eight percent invisible and displays few flashes of color when a person moves behind it.\textsuperscript{4} As the President and CEO of HyperStealth explains, “Unless you walked right into [the cloaked objects], you wouldn’t know they were there.”\textsuperscript{5} Although the exact details of how this technology works are not publicly available (and reasonably so), the basic concept is that the fabric forces light waves to bend around the cloaked object.\textsuperscript{6} The shield is passive technology, meaning that it works without cameras, batteries, lights, projectors, or mirrors, making it relatively lightweight and inexpensive to produce.\textsuperscript{7} Additionally, it protects the cloaked object against detection by infrared and thermal optics.\textsuperscript{8}

Granted, Quantum Stealth is still a work in progress. Environmental conditions, such as background color and lighting, continue to have a pronounced effect on its efficiency in minimizing background distortion.\textsuperscript{9} Nevertheless, Quantum Stealth is a significant advancement in invisibility technology designed specifically for military use. According to HyperStealth, the U.S. Government has pledged financial support for the Quantum Stealth project, primarily for use in U.S. Special Forces operations,\textsuperscript{10} and both the United States and Canada have classified the material.\textsuperscript{11}

In late 2014, a team of researchers at Rochester University unveiled the “Rochester Cloak,” a three-dimensional, continuously multidirectional invisibility technique that makes objects seemingly “disappear” within a designated area.\textsuperscript{12} The device is not really a “cloak” at all, but rather a series of four lenses with different focal lengths arranged in such a way that when a person looks through them, the viewer can clearly see what is beyond the farthest lens but not

\begin{itemize}
\item Moloney, supra note 3; Cramer, supra note 3.
\item Cramer, supra note 3.
\item Id.
\item Liu, supra note 2; Murphy, supra note 4.
\item Cramer, supra note 3 (“Currently the U.S. Military has budgeted to Research and Develop Quantum Stealth for FY2015 . . . .”).
\item Id. As of April 2014, HyperStealth was also pursuing the intellectual property rights for a confidential variant of the Quantum Stealth technology “available for Law Enforcement/Military Regular Forces.” Id.
\end{itemize}
objects placed between the lenses. The particular lens arrangement first focuses the light down to a fine point through one lens, then focuses it down again to a finer point through the second lens, and so on. This bends the light so that an object within the cloaking field is not visible to the person looking through the lenses, who will only see an undistorted background. In other words, the object or person placed between the lenses seems to disappear. In addition to being relatively inexpensive, the Rochester Cloak has the advantage of being completely scalable; it could render almost anything invisible as long as the lenses are large enough. Although Rochester researchers did not develop the Rochester Cloak with any particular use in mind, they acknowledge that it may serve military purposes.

Cloaking technology for military vehicles is also advancing. For example, BAE Systems is developing “e-camouflage” for armored vehicles, in which highly sophisticated electronic sensors, sometimes called “electronic ink,” attach to a tank’s hull. The sensors project images of the surrounding terrain back onto the outside of the vehicle, thereby creating an active camouflage that enables the vehicle to blend into the landscape as it moves undetected.

II. REVIEW REQUIREMENTS FOR NEW TECHNOLOGIES

Before the U.S. Government may use any of this invisibility technology or authorize its sale to other governments, DOD must determine that the technology is consistent with LOAC. Article 36 of Additional Protocol I (AP I) to the Geneva Conventions, entitled “New Weapons,” requires that “[i]n the study, development, acquisition or adoption of a new weapon, means or method of warfare,” countries must determine whether its employment would, in any or all circumstances, be prohibited by other provisions of AP I or other binding international law. Although AP I does not define “means or method of warfare,” “means” typically describes the weapons or other items used, whereas...
“method” generally refers to the manner in which such a weapon is used. The obligation to test new means and methods of warfare applies to the country manufacturing a new technology as well as the countries purchasing it.

Adherence to the requirements of Article 36 is part of a state’s obligation under Article 86 of AP I to “repress grave breaches, and take measures necessary to suppress all other breaches” of the Geneva Conventions and other provisions of the Protocol. If a selling or acquiring state does not fulfill its Article 36 obligation, the state will be responsible for any wrongful damage resulting from the use of an untested means or method. Moreover, such use in violation of Article 36 could expose soldiers to personal criminal liability.

