The Terminator and the Taliban

Assessing the Impact of Emerging Military Technologies On Counterinsurgency Operations

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The Terminator and the Taliban:
Assessing the Impact of Emerging Military Technologies On Counterinsurgency Operations

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“Technology is both the great separator and the great equalizer in military affairs”

Max Boot

“There are only two ways to fight the U.S.: stupidly [conventionally] or asymmetrically”

Lt. Gen. H.R. McMaster
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Executive Summary

Advances in military technology evolve continuously and rapidly in an age of globalization and networks of communication, as do the threats posed by violent non-state actors (VNSA) such as terrorist groups and criminal organizations. Western democracies, widely regarded as the incubators of such technologies as drones and stealth, are under constant pressure from adversaries to maintain their strategic advantage. In the past, these strategic imperatives culminated into military doctrines, also known as “offset-strategies”. In the current day and age, various technologies are increasingly important for the development of the latest offset strategy to fight asymmetric wars such as counterinsurgency operations.

This policy paper, produced under auspices of the Defense Department of the Netherlands Embassy in Washington D.C., examines the rise of new military technologies and human enhancement in the context of the future of warfare. Initially providing an overview of the latest developments in these fields, a number of country-specific perspectives will be provided that indicate how Western militaries are currently incorporating emerging military technologies into their force structures. Attention has also been paid to the potential backlashes of introducing such technologies into future warfare. In all, this paper is intended to provide a comprehensive review of how two high-impact trends – the emergence of new military technologies and the changing nature of warfare- converge and shape military strategic thinking as we advance into the twenty-first century.

To this end, a wide range of think tank experts and (foreign) government officials have been interviewed. The aim has been to discern how Western militaries around the world cope with the challenges of future warfare, and in what ways robotics and human enhancement can help overcome these obstacles. Thus, rather than seeking to deliver cutting-edge research in the field of military technology, the relevance of this paper should be viewed in the light of its multi-national outlook on these developments. The data for this paper has primarily been gathered through interviews, in addition to academic articles, journalistic pieces and policy papers. By no means the claim here
would be that this paper’s findings are definite or all-encompassing. The sensitive nature of the topic of study as well as a number of other limitations make that the scope of this paper is limited. At a minimum, it seeks to contribute to the latest insights into how warfare continues to change as a consequence of technological advances.

Indeed, unlike conventional inter-state wars, the wars of the next decades to come will be of a kind that is characterized by considerable disparities in military power and resources between actors. While indeed technological advancements in military robotics and human enhancements are unstoppable, there remains an unparalleled need to preserve human agency in the conduct of war. A key recommendation in this context is to start crafting a legislative- and policy framework that is capable of absorbing the unique challenges that the robotization of warfare poses to international law. This ought to be done before the proliferation of new technologies takes away the leverage of Western states to successfully cooperate on this issue with partner nations.

Secondly, the projected dominance of human-robot teaming over fully robotized armies is another important finding of this report. While it is easy to assume that defense agencies across the Western world are keen to introduce an ever-greater number of robots, the opposite appears to be the case. Uniquely human characteristics such as moral agency and compassion have impacted the nature of warfare for thousands of years, and will continue to do so. While the robotization of the military is often suggested to make war initiation more likely, there are numerous counterarguments as to why the human component should remain integral to warfare.

Finally, the research has sought to highlight the importance of public-private partnerships in developing the aforementioned ‘third-offset strategy’. Maintaining an edge over potential adversaries will only be possible if governments are capable of teaming up with universities, defense contractors and innovation hubs such as Silicon Valley. The current bureaucratic culture in many governmental defense agencies, including the Pentagon, ought to be thoroughly reviewed in this respect. However, once these obstacles will have been resolved, the potential of emerging military technologies in counterinsurgency operations (and warfare in general) can be exploited to the fullest.
Introduction

This policy paper is concerned with two of the most pressing developments related to the future of war: the advent of military robotics and the growing prominence of asymmetric warfare. Conducted as part of a research internship at the Defense Department of the Netherlands Embassy in Washington, D.C., the analysis presented in this paper attempts to shed light on the ways in which the revolution in military robotics will shape the engagement of Western militaries in asymmetric warfare. In particular, it seeks to investigate how new trends in military technology (primarily robotics and human enhancement) both constrain and provide Western militaries with new possibilities to fight the wars of the future. Within this broader set of objectives, the initial aim is to provide a conceptual framework of both emerging military technologies and asymmetric warfare, and to discern how Western militaries can best prepare for the most anticipated type of armed conflict.

In recent years, billions of dollars have been invested in the research and development of military robotics and other technologies, primarily in the United States. Yet, with more than seventy countries following suit, the proliferation of such military equipment is quickly becoming an unstoppable trend. To a large extent, forces of globalization and expanding networks of communication are at the roots of what many now refer to as the Information Age. In the military domain, the spread of technology is frequently being regarded as a triggering factor in the next Revolution in Military Affairs (RMA). Thus, as a result of technological innovation and subsequent proliferation, the conduct of war is witnessing a transformation that is irreversible and requires militaries (Western and non-Western alike) to adapt to a changing strategic environment. In this context, a number of scholars have predicted the return of war to a decentralized form, otherwise known as ‘fourth-generation warfare’ (4WG). The aim of this concept was to make massive, mechanized armed forces better suited to fighting guerrilla opposition forces exemplified by for instance Mao and Castro.

At the same time, the aforementioned quotation by Max Boot illustrates neatly that technology is not only the great separator, but also the great equalizer in military affairs.
The spread or diffusion of technology as a consequence of globalization has redistributive effects regarding the balance of power. States or violent non-state actors (VNSA) that were traditionally regarded as weaker actors are now endowed with more opportunities to challenge the hegemony of powerful nations. VNSA such as terrorist organizations are expected by some to soon be able to carry out attacks with WMD-equipped UAVs (Goodman: 2015). Since the future of conflict is likely to place greater emphasis upon threats emanating from VNSA, this paper is confined to this particular group of actors and therefore does not consider forms of inter-state conflict. Most importantly, asymmetric warfare as a type of conflict is on the rise while inter-state conflict has been in decline for decades. It is for this reason that this policy paper looks specifically at the intersection of military robotics and asymmetric warfare.

**Research Questions**

Against the backdrop of these new developments in the global security environment, this policy paper will address the following research question and accompanying sub questions:

*"How do Western militaries assess the impact of emerging military technologies on counterinsurgency operations?"

1. How does one conceptualize emerging military technologies and counterinsurgency operations as a form of asymmetric warfare?

2. Which particular challenges does asymmetric warfare, specifically counterinsurgency operations, pose to Western militaries?

3. What are the most recent trends in the sphere of emerging military technologies, and how would they help advance the realization of a 'third off-set strategy?'

4. How do Western militaries other than the United States view the potential of applying emerging military technologies to counterinsurgency
operations?

5. What are the potential backlashes of Western militaries’ increased reliance on emerging military technologies when conducting counterinsurgency operations?

It goes without saying that while understanding these questions is fairly easy, finding satisfactory answers to them is a far more difficult task. This is because, as Rubright (2015: 4) righteously pointed out, “not only technology is ever-changing, but also strategy and the political goals that it pursues.” At the same time, the very complexity of counterinsurgency warfare creates a set of challenges that even technological advancements cannot overcome completely. It can, however, greatly enhance the chance of success of counterinsurgency operations.

