Non-lethality in reality: a defence technology assessment of its political and military potential
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Citation for published version (APA):
Orbons, J. B. J. (2013). Non-lethality in reality: a defence technology assessment of its political and military potential

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Chapter 5
Are Non-Lethal Weapons a Viable Military Option to Strengthen the Hearts and Minds Approach in Afghanistan? *

Are non-lethal weapons a viable military option to strengthen the hearts and minds approach in Afghanistan?

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Commanders of the International Security Assistance Force (ISAF) have repeatedly stressed the hearts and minds approach in Afghanistan, in saying that the human terrain is decisive for a successful outcome of the mission. Avoidance of civilian casualties is considered of strategic importance, and by nature highly dependent on the management of tactical level Escalation of Force (EoF) situations. Non-lethal weapons (NLWs) are expected to enable tactical commanders to avoid innocent civilian casualties in such situations. This article considers a selected NLW on its potential to accomplish this requirement. It uses a defence technology assessment approach to analyse EoF situations experienced by Dutch ISAF forces in which the NLW is inserted. The analysis demonstrates that a range of contextual factors in the Afghanistan high-risk environment tend to narrow down the window of opportunity for the NLW to help defuse the risk of unintended civil casualties.

Keywords: ISAF; non-lethal weapons; Laser Optical Warner; civilian casualties

Introduction

Over the last two decades, Western military forces have increasingly been deployed in irregular conflict, while engaged in counter-insurgency (CI) missions. The NATO-led International Security Assistance Force (ISAF) mission in Afghanistan has been conducted as a CI against the Taliban. ISAF has been deployed to stabilise the country and to deny the Taliban coming back to power, thereby preventing a renewed creation of a sanctuary for a resurgent Al-Qaeda to prepare terrorist attacks worldwide. A dual strategy is being pursued by the Coalition forces: on the one hand combining military containment of Taliban armed strikes, intimidation and influence; and on the other using Provincial Reconstruction Teams to rebuild the country to win the hearts and minds of the Afghan population.1

The hearts and minds approach has repeatedly been emphasised by ISAF commanders, when saying that the human terrain is decisive for a successful outcome of the mission. According to US General David Petraeus, when in command of the ISAF-mission between mid-2010 and mid-2011, the people are the centre of gravity; only by providing them with security and earning their trust will ISAF prevail.2

By its nature, the strategic objective of winning hearts and minds is dependent on tactical activities. Robert Egnell divides such activities into several categories, one of which implies a different mindset in the conduct of military operations, involving a less coercive approach and emphasizing the minimum use of force.3 General Petraeus expressed this as a maxim by underlining
the strategic importance of avoiding harm to the civil population. He stated in his *Counterinsurgency Guidance* for ISAF that

if we kill civilians or damage their property in the course of our operations, we will create more enemies than our operations eliminate. That’s exactly what the Taliban want. Don’t fall into their trap. We must continue our efforts to reduce civilian casualties to an absolute minimum.

Minimising civilian casualties can be viewed as one side of the coin of “casualty aversion” that has influenced the decisions of western policy-makers and military commanders for several decades. The flip side represents the death among own military personnel during such missions. Gentry calls these two types of casualty-aversion “norms” in modern warfare, namely “standards of behaviour defined in terms of rights and obligations.” These are used by belligerents as “weapons,” by exploiting the sensitivity of Western societies and their political leaders to casualties. In Afghanistan, the Taliban seek to achieve this through tactical level “meeting” events between security forces and the population in which they face ISAF units with an “us or them” dilemma between their own security and that of the local people.

Civilian casualties have occurred during ISAF CI operations. Fatal events include Escalation of Force (EoF) incidents, when a driver fails to comply after warnings from military forces to stop, resulting in civilian death or injury. In the second half of 2006, 45 civilians were unintentionally killed or injured by ISAF personnel, the majority of whom were in EoF incidents. 2010 saw an increase in casualties of 15% compared to 2009, resulting in several large demonstrations by the Afghan people against ISAF and the Afghanistan National Security Forces, jeopardising the hearts-and-minds objectives of the ISAF mission.

**Non-lethal weapons and the strategic impact of tactical prudence**

Petraeus has pointed out that the situation at a checkpoint is where the control forces may misinterpret unanticipated or non-cooperative behaviour and cause those in charge to make split-second decisions, sometimes with life-or-death consequences. There is a need, therefore, for adequate training and the means to stop a vehicle without having to open fire. Patraeus called for novel and effective ways to neutralise such a threat without having to use lethal force. In doing so, he also encouraged the use of non-lethal weapons (NLWs) and asked US force planners to identify their top 10 NLWs.

Given the tactical uncertainties, do NLWs enable junior commanders to defuse the clash of casualty-aversion norms when meeting the strategic imperative of winning the hearts and minds of the Afghan people? The need to minimise civilian casualties in CI operations has been addressed by analysts such as McNab and Scott, who identified a number of recurring situations involving the risk of civilian casualties, including that of checkpoints. They argue that the use of NLWs reduces the number of deaths for a given incident and mitigates the strategic effects resulting from civilian deaths. Others, such as Altmann, warn against the danger of setting unrealistically high promises for NLWs, causing decision-makers to rely on a technological fix rather than political solutions. Mandel states that the relative absence of significant examples of publicly documented NLW applications makes it difficult to assess their utility. He also notes that the existing literature on NLWs is extremely scarce, and their conceptual context largely unexplored. A clearer understanding is needed about situation-dependent costs and benefits of a greater reliance on NLWs.

Little research has been devoted to the performance of NLWs in military situations, leaving the debate between those with high expectations of their military value and others questioning their utility largely unresolved. This article, therefore, assesses a selected type of NLW, using...
an analytical framework based on defence technology assessment (DTA) to determine the NLWs’ potential in the Afghan operational context and their contribution to ISAF’s strategic mission.

**Analytical approach for NLW assessment in Afghanistan**

**Defence technology assessment**

Technology assessment is an analytical approach aimed at evaluating innovative technological systems within a contextual framework. DTA is specifically designed for a systematic approach to new military concepts, with a focus on the operational context, including human and procedural factors, in which the system is to be applied. Addressing the operational context is essential as this enables an analysis of NLW performance under real conditions.

