Non-lethality in reality: a defence technology assessment of its political and military potential
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Chapter 1
Introduction
Introduction

This book discusses so-called non-lethal weapons (NLWs). Most basically, such weapons seek to minimize violence, especially deadly violence, during war. Technologies, concepts and devices designed for non-lethal use are wide-ranging. Taxonomies of NLWs are subdivided into categories according to their physical and biochemical-effects. These include mechanical/kinetic, acoustic, electromagnetic and chemical-based effects. NLWs are tailored either to application against humans, or to anti-materiel/anti-infrastructure use.

The NLW policy adopted by NATO provides the following broad definition:

*Non-Lethal Weapons are weapons that are explicitly designed and developed so as to incapacitate or repel personnel, with a low probability of fatality or permanent injury, or to disable equipment, with minimal undesired damage or impact on the environment.*

While we will use this as a working definition throughout this study, the focus will be on NLW use against humans. Conceptually, this has a long history. For instance, Sun Tzu, a Chinese strategist who lived over 2000 years ago, was the first who considered restraint from killing and destruction and thus limiting casualties and damage to the environment as of strategic importance. As another example, during the 1930s, Non-Lethal Weapons (NLWs) were recommended in colonial policing, to prevent undesired casualties by police forces (Gwynn 1934). Since the late 1960s, NLWs have started to play an increasing role in domestic policing, in response to the civilian deaths during clashes between security forces and large groups of protesters in the US. A steady development of NLW technologies and concepts followed, primarily in response to the need of police forces throughout the world (Davison 2009).

As we will discuss more extensively in the next section, in the two decades since the end of the Cold War, these weapons have rapidly gained importance in especially western military forces. NLWs became a doctrinal requirement in the military domain as a consequence of the shift in the role of Western armed forces from preparing for massive interstate war to intervening in intrastate humanitarian crises and conflicts. Starting in the US, the military rationale became enshrined in dedicated policy documents and ensuing development programmes, both at national and international level. Also, NLWs have indeed been deployed by military forces in recent and current intervention operations, and increasingly so in the last decade.

Yet, the utility, problems and risks of NLW use are still object of significant debate. Ever since their inception as a a military capability, NLWs have been hailed as well as contested regarding their appropriateness to meet the requirements to military force after the Cold War. Proponents expected and claimed that NLWs would enable the accomplishment of military

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2 In his book “The Art of War” he expresses this strategic maxim as follows: *The general rule for use of the military is that it is better to keep a nation intact than to destroy it. It is better to keep an army intact than to destroy it. It is better to keep a division intact than to destroy it, it is better to keep a battalion intact than to destroy it, it is better to keep a unit intact than to destroy it*. (Sun Tzu 1963: 77-9).
missions with a lower risk of innocent civilian casualties by providing for more fine-tuned military responses in violent confrontations. Sceptics questioned the claimed potential of NLWs and of military organisations’ ability to manage and conduct military operations involving both NLWs and lethal force.

This study assesses the performance of NLWs in such real world operations, in the tradition of the field of Defence Technology Assessment (DTA) that evolved in the 1980s from the work of the US Congress’ Office of Technology Assessment and its European sister organisations, a variety of academic groups in the US and Europe and, in some cases, of specific departments within Defence Ministries (Brauch et al. 1997). By doing so, it seeks to shed some light on the debate between NLW proponents and sceptics, who argue that such expectations may be dashed in the realities of operational circumstances and political tensions.

The next section sets out how conceptual thinking and actual use of NLWs has evolved since the 1970s. Next, the debate on NLW use will be concisely reviewed. On basis of these two sections we will, in the final section, formulate more specifically the objectives of this study and briefly introduce the analytical (DTA) framework that will be used throughout.

Developments leading to the increasing emphasis on non-lethal weapons

Trends and developments before 1990

NLWs have gained novel military importance since 1990. Yet, the precise rationale for NLW use has evolved from two trends that started well before 1990. One is the transformation in law enforcement and policing that paved the way for the domestic implementation of NLW. The other is the emergence during the Cold War of new technological options that had a profound impact on military thinking, norms and design. Both trends inform the debate on NLWs that unfolded after 1990, and will be addressed hereafter.

Transforming law enforcement and police: introducing NLWs

Police use of NLWs started to become more common half a century ago. It resulted from a tension between police operations in specific contingencies and the legal restraints which apply to the police in exercising its monopoly of violence: proportionality of force and maximum protection of life at all times, unless individual or collective aggression is imminently life threatening. These tensions came to expression, for instance, during the 1960s, when civil disorders and riots took place in the US over civil rights and the (Vietnam) war (Davison 2006: 2). Protesters were killed when police forces used firearms to suppress the riots. In Detroit, 43 Afro-Americans were killed during riots attributed to economic deprivation and social injustice. Following these incidents, two Presidential Commissions came with recommendations that the use of lethal force by the police be restricted and guidelines should be developed governing the use of control equipment and provide alternatives for the use of lethal weapons. It was also recommended that federal support for research in this area was needed (Davison 2006: 3).
The riots in Detroit in 1967 coincided with the publication of a report from futurist Joseph Coates, one of the early explorers on the police application of NLWs. He examined situations for which NLWs are appropriate, taking into consideration a broad range of NLWs available or considered for development at the time (Coates 1967). Follow-up efforts generally focused on NLWs to deal with public order disturbances and riotous crowds, to provide for a more flexible police response short of lethal force in such situations.5

In Europe, the developments in policing during the Northern Ireland conflict can be considered as leading for the application and development of NLWs. The Royal Ulster Constabulary and the British Army were collectively charged with maintaining public order in a politically highly charged environment, with the British Army in a police supporting role.6 Especially after Bloody Sunday in January 1972, when 13 civilians were killed by lethal rounds from the security forces, the need for minimal force approaches and associated non-lethal capabilities became crucial to prevent such a tragedy from happening again. The introduction and continuous development of non-lethal kinetic projectiles throughout the three decades of conflict was one of the instruments to assist these capabilities (Burrows 2002).