**Methodology**

In order to answer the previously discussed research questions, this policy paper draws upon three different methodological pillars. First of all, several interviews with stakeholders in the American think tank community, (foreign) government officials and academic scholars have been conducted. Foreign representatives include Defense Attachés working at the embassies of Germany, Sweden, Canada and Australia. Time constraints have unfortunately caused the omission of other important Western militaries such as the United Kingdom and Israel, whose inclusion surely would have enriched the quality of this paper.

The primary data gathered through these interviews are supposed to enhance the findings of this paper. At the same time, the privacy of all interviewees is being upheld by means of a non-disclose agreement between both parties involved. Secondly, various journalistic pieces and scholarly articles have been analyzed to substantiate the interview findings by means of triangulation. Finally, to the extent that this was made possible, a number of official U.S. government documents have been scrutinized that together constitute the third methodological pillar.
In this regard, as indicated before, one would have to take into account that this investigative report is based primarily on readily available, open-source information. The sensitive nature of military robotics significantly reduces the number of channels of information input. Additionally, this report does not intend to cover all aspects of military innovation and robotics. Neither is the aim to provide a threat analysis of all potential inherent to military robotics and asymmetric warfare. For these reasons, the analysis provided here should be regarded as a subset of a larger debate pertaining the future of war.

**Structure**

This policy paper is organized as follows. Chapter 1 is concerned with additional conceptual exploration of the relationship between emerging military technologies and asymmetric warfare. Moreover, it provides a contextual framework in which the subsequent chapters have been embedded. Chapter 2 is dedicated to the intricacies of asymmetric warfare and the challenges it poses to Western militaries. Covering both theory and practice, Chapter 2 seeks to identify how various forms of asymmetric warfare tend to reduce the effectiveness of current Western military power.

Chapter 3 focuses on the latest developments in the field of emerging military technologies, thereby paying specific attention to military robotics (most notably LAWS) and its relevance for Western militaries. In the same chapter, the stances of individual Western states vis-à-vis emerging military technology and asymmetric warfare will be elaborated upon. Chapter 4 reviews the potential backlashes of Western militaries using emerging military technologies to engage in asymmetric warfare, and counterinsurgency operations in particular. Finally, Chapter 5 synthesizes the main findings, restates a number of policy recommendations, and sets out the conclusions of this policy paper.
Chapter 1: A Conceptual Framework

1.1 Conceptualizing Emerging Military Technologies

Due to the wide array of definitions pertaining to emerging military technologies, military robotics and asymmetric warfare, some clarification is necessary concerning its use throughout this policy paper. According to Peter W. Singer, robots – in general terms - are “machines that are built upon what researchers call the "sense-think-act" paradigm. That is, they are manmade devices with three key components: "sensors" that monitor the environment and detect changes in it, "processors" or "artificial intelligence" that decide how to respond, and "effectors" that act upon the environment in a manner that reflects the decisions, creating some sort of change in the world around a robot (Singer in Shachtman: 2009).” Surely military robotics should be regarded as a subcomponent of emerging military technologies, which in turn can be regarded as an umbrella concept that also includes human enhancement and various forms of network communications.

In this policy paper, military robotics are mostly being referred to as Lethal Autonomous Weapon Systems (LAWS) that are used for military applications. Thus, these LAWS are capable of identifying and eliminating targets with little to no human guidance in the process (akin Singer’s definition of robots). Again, it should be stressed however that the rise of LAWS is part of a wider array of emerging technologies that are bound to change the global military balance, such as offensive cyber warfare tools; advanced computing, artificial intelligence, densely interconnected, multiphenomenology sensors; electric weapons such as directed energy, electromagnetic rail guns and high-powered microwave weapons, additive manufacturing and 3-D printing, synthetic biology, and even technologies to enhance human performance on the battlefield (Work & Brimley: 2014). Taken together, these disruptive military innovations change the character of war by introducing a new warfare style (Pierce: 2004).
1.2 Asymmetric Warfare and Counterinsurgency Operations

This new style of warfare is more subversive, covert and distant than the wars of the past looked like. Indeed, while VNSA increasingly seek to target weak spots of conventional armies, the latter group of actors is now starting to apply similar tactics while moving away from large-scale, inter-state confrontations. This phenomenon is what many have referred to as asymmetric warfare, and it carries with it a long history of conceptual disagreement among scholars and practitioners. Asymmetry, in generic terms, means the absence of a common base of comparison in respect to a quality, or in operational terms, a capability (Meigs: 2003). From a U.S. point of view, the Joint Chiefs of Staff provides the following conceptualization:

“Asymmetric approaches are attempts to circumvent or undermine U.S. strengths while exploiting U.S. weaknesses using methods that differ significantly from the United States’ expected method of operations (Joint Chiefs of Staff: 1999).”

Asymmetric warfare, then, is being defined here as “violent action undertaken by the ‘have-nots’ against the ‘haves’ whereby the have-nots, be they state or sub-state actors, seek to generate profound effects – at all levels of warfare, from the tactical to the strategic – by employing their own specific relative advantages against the vulnerabilities of much stronger opponents (Thornton: 2007).” In this regard, Rodin (2006: 155) makes the important observation that “asymmetric tactics are typically the tactics of weakness, not the tactics of choice.” Along similar lines, Pfanner (2005: 153) remarks:

“The weaker party, recognizing the military superiority of its opponent, will avoid open confrontation that is bound to lead to the annihilation of its troops and to defeat. Instead, it will tend to compensate its inadequate arsenal by employing unconventional means and methods and prolonging the conflict through an undercover war of attrition against its well-equipped enemy.”
Clearly, asymmetric warfare is unlike any conventional ‘game of chess’. The opponents are not of equal proportions, both in qualitative and quantitative terms. Neither are the rules of the game well-established and clear to all players involved; they are blurry and subject to interpretation. For conventional armies, engaging in this type of warfare has always been challenging due to the adaptability of the opponent. Western militaries are now seeking to turn the tables by embracing military robotics. Thus, the predominant asymmetry present in this policy paper is of a technological nature. It should be stressed however that asymmetry in warfare manifests itself in many different realms, including (but not limited to) population size, geographic and terrestrial characteristics, and the availability of natural resources.