The significance of the operational context in analysing NLWs has been identified and discussed by other analysts. Rappert argues that an account of technology relies on context as a way to understand its meaning. Feakin has taken the role of context further by capturing it in his “ICE” equation of non-lethality: Intent + Context = Effect. He contends that if an NLW is used with the correct intent and within an appropriate context, it will produce the desired “non-lethal” effect. His approach suggests that intent and context are variables that can be chosen independent of each other. It can be argued, however, that the intent of the user of the NLW may well be influenced by – and thus is dependent on – the context in which he operates.

This has, for instance, been demonstrated in an analysis of NLW use during “The Troubles” in Northern Ireland. Besides intent (of the user), a range of other factors come into play, such as the skills of the operator or the attitude of the individual or group exposed to the NLW. Moreover, engagements with NLWs also involve interactive mechanisms between the user and the person(s) engaged, as well as between the NLW and the targeted person(s).

DTA seeks to unravel the complexity associated with NLW use. It frames the essential elements – and the interactions between them – which in their entirety influence the outcome of NLW use in real-world situations. The framework consists of three main components: the user, the NLW device and technology and the target. They are called complexes, as each embodies a variety of factors that influence the process of NLW engagement to acquire a particular effect. The user complex, for instance, may include training of personnel and doctrinal guidance, organisational deployment of the non-lethal capability, experience, attitude and familiarity with the deployment environment.

Every single situation of NLW use is defined by a unique context. Context not only affects the outcome in a direct manner, but also indirectly, as it influences each of the three components separately, as is visualised in Figure 1. The contextual dependency of the three components, as well as their interactions during operational use of the NLW, is responsible for potential differences between what is required and expected from NLW deployment, and what is the outcome under tactical field conditions. The DTA will be applied to a selected set of EoF cases and will consider the most appropriate NLW to be identified thereafter.

**Defining the Afghanistan research case**

The DTA analysis focuses on NLW utility in cases involving EoF incidents, in which the number of innocent casualties should be diminished. Suicide bombers use tactics exploiting the presence of civilians as a means to conceal their approach of military targets. The concealment tactics are reinforced by the absence of clues to help to distinguish the potential suicide bomber from innocent persons. Hence, the distinction between combatants and non-combatants is fundamentally blurred and some of them even behave as chameleons in this respect. Once a suspect has
closed with ISAF forces, there is no other option than to neutralise the individual with deadly force. Such sudden and unanticipated suicide threat scenarios emerge in a range of operational settings.

As has been pointed out, these incidents predominantly occur in confrontations between civilians with military convoys and at checkpoints. Other EoF situations, such as Crowd and Riot Control events and at Entry Control Points of military facilities, occur at much lower rates and are accountable for relatively insignificant numbers of innocent civilian casualties. The analysis here will, therefore, focus on checkpoint and convoy situations.

A key requirement to reduce the clash of casualty-aversion norms with the EoF procedure is to extend the distance at which approaching vehicles or individuals should receive a clear and non-lethal alert to stop. Such a range is estimated by military experts to be at least 100, and possibly 150 m.23 Currently, only a few limited NLWs are capable of delivering a significant effect at such ranges. Four devices are available: a kinetic weapon, called the long-range baton round; a sound generator, called the acoustic hailing device; a millimetre wave-directed energy weapon, called the Active Denial System (ADS); a directed energy laser beam emitter, called the Laser Optical Warner.

While each of these systems has reached some stage of maturity or has technically been demonstrated, their applicability in EoF situations in Afghanistan should meet some additional basic criteria, given the high standards of reliability that NLWs should meet in delivering their effect at long ranges. These criteria include: deployability, safety of effect, aiming accuracy and discrimination precision.

The ADS, designed to engage individual targets with a millimetre wave heat effect at ranges up to hundreds of metres, is currently carried on a heavy truck platform. Given its large dimensions, its considerable logistic footprint and its political sensitivity due to the invisibility of the mmw beam that heats the target’s skin, ADS deployment in Afghanistan is unlikely in the foreseeable future. Only a few, if any, would be available.24

The long-range baton round, originally designed to strike human targets to achieve compliance by inflicting pain, would be used to hit the windscreen of vehicles at ranges of up to 100 m. Whereas this range is attainable when firing the weapon at a sufficiently elevated angle, the hit probability is compromised by the increasing loss of ballistic accuracy at ranges
above 50 m. Its efficacy is further diminished against moving targets, as is the case of checkpoint and convoy situations. In addition, the risk of causing serious harm to the vehicle driver and co-passengers is considerable, due to possible break-up of the windscreen upon impact of the baton round.

Acoustic hailing devices, while capable of attaining high sound levels out to hundreds of metres, are indiscriminate in their effect, as they were originally designed to warn or cause discomfort to crowds distributed over a larger area. In the case of an approaching vehicle, particularly in confrontations situated in a busy town or village, the noise may not be perceived by a driver as a warning explicitly aimed at him.

The Laser Optical Warner, designed to emit a directed monochromatic laser beam up to hundreds of metres, has reliable aiming precision, as the laser beam projection on the targeted vehicle or individual is visible to the operator, which also enables him to keep the laser beam fixed on the aiming point. The system is already in use with military forces of several countries participating in ISAF.

Real-world data of the use of Laser Optical Warner in EoF incidents in Afghanistan have proved difficult to acquire. Detailed records on NLW use in EoF procedures, which a DTA analysis requires, are hardly available or generally not releasable as open sources. Defence establishments dealing with NLW development when training ascribe the lack of NLW feedback data to the formats used in after-action reports from field commanders, which are not designed for documentation of NLW usage data. Only anecdotal accounts of NLW use have been received on an occasional basis.

Given the absence of real-world data on Laser Optical Warner use in EoF situations, the DTA approach predominantly draws on detailed accounts of checkpoint and convoy situations, which have been collected in interviews with Dutch junior commanders deployed in the Afghan province of Uruzgan. As Dutch ISAF forces in Uruzgan did not field the Laser Optical Warner, the device was inserted into selected situations in a fictitious manner, while using the expert judgement and imagination of individual Dutch officers with on-the-ground experience in Afghanistan to realistically and plausibly reconstruct the situation with the device implemented. This analytical approach can be conceived as a “prospective DTA, in contrast with the retrospective DTA that has been used to analyse NLW effects during The Troubles in Northern Ireland.”