The selling and acquiring countries should determine a technology’s legality on the basis of its normal use as anticipated at the time of testing. Virtually any technology can be misused for unlawful purposes, but that alone does not make the technology inherently unlawful. Whether a weapon is lawful per se depends on its intended, not possible, application. The Commentary to AP I also warns that even when research is originally oriented towards peaceful ends, much technological progress will unavoidably create new military applications, and governments must watch constantly for the outcomes of such technological progress. Therefore, even with a technology such as the Rochester Cloak—developed in the United States and not expressly intended for military use—the U.S. Government should ensure that its military application is sufficiently considered, tested, and controlled.

Although the United States has not ratified AP I or accepted Article 36 as binding customary international law, DOD Directive 5000.01 requires that an authorized legal advisor review any proposed means or method of warfare to determine its legality under domestic and international law. Specifically, the Directive requires that all “acquisition and procurement of D[O]D weapons and weapon systems [be] consistent with all applicable domestic law and treaties and international agreements . . . , customary international law, and the law of

22. Id. at 426.
28. See Protocols Commentary, supra note 1, at 428.
armed conflict..."30 Under U.S. practice, DOD conducts multiple legal reviews of new military technologies. First, the legal advisor determines whether LOAC would prohibit the item’s use per se.31 The first review not only ensures compliance with the legal obligations of the United States, but also ensures, as a practical matter, that the United States can legally use a new means or method of warfare before it expends considerable resources on its procurement. Each branch of the military has a designated attorney who conducts the first review.32 Once a unit decides to employ the means or method of warfare, an additional review ensures that its use in a particular factual context complies with LOAC.33

The legal advisor who performs the reviews must look to current LOAC for signals as to the legality of a proposed means or method. In many cases, this review will be fairly straightforward.34 For example, a treaty to which the United States is a party may prohibit the use of a certain type of weapon, or the President may have directed DOD to eliminate a particular kind of weapons system. In the absence of law directly applicable to the new technology in question, however, each legal advisor must make a discretionary decision about whether the technology is compatible with the more general but well-established principles of LOAC.35 These principles are found primarily in the 1949 Geneva Conventions and those provisions of its Additional Protocols that the United States recognizes as customary international law.

Although not technically a new weapon, emerging cloaking technology is a means and method of warfare governed by Article 36 and DOD Directive 5000.01. Accordingly, the United States must evaluate emerging invisibility technology to determine whether its anticipated use will violate LOAC. Because no law directly addresses cloaking technology, military legal advisors must look to current LOAC for signals of its legality and determine whether any LOAC principles would render it unlawful per se. The LOAC principles most likely to constrain the use of such technology are the requirement that combatants distinguish themselves from civilians and the prohibition on perfidy.

III. DISTINCTION

Invisibility technology will test the fundamental LOAC principle of distinction, which is the foundation upon which modern LOAC rests.36 Distinction refers both to discrimination, defined in Article 48 of AP I as the limitation that

30. Id.
34. Jensen, supra note 32, at 263.
35. Id.
belligerents “shall direct their operations only against military objectives,” and marking, defined in Article 44.3 of AP I as the obligation of combatants to “distinguish themselves from the civilian population while they are engaged in an attack or in a military operation preparatory to an attack.” Both aspects of distinction are customary international law, and both apply to international and noninternational armed conflicts. Marking, which applies to soldiers as well as to military objects, is of particular concern in assessing the legality of invisibility technology.

A. DISTINGUISHING COMBATANTS

The marking requirement is primarily intended to protect the civilian population, which may be endangered if combatants are unable to distinguish between innocent civilians and fighters dressed in civilian clothing. Individual soldiers also have a personal interest in distinguishing themselves from the civilian population for at least two reasons. First, Article 4 of the Third Geneva Convention states that “[m]embers of the armed forces of a Party to the conflict” are entitled to prisoner of war (POW) status, and a uniform or distinctive emblem helps the enemy easily identify a soldier’s entitlement to that status upon capture. In contrast, soldiers who fail to distinguish themselves from the civilian population while engaged in an attack, or in a military operation in preparation for an attack, have violated LOAC. Although most experts agree that the drafters of the Geneva Conventions did not intend for states to deny a soldier POW status solely because the soldier failed to wear a uniform, state actions and jurisprudence indicate that, in practice, combatants who do not distinguish themselves in such circumstances often forfeit their right to POW status. Second, as discussed in Part IV, wearing civilian clothing as a
disguise in order to kill, wound, or capture the enemy constitutes perfidy, which is punishable as a war crime.