In short, asymmetric wars can be categorized according to characteristics listed in next paragraph. It is this kind of warfare that this paper will investigate in greater detail, most importantly because it is projected to be the dominant style of warfare in the next decades ahead. In fact, the Joint Strategic Assessment 2006-2026 has indicated that the “predominant forms of warfare will be irregular, catastrophic, disruptive or a combination thereof (Defense Intelligence Agency: 2006).” The defining characteristics of asymmetric war as adhered to in this policy paper are as follows:

1. “A revalidation of guerrilla war, that is, making guerilla war less military-focused and more multidimensional, to include the use of time as an instrument of power;

2. The ‘deterritorialization’ and ‘denationalization’ of conflict, that is, one’s focus on physical territory shifts to the human territory and use of neighboring and other regional countries for support, resources and sanctuaries;

3. The use of communication and information, with the media becoming a primary instrument of power;

4. The ‘relativization of the time factor’ in contemporary conflict, that is, less concern regarding the achievement of a quick and easy military victory and more with the long war (prolonged / protracted war);
5. The placement of relatively small groups of combatants, agitators, or civilians interspersed among ordinary citizens, with no permanent locations and no identity to differentiate them clearly from the rests of a given civil population, concealing the threat they pose (possible Trojan horses) and enabling them to create and use devastating surprise (divine surprise) as a major instrument of power;

6. The eruption of Islam as a valid and competing ideology in the global security arena (Manwaring: 4-5).

1.3 Emerging Military Technology and Warfare: Two-Way Relationship

At first sight, emerging military technology such as robotics, and asymmetric warfare might seem like independent concepts. However, when one posits the two in the framework of military potential, the magnitude of the issue becomes clear. The initial selective proliferation of military robotics will increase disparities in military capabilities between the ‘have-nots’ and the ‘haves’. Indeed, the United States and some of its allies now look to high-tech systems to provide its forces with information dominance, unparalleled command and control networks, unrivalled weapons accuracy and unmatched firepower. Considering the enormous potential of emerging military technologies such as military robotics, this power disparity is set to increase as we progress into the twenty-first century. While over time this gap might be closed due to commercialization and lowering costs of production, the technological leap forward is likely to benefit established military powers in the near future.

The advent of various military technologies will not only increase the gap in military capabilities between the ‘have-nots’ and the ‘haves’, the trend itself will be irreversible as well. Indeed, with the importance of numerous military technologies on the rise, its proponents point at the manifold advantages, particularly when it comes to reducing the human cost of war:
“[T]he need to reduce costs, the short-term satisfaction of particular ‘risk-transfer rules’ for avoiding casualties, and the upkeep of a specific set of normative values – constitute the special appeal of unmanned systems to democracies (Sauer & Schörnig: 2012).”

For instance, a stronger presence of LAWS on the battlefield will require fewer soldiers to conduct warfighting, and civilian targeting can be reduced to an absolute minimum. In short, the emergence of military robotics in future warfare will take the human error-component out of the equation in an unprecedented manner. While this development seems beneficial to the quest for ‘humane’ warfare, there are a number of unintended consequences that should not be overlooked.

Firstly, the use of military robotics lowers the threshold for the application of violence and entering wars. Secondly, military robotics currently lack the emotional characteristics typically associated with human fighters, such as empathy and compassion. Particularly during peacekeeping operations, when the hearts and minds of the local population need to be won, the superiority of human beings over machines is unquestionable. Robotics expert Peter Singer captured the overarching trend related to the increasing distance between the fighter and its target as follows:

„Each new military technology, from the bow and arrow to the bomber plane, has moved soldiers farther and farther from their foes (Singer: 2009).”

Most importantly, already in 2010, a United Nations human-rights investigator recommended in a report to the United Nations that “the international community urgently needs to address the legal, political, ethical and moral implications of the development of lethal robotic technologies (Worsnip: 2010).” In that same year, a convention of robotics experts on LAWS held in Berlin issued a statement calling upon “the international community to commence a discussion about the pressing dangers that these systems pose to peace and international security and to civilians (ICRAC: 2010).” In particular, these experts warned about the dangers associated with the ‘exacerbation of asymmetric warfare’. In their view, presenting VNSA with an opponent that is non-human completely overhauls our traditional understanding of warfare being a human
endeavor. Consequently, the opponent is likely to look for alternative means to seek victory in its battles, potentially through the deliberate targeting of civilians.

Since the costs associated with the adoption of new forms of military robotics will drop over time, the diffusion of LAWS is likely to continue accelerating in the foreseeable future. Of course, the chances of VNSA one day acquiring similar forms of military robotics is omnipresent, but it is imperative for Western militaries to secure particular advantages for as long as possible. As Grossman (2013: 7) indicates, “the history of security threats tends to follow a back-and-forth pattern, in which powerful states establish security and another state or non-state actor figures out a way to threaten that security.” This process, whereby the resources and capabilities of both opponents vary constantly, is depicted in the graph below:

In asymmetric warfare, vis-à-vis VNSA, the future use of military robotics should be regarded as a new ‘offset-strategy’ in which Western militaries are increasingly able to neutralize threats to national security. It is the ultimate purpose of this policy paper to explore the options available to Western militaries of exploiting military robotics in asymmetric warfare. Finally, however, it should be noted that while Western militaries will use weaponry such as military robotics first, it is those who fight against such
nations who will ultimately benefit most from asymmetry. Since VNSA will not be able to match Western militaries in the realm of conventional military force, they will seek to find an edge over their opponents by using military robotics and other types of weaponry. It is their only effective option to counterbalance a superior national military force. As Locks (2015) has indicated, the military innovation curve of such actors is ‘much faster by necessity.’

Taken together, the ways in which Western militaries will engage in asymmetric warfare, and counterinsurgency operations in particular, will largely emanate from (technological) changes caused by the rise of LAWS and other emerging technologies. Retired U.S. Navy Captain Wayne P. Hughes (2000: 285) describes the projected changes in the conduct of war as follows:

“…we may be on the leading edge of a new age of tactics. Call it the “age of robotics.” Unpeopled air, surface and subsurface vehicles have a brilliant, if disconcerting, future in warfare. To appreciate the possibilities, think of future unmanned aerial vehicles in the same relationship to the manned combat aircraft as the present precision guided Tomahawk land-attack vehicle has with respect to the scarcely aimed V-1 cruise missiles of late World War II…The most likely revolution in warfare is not in information acquisition, transfer, and processing, the beginnings of which are already fifty years behind us insofar as naval tactics are concerned. The revolution will be in uninhabited robots that search and shoot under amazing modes of self-control.”
Chapter 2: Challenges of Asymmetric Warfare

2.1 The Exploitation of Weaknesses

As has been indicated in the previous chapter, asymmetries in the technological realm are likely to have the most profound effect on the conduct of war and its outcome. Highlighting the nexus between military robotics and asymmetric warfare, the Joint Vision (JV) 2010 envisioned the most daunting asymmetric challenges to emanate from the following opposing force: “our most vexing future adversary may be one who can use technology to make rapid improvements in its military capabilities that provide asymmetrical counters to U.S. military strengths…” Indeed, as was indicated in Chapter 1, asymmetrical threats are aimed particularly at the weaknesses of the strongest contender. VNSA seeking to exploit these weaknesses can do so through a wide range of options.

First of all, asymmetric warfare poses substantial demands on the willingness of Western democracies and their militaries to endure casualties. In the minds of many scholars and practitioners, the West has grown an aversion towards the possibility of its soldiers dying on the battlefield. Conversely, VNSA are far more willing to make the ultimate sacrifice for the pursuance of their battle-related objectives. Particularly in the face of suicide terrorism, various radical Islamist groups have shown their dedication to sacrificing their lives. This phenomenon has strong links with the superior ability of VNSA to fight so-called ‘wars of attrition’.