Laser Optical Warner technology and working principles

The Laser Optical Warner projects a monochromatic (green) laser beam at a wavelength on the electromagnetic spectrum to which the human visual system is highly sensitive. The emitted energy does not harm the human eye at levels below a well-defined safety margin, provided that the eye’s physiological reflex is not disturbed. When the eye is hit, it causes discomfort and disorientation to the individual; and the target’s reflex is to close the unprotected eyes to avoid the unpleasant and perhaps painful effect, or to look away in another direction. The device’s purpose is to draw the attention of an individual and to make him alert to other means of warning against approaching a protected object in a prohibited manner, or to deny actions of non-compliant persons by obscuring their vision. These systems are considerably softer in effect than, for instance, non-lethal kinetic projectiles or tear gas.

As the beam slightly widens with increasing range, the laser energy intensity drops gradually to reach a safe energy level at a certain distance from the laser source. The device deployed by the Royal Netherlands Army, called the Green Laser Optical Warner (GLOW), can be operated in different modes. One is the continuous narrow mode with the beam cross-section of the size of an individual’s upper body part at a range of 100 m, whereas the wider mode emits a wider beam,
consequently at a lower intensity level. Both modes can also be selected with a 4 Hz pulsed beam.\textsuperscript{31} The laser is eye safe above 6 m distance, if exposure time does not exceed 250 ms, which is the duration of the closing reflex of the eyelid.\textsuperscript{32} US forces use a stronger device, with a safe range of 5–10 m, depending on the mode used.\textsuperscript{33} A Laser Optical Warner generally weighs between 1 and 1.5 kg. The GLOW weighs 1.25 kg.\textsuperscript{34}

The laser is usually mounted coaxially on a hand-held rifle or a vehicle-mounted gun. Such combinations allow for the simultaneous aiming of a laser source and a weapon.\textsuperscript{35} The laser beam has to be locked onto the target for several seconds to prevent the target from retaining vision. Accurate aiming of the laser at the target’s head is required to keep the target’s eyes within the brighter centre of the laser beam. When the laser is co-mounted with a rifle or gun, the difference between the ballistic flight of the kinetic round and the rectilinear propagation of the laser beam has to be taken into account when taking aim. The aiming points of the two sub-systems do not coincide; hence, aiming adjustment is required when switching between the laser and the rifle.\textsuperscript{36} This correction factor changes with range, and usually the adjustment is preset for a preferred engagement range. Precautions have to be taken to prevent eye damage to one’s own personnel who find themselves close to the device. Hence, the laser should be positioned and operated in such a way to ensure that a free field ranges above the eye hazard distance.

Laser Optical Warner use-in-operational-context at checkpoints

An important task within the framework of a CI campaign is the checking of vehicles and passengers for weapons and equipment to supply insurgent groups. Security checks of persons and vehicles also serve to prevent suicide improvised explosive devices (SIEDs) and suicide vehicle improvised explosive devices (SVIEDs) from moving into an ISAF controlled area. Checkpoints can be located in a wide variety of settings, ranging from transit roads passing through thinly populated rural areas to main roads leading into or through an urbanised area.

Checkpoints represent situations in which unidentified strangers may close in with security forces at very short range. The risk to personnel at such chokepoints is, therefore, considerable. Equally, there is a risk to civilians, as control forces may misperceive unanticipated and seemingly non-cooperative behaviour. Unintended casualties have occurred when drivers ignore stop signals when approaching a checkpoint. They were subsequently engaged with lethal force upon entering the zone of the checkpoint, where the Rules of Engagement (RoEs) authorise military personnel to open fire. Two concrete checkpoint situations that have occurred in the Afghan province of Uruzgan will be taken to analyse the Laser Optical Warner.

Checkpoint north of Singhowlah

During September and October 2009, Dutch ISAF units regularly set up mobile checkpoints on a road leading to a bridge across the River Helmand. The checkpoints were located several kilometres north of the village of Singhowlah, situated at an angle east of the River Helmand and north of the river Tiri Rud. The checkpoints were positioned close to the forward operating base (FOB) “Coyote,” sitting on a hilltop, which overlooked the road and an area several kilometres towards the south, the direction towards which the checkpoint was orientated. The purpose of the checkpoint was not only the checking of vehicles and other traffic and the biometric identification of Afghans, but also showing the ISAF flag in an area bordering the territory held by the Opposing Militant Forces (OMF). In this manner, the checkpoint also served as a deterrent against OMF attempts to gain more ground.
The checkpoint layout consisted of a traffic arrest line marked with a red-white ribbon just above the road, 150 m in front of the checkpoint baseline. A trigger line was marked with orange cones placed on the roadside, 50 m in front of the baseline. Drivers or pedestrians who would not halt at the arrest line would be warned by waving, shouting, flagging and, if necessary, a warning shot into the ground next to the vehicle or pedestrian. If all warnings were ignored and the trigger line crossed, checkpoint personnel were authorised to open direct fire.

The road at the checkpoint was in a bad state, scattered with holes and rocks, prohibiting cars to drive faster than 30 km/h. With these conditions, there was no need to place extra obstacles on the road. Communication with FOB Coyote provided for additional observation support, as the checkpoint crew received an early alert on any traffic approaching when still several kilometres away. Visibility conditions were always very good and the checkpoint was operated during daylight hours only. The area near the checkpoint was practically uninhabited and vegetation was largely absent. Obscuration by sand due to a strong wind did not occur. Since the wider area was surrounded by high mountains, the blinding effect by the sun was not experienced, nor was it likely to create a problem for incoming traffic. Coyote also watched the behaviour of drivers and possible passengers in order to obtain a risk profile in advance. Checkpoint personnel were equipped with a high resolution camera to enhance early warning. The flow of traffic was very low, fewer than 10 vehicles, motorbikes and pedestrians per hour. Hence, the user context, as well as the context of the situation at the checkpoint location and timing, was generally favourable for effective operations.