When evaluating distinction, it is important to keep in mind that soldiers are not required to distinguish themselves at all times, but rather “while they are engaged in an attack or in a military operation preparatory to an attack.” A soldier who disguises himself as a civilian only commits a war crime if his deception involves the use of perfidy to kill, injure, or capture the enemy. Thus, in many circumstances, soldiers may use cloaking technology to their advantage, even in urban areas, without violating the principles of distinction. For example, a soldier may use cloaking technology to protect himself while attempting to rescue a fellow soldier or a wounded civilian. Similarly, a soldier may render herself effectively invisible while she monitors a civilian building in preparation for a hostage rescue operation. Thus, although the need to distinguish may limit a soldier’s use of invisibility technology in urban environments during and in preparation for active hostilities, it does not prohibit a soldier’s use of such technology in natural environments or even for certain operations in urban areas.

The marking requirement may present the greatest challenge to the use of cloaking technology in certain urban conflict situations. Modern conflicts—such as those in Afghanistan, Lebanon, Iraq, and Gaza—have increasingly involved hostilities in urban areas, where the need to distinguish oneself as a combatant is especially important for avoiding civilian casualties. In urban areas, if soldiers use cloaking technology to assume the characteristics of their surrounding environment, combatants will likely project civilian aspects, blurring the line of distinction. Thus, if soldiers are fighting in an urban setting, Article 44.3 may preclude them from utilizing invisibility techniques in preparation for an attack or during active hostilities, even if the technology is used for force protection. Significant public policy and proportionality concerns may also counsel against certain uses of invisibility technology by soldiers in densely populated areas. Even where the soldiers are careful not to assume civilian attributes, use in such environments nevertheless may create uncertainty about whether combatants are concealing themselves as civilian objects and consequently increase the likelihood that civilian objects will become mistaken targets of attack.

Invisibility technology also raises the potential problem of soldiers of one state failing to distinguish themselves from enemy combatants. Article 4 does not explicitly state that a soldier must wear an official uniform to be considered a member of a regular armed force in conflict, nor does the Convention specify what such a uniform must look like. However, the drafters of the Geneva

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45. AP I, supra note 20, art. 44.3.
46. See id. art. 37.1; Parks, supra note 44, at 512–13; Pfanner, supra note 36, at 104.
47. Jensen, supra note 32, at 316.
Conventions considered that “having a fixed distinctive [sign/emblem] recognizable at a distance” was at least an implicit characteristic of members of regular armed forces. Additionally, the Commentary to the Convention makes clear that each state has a duty “to take steps so that members of its armed forces can be immediately recognized as such and to see to it that they are easily distinguishable from members of the enemy armed forces or from civilians.” Therefore, states are free to choose the uniforms of their armed forces, so long as something about those uniforms distinguishes the soldier from a civilian or enemy fighter.

The traditional camouflage of military combat uniforms, or battle fatigues, has not created significant problems of distinction, even though its primary purpose is to render the soldier less recognizable at a distance. As Professor Sean Watts explains, “Today, the wear of camouflage-patterned clothing is so-widely used by armed forces as to be in many contexts itself a distinctive and visible claim to combat status on the battlefield,” clearly distinguishing soldier from civilian. The camouflage fatigues worn by virtually all armies also bear clear insignia of the state’s armed forces, which distinguish the combatants of opposing forces even when their uniforms appear similar in all other respects from a distance. Distinctive insignia may include, for example, a beret, an arm patch, a lanyard, a branch insignia patch, shoulder or sleeve markings, or army or personal nametapes. Soldiers may also use such insignia on nonstandard uniforms, such as those worn in covert operations, to satisfy the marking requirement while maintaining operational flexibility.

According to Professor Toni Pfanner, former head of the International Committee of the Red Cross’s Legal Division, the fact that soldiers who wear camouflage fatigues and members of the special forces who wear nonstandard uniforms may rely on a relatively small emblem like an arm patch to satisfy the marking requirement demonstrates that the “criterion of visibility cannot be applied toostringently for combatants who do not wear uniforms but other distinctive signs.” The notion that the recognizable at a distance standard has relaxed is further evidenced by the modern practice of soldiers covering themselves with a camouflage blanket or suit that traps excess heat and shields their thermal

49. Id. at 52; see also API, supra note 20, art. 44.7 (noting “the generally accepted practice of States with respect to the wearing of the uniform by combatants assigned to the regular, uniformed armed units of a Party to the conflict”).
50. Ferrell, supra note 39, at 106.
52. See Pfanner, supra note 36, at 106–08.
53. Id. at 100.
54. Id. at 94, 100, 108.
55. Id. at 108.
signature from detection by thermal imaging devices. Although a soldier under such fabric is not openly displaying a fixed emblem or uniform, the soldier would still seemingly satisfy the marking requirement by wearing a uniform underneath it.

