"NON-LETHAL WEAPONS" – A CONCEPT DIFFICULT TO DEFINE

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Abstract: *More than 50 years after introducing the term "non-lethal weapons" (NLWs) and over 20 years of adopting the non-lethality policy, there is still no commonly accepted definition of this class of weapons, and the term "non-lethal weapons" is still subject to debates. This problem affects almost all aspects in the field of non-lethal weapons and is cause of most incorrect interpretations and contradictions connected to NLWs. The purpose of this paper is to discuss and summarize the purpose, features and potential of NLWs, in order to help clarify some existing ambiguities, thus contributing to the proper understanding of the modern "non-lethal weapons" concept.*

Keywords: NON-LETHAL WEAPON (NLW), NON-LETHAL CONCEPT, NON-LETHAL POLICY

Introduction

The concept of avoiding destruction and minimizing the number of victims of internal and international conflicts was globally accepted over the past few decades under the influence of various political, social, economic and other factors. Present-day military operations differ substantially from wars in the past by principles, purposes and character and most of them are carried out in cities and other densely populated areas. In the context of the new realities the forces conducting law and order enforcement, military, anti-terrorist and other operations need and require tools to successfully perform their missions while providing reduced injuries to civilians and officers, less lethality and collateral damage and shorter duration of the effect than conventional weapons.

Non-lethal weapons (NLWs) has been widely used in the police forces practices over the world since the 1960s and 70s as an alternative or complement to police batons and firearms in controlling the aggressive crowd behavior during public disorders related to anti-war movements, protection of human rights and other causes. The military interest in non-lethality began in the early 1990s in the United States as a result of the changes in international security environment marked by the Cold War end. Technological advances, social and political environment, legal developments, and evolution of institutional structures gave impetus to purposeful and intense activities in the non-lethal weapons development.

The term "non-lethal weapons" has been introduced in the 1960s in regard to a group of diverse technologies, but debates induced by this formulation continue to this day. These debates were particularly heated in the second half of the 1990s after the adoption of non-lethal weapons doctrine by the USA.

According to the international study [1] "Currently there is no commonly, let alone universally, accepted definition for non-lethal weapons anywhere in the world. This problem is pervasive and affects nearly all aspects of the non-lethal field... Much of the confusion and controversy surrounding non-lethal weapons has been attributed to this lack of commonly accepted definitions or terminology - a problem for which no resolution appears to be forthcoming".

As noted in [2], the concept of "non-lethal" weapons is very complex and needs to be examined rigorously so that all its features are understood. A simple definitions is not sufficient since the ""Non-lethal" weapons are a phenomenon, not just new types of weapons". That is why, formulating correct definition of non-lethal weapons is difficult and "any analysis of "non-lethal" weapons has to confront difficulties that arise with their definition". Therefore, "Any discussion of NLWs must start with determining exactly what they are. The reader beginning to study the issue will quickly note how many definitions appear in the literature surrounding the subject, ranging from science fiction to the more prosaic". [3]

Earlier terms and definitions describing NLWs

Some of the earlier views on non-lethal weapons sound quite unrealistic at present, revealing lack of proper understanding the NLWs purpose and capabilities, most often overestimating what they can actually achieve, at least at this stage. For example, one of the strongest supporters of the NLWs, cited in [3], defines them as weapons whose intent is to nonlethally overwhelm an enemy's lethal force by destroying the aggressive capability of his weapons and temporarily neutralizing his soldiers. Another formulation cited in [3] reads: "Non-lethality is the use of weapons of mass protection such as nonlethal and anti-lethal weapons and information warfare to project high precision power in a timely fashion, delivering results that are life conserving, environmentally friendly, and fiscally responsible". Though inaccurate, this idea "represents one end of the conceptual spectrum and illustrates the long-standing hope that non-lethal weapons can defeat the opponent without causing lasting harm to almost anything or to anyone". [3]

The subsequent publications do not contain such extreme expectations. Regardless of their wording "it is clear that non-lethality is fundamentally a minimal destruction policy involving different technologies". [3]