The fielding of the Laser Optical Warner contributed to the warning procedure. Although visibility conditions allowed for the use of the laser to alert approaching traffic at ranges well beyond the arrest line, this was considered a less desirable approach from a tactical and political point of view. The early use of the laser would potentially intimidate drivers and possible passengers. The transit time of the warning zone for a vehicle driving at 30 km/h and not slowing down, would be around 12 sec. If all softer warning measures failed, an estimated 2–4 sec would remain for using the Laser Optical Warner, before a warning shot was to be fired.

From the operator’s perception, the laser would achieve the same effect as a flare, which was already available to his unit. It is also relevant that drivers sometimes wore sunglasses, which would probably have reduced the effect of any optical device. The likelihood of approaching persons misunderstanding the Laser Optical Warner was relatively small, as by 2009, the public information on their use by ISAF should have reached the vast majority of the Afghan population. The absence of distractions shaped the target context such that during the approach, the driver’s attention would almost automatically be focused on the checkpoint. Furthermore, the repeated use of checkpoints would most probably have familiarised the large majority of incoming drivers and foot passengers with its presence. This has been demonstrated in an experimental study, indicating that drivers become better at understanding warnings and instructions after repeated experience with checkpoints.

The threat level in the area around the checkpoint was generally low, as incidents did not occur during the checkpoint operations. No OMF passed the position during any of the deployment times of the checkpoint. The absence of violence shaped a context of relatively low tension levels. Only personnel who had previously been exposed to suicide attacks or strikes with improvised explosive devices (IEDs), or had witnessed such incidents may risk overreacting. If available, the deployment of the Laser Optical Warner would have been a tactically useful option, even if not used.

**Checkpoint on the west bank of River Helmand, south of Garam**

In July 2009, Dutch ISAF forces set up a checkpoint on a road running towards the west bank of the River Helmand. The checkpoint was deployed only once, between 8 a.m. and 3 p.m. It was
located some 3 km south of the village of Garam, next to a quala, which is a fortified family compound, with the number 1048. At that point, the road was flanked on the west side by a hill called Mount Suzy, on top of which a French ISAF unit was operating an observation post (OP). The purpose of the checkpoint was to prevent the road from being used for supply trafficking from OMF-controlled territory north of the checkpoint. During the check-point operation, armed hostilities were taking place near Garam, as the OMF wanted to defend and consolidate their control of the area against ISAF and the Afghan National Army.

At the checkpoint, the road was narrow, about 3 m wide. Although the road surface was not metalled, it was easily negotiable. Checkpoint military personnel had placed heavy rocks on the road to further narrow the passage. North of the checkpoint, the fairly straight road was flanked by hills on the west side and a green zone on a steep downward slope on the east side. These circumstances and preparations prevented motorised traffic coming from a northern direction to bypass the checkpoint. No additional markings were used on the road in front of the checkpoint to alert oncoming vehicles and/or motorbikes off the checkpoint ahead.

At the checkpoint, military personnel, composed of Dutch ISAF soldiers and Afghan National Police, were positioned close to the rock obstacle on the road. Other military personnel armed with automatic rifles had taken up positions on top of quala 1048 to overlook the road ahead of the checkpoint and the checkpoint itself. No military vehicles were deployed to support the checkpoint.

It was a sunny day, with a temperature of over 40°C. Weather conditions were such that visibility was very good, allowing observation of the road from the French OP up to several kilometres north. There was clear visibility, to incoming traffic from the North, the checkpoint was visible from approximately 200 m distance. The EoF procedure started with personnel at the obstacle giving a hand signal as soon as a vehicle approached 150 m in front of the checkpoint baseline. If it ignored the hand signal, a warning shot would follow, either from the personnel at the road obstacle or from the quala roof. In the latter case, the personnel at the obstacle should take cover. The imaginary arrest line was about 75 m in front of the checkpoint baseline at the obstacle. Vehicles crossing the arrest line without permission would be engaged with direct fire aimed at the driver.42

The context of personnel manning the checkpoint also encompassed an offensive from the adjacent OMF-controlled zone, near the village of Garam, which occurred simultaneously with the checkpoint operation. The high level of violence and shootings audible at the checkpoint gave rise to considerable tension among those at the checkpoint. These circumstances, in combination with the hot weather, were responsible for the heavy and stressful workload of the military personnel. They were rotated every 30 min to prevent fatigue and loss of alertness. This was deemed necessary by their Commander, despite dedicated prior training.43

During the day, fewer than five vehicles came through the checkpoint and an equal number of motorbikes. EoF incidents did not occur, though military personnel on guard came close to firing warning shots on a few occasions. Pedestrians passed in considerable numbers, many of them on the run from the hostilities in the North. As they could also bypass the checkpoint off the road, spies hired by the OMF could obtain information on the checkpoint’s operations.

A Laser Optical Warner should be used to alert incoming vehicles at a range of at least 150 m, given the average high speed of their approach. As hand signals at distances above 150 m are likely to go unnoticed, the laser signal would replace the hand signal within the EoF procedure and send a stronger warning message. After activation of the laser beam, the remaining distance towards the arrest line, some 75 m, would be covered in 4–5 sec, the time available for a laser warning and subsequent warning shots. These warning shots would have to be fired by the same personnel who operate the Laser Optical Warner, in order to minimise the time for switching to the rifle. In practical terms, the time to activate the laser beam would be around 3 sec. This
would also require the Laser Optical Warner to be co-mounted on the personal weapon. Co-ordination of the Laser Optical Warner operator with the riflemen on the quala roof would be too complicated, given the increased time pressure.

Given the physically and mentally difficult user context, handling and operation of the Laser Optical Warner would be a demanding task, in particular because the laser beam should be fixed on the windshield of an unsteady moving vehicle. Moreover, the poor contrast of the laser on a sunny mid-Summer day against the bright ambient light would not only restrict the operator’s ability to aim the beam at a vehicle at 150 m distance, but also fail to prevent the driver from looking into the beam unhindered due to the beam intensity loss at that range. Under these circumstances, oncoming drivers might not be inclined to stop, especially when in a hurry. By the time the vehicle got close enough for the laser to achieve sufficient beam intensity levels, the need for escalation would already be acute. The checkpoint personnel, confronted with a fast approaching vehicle that refuses to slow down and stop, might wrongly perceive a hostile intent on the part of the driver, and under increased stress conditions might aim and fire their rifles at him pre-emptively, with the RoE legitimising their right of self-protection.