Soldiers cloaking themselves with invisibility technology will not display a uniform or insignia recognizable at a distance. In fact, the whole purpose of the technology is to avoid displaying any part of themselves at all. Nevertheless, so long as soldiers wear a uniform or distinctive insignia under the cloaking device, the soldiers would still seemingly satisfy the modern conception of the fixed distinctive sign/emblem requirement. Little difference exists conceptually between uniformed soldiers cloaking themselves with invisibility fabric in a natural environment and the camouflage blankets currently used to reduce a soldier’s thermal signature, which indicates that similar use of an invisibility cloak poses no distinction problem. Also, if enemy combatants capture a soldier who is attempting to use an invisibility technique while also wearing a uniform or distinctive insignia, the enemy combatants would still be able to readily identify the captured soldier as a lawful, uniformed combatant entitled to POW status.

B. DISTINGUISHING MILITARY OBJECTS

Whether disguising legitimate military targets as civilian objects for defensive purposes constitutes lawful camouflage or a violation of the principle of distinction is an unsettled issue. According to Captain Ashley Roach, former advisor in the U.S. Department of State’s Office of the Legal Adviser, “[I]t is a common practice, not prohibited by [AP I], to disguise a military object to appear to be a civilian object.” A number of historical cases seem to support Captain Roach’s position. For example, during World War II, the United States and Australia used fabricated houses, streets, and trees in elaborate industrial camouflage schemes in order to make aircraft factories and other military-industrial complexes look like civilian neighborhoods when viewed by aerial surveillance. At the same time, as Professor Watts explains, “It is unclear from law-of-war doctrine and scholarship whether such a general duty [to avoid civilian camouflage and mimicry for general military advantage] existed at the time or whether such a duty exists today.” The camouflage of these facilities

57. See Watts, supra note 51, at 163–66. A civilian disguise for offensive purposes would generally constitute perfidy.
59. Watts, supra note 51, at 163–64.
60. Id. at 166.
occurred well before the adoption of AP I and seems counter to the present spirit of distinction, particularly because a civilian façade, if discovered by the enemy, may invite inadvertent attacks on actual civilian objects with a similar appearance.

What is clear, however, is that hiding military objects among the civilian population, such as in civilian buildings or in densely populated areas, is a clear violation of the distinction requirement. Article 58(b) of AP I, which the United States considers customary international law, explicitly requires that “Parties to the conflict shall, to the maximum extent feasible . . . [a]void locating military objectives within or near densely populated areas.” Taking advantage of the protections provided by LOAC to civilians by using them to shield military objects undermines efforts to reduce civilian casualties. In recent conflicts, the placement of military objects in densely populated areas has occurred with unfortunate frequency. For example, in the early days of the War in Afghanistan, the Taliban government violated the law of distinction by placing tanks and antiaircraft guns in front of a humanitarian aid organization’s office in a Kabul neighborhood. Similarly, according to a U.S. Department of Defense official, during Operation Iraqi Freedom, Iraqi forces regularly placed air defense missile systems “in and around civilian areas, including parks, mosques, hospitals, hotels, crowded shopping districts, and even in cemeteries.” They also positioned rocket launchers near soccer stadiums that were in active use and parked operational surface-to-air missile systems in civilian industrial areas. But even against enemies who flagrantly disregard the law of distinction, the United States has a legal and moral obligation to refrain from using similarly unlawful tactics for its own strategic advantage.

Using invisibility technology to ensure the safe storage or movement of military vehicles, equipment, and other objects will not, without more, violate the law of distinction. Cloaking a weapons cache with a projected image of a natural environment, for example, would not constitute a marking violation. A distinction problem may occur, however, when military objects utilize invisibility technology to project civilian attributes, either intentionally or incidentally with movement in urban areas. If the objects are used in active hostilities while projecting the civilian attributes, such use would constitute unlawful perfidy. Additionally, invisibility technology could allow military objects to hide among the civilian population more easily, increasing the potential for Article 58(b) violations.

61. AP I, supra note 20, art. 58(b).
62. Id.; see also Matheson, supra note 23, at 427.
65. Id.
Although still unsettled, it may be lawful for a military object to use invisibility technology to be presented as a civilian object for defensive purposes (as were the civilian-disguised military factories of WWII) so long as the object is not located in a densely populated area. However, as noted above, the civilian façade attainable with invisibility technology would seem to undermine the spirit and central purpose of distinction, and military decision makers may wish to avoid using cloaking technology to project civilian disguises as a matter of policy.