Elsewhere in Europe police organizations went through transformation processes as well. The student movements and protests of the 1960s and 70s were the forerunners of the changes in Western societies that demanded a change in approach by constabulary organisations. In the Netherlands, for instance, the professionalization of the (military) police was judged necessary because society no longer accepted authoritarian rule of law enforced by the police. Hovens (2006) partly ascribes the transformation of the Royal Netherlands Marechaussee, a police organisation with a military status, towards socialisation and professionalization to the increase of control by society, to growing interaction between society and the armed forces and to the growing influence of technology on war fighting methods. Officers are bound to operate within the framework of human rights. This amongst others implies that the use of excessive violence is unacceptable by law and to society. Although not explicitly stated by Hovens, the urgency for controlled use of violence called for a search for tactics and instruments to enable the police and Marechaussee to act accordingly. The concept of Crowd and Riot Control that evolved under Koninklijke Marechaussee supervision eventually included a limited though growing number of NLWs.7

By the end of the Cold War, the reform processes of police and law enforcement organizations had resulted in the fielding and continuous innovation, on basis of practical experience, of a range of NLW devices and concepts that soon would become relevant to the military domain.8

Evolving military thinking in the 1970s and 1980s

Meanwhile, in the military domain, various developments in doctrinal thinking had been going on which, at least in hindsight, have prepared the ground for the military use of NLWs. Much of this was rooted in the very destructiveness that any war was believed – at least since World War II - to have.

6 For an extensive analysis of NLW use in Northern Ireland, see Chapter 3 of this thesis.
7 Various NLWs in use with the Royal Netherlands Marechaussee (KMAR) have been demonstrated to the author during a visit to the LOKKMAR (Expertise and Training Centre KMAR) at Apeldoorn, The Netherlands (Fall 2007).
8 Davison concludes that despite the research and development programmes to further improve the performance and reliability of the NLWs used or considered for use by the police, most devices were still suffering from significant deficiencies by the late 1980s (Davison 2009: 39).
The ‘industrialization of war’ had enlarged the dimensions and physical effects of warfare through the exploitation of new technologies invented for or applied on the battlefield. The scale, intensity and destructiveness of firepower had shaped a new politico-strategic reality that made the major powers realize that the cost in terms of destruction of waging (nuclear) war amongst them would far outweigh the benefits of winning it.

Notwithstanding this strategic stalemate, throughout the Cold War, the Western political and military establishments continued to calibrate the defence posture to a response to the Warsaw Treaty Organization (WTO). In the face of a perceived quantitative superiority of the WTO, they further developed and specialized for an - though unlikely to materialize - air-land military confrontation in Central Europe that drew on NATO countries’ technological edge so as to ‘outsmart’ the WTO.

This approach and strong reliance on technological dominance became subject of debate ever since new enabling technologies, in particular in micro-electronics and information & communication technology (ICT), started to emerge, around 1970. This debate revolved around three subsequent developments: that of Precision Guided Munitions (PGMs), starting in the early 1970s, the US military doctrine of AirLand Battle (ALB) rooted in the late 1970s, and the NATO concept of Follow-On Forces Attack (FOFA) of the early 1980s.

Canby (1974) questioned the way military-technological innovations were implemented. He argued that in the US, technology has often been seen as a panacea, or, as it was called, a ‘force multiplier’ that could offset quantity with quality; if the war is not going well, as in Vietnam, some new gadget is designed to make ‘experience proven’ doctrine workable. In his view, NATO has similarly sought technological solutions, but none has yet appeared that has significantly improved NATO’s relative position. For instance, Precision Guided Munitions (PGMs) have been acclaimed as one way to compensate for NATO’s inferiority. Canby argues that, because of NATO’s force structure, symmetrical adoption of PGM may well work to NATO’s disadvantage. Without institutional and doctrinal adaptation, potential technological superiority can be meaningless. The utility and cost-effectiveness of PGMs continued to be debated during the 1970s and 1980s. A decade after, Metz noted that while over time PGMs made the physical task of destroying sensitive targets without collateral damage less difficult than before, the penalties in lost public and neutral support steadily grew (Metz 2001: 39).

Change in doctrine called for in Canby’s PGM technology assessment came in the early 1980s. In the US, the ‘AirLand Battle’ (ALB) doctrine was adopted, defining a comprehensive battle space by extension of the battle area into the third dimension. ALB hinged on capabilities to integrate and synchronise multiple operations throughout the battle space. The required capabilities were to be enabled by a range of innovative technologies, of which advances in ICT were the most salient ones. Military analysts, such as Booth (2006: 333) viewed ALB as fundamentally revolutionary to the US forces as it signifies a radical departure from the attrition strategy embraced before.

ALB was soon complemented by NATO’s so-called Follow-On Forces Attack (FOFA) concept. The rationale of the concept was not so much the in-depth integration of the battle space, but

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9 Doctrine change envisioned by Canby was different from ALB. He proposed a so-called ‘checkerboard defence’ concept that relied on less ambitious demands from technology, but more on a combination of technological innovation and infantry (Canby 1974).


comparing to ALB it entailed the relatively modest ambition to disrupt and delay Warsaw Treaty Organization formations before they would arrive at NATO’s first line of defence. Against the backdrop of vehement public protests against nuclear weapons, Rogers (1983: 22-3) argued that FOFA could help prevent nuclear weapons use in an early stage of the war – in an affordable way through relying on technological advance rather than quantitative superiority.