Given this sequence of events, the incorporation of the Laser Optical Warner at the checkpoint would redefine the operational context in such a way that the actual warning time would be further compressed, ultimately to raise the risk of innocent casualties.

Apart from the situation-specific contextual factors that interfere with the effective application of the Laser Optical Warner, other more general contextual factors may also impact upon checkpoint operations. One is the way drivers may perceive a checkpoint. In at least one case, this has resulted in the death of a driver, who refused to stop at a Dutch checkpoint. His passengers, who remained unharmed, declared afterwards that the driver supposed the checkpoint had been set up by a criminal group to collect fees from drivers in transit.

Afghan car drivers generally tend to drive as fast as possible, even on bumpy roads, with heavy loads on their vehicles, including passengers. At the checkpoint, cars approached at a speed exceeding 60 km/h and motorbikes somewhat slower. Afghans have understandable reasons for driving fast, as time is money for the generally poor Afghans. This explains why Afghans resent being stopped at a checkpoint for a time-consuming search of the load.

Other factors have a cultural origin, such as the macho culture among Afghan men, dictating that one must show courage when confronted. This implies that an Afghan should not stop at a checkpoint until a shot has been fired or, even better, he has been injured. The use of drugs by many Afghan men may add to this behaviour. It is also to be noted that in Afghanistan drivers are not required to pass a driving or medical test. The latter is also highly relevant as many Afghan drivers have poor eyesight.

Laser Optical Warner use-in-operational-context by convoys

The movement of military units is an essential part of ISAF operations. Logistics and personnel transports, as well as mounted patrols, make use of a thinly distributed road network. Therefore, the repeated and predictable movement along obvious routes expose ISAF units to insurgency attacks. ISAF movements, mostly in convoys of varying sizes, have regularly been targeted by IEDs, SIED or SVIEDs. For the latter two, EoF procedures have been developed to reduce the risk of such attacks. The aim of these procedures is to ensure a safe distance between the convoy and approaching subjects or vehicles, thereby preventing an insurgent from getting close and detonating an IED.

ISAF forces are authorised to use lethal force for self-protection against such threats. Factors such as the lack of awareness of civilians of the presence of a convoy, or not noticing or understanding the warning signs, may lead to confusion and lead to the death of innocent civilians.
The risk of fatalities due to miscommunication and misinterpretation increases when convoys pass through towns, villages and other populated areas. The application of EoF procedures is constrained by the characteristics of built-up areas, a road network offering multiple approach options and the presence of many civilians. Many convoys have EoF incidents involving warning shots against civilian drivers.51

**Convoy moving through zone north of Deh Rawod**

In July 2010, a Dutch ISAF convoy moved in a northerly direction on a road known as Singhowlah East, situated slightly north of the town of Deh Rawod. The convoy, consisting of about 15 vehicles, was passing on a 2–3 km section of the road, when there was an enhanced risk of an IED attack. The quality of the road was good, with a speed ramp to slow down traffic every 100–200 m. The winding road was about 6 m wide, with limited free lines of sight, due to the presence of houses and vegetation scattered along the road. At the time, around 8 a.m., traffic was busy. With vehicles travelling at about 30 km/h, cars with heavy loads at 20 km/h, and motorcycles somewhat faster, the convoy moved at a speed of 15–20 km/h.

During the 10-min passage, around 10 motorbikes and an equal number of cars moved down the road in both directions. There were a few intersections with side roads and many narrow alleys between the houses. The probability of the need to fire warning shots was high because motorbikes and cars could suddenly approach the passing convoy at a close distance coming out of side roads and alleys.52 Consequently, the user context was dominated by the risk of IED and SVIED attacks, putting the convoy’s personnel on high alert. In addition, the continuous presence of traffic created a situation in which they had to deal with a very short response time. This problem was exacerbated by the relatively short free line of sight ahead of the convoy. While regular EoF procedures prescribed a minimal tolerable distance of civilian traffic to the convoy of 50 m, the practical conditions reduced this distance to 30 m. Military personnel in every vehicle of the convoy were assigned the task to cover the flank of their section to protect themselves against potential threats.

The target context was such that civilian drivers and other approaching individuals, given the required distance from the convoy, would be challenged, bearing in mind the speed in which they approached. Moreover, early morning traffic is often in a hurry, in this case to Deh Rawod in a southerly direction. The majority of vehicles were heavily laden, with their drivers less concerned about safety and waiting to reach their destination as quickly as possible.53 Some of the Dutch ISAF commanders, who had experienced this situation before and were well aware of the circumstances, preferred to take a rocky road bypassing built-up zones. In doing so, they avoided disturbing the daily life of the population.54

The deployment of the Laser Optical Warner should warn a driver of an approaching vehicle or motorbike to stop. The response time to activate the laser beam is, however, very short. The extremely limited time to decide which weapon to use would leave the Laser Optical Warner to be co-mounted either with a personal weapon or attached to the gun mounted on the vehicle as the only viable option to minimise time to switch from one weapon to the other. In addition, if a laser warning were to be a capability available in an EoF engagement against a motorised civilian from any section of the convoy, every vehicle should carry at least two such devices to ensure coverage all around the convoy. That would imply that about 30 devices should be carried in this 15-vehicle convoy.

While in the sitting or standing position on their moving vehicle, keeping the Laser Optical Warner aimed at the moving target is a task requiring great skill and intense pre-deployment training.55 Irrespective of the skill levels, the operational context would reduce the time available to activate the laser beam before firing a warning shot in less than 1 s. Targets may not always
respond as desired, that is, halt their vehicle when blinded by the laser light, besides the 1.5 sec reaction time before any response to the blinding effect follows. Drivers not familiar with the meaning of the blinding light might also respond in ways that increase the risk of traffic incidents.

An additional problem is the responsibility placed on most junior personnel to have to decide independently whether or not to use the laser or fire a warning shot. The convoy commander or sub-commander will often be too far away to give guidance, as the length of the convoy is several hundreds of metres and the distance between the vehicles around 15 m in built-up areas. If the laser light would not make the driver stop, there would be no time left for a warning shot. The extra stress due to the IED threat makes this problem even more pressing. Overall, the warning cycle in these circumstances would be too short, highly dynamic and compact for the effective deployment of the Laser Optical Warner.