IV. PERFIDY AND RUSE

Perfidy, also known as treachery, has long been regarded as a violation of LOAC. The condemnation of perfidy in warfare is an ancient concept derived from principles of chivalry, and dates back to at least the seventh century. In its broadest sense, perfidy is the “deliberate claim to legal protection for hostile purposes,” and is a specific type of distinction violation. According to Professor Watts, “With the possible exception of deliberate indiscriminate attack, few law-of-war breaches signal contempt for humanity and respect in war as clearly as perfidy does.” Perfidy is reprehensible in LOAC because the true victims are often innocent civilians, who are trapped in the conflict zone by fighters using them as cover and become the unintentional victims of soldiers who mistake them for legitimate targets when unable to distinguish them from enemy fighters. Perfidy also erodes the protections that lawful combatants rightfully expect for themselves, such as protection of the sick and wounded.

The prohibition against perfidy was first codified in the Lieber Code of 1863, and the Hague Convention of 1907 was the first international convention to prohibit perfidy, forbidding the “kill[ing] or wound[ing] treacherously [of] individuals belonging to the hostile nation or army.” In 1977, Article 37

67. Treachery is actually a slightly narrower concept than perfidy. However, the terms are often used interchangeably in international law. *Id.* at 421–22.


70. *Protocols Commentary, supra* note 1, at 435.


of AP I replaced the term “treachery” with “perfidy” and gave it a more specific definition—“[a]cts inviting the confidence of an adversary to lead him to believe that he is entitled to, or is obliged to accord, protection under the rules of international law applicable in armed conflict, with intent to betray that confidence,” with such acts constituting war crimes only if used to “kill, injure or capture an adversary.”

AP I, and therefore the perfidy prohibition in Article 37, is limited in application to international armed conflicts. The only treaty to adopt perfidy as a crime in noninternational armed conflicts is the Rome Statute, to which the United States is not a party. Nevertheless, the fact that AP II (the treaty on noninternational armed conflicts) does not contain a provision similar to Article 37 does not necessarily mean that perfidy is permissible in noninternational armed conflicts. In fact, a strong argument can be made that—based on the near-universal condemnation of any perfidious attacks, current state practice, international criminal tribunal decisions, and recent U.S. military commission cases—the prohibition against perfidy applies to noninternational armed conflicts as well.

Although not a party to AP I, the United States considers Article 37 binding customary international law. In addition, the Military Commissions Act of 2009 adopts a definition of perfidy similar to that in Article 37 and makes it a triable offense.

An example of perfidy expressly cited in Article 37 is “[t]he feigning of civilian, non-combatant status” in order to “kill, injure or capture.” Therefore, in 2003, when the Iraqi Fedayeen purposely concealed their weapons and wore civilian clothing in order to kill U.S. soldiers, the Iraqi forces committed acts of perfidy. Similarly, the terrorist attacks on September 11, 2001, which began the War on Terrorism, were acts of perfidy because the attackers dressed in civilian attire to gain access to, and eventually take control of, civilian aircraft that they then used to kill and injure. Suicide bombers disguising themselves

76. AP I, supra note 20, art. 37.1.
77. See Rome Statute of the International Criminal Court, art. 8.2(c)(ix), July 17, 1998, 2187 U.N.T.S. 90. In an important distinction from Article 37 of AP I, the Rome Statute does not consider perfidy resulting in capture to be unlawful. See id.
78. See Watts, supra note 51, at 111 n.15; see generally Jackson, supra note 39 (explaining how treaties, the International Red Cross’s Customary International Humanitarian Law Study, findings of international tribunals prosecuting war criminals, state practice, and customary international law all indicate that perfidy violates LOAC in noninternational armed conflict).
79. Matheson, supra note 23, at 425; see also Madden, supra note 73, at 442–44 (describing bases for accepting Article 37 as customary international law).
80. See 10 U.S.C. § 950t(17) (2012). Under the statute, a person may be tried by military commission if “after inviting the confidence or belief of one or more persons that they were entitled to, or obliged to accord, protection under the law of war, [the person] intentionally makes use of that confidence or belief in killing, injuring, or capturing such person or persons.” Id.
81. AP I, supra note 20, art. 37.1(c).
82. See Watts, supra note 51, at 110.
83. Id. at 112 & n.18. This example assumes that the perfidy prohibition applies to noninternational armed conflicts.
as ordinary civilians to gain closer access to a group of soldiers or a military checkpoint in order to inflict greater damage and casualties also engage in unlawful perfidy.\textsuperscript{84}