Throughout the 1980s, the new concepts raised questions and sparked new debate, both for reasons of doubts about their technical, financial and operational feasibility, as well as their security-political desirability. Lt Col Egter van Wissekerke (1989: 331) questioned the more offensive orientation of ALB, as the feasibility of highly coordinated and pre-planned in depth manoeuvre critically hinges on the opponent ‘complaisance’ with NATO’s military scheme. He thus stressed the vulnerabilities resulting from the internal complexities of ALB in a real world operational context. Siccama (1984: 43), in an assessment of ALB, saw the potential strategic implications of ALB as interfering with and possibly even undermining NATO’s defensive posture. Grin (1989) argued that the renewed emphasis on manoeuvre warfare not only significantly increased offensive capacity, but also that it implied a self-imposed need to do the same as the adversary, yet better or faster – so that advanced command and control systems would, rather than form the intended ‘force multiplier’, become NATO’s Achilles heel. Romjue noted that the 1992 doctrinal revisions within the US Army reflected that technologically enabled (near-) real-time capabilities ALB required were only beginning to mature.  

The concerns regarding the destabilizing effects of ALB and FOFA, as well as about their military-operational effectiveness and affordability, produced a range of alternative concepts emphasizing a defensive character of NATO’s conventional military posture in Central Europe. The majority of these concepts entailed territorially oriented, thus more defensive, postures that enabled benefiting from emerging technologies in a way that was claimed to be much more realistic and affordable (both financially and in terms of human resources) than in official proposals (Unterseher 1984; Hartwig 1989; Bebermeyer 1989; Grin 1990).

A particular alternative in the defence reform debate was proposed by Alexander, who argued that engaging in a deep strike battle with PGMs would ultimately lead to a prohibitively expensive armour/anti-armour arms race. Instead, he proposed a range of softer or non-lethal anti-materiel technologies to immobilize the more vulnerable and vital elements in the follow-on forces and their military infrastructure. Such options would be less demanding in terms of precision and at the same time reduce the risk of unintended collateral damage (Alexander 1989). At the time of his writing, Alexander could hardly foresee the potential of non-lethality and damage limitation after the fall of the Berlin Wall in the same month his article appeared.

What official and unofficial conventional defence concepts during the 1980s had in common, was a departure from indiscriminate large scale destruction in conventional warfare. Although certainly not undisputed, this notion would gain prominence in the first decade after the end of the Cold War.

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13 During the 1980s, in various NATO countries a range of alternative non-offensive conventional force structures to ALB and FOFA have been proposed by military experts and academics. See e.g. Studiengruppe Alternative Sicherheitspolitik (1984) and Afheldt (1983).
The 1990s: paradigmatic examples and continuing debate

During the Cold War era, Western military forces had never been deployed in a large war to bring their defence posture to the test. Hence, planning and equipping for armed conflict had been largely based on an imaginative war, that was defined by scenarios linked to a well defined battle space in Central Europe.

The first opportunity to demonstrate real performance of Western military forces came with the 1991 Second Gulf War. It was fought as an interstate war between regular mechanized forces, allowing the intervening Western coalition forces to operate according to the same doctrinal principles and order of battle as applied in the conventional defence of Central Europe. The Second Gulf War shaped an image of a ‘Revolution in Military Affairs’ (RMA), as the technology-induced change of warfare is named, enabling the conduct of war that exposes own military personnel to lethal risk far less than used to be. Futurologists Toffler & Toffler (1993) recognized in this war’s events a novel reality, in line with their more general ideas of the transition from industrial society to information society, where information and legitimacy would replace money and violence as primary sources of power. They used the phrase ‘de-massification’ of destruction, to mark the shift towards precision strike and more selectivity enabled by the technological advances. The Western military had moved from ‘second wave’ to ‘third wave’ war, representing the industrial age and information age respectively. The Toffler couple cited Col Alan Campen, responsible for the US DOD Command and Control Policy, who stated that the Gulf War ‘was a war where an ounce of silicon in a computer may have had more effect than a ton of uranium’ (Toffler & Toffler 1993: 86).

An important inheritance from the Gulf War concerned the felt political imperative to minimize the number of casualties of own soldiers. Janet and Chris Morris (1991: 1) were amongst the leading lobbyists for a (reverse) arms race to minimise lethality in warfare. They even used the label “Weapons of Mass Protection” for their approach, and demonstrated a preference to relate this idea to air power. These weapons were not only to substitute for ground combat that brings own personnel in harm’s way, it was also considered to offer the potential to more precisely distinguish between military targets and the civil environment (Morris and Morris (1995).

Picking up such strands of thought, shortly after the Gulf War, Knight, Unterseher and Connetta (1992) noted that this was likely to become a dominant mode of thinking. All nations with any degree of responsibility to their citizens are casualty averse, in particular wealthy democratic countries, who’s political elites can be said to be risk averse in regard to war casualties. Political leadership feels a pressure to achieve military aims with very low casualty rates. They observe that in the US a trend emerges to invest in technology that can progressively contribute to minimizing own casualties in warfare, and subtly hint that this might offer a novel strategic legitimization for the R&D programs set in motion around the doctrinal renewals in the 1980s that saw technology as a force multiplier. To be sure, these early observers are skeptical of realism behind these ideas, warning that casualty reduction is a much more demanding requirement than the goal of winning the conflict. They caution for inherent system vulnerabilities due to excessive technological complexity resulting from the strive to minimize own casualties. It is therefore that Freedman calls the military revolution resulting from the Gulf War one of expectations, from which the features of a ‘Western Way of Warfare’ emerged. One of its key characteristics is that the tolerance of casualties from earlier times no longer exists. It puts a premium on framing strategies that keep casualties to a minimum (Freedman 1998). However, drawing from historical evidence, Freedman cautions that deriving claims about the effectiveness of particular military strategies in future armed
conflict from previous wars may well prove illusory in reality.\(^\text{14}\) Van Creveld (1991) had already taken a more radical position regarding the changing face of war well before. He predicted that the nature of conflict was going to become fundamentally different from the Gulf War, provocatively claiming that:

\[\ldots\text{the most powerful modern armed forces are largely irrelevant to modern war.}\]