A convoy moving between Tarin Kowt and Sorkh Morghab

On a rainy morning in April 2010, a Dutch ISAF convoy of 15 vehicles was moving north on a road towards an FOB near Sorkh Morghab; the fairly straight tarmac road was of good quality, and between 6 and 7 m wide. Heavy rainfall reduced visibility to less than 200 m, and occasionally down to a mere 50 m at one point, where there was a slight bend in the road. As houses and vegetation flanked the road, the free line of sight was limited at that point. At a certain moment, the convoy was stationary, as a number of personnel had dismounted to search for a particular type of IED, the so-called directional focused charge, designed to produce a horizontal blast effect and, therefore, usually placed slightly away from the road.

Precisely at that moment, a Toyota van came from the opposite direction around the bend in the road, leading towards the convoy at high speed, approximately 80 km/h. The vehicle driver noticed the convoy when he was at a distance of about 75 m. Frightened by the sudden confrontation, he abruptly applied the brakes, causing his van to skid uncontrollably on the slippery road towards the hard shoulder, where it came to a standstill, some 20–30 m away from the convoy. The driver and his 10 passengers remained unharmed. Afterwards, the middle-aged driver apologised and explained that his car had bad brakes and defective windscreen wipers.

Had the car not skidded and moved forward instead, the driver would have been hit by lethal fire when coming closer than 75 m, given the high velocity of his approach. This would have been a challenging and difficult task for a rifleman while standing in his vehicle and aiming to accurately hit a driver driving at high speed. There would be a considerable risk that he would miss and unintentionally hit a passenger instead, especially when the round would be deflected upon breaking the windscreen.

The context of this situation did not allow for warning signals to be fired before a direct shot. The convoy military personnel were mainly composed of Marines, who are trained to develop dedicated skills for rapid switching between widely different levels of violence. They apply a three-stage EoF cycle to warn and stop non-compliant drivers. The first is a warning shot into the ground next to the vehicle. If the vehicle fails to stop, a shot into the vehicle’s engine block will follow. In case the driver still does not respond as required, he will be targeted directly.

If the Laser Optical Warner had been deployed with a Marines platoon, the use of the device would have been prepared in a dedicated four-day training cycle to familiarise servicemen with it and to develop drills for quickly switching between using the laser beam and the rifle, also called “enhanced marksmanship.” However, attaching the laser device to a vehicle-mounted gun would be the preferred option, as the weight of the laser device would unacceptably disturb the balance of hand-held weapons. The extra weight is quite cumbersome, and therefore some commanders
do not consider the device as effective. Under such considerations, in the convoy situation, only the guns mounted on the front vehicle and the rear vehicle would be suitable for the coaxial mounting of the Laser Optical Warner.

In the situation described, the Laser Optical Warner should have made the driver of the vehicle slow down and stop. However, from the gunner’s (user’s) perspective, the time to use it against the fast-approaching car would have been less than 1 sec, since during that time the van would have covered over 20 m. Given the weather conditions on the day of the incident, the laser beam would most likely have been attenuated too much by the rain, preventing an effective warning to the driver. In reality, the circumstances for using the laser in this situation would have been even less favourable, due to the natural delay of the driver’s reaction to the blinding effect. Hence, the Laser Optical Warner use would not have effectively contributed to EoF procedure to make the driver stop in time before he would have been engaged with lethal fire.

In the course of deployment, the focus of military personnel may shift from respect for and education of the local population towards self-protection. This change is brought about by past experience, which undermines the high level of self-confidence acquired during the pre-deployment phase and the development of high skills. In the user context, this translates into a shift in mental attitude that is highly relevant when decisions have to be made on the level of force to deal with potential threats in a predominantly civilian environment. Whereas this may apply to highly-trained, self-confident and experienced personnel, an opposite trend can be observed with less experienced and more junior personnel.

Assessment synthesis

This analysis has been conducted to address the question whether the employment of NLWs at the tactical level helps to ameliorate the clash of casualty-aversion norms, and contributes to ISAF’s strategic imperative of winning the hearts and minds of the Afghan people.

The debate on the potential and promises of NLWs to help reduce the number of unintended innocent civilian casualties is still unresolved. The approach taken here has sought to provide deeper insights into the difference which the deployment of a Laser Optical Warner would make if applied in situations where unintended fatalities have occurred on a regular basis.

Laser Optical Warner devices are intended to produce a stopping effect at ranges in excess of 100 m. In relatively static situations such as at checkpoints, the situations can be redesigned such that the device can be incorporated into EoF procedures. This is mainly due to the fact that a sufficient line-of-sight is normally ensured, as the location and configuration of the checkpoint can be selected accordingly. Such opportunities are primarily available in less inhabited and fairly open areas. Under such conditions, the use of a Laser Optical Warner expands the time available for the EoF procedure, thus raising the probability of identifying the driver’s intent and making an innocent driver comply with the warning to stop.

Even when optimal circumstances for checkpoint deployment are in place, operating the Laser Optical Warner at extended ranges faces performance limitations, including accurate aiming of the laser beam at the drivers of irregularly moving vehicles; the loss of laser light contrast under bright daylight conditions, and a weakening of the intended blinding effect due to lower beam intensity. Unfavourable weather conditions, such as rain, snow, fog and sand storms, may seriously interfere with laser beam performance and may even totally block the effect. Some analysts argue that in such circumstances, the target’s vision is also degraded. Thus, the system may be least effective when most needed and most risky in cases where this is least desirable.

The above drawbacks of the Laser Optical Warner have led system designers to start developing a next generation Laser Optical Warner, one fitted with technological upgrades, such as
the ability to control and adjust the laser beam intensity to the target’s position and by measuring the atmospheric attenuation between the laser and the target.70

The application of the Laser Optical Warner in convoy operations encounters considerably more complexity than in checkpoint operations. Besides a general sense of the threat level in the area, military personnel in convoys often have no clue when and where a possible threat to their unit emerges. This might perhaps not be so much of a problem when moving through uninhabited terrain where sufficient visibility and little traffic make early warning of approaching vehicles possible. When on transit through a built-up area, the situation is often the opposite, as limited free lines of sight prevent Laser Optical Warner use in the EoF procedure. The dynamics associated with these scenarios tend to shut down the tactical window needed for relatively soft NLWs, such as the Laser Optical Warner, to produce their desired effect.