Perfidy is distinct from a ruse, which is a lawful means of warfare. A ruse is an act intended to mislead an adversary or to induce the adversary to act recklessly, but unlike perfidy, a ruse does not invite the adversary’s confidence by feigning claim to LOAC protected status.\textsuperscript{85} Thus, a “soldier may attempt to become invisible in the landscape [by wearing a camouflage uniform], but not in a crowd [by pretending to be a civilian].”\textsuperscript{86}

Article 37 cites the “use of camouflage” as a lawful ruse,\textsuperscript{87} and the Protocols Commentary explains in more detail that “camouflaging troops, weapons, depots or firing positions in the natural or artificial environment” is a legitimate ruse because the camouflage does not involve any assurance of protection under LOAC.\textsuperscript{88} Similar to camouflage, the simulation of quiet and inactivity, which helps the soldier hide unnoticed, is also a lawful ruse.\textsuperscript{89}

Militaries may use camouflage as a legitimate ruse to disguise military objects as well. For example, as British Major General Anthony Rogers explains, “[T]he camouflaging of a tank so that the enemy pass by unaware of its existence and are then fired on at short and lethal range” is a lawful ruse because the tank crew did not feign any protected status.\textsuperscript{90}

Should LOAC treat invisibility technology as a lawful ruse, as it does traditional camouflage? Significant distinctions exist between the two techniques of disguise. Historically, camouflage has been used to help a soldier or object blend in with the natural environment or mimic other environments.\textsuperscript{91} Advanced “digital camouflage” patterns, such as the Canadian Disruptive Pattern (CADPAT) used by the Canadian Forces and the Marine Pattern (MARPAT) used by the U.S. Marine Corps, go a step further toward invisibility by using optical tricks. These patterns mimic fractal patterns, which the human brain interprets as white noise, in order to confuse the brain into missing the body of the targets altogether, rather than simply making the targets more difficult to see by blending them into the environment.\textsuperscript{92}

\textsuperscript{84} Blank, supra note 39, at 785.
\textsuperscript{85} AP I, supra note 20, art. 37.2.
\textsuperscript{86} SOLIS, supra note 66, at 423.
\textsuperscript{87} AP I, supra note 20, art. 37.2.
\textsuperscript{88} PROTOCOLS COMMENTARY, supra note 1, at 443.
\textsuperscript{89} Roach, supra note 58, at 398.
\textsuperscript{90} A. P. V. ROGERS, LAW ON THE BATTLEFIELD 42 (3d ed. 2012).
\textsuperscript{91} “[C]amouflage is understood as an effort to escape notice at all. Mimicry, on the other hand, though often conceived as a form of camouflage, . . . involves deceiving the viewer as to the nature of the object or person perceived.” Watts, supra note 51, at 166–67.
However, even with digital camouflage, opposing forces are aware of the nature of camouflage uniforms, and painting vehicles to match the anticipated terrain does not change the visible form of the vehicle.\textsuperscript{93} The same is not necessarily true for soldiers and objects hidden using invisibility technology. Moreover, traditional camouflage did not allow persons to flawlessly project themselves as part of civilian objects.

Despite its differences from traditional camouflage, invisibility techniques are not, by their nature, perfidious means or methods of warfare. The most successful deceptions often involve significant innovation and imagination, which does not necessarily make them perfidious.\textsuperscript{94} Under Article 37, the war crime of perfidy has specific requirements—(1) feigned protected status, (2) that invites the confidence of the adversary, and (3) is used to kill, injure, or capture.\textsuperscript{95} Thus, using invisibility technology for the sabotage or destruction of military property would not constitute perfidy within the meaning of Article 37.\textsuperscript{96} Nor would it constitute perfidy to use the technology to “feign civilian status in order to retreat, to stall for time while awaiting re-supply, or generally to confuse the enemy.”\textsuperscript{97} In fact, whether an attempted or unsuccessful act of deception to kill, injure, or capture the enemy would constitute perfidy under this definition remains subject to debate.\textsuperscript{98}