As was the case in both Iraq and Afghanistan, the adversaries of Western militaries sought to eradicate the bonds between coalition partners through deliberate targeting and repeated ambush attacks. The higher degree of resolve among VNSA is being exemplified by the fact that coalition forces appear to be leaving Iraq and Afghanistan based not on their own terms, but those of their adversaries. As Spinney (2011) righteously points out, the Taliban’s rationale is embodied in the following saying: “The Americans have a clock, but we have the time.”
To the advantage of VNSA, virtually unlimited levels of resolve are frequently being coupled with a similarly wide array of weaponry. In the process, compared to Western militaries, these actors are “far less restrained in the use of violence and unhindered by legal encumbrances (Thornton: 17).” Typical examples in this debate include hostage-takings, the use of weapons of mass destruction (WMD), and other illegitimate operational techniques such as suicide bombings. In the digital realm, VNSA currently employ social media, internet, television, and camera recording to recruit new members into their organizations and prophesize their acts.

2.2 Organizational Resilience

Related to the second set of asymmetric warfare challenges (methods of attack and absence of legal constraints), the organizational fluidity of VNSA allows for the kind of warfighting that is far more dynamic than most conventional armies can handle. The counterinsurgency campaign that the U.S. undertook in Iraq over the past decade shows how an adversary can outperform a stronger opponent with fewer capabilities and manpower. As Meigs (2003: 8) indicates, the advantage of any VNSA lies in our “inability to recognize the new structures of his operation and to predict his new attack vector.” A military can have the finest means of intelligence available in the world, but if the enemy makes use of homing pigeons and word-of-mouth communication, they are often rendered useless.

Alternatively, the increased reliance of Western militaries on various forms of digital communication makes them particularly vulnerable to disruptive information operations. Attacks carried out by VNSA through cyberspace can have a severe impact on the U.S. deployment infrastructure. As Kolodzie (2001) has pointed out, logistic units, maintenance and supply assets are particularly vulnerable as they usually have a high payoff while being rather poorly defended. Other weak spots include command and control functionalities that can be taken down through computer hackings and other forms of malware.
If Western militaries face such a diverse asymmetric threat spectrum, then what should be done to mitigate these risks? According to McKenzie (2001: 96), Western militaries ought to focus on three pillars: "minimizing vulnerabilities, accentuating unique strengths and preventing disproportionate effects." The next chapter is supposed to review current trends in emerging military technologies, and is tasked with the question of how Western militaries are currently seeking to exploit these opportunities when engaging in asymmetric warfare such as counterinsurgency operations.
Chapter 3: Developments in Emerging Military Technologies

In the United States, anticipatory strategies regarding the future of warfare are actively being debated and reshaped though progressive insight. U.S. Deputy Defense Secretary Bob Work recently outlined what he refers to as the ‘third offset strategy’: a grand defense framework that readies the U.S. armed forces for the challenges of the twenty-first century, including counterinsurgency operations. The U.S. Department of Defense indicates that “unlike the first two offset strategies, which depended on military development, the third would rely on commercially driven technology such as robotics, autonomously operating vehicles, guidance and control systems, visualization, biotechnology, miniaturization, advanced computing, big data analytics and additive manufacturing (Cronk: 2015).” The conclusions of a report composed after a U.S. Army workshop on the future of warfare largely coincide with Work’s third offset strategy, and include some bold claims on the key features of the battlefield in 2050:

“The principal Army unit operating in 2050 will be mixed human-robot teams. To enable humans to partner effectively with robots, human team members will be enhanced in a variety of ways. These super humans will feature exoskeletons, possess a variety of implants, and have seamless access to sensing and cognitive enhancements (Gady: 2015).”

The next sections will elaborate in greater detail how the United States, as the pacemaker in the development of these emerging military technologies, works in concert with allied nations to advance the sophistication of UAVs, UGVs, UMS and exoskeletons.

3.1 Unmanned Aerial Vehicles

As can be inferred from the previous chapter, the challenges posed by asymmetric warfare are diverse and dynamic. An effective military approach to countering threats emanating from asymmetric opponents requires innovation and adaptability. Currently, the demands that the new security environment places upon Western militaries are best satisfied by the increased use of military robotics. While Chapter 1 has already touched
upon some of the benefits of military robotics in asymmetric warfare, this chapter will take a closer look at the latest developments regarding various emerging military technologies. It will also discern for individual countries how these trends impact the ability of their militaries to engage in asymmetric warfare. In principle, LAWS designed for military purposes in nearly all theaters of conflict will be discussed (sea, air, land).

Among the general public, military robotics is known most widely in the form of unmanned aerial vehicles (UAVs). This is not surprising, because since the start of the Iraq invasion of 2003, the number of UAVs as part of the U.S. Armed Forces inventory increased from a handful to about 7,000 copies. While the Predator and Reaper drones are two of the most accomplished UAV systems, other technological masterpieces are making their way into the battlefield arena. One such device is the MQ-8 Fire Scout, a helicopter drone that just completed a series of autonomous takeoffs and landing tests from the back of a guided-missile destroyer (Singer: 2015).

Even though the wars in Afghanistan and Iraq have instigated massive transformations in the field of lethal drones, the latest UAV-developments are currently taking place in the field of micro-UAVs. These mini airborne robots are typically the size of insects, and, deployed in the number of hundreds or thousands, VNSA will find their chances of successfully defending against these intruders to be rather slim. One of the most intriguing creations in the field of military micro-UAVs is the PD-100 Black Hornet Nano developed by Norwegian Prox Dynamics. At a weight of just 16 grams, the Black Hornet Nano is used primarily in intelligence, surveillance and reconnaissance (ISR) missions to support front line troops. The PD-100’s unique dimensions allow an individual soldier to easily carry around the system as part of his gear.

### 3.2 Unmanned Ground Vehicles

Another area of military technology that continues to evolve is that of unmanned ground vehicles (UGVs). Not only are UGVs useful in typical ISR (Intelligence, Surveillance, Reconnaissance) missions, they will also become increasingly important for carrying and moving around a soldier’s equipment. Other tasks include bomb disposal and the transport of wounded soldiers from the battlefield. One of the most profound threats
emanating from asymmetric warfare are improvised explosive devices (IEDs), and their widespread usage in conflict zones has spurred research and development in the field of UGVs to unprecedented levels. At the same time, since the main purpose of UGVs to assist in Explosive Ordinance Disposal (EOD) missions is starting to shift, the range of UGV capabilities is expanding rapidly.

One of the most intriguing UGVs is the Legged Squad Support System (LS3), which can function autonomously and serve as a packhorse for a squad of soldiers or marines. The Defense Advanced Research Projects Agency (DARPA), developer of the LS3, claims that the robotic system is capable of interacting with soldiers on the ground similar to a trained animal and his handler. Other notable systems include the Modular Advanced Armed Robotics System (MAARS) by Qinetic and the Battlefield Extraction-Assist Robot (BEAR) by Vecna Technologies. The MAARS can be configured both as a lethal and non-lethal UGV, and can be equipped with a machine gun and grenade launcher. The BEAR, on the other hand, is designed primarily – as the name suggests - to extract wounded soldiers from the battlefield. Standing six feet tall, this humanoid robot can carry military personal and equipment over long distances and through rough terrain.