Besides the technical and contextual factors that interfere with the device’s performance, targeted drivers have options to avoid the blinding effect. They may focus on the road directly in front of their vehicle, thus sharply reducing the amount of light entering the eye and may also use technical countermeasures to block the light beam from striking the face. 71 Such non-compliant behaviour may identify the driver as a hostile subject, legitimising the use of force to stop the suspect vehicle. However, there may well be reasons other than a hostile intent for a driver to continue driving towards the military convoy.

Military personnel are guided by RoEs issued and updated daily, yet their mindset in interpreting these rules is also defined by wider contextual influences. Although experienced junior commanders and soldiers have developed a good understanding of the threat on the basis of their observation, stressful incidents of a highly lethal nature tend to reduce their own risk tolerance when confronted with a non-cooperative subject whose intent and identity is unclear. 72 Apparently, the mental ability to reset the EoF procedure after a traumatic experience competes with the self-defence reflex.

Conclusions
The prospective DTA of the Laser Optical Warner in the Afghanistan security environment has demonstrated that forces exposed to an open CI environment, the in situ material and human context denies the development of more tactical flexibility. It is not possible to create a state of permanent quarantine for military formations moving amongst the people. 73 Consequently, in many situations, longer-range NLWs, such as the Laser Optical Warner, are unlikely to widen the response margins enabling the identification of friend or foe before the use of lethal force is imminent. It is the operational context that defines the feasibility of stand-off non-lethal engagement, not the NLW concept or technology itself.

The contextual factors, that impact on a military unit moving in a potentially lethal environment, tend to further narrow down the window of opportunity for a Laser Optical Warner or any other NLW to interrogate the intent of the unknown subject before strong force is used. Military commanders and operators, facing the dilemma of making split-second decisions between using a non-lethal or a lethal capability in a highly dynamic context. They may feel further pressed when the availability of a Laser Optical Warner implicitly requires them to consider its use before using lethal force. This is but one explanation why military commanders might not be eager to introduce this capability. Keeping the RoEs simple, both for the junior commander and for their personnel, is a quality in itself under high-stress conditions. NLWs may overburden the intellectual potential of assigned operators and, in general, increase the complexity facing (junior) military commanders and their personnel. 74

Political and military authorities hope that NLWs will contribute to casualty avoidance. This article has demonstrated that the situations in which ISAF forces move in transit through urban
settings are the most challenging to prevent unintended civilian casualties with the use of NLWs. It is precisely these situations that are easy to exploit by insurgents to challenge Western casualty-aversion norms as their weapons of war. Thus, the ever-present threat of a lethal suicide strike against ISAF forces on the move amongst the people only allows for a very limited contribution by NLWs to resolving the clash between the casualty-aversion norms of the military intervention forces and the local population, the “us or them” dilemma.

The analysis also reveals the gap between declared policies on casualty aversion and the realities on the tactical level to make this happen. Petraeus’s call to military – junior and senior – commanders to identify the 10 most promising NLWs at least suggests that he expects NLWs to make a valuable contribution to the hearts and minds strategy. From a political perspective, this call is understandable, but it seemingly ignores the contextual complexity of the non-cooperative and lethal environment in which this vision has to materialise.

Those who focus primarily on the NLWs to prevent unnecessary casualties are either ignorant, or underestimate the limitations of the ability of the military at the tactical level to switch between lethal and non-lethal levels of action. Whereas special forces have been selected and specifically trained in operational flexibility, including the use of NLWs, such skills are largely beyond the ability of the majority of ground forces. Insurgents will relentlessly nurture the self-defence reflex of ISAF personnel in order to maximise the chances of inflicting civilian casualties.

Acknowledgements
I want to thank Professor John Grin for his suggestions and constructive remarks on a draft of this article.

Notes
4. COMISAF’s Counterinsurgency Guidance, August 1, 2010.


17. Ibid., 534.


23. Taken from conversation with Lt Col (rtd) Rick Bartis, American Systems Contractor, USCENTCOM’s Joint Non-Lethal Weapons Liaison Office, October 20, 2010.


27. Information obtained during meetings with staff officers at the US Army Nonlethal Scalable Effects Center at Fort Leonard Wood, 27 October 2009, and at the US DOD Joint Non-Lethal Weapons Directorate at Quantico, 9 November 2009. British Army and Australian Army Lessons Learned Centers responded that they were either lacking specific data records of NLW use in Afghanistan, or such data were not releasable.


29. This “softness” should of course be related to the intensity of the dazzler beam, which must not lead to permanent blindness or any lasting ocular damage. Such harmful effects would violate Protocol IV of 1995 of the Inhumane Weapons Convention, prohibiting the design and use of laser causing permanent blindness. Massimo Annati and Ezio Bosignore, ‘Non-Lethal Weapons: Possibilities, Programmes, Perspectives and Problems’, *MilitaryTechnology*, no. 27 (July 2003): 49.

30. Typical beam widening angles are in the order of 6 mrad when the laser is operated in the narrow beam mode. This results in a beam cross-section of 0.87 m at 50 m range, and 1.75 m at 100 m. Laser beam intensity drops off with the square of the range. Hence, the intensity is four times weaker at 100 m than at 50 m. Furthermore, most devices have a non-uniform beam intensity cross-section, which is more intense at its centre, and typically has a Gaussian distribution. Data are taken and calculated from the test report WTA-Nr. 904930 *Ergebnisprotokoll über die messtechnische Ermittlung der Strahlungsdaten des Laser-Dazzlers mit der Bezeichnung “GLOW,”* Wehrtechnische Dienststelle 9, Bundeswehr, Germany, August 17, 2010.


32. Ibid., I.3.


34. *Voorschrift VS 7-519*, I-3.
35. As has been accomplished by Dutch ground forces, in preparation for deployment to Afghanistan. Interview on 26 October 2010 with Lt Col Marcel van Luit, Royal Netherlands Army, Army Ground Manoeuvre Knowledge Centre.

36. Ibid.

37. The above account of the checkpoint situation was obtained from 1Lt Dirk Ferwerda, Royal Netherlands Army, who was deployed to Uruzgan as a platoon commander between July 2009 and November 2009. First interview, 3 February 2011.