As the Commentary to the Protocols explains, the crux of the perfidy prohibition is that a “combatant who takes part in an attack, or in a military operation preparatory to an attack, can use camouflage and make himself virtually invisible against a natural or man-made background, but he may not feign a civilian status and hide amongst a crowd.”\textsuperscript{99} This is a narrower concept than distinction. Accordingly, using invisibility technology to make a sniper completely blend into a forest environment as she takes aim at her target would not constitute perfidy because the soldier is not feigning a protected status. Similarly, cloaking a tank as it mobilizes across the desert, even in preparation to kill, injure, or capture, would not constitute perfidy because the tank has merely projected itself as natural landscape. Finally, shielding a wounded soldier or fallen parachutist while he waits for rescue, even in a civilian town or city, would not constitute perfidy because the soldier has no intent to kill, injure, or capture, nor is he feigning the protected status of \textit{hors de combat}.\textsuperscript{100}

The potential perfidy problem arises when the invisibility technology is used to project a soldier or military object to be of civilian character during, or in

\textsuperscript{93} Jensen, supra note 32, at 310.
\textsuperscript{94} Watts, supra note 51, at 161.
\textsuperscript{95} AP I, supra note 20, art. 37.
\textsuperscript{96} See Bothe et al., supra note 68, at 204.
\textsuperscript{97} Morris, supra note 1, at 238.
\textsuperscript{98} See Watts, supra note 51, at 146–47; see also Protocols Commentary, supra note 1, at 433 (taking the position that attempted or unsuccessful acts fall within the scope of the perfidy prohibition).
\textsuperscript{99} Protocols Commentary, supra note 1, at 438.
\textsuperscript{100} See AP I, supra note 20, art. 41.1. A soldier is defined as \textit{hors de combat} if he is captured, indicates an intent to surrender, or is incapacitated and defenseless. \textit{Id.} art. 41.2.
preparation for, an attack. For example, a soldier firing at enemy combatants or unlawful belligerents while disguising himself as the side of a civilian residence would be perfidious. Similarly, a military vehicle assuming the visual attributes of parked civilian cars as it waits to capture a high value target would constitute perfidy under Article 37.101 The fact that invisibility technology may be used to commit perfidy does not make the technology unlawful. Virtually any lawful weapon, such as a gun or grenade, can be used in an unlawful manner. What matters for the purpose of determining a technology’s compliance with LOAC is the item’s intended, not possible, application.102 Although there is nothing inherently perfidious about invisibility technology that would prevent its adoption or sale, soldiers entrusted with such technology should receive clear warnings about its potential misuse for perfidious purposes.

V. RECONNAISSANCE

Invisibility technology may be particularly advantageous for reconnaissance operations. As the United States increasingly depends on partner–state relationships and advanced intelligence technologies, such as unmanned aerial vehicles (UAV), for intelligence gathering, clandestine human intelligence (HUMINT) has become a small portion of U.S. intelligence efforts worldwide.103 Although UAVs can capture tactical and capability-based intelligence that is valuable to military commanders, they are not the best tools for deciphering adversaries’ intentions, which are important for developing effective strategies to defeat them.104 Invisibility technology may improve the safety and effectiveness of clandestine HUMINT, such that they could be used more readily in intention-gathering missions. Whereas a UAV may not be capable of recording what is said during a meeting between suspected members of a terrorist organization, an individual using cloaking technology could potentially position himself to overhear that conversation or plant a recording device without detection.

No LOAC principle would expressly prohibit the use of a cloaking device for strictly intelligence-collection purposes. However, there may be some questions whether such activities should be classified as reconnaissance or spying. A reconnaissance scout is distinct from a spy. A spy is someone who, while in enemy territory, seeks to obtain information for an opposing party while operating under a false claim of noncombatant or friendly forces status.105 In other words, a soldier who penetrates enemy-held territory to collect intelligence while wearing civilian attire or an enemy uniform is a spy.106 Spying during

101. See Jensen, supra note 32, at 316.
102. Schmitt & Thurnher, supra note 27, at 273.
104. See id.
105. Roach, supra note 58, at 418.
106. Id.
armed conflict, whether international or noninternational, is not a violation of LOAC;\textsuperscript{107} however, captured spies are considered unprivileged belligerents and are not entitled to POW status, even if they have been identified as members of a state’s armed forces.\textsuperscript{108} Worse still, spies who are captured in civilian clothing behind enemy lines may be tried and punished under the domestic law of the capturing state, and historically, spies have received severe punishment.\textsuperscript{109} In the United States, for example, spying during wartime is punishable by death.\textsuperscript{110}