3.3 Unmanned Maritime Systems

While the majority of military robotics innovation is currently taking place in the field of UAVs and UGVs, there is also a substantial interest of Western militaries in the development of what the Pentagon has referred to as Unmanned Maritime Systems (UMS). Particularly for nation-states with extensive coastal lines, such as Australia and the United States, the deployment of UMS is useful both for the monitoring of seaborne activities as well as military purposes.

A submission to the Australian Defence White Paper 2015 suggests that two ocean-going robotics devices are particularly worth highlighting: Wave Gliders and Sea Gliders. Both UMS can be deployed either on autonomous or semi-autonomous missions for up to twelve months, continuously gathering and transmitting data from the ocean surface and below, while remaining virtually undetectable. Surely, Wave Gliders and Sea
Gliders are ideal tools for missions that focus on ISR. There are however also a number of UMS designed to neutralize below-surface threats such as mines and improvised explosive devices (IED). Earlier this year, the U.S. Navy awarded contracts that could total as much as $228.4 million to seven companies for unmanned maritime operations in the Pacific region (McCaney: 2015).

3.4 Cyborgization, Exoskeletons and Human Enhancement

Perhaps the greatest potential of the robotics revolution in military affairs is to be found in the cyborgization of human soldiers. Rather than developing robotic systems that are remotely controlled by human beings, cyborgization involves employing military robotics to improve existing human capabilities by augmenting speed, power and agility. At the same time, the superior cognitive abilities of human beings are being preserved. It is projected that these kinds of innovations will be particularly useful in asymmetric warfare in urban settings (i.e. close quarter combat).

![The Future Soldier](image)

**Figure 2:** *The Future Warfighter: Part Human, Part Machine (CNBC: 2014).*
As has been observed by Lin (2012), we might arrive at the “perfect future warfighter somewhere in between robotics and biomedical research: one that is part machine and part human, striking a formidable balance between technology and our frailties.”

Contemporary examples of human-machine collaboration in military affairs are increasing in numbers. Various exoskeletal suits are currently being developed that can greatly enhance the safety and power projection of the first soldier to breach a door (see figure 1). One such product is the Tactical Assault Light Operator Suit (TALOS), designed by a number of universities and research laboratories under auspices of United States Special Operations Command (USSOCOM). In the words of USSOCOM Commander Joseph L. Votel, TALOS was “chartered to explore and catalyze a revolutionary integration of advanced technology to provide comprehensive ballistic protection, peerless tactical capabilities and ultimately to enhance the strategic effectiveness of the SOF operator of the future (Garamone: 2015).”

Arizona State University, which collaborates with DARPA on the TALOS project, is also currently developing the slightly less ambitious Air Legs Version 2 Exosuit. Using this system, a soldier can sprint a mile in under four minutes while carrying his entire load of equipment. Similar to TALOS, this joint project with ASU is part of DARPA’s Warrior Web Program, which “seeks to develop the technologies required to prevent and reduce musculoskeletal injuries caused by dynamic events typically found in the warfighter’s environment (Orlowski: 2015).” Lockheed Martin, on the other hand, has designed the HULC, which allows the user to carry up to 200 pounds over an extended period of time and over all terrains (Lockheed Martin: 2012).

While cyborgization and the development of exoskeletal suits represents the mechanical approach to creating a ‘super soldier’, human enhancement does so from a biological perspective. Indeed, as Lin (2010) points out, “enhancement technologies and robotics represent opposite directions to the same goal: one is an engineering approach that works with mechanized systems, and the other is a biomedical approach that works with organic systems.” Particularly worth noting here is that both robotics and enhancement technologies have a direct impact on the human dimension of warfare.
That is, these technologies either replace soldiers from the battlefield, or they upgrade them. At the same time, while cyborgization, exoskeletons and human enhancement have tremendous potential for creating the perfect warfighter, there are a number of ethical and legal loopholes tied to these technologies as well. In another article, Lin (2011) remarks that if soldiers are able to resist pain through robotics, genetic engineering or narcotics, are we still prohibited from torturing that person? Such ethical concerns will prevail in the next chapter, as country-specific perspectives will be provided on these issues.
Chapter 4: Multinational Perspectives of Western Militaries

4.1 Germany: Reluctance and Experimentation

In Germany, the application of military force has been a contested issue for decades, particularly since the end of World War II. It should therefore not come as a surprise that when emerging military technologies are concerned, both German political parties and the public have been hesitant towards large-scale deployment of automated weapon systems. As a German general pointed out during one of the interviews in Washington D.C., the appetite for robotizing defensive military equipment is much higher than those with dedicated offensive capabilities. Similarly, German Army Chief Werner Freers remarked a couple of years ago: "We are looking for pragmatic solutions that would make life easier for our soldiers in military missions."

The source at the German embassy also remarked that while conventional 'inter-state conflict' may be the most dangerous form of future conflict, Western militaries should remain concerned with counterinsurgency operations. Indeed, while occasional terrorist attacks are unlikely to have a massive impact on the collective imagination of what constitutes conflict (akin WWII), these "bee stings" should be taken seriously. If ignored for too long, these incidental attacks can multiply in frequency and lethality once VNSA are able to successfully get their hands on political tools of force (i.e. police and military).

In recent years, the German government (which includes the Christian Democratic Party or CDU), has clashed frequently with opposition parties over the need for military robotics, including drones: "The CIA’s combat drone scenario is completely out of the question for Germany," said SPD-politician Hans-Peter Bartels back in 2013. German opposition parties have predominantly expressed their concerns about the increased appetite for war when robotizing the military. Moreover, the Greens have criticized the growing sophistication of military robotics as "armed, automated systems not tied to a chain of accountability (Werkhäuser: 2013)."
At the same time, Germany has also hosted a number of events dedicated to the experimentation with military robotics, including the European Land-Robot Trial (ELROB). An annual event, ELROB’s purpose is to display the capabilities of Unmanned Ground Vehicles (UGVs) to European stakeholders in both public and private sectors.

4.2 Sweden: Necessity Supersedes Everything Else

In May of this year, Sweden's center-left government announced a new 10.2 billion kronor ($111.9 million) defense deal designed to increase the country's capabilities. With mounting Russian aggression towards the Baltic States, Sweden has found itself in a position in which its defense apparatus needs to be bolstered. The recent intrusions into Swedish airspace and maritime territories by bombers and ‘foreign’ submarines exemplify the growing threat to Swedish national security. In addition, the budget cuts that have been plaguing Western countries for many years now have also struck Sweden: the size of its army decreased by 90 percent over the past few decades, from around half a million to 50,000 troops today.

Turning to military robotics, Sweden is gradually increasing the importance of autonomous systems within its armed forces. Three years ago, aerial craft developer AeroVironment received an order for hybrid surveillance drones from the Swedish Defence Materiel Administration (Försvaret's Materielverk) on behalf of the Swedish Army. At the time, FM ordered 12 small hybrid unmanned aircraft systems (UAS). The fixed-price deal includes Puma AE and Wasp air vehicles -- and the necessary ground stations, training and logistics systems to support their operation. The contract is open-ended enough that the Swedish Army has the option of procuring up to 30 vehicles in time.