Along the same line as Van Creveld, Mazarr, anticipating the unfolding complexity of geopolitical changes in the security environment, argues that US forces would have to operate in far more irregular environments than they had been geared to, and that technologies, doctrines and force structures needed modifications to make their capabilities more compatible with irregular operations.\(^\text{15}\) Haass cautions that modern technology useful on the open battlefield is often irrelevant in civil conflicts that take place in heavily congested areas where friend cannot be distinguished from foe.\(^\text{16}\) To speak with the Tofflers, a collision of war-forms was lying ahead, forcing third wave force planners to rethink and conceptualize war-forms and how they interrelate (Toffler and Toffler 1993: 110).

This became apparent in various peacekeeping missions and interventions shortly after the Second Gulf War. In 1993 in Somalia, the operation “Restore Hope” degenerated from an humanitarian aid operation into combating warlords and their militias. The armed exchanges resulted in hundreds of casualties amongst the population, partly due to the fact that the US forces only had lethal weapons at their disposal. That changed in 1994/95, when US forces returned to Somalia, this time under the name United Shield to evacuate UN forces after the situation on the ground had severely deteriorated. The evacuation forces carried a range of NLWs, assisting them to enforce their mission objective without having to use lethal force. The mission was accomplished successfully and this prompted the commander of the US troops, Lt-gen Zinni, to declare that he would never go on a peace support mission again without NLWs (Alexander 1999).

The operation United Shield in Somalia provided for a decisive leverage to formalizing the need for NLWs in terms of an agreed US Department of Defense (DOD) policy. A report written by the Council of Foreign Relations, shortly after United Shield, identified the advantage and need of NLWs in operations such as in Somalia.\(^\text{17}\) The report’s conclusion anticipated that US forces would be increasingly involved in peacekeeping operations. The US policy was published in July 1996 as DOD Directive 3000.3 under the title: Policy for Non-Lethal Weapons.\(^\text{18}\)

A NATO NLW policy followed suit.\(^\text{19}\) This was hardly surprising, since institutionalization of NLW-development and collaboration had been ongoing since 1993. Simultaneously with the NATO initiatives, national NLW R&D programmes were launched to inform the policy makers on the feasibility and applicability of NLWs for the armed forces. In the Netherlands

\(^{14}\) Freedman made a historical comparison with the advocates of strategic airpower and mechanised warfare after World War I, who promised quick and decisive and relatively pain-free victory. World War II demonstrated how exaggerated their claims had been. (Freedman 1998: 17).


\(^{19}\) NATO (note 1).
a five year NLW-R&D programme started in 2000. The institutionalization created interest groups within the military establishments that, drawing from the declared NLW policies, actually recycled the need for NLWs, and invested in the development, improvement and testing of NLW-concepts and devices. Non-lethality was now born as a new military concept, as a child of the paradigm shift in warfare, and now adopted by the military establishment. Technology was the main avenue along which the development of both the performance and spectrum of NLWs was going to be pursued.

Yet, these ideas were certainly not uncontested, as is reflected by Coker (2001: 22) who argues that the West is trying to humanise war, even if it would have to accept that selective targeting doesn’t work. The military is now expected to reflect civility and compassion in the way it prosecutes war, while elsewhere in the world war is becoming more inhumane, not less: it is asymmetric towards the Western way of war (Coker 2001: 92-3). It spoils the ideal world that the RMA needs to attain effect: separation of the military from the civilian, of combatants from non-combatants, of fire from society, as Freedman (1998: 17) sees it.

It is against the backdrop of this wider debate on the promises of technological superiority in terms of its potential to make war less destructive and deadly, that the emergence and validation of NLWs should be appreciated. Conceptually, the step from the promises of precision warfare towards those of military non-lethality is a short and logical one. While NLWs are intended to widen the spectrum of options to wage the Western way of war, the question about their potential to meet that requirement is debated from a variety of perspectives, but still largely unanswered.

**NLWs between doctrinal inclusion and critical debate**

From the preceding section it is clear that two issues got much emphasis in military and security political establishments in the 1990s: innovating the conduct of low intensity conflict by employing less deadly modes of warfare, and the intermingling of and blurring distinction between aggressors and civilians in such conflicts. In this section we will discuss how they were elaborated by NLW proponents, and disputed or at least framed more carefully by others.

**Technological optimism**

These two characteristics were articulated, and promoted, authoritatively by Smith (2006: 278), who as a senior operational commander had experienced them in the midst of the new types of conflict during the 1990s. He stresses that the fight is now amongst the people, amongst which the enemy is concealed. The fight is also over the people, the strategic objective both sides aim for. The ultimate objective is capturing the will of the people, and this is at odds with the use of destructive force (Smith 2006: 376).

From this perspective, the notion of non-lethality related to weapons appeals to those
who believe that NLW enable the waging of war without or with minimal killing. Janet and Chris Morris (1991) were amongst the first who outlined a new strategic theory explicating that non-lethal technology and concepts would subdue an opponent without fighting. Their vision of merging of humanity and warfare is best expressed in the following statement:

Nonlethality is the use of weapons of mass protection such as nonlethal and antilethal weapons and information warfare to project high-precision power in a timely fashion, delivering results that are life conserving, environmentally friendly, and fiscally responsible.

The concept of bloodless war was inspired by a climate of euphoria that accompanied the new world order that followed after the Cold War. The assumption was that the new strategic concept or doctrine would find worldwide acceptance when it embodied the intent of mass-protection applied on a global scale.