In contrast, if members of the armed forces of a party to a conflict collect information about the enemy while wearing their own military uniforms behind enemy lines, the soldiers are reconnaissance scouts. Whereas the spy seeks to collect information by wearing a disguise, the reconnaissance scout attempts to evade detection altogether. Reconnaissance, like spying, does not violate LOAC; however, a reconnaissance scout is entitled to the privilege of POW status upon capture and may not be executed by the capturing state for the intelligence-gathering activities.\textsuperscript{111}

Article 46.2 of AP I makes the distinction between spying and reconnaissance explicit, stating that a soldier who, “in territory controlled by an adverse Party, gathers or attempts to gather information shall not be considered as engaging in espionage if, while so acting, he is in the uniform of his armed forces.”\textsuperscript{112} The United States has not recognized Article 46.2 as customary international law.\textsuperscript{113} However, the United States has ratified the 1907 Hague Convention IV, and Article 29 of the Convention states that “soldiers not wearing a disguise who have penetrated into the zone of operations of the hostile army, for the purpose of obtaining information, are not considered spies.”\textsuperscript{114} Although Article 29 does not mention uniforms expressly, it conveys the same basic distinction between spy and reconnaissance scout as expressed in Article 46.2.

Members of an armed force utilizing cloaking technology to penetrate territory controlled by an adverse party in order to gather intelligence would be reconnaissance scouts if wearing uniforms or a distinctive emblem under the cloak. Although cloaking involves some deception, like spying, it seems unlikely that soldiers using such technology, at least the technology currently in development, would project themselves to be anything other than their surround-

\textsuperscript{107} Jackson, supra note 39, at 248. \textit{But see Ex parte Quirin}, 317 U.S. 1, 31 (1942) (holding that “[t]he spy who secretly and without uniform passes the military lines” violates LOAC).

\textsuperscript{108} 1907 Hague Convention, supra note 75, arts. 29–30; AP I, supra note 20, art. 46.

\textsuperscript{109} SOLIS, supra note 66, at 424; Roach, supra note 58, at 415.

\textsuperscript{110} 10 U.S.C. § 906 (2012); \textit{see also LIEBER CODE}, supra note 74, art. 88 (“The spy is punishable with death by hanging by the neck, whether or not he succeed in obtaining the information or in conveying it to the enemy.”).


\textsuperscript{112} AP I, supra note 20, art. 46.2.

\textsuperscript{113} \textit{See generally} Matheson, supra note 23 (neither expressly adopting nor rejecting Article 46 as customary international law).

\textsuperscript{114} 1907 Hague Convention, supra note 75, art. 29.
ing environment. Effectively blending into one’s surrounding, whether natural or man-made, would not constitute a disguise, which is required for spying. Rather, the purpose of cloaking while attempting to gather intelligence is to attempt evasion of detection altogether, which is the goal of reconnaissance. Although this distinction may seem insignificant in theory, in practice the difference may mean whether soldiers can be sentenced to death. One could imagine numerous ways in which reconnaissance scouts using invisibility technology might inadvertently reveal their location. For example, a cloaked soldier might block a moving object that then bumps into him, or a sudden change in weather conditions might affect the quality of the device’s visible projection. Regardless of how their location is revealed, if the cloaked soldiers are wearing uniforms or other distinctive emblems upon capture, they would be entitled to POW status.

CONCLUSION

With further development and refinement, invisibility technology—such as Quantum Stealth, the Rochester Cloak, e-camouflage, and their future variants—may offer soldiers and military objects unique and significant protection on the battlefield and in reconnaissance operations. By its nature, invisibility technology does not violate the LOAC principle of distinction or the prohibition on perfidy, and upon legal testing, the U.S. Armed Forces may adopt such technology as a lawful means and method of warfare.

The United States must also recognize the potential for this technology’s misuse, particularly in urban areas where soldiers or military assets may assume the characteristics of civilian objects, either intentionally or inadvertently. For example, soldiers will be technically able to store cloaked military objects in densely populated areas more easily, thereby violating Article 58(b) of AP I. Soldiers will also have the technical capability to project themselves to be part of civilian objects in order to treacherously kill, injure, or capture, in violation of Articles 37 and 44.3. Moreover, even if soldiers can avoid projecting civilian attributes while using invisibility technology in a particular mission, commanders should be cautious when sanctioning its use in urban areas, where the adversary’s increased uncertainty may invite the mistaken targeting of civilian objects, undermining the purpose of distinction.

Invisibility technology is likely to become an important part of land warfare in the near future. Therefore, the United States should begin setting concrete guidelines for its adoption to ensure that the use of this valuable asset is consistent with the principles of LOAC.