Last year, in addition to a number of UAVs, the Swedish military has also ordered 10 remotely operated vehicles (ROV) for underwater operations (in this report referred to as UMS). The Sea-Eye Falcon, developed by Swedish manufacturer Saab, is being used for seabed surveys, inspections, light underwater operations and recovery of objects. The robots are being carried by Swedish Navy patrol boats and auxiliary ships,
and the contract was placed by the Swedish Defense Materiel Administration (Peck: 2014).

During an interview with a defense department employee of the Embassy of Sweden in the United States, it was pointed out that building a force structure capable of fighting conventional warfare supplemented with counterinsurgency capabilities is preferred over the contrarian option. Thus, while LAWS and other forms of military robotics could perfectly be incorporated into an armed forces apparatus that is designed for nation-state warfare, its use in traditional counterinsurgency operations should remain limited. This is because counterinsurgency warfare generally poses greater risks to civilian populations than do force-on-force battles, particularly because insurgents will tend to hide among the civilian population. As a consequence, the introduction of LAWS by Western militaries will raise significant ethical and legal constraints that are inherent to counterinsurgency warfare.

Particularly for a country like Sweden, which traditionally puts the upholding of international rule of law and human rights protection at the forefront of its foreign policy, the unrestricted proliferation and adoption of military robotics goes against Swedish interests. During meetings at the CCW in May 2014, several European nations expressed opinions regarding LAWS that ranged from skepticism to hostility. Sweden expressed doubt whether LAWS were “a desirable development for a military force” and insisted that humans “should never be ‘out of the loop” (Groves: 2015).

4.3 Canada: Responsible Robotics Exploration

Similar to most other Western militaries, Canada is actively exploring the possibilities of emerging military technologies while keeping a close watch on existing ethical and legal standards. Generally speaking, the Canadian military is investing moderately at the lower end of the force spectrum, little in the middle and very little at the high end (beyond R&D). According to an interviewee at the Canadian Embassy in Washington D.C. such low-end tasks include C-IED, electronic warfare (EW) and network management. As the level of task complexity increases, so does the risk of greater potential collateral damage occurring. In that regard, intermediate tasks include smart
bombs, drones and cruise missiles, while the high-end tasks are those that seek to employ directed energy, automated counter sniper systems and C-IED in complex urban environments.

In April of this year, Canadian Defence spokeswoman Ashley Lemire also indicated that “while Canada is not currently developing any lethal fully autonomous weapons systems, Defence Research and Development Canada (DRDC) has an active research program on unmanned systems that informs policy on the opportunities and threats that technologies could pose (Harris: 2015).” Thus, largely similar to the German stance on emerging military technologies, Canada is concerned primarily with the defensive capabilities of unmanned systems, while the application of lethal force by military robotics is not something Canadian officials dare speculating about.

If Canada is not currently employing LAWS or other military robotics that can execute high-end tasks, then which systems have recently been acquired? In 2014, the Canadian military spent nearly $10 million to acquire 20 high-tech robots meant to sniff out radioactive dirty bombs as well as chemical and biological weapons (The Canadian Press: 2014). Specifically, these iRobot510 Recce Systems are capable of detecting and neutralizing CBRN threats. Alternatively, Canada has joined a number of partnerships that focus on defense science and technology matters, both within and outside of NATO. One such partnership is The Technical Cooperation Program (TTCP), whose members also include the United States, Australia, New Zealand and the United Kingdom (Five Eyes Intelligence Alliance). Thus, Canadian defense agencies are actively considering incorporating various forms of emerging military technology into their force structures while preserving the need for appropriate ethical and legal standards.
4.4 Australia: Geopolitics Fostering Research and Development

A prime example of pioneering in military robotics and the future of warfare, Australia is not only a member of TTCP, but also actively researches applied defense technology for future conflicts within its own borders. The findings of these research endeavors culminate in the form of white papers such as the ‘Army Research and Development Plan 2015’.

Indicative of Australia’s active stance when it comes to defense technology is the country’s longstanding track-record regarding public-private partnerships. Already in 2009, the Australian government organized a multi-million dollar competition to find innovative solutions to helping soldiers “fight by remote control in urban combat zones (Mercer: 2009).” In addition, the University of Sydney has embarked upon a joint collaboration with the Defence Science and Technology Organisation (DSTO) that focuses on research and development in autonomous and uninhabited systems for defense, including UAVs, UGVs and UMS (Slocombe: 2015).

To be sure, Australia is geographically proximate to such hotspots as the Senkaku islands in the South China Sea, which have been a source of dispute between China and Japan for many years now. In addition to naval conflicts, the Australian military expects that it will face challenging, high-tech combat in Asia’s megacities as a consequence of food scarcity, urbanization and population growth. Indeed, the Australian Army’s Directorate of Future Land Warfare has published a report that warns Australia’s future land wars will be very different from recent counterinsurgency operations in the rural areas of Afghanistan and Iraq (see Future Land Warfare Report: 2014).

Compared to other Western militaries such as Germany and Sweden, Australia appears to be less reluctant to explore the possibilities that emerging military technology have to offer: “Physical and cognitive enhancements such as ‘exosuits’ or long-lasting stimulants need to be considered in the context of amplifying performance and also for their potentially unintended physical and mental health consequences (Dorling: 2014).”
Generally speaking, the Australian perspective concerning the usefulness of military robotics rests on a number of key technologies that the Australian Army is likely to deploy in the near future (Marlow: 2015):

- “Precision inertial navigation, which is now capable of providing accurate position information comparable to GPS (global positioning system) but independent of satellite input.

- LADAR (Laser Radar), which is now capable of three-dimensional terrain mapping accurate enough to identify obstacles and lanes of traffic in real time from a moving vehicle.

- High bandwidth line-of-sight laser communications, which have demonstrated long-range data rates six times that of the fastest radio and have the theoretical capacity to be 100 times faster.

- Quantum encryption technology, which is nearing maturity and has the potential to provide the secure communications required for high bandwidth transmission.”

In addition, the Australian Army is “well placed to capitalise on advances in the following areas (Marlow: 2015)”:

1. Assisted teleoperation of armoured vehicles.
3. Assisted teleoperation of armoured engineering vehicles.

One of the founding members of the International Committee for Robot Arms Control (ICRAC), the Australian philosopher Robert Sparrow, spurred a heated discussion in Australia on the unbridled proliferation of military robotics. In his view, the “ethics of working on military robotics today cannot be entirely divorced from the ethics of the ends to which military robots are used (Monash University: 2012).” He also adheres to the argument that governments will find it easier to initiate wars when military robotics
replaces human soldiers on the battlefield. In all, the opinions on accepting emerging military technologies with open arms are mixed. While the operational environment clearly pushes Australian defense agencies in one direction, those working in non-governmental organizations and think tanks are generally more concerned about unrestrained advances in these fields. This trend is visible in most Western states, but the impact of geopolitics and the natural environment on warfare is more prevalent in Australia than anywhere else.
Chapter 5: Unbridled Diffusion: A Cause for Concern?