Benign Intervention (BI) is a concept that comes close to the idea of bloodless war at the tactical level. Lewer and Schofield (1997: 113) proposed a United Nations Benign Intervention Force (UNBIF) that would predominantly rely on their Non-Lethal capabilities. The authors characterize BI as:

...a holistic philosophy that would include and integrate a role for non-lethal weapons in the military element of conflict intervention. The term ‘benign’ is chosen to indicate that the ethos of the intervention is humanitarian, benevolent (with the intension to stopping violence and bloodshed), and philanthropic for all conflicting parties.

The idea of bloodless war persisted throughout the 1990s, as can for instance be noted with Coker (2001: 89), who reiterates the Tofflers’ view of the early 1990s:

Non-Lethality emerges not as a simple replacement for war, or an extension of peace, but as something different. It is something radically different in global affairs – an intermediate phenomenon, a pausing peace, an arena for contests where more outcomes are decided bloodlessly.

What these proponents share, is a firm belief in advanced technology to help realize political-strategic objectives. We will therefore designate this view as the ‘technological optimist’ view. This view of a bloodless, or at least more humane, war has survived the geopolitical shock of the 9/11 attacks. Foster (2010), in an appeal to the US to reshape its national security policy towards one of global security, considers “delethalization”, i.e. the replacement of lethal by non-lethal weapons, as a precondition for such a transformation. He also considers delethalization as a condition for a necessary demilitarization by the military itself. Greig (2011) envisions a world in which technology enables the protection of territorial integrity and human rights without using lethal weapons and without killing or injuring humans, to an extent that NLWs have the potential to attain world peace. Staulus (2012: 5) concludes that NLWs could serve the purpose of completely replacing traditional weapons and methods of engaging in war.

As noted, NLW proponents in addressing benevolence in warfare through NLWs share an (implicit) premise that non-lethal technologies and concepts in themselves are equivalent to non-lethality in military practice. Another underlying premise is that adversaries would respond ‘in kind’, implying meaning that they would under all circumstances comply with the demands of intervention forces that would rely on non-lethal capabilities only.

Careful supporters

Others, whom we will call the careful supporters, have indicated to be less optimistic. Most of them are (former) military professionals and scholars who generally subscribe to the military need for NLWs. While there have been, and still are, dozens of onlookers and analysts contributing to the NLW debate, a selection from this community are included as indicative for the scope of arguments in favour of the debate.

Alexander (1999: 205) is one of the pioneers in the NLW debate. A former Colonel in the US Green Berets, he had a practical knowledge of a wide range of weapons, including NLWs. He argues that due to the complexity of military operations that current and future US had to undertake, the utility of lethal force would be limited. Conversely, NLWs are the tools necessary to accomplish the stated objectives. He contends that NLWs are instrumental in minimizing collateral casualties, hence supportive in gaining the support of the population in the effort to establish stability and peace. Bunker (1997: x-xi) contends that once NLWs are ready for wide-scale application, this will signal a development as significant in magnitude as the emergence of gunpowder based firearms during the European Renaissance. The introduction of nonlethals may allow for tailored employment of politico-military force. He projects the most important application of nonlethal technology in operations in “failed states”, to counter the non-Western form of warfare that is emerging globally, and as a defence against the specter of further terrorist assaults upon our homeland. The ability to use NLWs effectively will be a critical component of US future capabilities The author identifies the need of the military user to adapt organisation and doctrinal principles to optimally use NLWs.

Fenton (1999), a former US Marine, as a Director of the US DOD Joint Non-Lethal Weapons Directorate (JNLWD), envisions respect for human life as a basic tenet in contemporary US armed operations in line with de-lethalization school of thought. Combined with the advances in technology and precision engagement capability, the protection of human life underscores the importance of NLW in armed conflict. His expresses the ambitions regarding the NLW potential in aiming at ‘getting beyond the rubber bullet modality and develop non-lethal capabilities for the operational and strategic levels of war’. He obviously believes that technologically more advanced NLW concepts may even have immediate strategic level effects.

Leech (2000: 20) sees introducing NLWs as a method to sensitize the blunt instrument of military intervention. He refers to the Kosovo war by stating that the most effective actions against Serbia was the carbon-filled bomb which blacked out power supplies without destroying the generating stations. In ground operations, weapons that restrain but do not kill will preserve the peacekeeper’s principal shield: impartiality. In addition, the impact of the media such as CNN leads to demands for international policing rather than punitive wars. In a way, the author conceives a role of NLWs to support a ‘hearts and minds’ strategy. On the one hand such a strategy seeks the backing from the international community and the general public for the intervention by performing their mission non-destructively. On the other a hearts and minds strategy focuses on the support of the local population for the mission the intervention forces need to gain.

According to Leech (2002: 161), the need to intervene in essentially civil wars has posed
a dilemma: traditional methods to meet force with force are inappropriate, as civil conflict lacks the clarity of friend and foe. Intervention for non-aggressive purposes requires disabling technologies. Appropriate response will be elusive unless we exchange superguns for tools of crowd control.

After the attacks against the US of September 11, 2001, Alexander (2003) was the first to discuss the role of NLWs in the ‘post-9/11’ world. Feakin (2005: 59) quotes a personal interview with Alexander:

“In my opinion we are in World War ‘X’ and a good deal of this is going to take place in metropolitan areas...when we start talking about cities such as London, Paris, Rome, Cairo, and other places like that, then I think that we are going to need to have the ability to separate the real adversaries from the general public. In my view the requirement for NLWs is going to be even greater.”