38. Second interview with 1Lt Dirk Ferwerda, 5 April 2011.

39. These opinions and observations are made by 1Lt Dirk Ferwerda, second interview, 5 April 2011.

40. Familiarity with the purpose of the Laser Optical Warner is key to the way Afghans would respond to the blinding effect of the laser beam. Hence, public information is a prerequisite for compliant behaviour. Interview on 21 April 2011 with Shakila Azizzada, who was a cultural adviser to Dutch ISAF forces in Afghanistan in 2008 and 2009.


42. Interview on 28 April 2011 with 1Lt Sven van der Haas, Royal Netherlands Army, who was deployed to Uruzgan as a platoon commander between July 2009 and November 2009. He provided all the data on the checkpoint operation.

43. As stated by the commanding platoon commander at the checkpoint, 1Lt Sven van der Haas. Interview on 28 April 2011.

44. According to experiments, both the poor contrast of the laser beam under bright daylight conditions and the confrontation with an unannounced and hastily deployed checkpoint, are indicators which strongly reduce the probability of innocent drivers to stop. Mezzacappa et al., Tactical Checkpoint – Hail/Warn and Suppress/Stop.

45. It should be taken into account that drivers, when confronted with the blinding effect, have an average reaction time of about 1.5 sec before decelerating the car after the onset of the loss of forward view. A. Toet and G. Westra, Effects of High Intensity Light Sources on Vision through Windscreens, TNO report TNO-DV 2011 A127, 2011, 35.

46. Interview with Lt Col Marcel van Luit.

47. The fast driving style of Afghans has been mentioned by several military junior commanders during interviews, such as by Cpt. Rob Steehouwer, Royal Netherlands Army, who was deployed as platoon commander to Uruzgan between November 2006 and January 2007 and dpty company commander between August 2008 and December 2008. Interviews on 3 February 2011 and 11 April 2011.

48. At checkpoints in four out of ten cases, men driving their vehicle without passengers refuse to stop until a round has been fired. Interview on 23 July 2009 with Maj Niels Roelen, Royal Netherlands Army, who was deployed as a company commander to Uruzgan between January and July 2007.

49. HQ British Forces Kandahar Airfield, Escalation of Force Mitigation.

50. For instance, a total of 19 innocent civilian casualties across the whole of Afghanistan have been reported, mostly shot by ISAF soldiers in convoys or on patrol, in the second half of 2006. HQ British Forces Kandahar Airfield, Escalation of Force Mitigation.

51. One officer stated that he experienced EoF incidents in 75% of the convoys he operated. Interview with Cpt Rob Steehouwer on 3 February 2011.

52. Interviews on 17 February and 12 April 2011 with 1Lt Kevin van Loon, Royal Netherlands Army, who was deployed as platoon commander to Uruzgan between March 2010 and September 2010.

53. These findings are based on the interviews on 17 February and 12 April 2011 with 1Lt Kevin van Loon.

54. Interview on 23 May 2011 with 1LNT NLMC Anne Kemerink op Schiphorst, who was deployed as a platoon commander to Uruzgan between March and June 2010.

55. As stressed in the interview on 12 April 2011 by 1Lt Kevin van Loon.

56. Toet and Westra, Effects of High Intensity Light Sources, 35.

57. Interview on 21 April 2011 with Shakila Azizzada.

58. As, for instance, stated in the second interview with 1Lt Tom Pasman on 12 April 2011, Royal Netherlands Army, who was deployed as a platoon commander to Uruzgan between March 2010 and July 2010.

59. At map grid co-ordinates 74.5 by 22.5.

60. Interview on 23 May 2011 with 1LNT NLMC Anne Kemerink op Schiphorst.
61. The 3g’s rule was a common procedure employed by Netherlands Marines units when operating in convoys in Afghanistan. Interview on 23 May 2011 with 1LNT NLMC Anne Kemerink op Schiphorst.

62. As stated on the UK composite beam green laser Dangerlight, in an Email received on 21 January 2011 from Lt Col (rtd) Martin Osborne, UK Army Warfare Development Centre. The GLOW of the Royal Netherlands Army, weighing over 1 kilogram, encounters similar objections, as stated in the first interview on 3 February 2011 with 1Lt Dirk Ferwerda.

63. These considerations were expressed by 1Lt NLMC Anne Kemerink op Schiphorst, during the interview on 23 May 2011.

64. Toet and Westrale, Effects of High Intensity Light Sources, 35.

65. The change in attitude has been observed during his deployment in Uruzgan by 1Lt NLMC Anne Kemerink op Schiphorst, and declared during the interview on 23 May 2011.

66. As has been experienced by Maj Larry Hamers who stated in the interview on 17 April 2011.


68. Conversation with LtCol (rtd) Richard Bartis on 13 January 2011.


70. As stated by Pascal Paulissen, senior scientist at TNO Defence and Security Laboratory, The Hague, The Netherlands, in a conversation on 30 June 2011.

71. As has been successfully tried during experiments and trials. Interview with Lt Col Marcel van Luit.

72. Several officers have indicated the correlation between recent deep impact events and the mental attitude and perception in current situations in which quick decision making on weapon use is required. Interview with Maj Niels Roelen; interview on 26 February 2008 with Col Hans van Griensven, Royal Netherlands Army, deployed to Uruzgan as Commander Task Force Uruzgan between January 2007 and August 2007; interview on 25 May 2007 with Maj Carlo Tempelaars, Royal Netherlands Army, deployed to Uruzgan as a company commander between July 2006 and January 2007; the latter declared that the population even intentionally challenged the forces during the days after an event with casualties. This same “checking” was done to units that had just arrived in Afghanistan.

73. Dutch interviewees have repetitively pointed out that the compact space in the small cities and villages in Uruzgan is an unfavourable environment in terms of operational space/time factors. As stated in an interview on 24 January 2011 with Cpt Tim Ros, Royal Netherlands Army, who was deployed to Uruzgan as a legal adviser between January and July 2010.

74. As declared by various officers during interviews, for instance, Maj Lenny Hazelbag, Royal Netherlands Army, who was deployed Infantry Platoon Commander to Uruzgan as a platoon commander between November 2006 and April 2007.