5.1 Ethical and Legal Dilemmas

First of all, the proliferation of numerous military technologies on the battlefield raises a number of ethical questions. Moral responsibility and accountability, which were traditionally assigned to military commanders, are slowly being relegated to LAWS that are tasked with making life-or-death decisions. Not only will this make legal attribution increasingly complex, it might also incentivize political leaders to resort to violence instead of negotiation when seeking to resolve disputes.

As has been discussed in earlier chapters, the introduction of military robotics such as LAWS and other forms of technology designed for warfare purposes largely focuses on the degree to which these systems will and should become autonomous. Indeed, various robotics experts have opined that the introduction of autonomous weapons systems should be halted, and that an appropriate legal framework should be established prior to further proliferation of these systems.

Predominantly, the backlashes of introducing military robotics and other emerging military technologies to counterinsurgency warfare are concerned with ethical dilemmas. Insurgents typically operate in environments that inhabit large numbers of civilians, thereby making the appropriate targeting and elimination decisions by robots far more problematic. LAWS might be able to distinguish human beings from other objects, but discerning combatants from civilians is likely to prove tremendously difficult. Secondly, there is another ethical issue that arises as a consequence of wide-scale robotics adoption in counterinsurgency warfare.

As was mentioned in the introduction, asymmetry in warfare can manifest itself in many different ways. Most importantly, the “overwhelming asymmetry in technological resource power may cast doubt over the moral legitimacy of military action” (Galliott: 168). Indeed, when the proportionality balance has been distorted dramatically as a consequence of such overwhelming asymmetries, then the escalation of war poses a substantial risk.
5.2 Risks to Military Doctrine and Strategy

Moreover, the adoption of various kinds of military technology will have profound consequences on the operational and doctrinal elements of Western counterinsurgency warfare. On a philosophical level, soldiers as part of any Western military will be less able to exercise virtues associated with the ‘warrior ethos’ when large-scale robotization becomes a reality. When LAWS take over the traditional tasks of a soldier, that same soldier is no longer able to exercise acts of physical courage and the willingness to sacrifice his or her life for the community served. While of course the introduction of LAWS will mean that human lives can be saved to a greater degree, the danger this poses to the self-conception and existence of Western militaries should not be underestimated. In the words of Sparrow (2011: 13), it might “no longer be plausible to posit a connection between war and the character of those who fight it.”

In both the domains of military robotics and soldier enhancement, there are additional ethical considerations that are worthwhile to examine more closely. In particular, the concept of informed consent is in jeopardy when the testing of these technologies in military environments requires a chain of command that allows commanders to exert influence over their subordinates. In addition, Lin has pointed out that technologies such as enhancement “inadvertently harm individuals, affect others’ perceptions of those who take them, give some individuals a leg up on others, and may affect reintegration into society (Lin: 2013).”

As is the case with the majority of military inventions, being the first to military implement them is not the same as gaining advantages in international politics from those inventions. Indeed, many historical examples of military innovation originate from the United States, such as GPS and nuclear technology. However, through the commercialization, such military inventions eventually spread to the civilian consumer markets. The pace of the diffusion of such military innovation depends to a great degree on the nature of the innovation involved, as well as state- and international responses.
While the proliferation of military robotics is likely to become a more pressing policy issue in the future, it is certainly not the first of such kind in recorded history. Ever since the momentous droppings of the atomic bombs on Hiroshima and Nagasaki in 1945, non-proliferation movements all around the world have sought to eradicate nuclear weapons of mass destruction. Unfortunately, the possession of such weapons by various nation states has not yet been relegated to the dustbin of history. The road towards a nuclear weapon-free world has been a rocky one thus far, and one can imagine that containing the effects of LAWS-proliferation will be equally difficult.

5.3 Violent Non-State Actor Empowerment

Finally, of particular relevance to this policy paper, is the empowerment of VNSA that goes hand in hand with the latest revolution in military affairs. When VNSA such as terrorist organizations successfully manage to obtain military robotics and other technologies, their capacity to conduct strikes against Western targets all around the world is greatly enhanced. Already, as has been the case with Islamic State, terrorist organizations are using the age of information warfare to their benefit. As Cronin (2006) and Hammes (2004) have pointed out, they are shifting the locus of their education, recruitment, and training operations to the virtual world of the Internet.

In the past couple of years, a number of drone-related incidents have shown that the threat of terrorist organizations using LAWS is not unimaginable. In January of 2015, an individual accidentally steered a drone into the White House lawn after having dodged Secret Service radar surveillance. While the suspect did not have terrorist intentions, the incident depicts the danger associated with dual-use technologies such as drones. In another event, Islamic State militants used drones for reconnaissance and battle-related operations against the Baiji oil refinery complex in April of 2015. Other examples include the use of VBIEDs (vehicle-borne improvised explosive devices) in Afghanistan and Iraq, whereby jihadists deploy remotely controlled robotic systems to carry out attacks without having to martyr themselves.

In the UK, a research led by a former director of GCHQ concluded that “terrorist organizations could potentially turn remotely-piloted aircraft into flying bombs by
hooking them up to improvised explosive devices (Farmer: 2014).” Even worse, such drones could be carrying any toxic substance related to CBRN. Stressing the urgency of the policy problem, the report also stated that “more thought needs to be given to their employment for malign purposes in the domestic environment.” Yet, the most imminent threats will arise from fragile or failed states that are incapable of securing their military innovation administration. In a nightmare scenario akin Islamic State obtaining American Humvees and weaponry, terrorist organizations might be able to get their hands on military robotics that could then be deployed for malign purposes. They could do so either by conquering state weapon depots, or by incorporating defecting military officers from the host state into their organizational structures.

**Conclusion**
The Revolution in Military Affairs has sparked a number of technological inventions that have transformed the Western conduct of warfare and are projected to continue that process into the future. At the same time, VNSA will continue to seek to disrupt the international system and pose risks to nation-states around the world. While indeed conventional inter-state conflict is deemed more dangerous and imminent, counterinsurgency operations are likely to remain part and parcel of Western military doctrine. Through the deciphering of these two converging trends, this paper has sought to enhance the understanding of policymakers concerning the appropriate force structure and military capabilities for the twenty-first century.

As Michael Horowitz indicated in his seminal work ‘The Diffusion of Military Power: Causes and Consequences for International Politics’, the proliferation of military technologies is irreversible and is set to intensify in the next decades ahead. Although Western militaries positioned to pioneer with such technologies will have a first-mover advantage, their adversaries will rapidly catch up with these developments and deploy technological inventions in new and unforeseen ways. For that reason, it is imperative that Western countries are at the forefront of the establishment of an international legal framework that regulates the use and transfer of military technology, particularly robotics.

Secondly, while the shaping of an international legal framework will reduce the unintended consequences of technological proliferation, it merely constitutes the environment in which Western militaries are supposed to operate. It is therefore not sufficient to establish an agreed set of standards and assume that the problems will solve themselves. What is required is a proactive approach; one that incorporates new military technologies into the Western style of warfighting and safeguards Western military superiority over its adversaries (i.e. a ‘third off-set strategy’).