He also seeks to conceptually fill the void between Military Operations Other Than War (MOOTW) and conventional warfare by focusing on Counterinsurgency (CI) operations and claims a role for NLWs in CI mission success such as in conflict theatres as Iraq and Afghanistan. He emphasizes the need for dedicated NLWs for area denial, meaning that people are denied access to a particular area or public space. He obviously envisions a discriminatory role for non-discriminatory NLWs such as area effect devices.

Other proposals to pursue the promises of NLWs in contemporary conflict have been undertaken in the wake of the violent CI operations launched by the international coalitions forces in Iraq and Afghanistan. In 2009, the RAND cooperation published a study into ‘scalable capabilities for military operations amid populations’. It re-iterates Rupert Smith’s paradigm:

In CI, the epicentre of politics is the contested population. Failure to treat that population with care, even reverence – as good police treat even bad neighbourhoods – will affect and possibly determine a campaign’s course and outcome. This is the light in which the utility of non-lethal weapons appears not only tactical and operational, but also strategic. Gompert et al. (2009: 2).

This viewpoint implies that NLWs are expected to be supportive to a ‘hearts and minds’ approach to strategy, focused on the local population. Furthermore, the authors believe that NLWs could contribute to scalable capabilities within a continuum of force, thereby gaining time for better decision making in tactical level scenarios. Such an approach defines requirements during tactical engagements, including information sensing, two-way communication and educating the population. Resolving uncertainty is considered as important as physical effect (Gompert et al. 2009: 79-81) In accomplishing these requirements, the authors identify a range of advanced non-lethal technologies, superior in effect to the first generation NLWs such as tear gas and baton rounds. At the same time, they stress that the feasibility of a continuum of force capability critically depends on the skill, sensitivity and preparation of military personnel (Gompert et al. 2009: 133) The authors believe that uncertainty in real world conflict can be mitigated by a technically more fine-tuned interplay between information collection and scalable force options.

Sceptics

Optimistic expectations regarding the military performance of NLWs, reinforced by a strong
confident in technological fixes displayed in the NLW debate, have been disputed by other analysts throughout the debate. Col Siniscalchi (1998: 15) points out that the civilization of conflict in situations in which US forces intervene is a desire and expectation driven by various factors as the intrusiveness of the media and high regard for life in modern societies. In addressing the unrealistic expectations of NLWs, he notes the lack of objective data to test the effectiveness of NLWs. These data should be generated by combat testing, exercising and military experience, but are in short supply. Most outspoken on bloodlessness is Siniscalchi when stating:

The ability to use technology to defeat an enemy without casualties appeals to our sense of morality. This vision is inspiring but, unfortunately, unrealistic. While thoughts on “near bloodless battlefield” have long been abandoned, the visionary promise of non-lethality leads to widespread misconceptions that are “likely to prove counterproductive and potentially dangerous”\(^\text{24}\)

Hence, Siniscalchi stresses that assessment of NLW utility should rely on real world data rather than on technology-driven expectations, in order to prevent adverse consequences of their implementation.

Lt Col Coppernoll (1999: 126), discussing NLWs in an operational context, stresses the dynamics facing military officers and operators on the ground, where often quick decisions have to be taken in difficult situations. She, therefore, considers leadership and initiative, dedicated training concepts and NLW employment more critical than the technology itself. Hence, the attitude and performance of the user of NLWs is to be conceived as a critical factor for effect of NLW deployment. Coppernoll’s emphasis on the importance of operational contextual factors involving, amongst others, the performance of commanders and operators, has been picked-up by others several years later.

Grin (2000) cautions that, in attempts to meet strategic objectives with NLWs, technologically determined expectations are over-emphasized, and operational limitations and strategic particularities are de-emphasized. He stresses the need to assess the strategic expectations of ‘Third Wave War’, under which non-lethality can be arranged, in the context of real operational circumstances and political contestation (Grin 2000: 91). Also others have claimed that the assessment of NLWs has to take into account the validity of the claims that are stated over the effectiveness of NLWs. Rappert (2003: 27) expresses this as follows:

That much of the existing discussion about non-lethal weapons is highly optimistic means that much of the analysis that follows examines the production of such positive assessments.

From a conceptual-analytical perspective, Rappert (2003: 32) argues that one of the issues that inform the validity of the claims on NLW-properties, is the relationship between the technology itself and the context in which the technology is being employed, and both the context and the relationship between context and effect have to be understood. Framing debates in terms of characteristics of technologies alone, for instance by seeking to establish probable effects, misses out how NLWs function in practice (Rappert 2003: 265).

Koplow (2006: 3) considers a number of scenarios and imagines how these scenarios could have evolved if NLWs had been used. He identifies a number of caveats that have to be addressed before the future role of NLWs can be appreciated. One concern refers to the operational considerations related to the realities of modern law enforcement and conflict. A second

refers to the risk of overreliance on and proactive use of non-lethal force by the security forces. The user might also meet complications when dealing with NLWs regarding decision making between his lethal and non-lethal options. Furthermore, due to their very different nature, NLWs require particular training, guidance into applicable doctrine, and dedicated Rules of Engagement (RoEs). He also cautions that NLW may not perform as advertised. Furthermore, explicit attention should be paid to the likely responses of opponents, including countermeasures and the perception that an NLW is simply a ‘weak weapon’ that can be resisted, or countered with stronger force (Koplow 2006: 129-33).

Lt Col Pittman (2005) adds that NLWs will unnecessarily complicate combat operations. While he acknowledges that NLWs provide military commanders with a wider range of options, he cautions that this was applicable to the MOOTW, that dominated US military expeditionary operations in the early 1990s, but the fielding of NLWs will not change the nature of war in general. He considers that the gap between what is expected from NLWs and what they actually produce on the battlefield may have serious consequences. His message implies that one cannot shape a conflict scenario into one favouring NLW application. It also says that the context of the situation in which the NLW is deployed matters, as does the technical performance of the NLWs and the response of the opponent, and that the use of NLWs may potentially be counterproductive.