Concurrently, the advent of military technology will not be a panacea for all challenges of future warfare, particularly counterinsurgency operations. In this type of asymmetric warfare, winning the hearts and minds of the local population is essential to a lasting peace and the prevention of insurgency revival. Rubright has pointed out that while
most counterinsurgency experts agree that the human component is indispensable, the process of ‘co-opting’ civilians can only be initiated by protecting them from harm. The unbridled proliferation of military technology such as LAWS would be counterproductive to such efforts, particularly when robots lack the ability to distinguish between innocent civilians and combatants. Military technology will provide Western militaries with an edge over VNSA, but the human component inherent to counterinsurgency operations will remain indispensable.

Aside from presenting a framework that highlights the challenges of asymmetric warfare, current trends in military technology and the potential backlashes of incorporating them in Western military strategy, this paper has also aimed to garner the perspectives of individual Western states on these issues. Across the board, it was found that Western militaries are highly reluctant to push for greater autonomy when it comes to military robotics. At the very least, humans should remain ‘on the loop’, instead of ‘out of the loop’. A collective analysis of the interviews at the various embassies in Washington D.C. suggests that two arguments are particularly important with regard to the roots of this reluctance: 1) increased autonomy for military robotics has the potential to incite a greater appetite for war; 2) growing sophistication of military robotics leads to armed, autonomous weapon systems not tied to a clear chain of command (i.e. accountability issues).

In the foreseeable future, military technology in the form of human-robot interaction will be the most promising route to take for Western militaries. HRI could serve counterinsurgency efforts in a variety of ways, particularly for navigation, remote sensing and telemanipulation purposes. At the same time, placing greater emphasis on HRI as opposed to LAWS will allow Western militaries to avoid a myriad of ethical and legal quagmires, including distinguishing between civilians and combatants and enemy engagement. There is widespread agreement that the human component will remain indispensable in future warfare, particularly counterinsurgency operations. The human role is likely to become more supervisory (‘human on the loop’), but the unique challenge of winning the hearts and minds of the local population ensures that soldiers of flesh and blood will remain present on the battlefield.
The emphasis on new technologies suggests that indeed the future of warfare, including counterinsurgency operations, will be highly contingent upon innovation that meets the challenges of Western militaries. However, let us not forget that in order to preserve the international legal framework, including its ethical foundations, a greater autonomy for military robotics should primarily remain confined to support duties such as ISR and logistics. Until this day, widespread agreement among experts and practitioners suggests that, at a bare minimum, humans ought to be ‘on the loop’.

Reference List


Annex

(A) Invitation Letter Interview

Dear Sir or Madam:

Hereby I would like to invite you to an interview as part of the completion of a research project at the Embassy of the Netherlands in the United States. As an intern at the Defense Department, I am currently working on a research that seeks to investigate the relationship between military robotics (supplemented by human enhancement) and the conduct of asymmetric warfare. The research question that I aim to answer is how military robotics will shape the ways in which Western militaries will engage in asymmetric warfare. As part of my research, I will be conducting interviews with various (foreign) government officials, as well as think tank experts and military personnel. In particular, the interviews intend to pay attention to six different factors: 1) definitions of military robotics and asymmetric warfare; 2) challenges of asymmetric warfare; 3) trends in military robotics; 4) application of military robotics to the Western style of warfighting; 5) unintended consequences or backlashes of robotizing the military. Only applicable to government officials of foreign countries, there will also be series of interview questions on country-specific outlooks on military robotics and asymmetric warfare.

The interview will not last much longer than thirty minutes, and will most likely be conducted in the vicinity of the respective embassy, depending on the preferences of the interviewee. The interview will be of a semi-structured format, in which there are enough possibilities to make remarks that are of value to the interviewee and the research. Also, if there are any questions you would prefer not to answer, please indicate this to me and we can resume the interview by discussing another issue. Your responses will be kept strictly confidential, unless your explicit consent would allow full quotations in the research paper. At all times, the interviewee is allowed to withdraw from the interview without having to give an explanation. With your permission, I would greatly appreciate to be able to record (audio) the interview for analytical purposes. Pieces of information gathered from the interviews will be incorporated in the research
paper after a thorough analysis. In case you have any queries, please do not hesitate to get in touch with me via email or telephone.

Thank you in advance for considering this invitation, and I am looking forward to your response!

Kind regards,

Jan van Dorp  Tim Sneek
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THE ADVENT OF MILITARY ROBOTICS AND THE
CHALLENGES OF ASYMMETRIC WARFARE

“How will the revolution in military robotics shape the ways in which Western militaries will engage in asymmetric warfare?”

Structure of the interview:

I. Introduction
II. Objectives
III. Structure
IV. Estimated duration
V. Appreciation of participation
VI. Data importance
VII. What happens with the data

Topic list:

- Definition / Problem Description
- Challenges of Asymmetric Warfare
• Trends in Military Robotics
• Application to Western Style of Warfighting
• Unintended Consequences / Backlashes
• (Perspectives of Western Militaries)

Introductory questions:

• In what capacity have you been concerned with military robotics and/or the conduct of asymmetric warfare?

Factor 1: Definition / Problem Description

• How would you conceptualize military robotics and asymmetric warfare; what are your preferred definitions of the two?

• How would you frame military robotics and asymmetric warfare in the larger debate that is the future of war? How are these two concepts related and embedded in the discussion on the wars of the 21st century and beyond?

Factor 2: Challenges of Asymmetric Warfare

• Would you agree with the statement that asymmetric warfare will become the dominant mode of conflict in the 21st century and beyond? If so, why?

• How do you assess the particular challenges that asymmetric warfare poses to Western democracies and their militaries in particular?

• Assuming that ‘asymmetric opponents’ will always succeed in targeting an army’s Achilles’ heel, would it make sense for Western militaries to continuously look for new ways to escape the maze?

Factor 3: Trends in Military Robotics
• What is your perspective on the current trends in the field of Lethal Autonomous Weapon Systems (LAWS) for the purposes of aerial, undersea and land warfare?

• How do you think the field of military robotics will evolve in the next couple of decades?

• Is tighter cooperation among Western militaries necessary in the field of military robotics, or should all countries continue to forge their own approach?

**Factor 4: Application to Western Style of Warfighting**

• In your view, how should Western militaries best transition from the conventional style of warfighting to one that is centred on military robotics and other technologies?

• Do you think other military technologies (e.g. human enhancement) should complement robotics in order to confront 21st century threats? If so, which one(s)?

• What do you envision the purpose of human soldiers to be in an age of military robotics?

• What do you reckon the consequences will be of robotizing the conduct of war, with respect to popular support, ethics and legal constraints?

**Factor 5: Unintended Consequences / Backlashes**

• Should we expect any particular unintended consequences or backlashes to arise (i.e. aggravation of conflict) from robotizing the military as well as the conduct of asymmetrical warfare?

• How can we minimize the risks of unintended consequences occurring when further robotizing the military?
(Factor 6: Perspectives of Western Militaries)

- How does the military of your country view the importance of military robotics in the future of warfare?

- Can you elaborate on any specific initiatives in your country related to the field of military robotics and/or asymmetric warfare?

- Does your country maintain any partnerships with other (Western) militaries for the development of military robotics?

Additional topics of discussion:

- Are there any relevant topics of discussion that according to you have been little exposed in this interview and that would have to be provided with additional explanations?

Conclusion of the interview:

Thank you very much for your contribution and for participating in this research project!