Regarding the military applicability of NLWs, Altmann and Reppy (2008) arrive at a similar conclusion as Pittman, though from a different perspective. NLWs are largely reserved for MOOTW, where minimizing casualties has a direct military utility, in the sense that it increases the chances of mission success. They also argue that in conventional warfare NLWs are less attractive, as casualty avoidance in war fought against a highly lethal opponent is still focused on reducing one’s own casualties.

**Deriving the research questions from the NLW debate**

From the debate on NLW’s discussed above, the question arises: who is right? A first step towards answering this question is to identify the main issues from the claims and expectations emerging from this debate. These will be categorized to frame and define the further analysis on the military utility of NLWs. To serve that purpose, the claims have been arranged according to the key analytical components on which the DTA in this study relies. These components are:

- the Non-Lethal Weapon & Technology
- the NLW target group
- the NLW military user.

The components are elaborated in Chapter 2.

Furthermore, claims have been identified that are specifically related to the strategic effect of NLW application.
Claims related to Non-Lethal Weapons & Technology

Claims from the technological optimists:
• NLWs enable casualty-free military intervention
• The uncertainties encountered in real world scenarios can be mitigated and compensated by technological innovations

Claims from the sceptics:
• In real world situations NLW devices and technology may not perform as designed, and may even malfunction
• The situational context in which an NLW is deployed influences its effect

Claims related to NLW target groups

Claim from the careful supporters:
• NLWs may help discriminate between irregular militants and innocents within the target population, as they will respond differently to the NLW effect.

Claim from the sceptics:
• The target population may respond in a different manner than expected in the design and purpose of the NLW.

Claims related to military users of NLWs

Claim from the careful supporters:
• Doctrinal and organizational adjustments are needed to effectively incorporate NLWs in military operations.

Claims from the sceptics:
• The attitude, preparedness and guidance of the user are more important for the NLW’s effect than the technology itself
• The user of the NLW may not perform as directed and expected.

Claims related to the strategic effect of NLW application

Claim from the careful supporters:
• NLWs have positive strategic implications, either in terms of supporting a hearts and minds approach, or by immediate strategic effects of –future- NLWs.

Claim from the sceptics:
• Overly optimistic expectations of the potential of NLW concepts and technologies are illusive and potentially counterproductive.
The claims taken from the sceptics community address issues that have not been considered or identified by the optimists and, to a lesser extent, by the careful supporters. They highlight the potential adverse implications of these issues for the accomplishment of the political objectives envisioned with the deployment of NLWs. These issues are incorporated in the analysis approach.

From the extracted claims and viewpoints above the central research questions of this study are formulated as follows:

• **To what extent do real world operational circumstances affect NLW mission performance and effect?**

• **Given the answer to the previous question, what may we say on the degree at which NLW use meets the expectations that underlie current strategic frameworks?**

### The research approach

The analysis in this study to find answers to the research questions has to consider the technological advances that enable NLWs to materialize, and also the complex of factors of influence that in one way or another interact with the technical NLW concepts. This complex mix of factors is wide-ranging.

A proper method to investigate these issues comes from the field of Technology Assessment (TA). For a long time, the world’s most prominent TA institute was the US Office of Technology Assessment, founded in 1972 to support US Congress on highly complex technical issues with a long-term impact on US policy decision making. Similar TA organisations emerged in other countries, such as the NOTA in the Netherlands.

In the wake of TA, assessments on defence technology have been emerging. Reflecting increasing public concern with defence policies, from 1978, OTA also conducted assessments of military-technological developments. A similar trend could be observed in European countries, including the Netherlands and the Federal Republic of Germany. In the wake of NOTA, INSTEAD was founded, aimed at studying the technological aspects of defence. Some of the Defence Technology Assessments (DTA) have been motivated for their implications for arms control. Official government advising TA establishments ceased to exist in the 1990s. Since then, DTAs have been performed on an occasional basis, mostly initiated from academic institutions. While it is worthwhile to reconsider the value of re-initiating a government-supported TA institution, in absence of its existence this study is to be viewed as particular example of a DTA study.

Smit et al. (1992), seeking to establish some generic methodological guidelines for DTA studies, frame DTA as follows:

> In DTA studies, assessments of the effectiveness of advanced military systems need to take into account the operational context (including human and procedural factors) in which the system has to be applied, as well as on the available number of systems and their vulnerability. (Smit et al. 1992: 163)

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25 The OTA was established through the Technology Assessment Act of 1972, Public Law 92-484, 92d Congress, H.R. 10243, of 13 October 1972. Joseph Coates, mentioned above, was one of the initiators and would contribute to OTA’s defence technology assessments.

26 The Netherlands Organization for Technology Assessment (NOTA) was founded in 1986.

27 The Interuniversity Network for Studying the Technological Aspects of Defence (INSTEAD) was also founded in 1986.

28 In the Netherlands, such an assessment was for instance made on the Patriot missile. Akkermans et al. (1985).
In the research approach used in this study, the operational context will be a focal point, around which a dedicated reference model will be defined in Chapter 2. The reference model provides orientation to bringing together into a coherent account the data that are collected on the various issues to be considered of key relevance for the assessment. It helps to achieve what Weiss (1994: 157 ff) calls inclusive integration when investigating phenomena which comprise various aspects, each if which complexes of factors, which come together in actual processes. Quintessential in such cases is a framework that helps to establish a coherent account of how all these factors come together. (Weiss, 1994: 160) The reference model will serve as such a framework for analyzing the impact of the operational context on NLW performance. Stoop (2005) follows a similar approach by using a diagnostic model to guide the interest of issues in the research process. In this thesis the reference model has initially been taken as a heuristic model to inform the development of the interview questionnaires. It will support a qualitative assessment of NLWs, applied to three concrete research cases:

- The use of NLWs in the conflict in Northern Ireland and its aftermath between 1969 and 2006 (Chapter 3)
- The use of NLWs in US controlled detention centres in Iraq between 2003 and 2009 (Chapter 4)
- The hypothetical use by Dutch ISAF forces in Afghanistan between 2009 and 2010 (Chapter 5)

Given the exploratory nature of this project, these cases have been selected to vary in terms of the nature of the various ‘complexes’ of the reference model. These complexes, which are elaborated in Chapter 2, entail phenomena that perform differently, depending on the real-world context of the respective cases. This approach is in line with Yin (2003: 54), who argues that multiple cases offer contrasting situations that strengthen the external validity of the research findings. More specifically, the choice of these particular cases has been based on the following considerations:

- Although the conflict in Northern Ireland was of a domestic and policing nature, the deployment of military forces to manage the conflict provides insights into the performance of military units within the context of an internal security mission. Furthermore, the accessibility of operational data on the NLW use during a prolonged conflict offers particular insights in the evolvement of NLW performance over an extended time span. A particular feature of this case is the availability of sources originating from the ‘receiving side’, i.e. the target population that was engaged with NLWs
- The Iraq detention centres presented a special military operational configuration, namely a confined space, in which security forces and the detainee community physically resided in separate zones. Given this condition, together with the long endurance of detentions, recurrent patterns of interaction between the two sides developed. It is important to understand the performance and appreciation of NLWs within such a context over time, in particular when the use of lethal force against the unarmed detainees is prohibited
• The Afghanistan case was selected because of the open space environment in which NLWs were to be used in unanticipated engagements between the military security forces and target persons. The open space environment also implied uncertainty about the identity and intent of target persons. These circumstances were further compounded as hostile individuals intermingled with the civil population. The case offered an opportunity to hypothetically assess the performance of NLWs in a Counterinsurgency environment, where the deployment and use of lethal and non-lethal force is highly integrated.

All cases will address a limited set of NLWs used again humans. The findings based on the experiences with these NLWs will also provide for considerations regarding the military utility of a wider range of NLWs. Instances of NLW use will be investigated that reveal different degrees and kinds of impact.

Sources and data collection

A DTA requires extensive search for data in open military literature and in military reports and manuals. As this study is to a large extent based on case studies to analyse the operational employment of NLWs, data are to be drawn from real world military (operational) events. This has proven to be a challenging effort, as access to such data was often denied for various reasons. The most important reason is the sensitivity related to military tactical events where armed force has been applied. Military authorities are reluctant to provide information of such events to outsiders, including myself, despite my status as a civil servant in the Ministry of Defence (MOD) of The Netherlands. The US Army and Marine Corps are potentially the richest providers of sources on real world military events in which NLWs have been used. Yet, dedicated reports and data on NLW use during military operations have proven to be in short supply, as reporting and feedback from military missions is predominantly focused on events involving the use of lethal force, at the detriment of reporting on incidents in which ‘only’ NLWs were used. Hence, data on NLW use in real world events during military missions were primarily obtained through qualitative interviews with military personnel involved in such NLW events, as far as personnel with such experience could be identified.

Throughout the case studies, the method of triangulation has been used in order to exploit as many different sources as possible to optimize the reliability of the research. Through synthesizing the data from a variety of sources with different perspectives on the same topic, reliability of the data and validity of the analysis are ensured (Olsen 2004). Triangulation has been common practice in other DTA studies, as can be taken from e.g. Grin (1990), Stoop (2005) and Altmann (2008). These authors also note that in pursuing such triangulation, the analysts’ own “thorough understanding” (Grin 1990: 34) of the subject matter may be very significant to help in interpreting differences in viewpoints, and in pre-empting, or where necessary noting, misinformation. Scientifically unfounded claims of new weapon concepts made by both their advocates and their opponents can be demystified by independent academic research to produce thorough knowledge based on scientific-technical analysis (Altmann 2008: 12). Combining different methods for data gathering also serves to cast an as broad as possible net over the research object (Stoop 2005: 15-16).

It should be noted that the author could include these techniques for triangulation by drawing on his own expertise on the research topic, which he acquired between 1994 and 2001 while serving in staff positions in the Dutch MOD’s Defence Staff in exploring the potential
of NLWs for the armed forces and formulating policy guidelines on the topic. This added significant background knowledge, which helped to interpret data from different sources so as achieve proper triangulation.

In the present study triangulation is accomplished by using data gained from a differentiated set of sources, namely open military literature, official and technical reports, and interviews with military practitioners and experts. The reliance on the respective categories of sources varied between the case studies, depending on the characteristics of the case. In the Northern Ireland case (Chapter 3), being a historical and domestic case, much of the data is available in open literature and reports. These sources were complemented by structured and semi-structured interviews. In the cases of the Iraq detention centres (Chapter 4) and Afghanistan (Chapter 5), data collection more relied on inputs from interviews, as reports on events were not available or non-existing, in particular in the Afghanistan case. Interviewees are listed in the Appendix. Interviews were mostly semi-structured, to provide opportunity for respondents to tell their own story, in order to optimally inform the reference model supporting the analysis. Interviewees were asked to provide unclassified information only, so that all data could be actually used. Since the military application of NLWs primarily resides in the military-tactical domain, key respondents were military practitioners who could provide first-hand accounts of the selected tactical event for the NLW assessment, in order to optimally inform the complexes in the reference model. This real world data collection was strengthened by taking inputs from multiple respondents on the same tactical situation. Real world data input for the complexes in the reference model was complemented with data from technical and tactical documentation. Thus a reliable picture of the phenomena defining the various complexes and the operational context was constructed to determine the performance of the NLW.

References