The NLWs definition which is most frequently used in the literature is that of the US Department of Defense Directive (DODD 3000.3 of 1996), adopted also by NATO in 1999. According to it, NLWs are "weapons that are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment". [4]

According to some experts (mainly in the field of law), this definition contains some unclear formulations that are subject to criticism. For example: "First, it supports the conclusion that the term "non-lethal" is misleading because it only refers to "minimizing fatalities". Second, it is not clear whether the objective of minimizing permanent injury applies to all military personnel in a conflict or just members of the U.S. armed forces. Third, the focus in the definition is solely on the intent behind the weapon's development and use with no mention of actual or foreseeable consequences of its use. Fourth, it is not clear what "undesired damage to property and the environment" means. "Undesired" from whose perspective? A desirable or tolerable level of damage from a military point of view may differ greatly from the property owner's or environmentalist's standard of desirability. Finally, the definition as a whole allows for subjective rather than objective analysis of what might be "non-lethal"". [2]

A number of publications, especially in the second half of the 1990s, are devoted to criticism of the term "non-lethal" and many alternatives are suggested as result of attempts to describe the nature of this class of weapons. They offer terms as "less-lethal weapons", "less-than-lethal weapons", "compliance weapons", "pain-inducing weapons", "sub-lethal weapons", "safe weapons", "discriminating power", "disabling systems", "minimal force", "new age weapons", "stabilization technologies", "weapons that do not cross the deadly barrier", etc. The NLWs opponents, considering these weapons

cruel, inhumane and degrading, specially designed to practice torture, call them “worse than lethal”. The term "weapons" is also subject to debate, since many means and systems falling within the category “NLWs” could hardly be perceived as weapons.

Since, when using NLWs, there is always a possibility of injury, death or destruction of property, some believe that the attribute "'non-lethal" applied to a weapon is both euphemism and oxymoron. For the same reason some find this term „misleading“. Supporters of term "non-lethal" recognize the ambiguity, while pointing out that the term "non-lethal" accurately expresses the user’s intention. They find this term to be appropriate and describing clearly enough the essence of NLWs – not to kill or destroy, but to incapacitate personnel and equipment, giving the commanders new operational flexibility in strategy and tactics.

“Arguably, any term selected to represent this class of weapon systems would face the same perception problems that the term "non-lethal" faces”. [5]

Contemporary terms and definitions describing the non-lethal weapons

At present, it is widely recognized that the term "non-lethal" refers to the ultimate goal of avoiding fatal accidents and unnecessary destruction. Most countries have formally adopted the term "non-lethal weapons". However, several countries, including USA, still have differences within their own borders - the military community uses "non-lethal weapons", the police - "less lethal weapons" or "minimum force". As noted in [5], even in military circles there has been a significant debate on terminology (the US Army and the Air Force have used the term "non-lethal" weapons, while the US Marine Corps and the Navy - "less lethal"), but ultimately “after many debates, the term that has received benevolence in the Ministry of Defense was "non-lethal"”. This is in line with the conclusion of [1] that “the choice of terminology tends to be along the lines of disciplines rather than countries”.

Similar situation has been observed concerning the NLWs definitions. In support of the conclusion that there is no universally accepted definition for non-lethal force or weapons the authors of [1] point to some examples:

• Australia: Non-lethal (or less-than-lethal) incapacitation means to render a suspect incapable of action by means of force which is highly unlikely to cause death or serious injury when properly applied.

• Germany: Non-lethal weapons is a technical means whose intention is to obviate (prevent or stop) hostile operations without causing death or lasting injury to human beings. In addition, secondary effects caused by the use of those means to innocent people, property, and environment shall be minimized.

• Israel: Weapons intended to cause those upon whom they are used to sustain injury, without either killing them or causing irreversible damage over time. The function of such weaponry is to deter, confine, remove from activity, paralyze, confuse, stop, neutralize, distract, disperse, isolate, remove from focus or deprive entry of people or vehicles [in a given area].

• UK: "Less lethal" is a term carefully defined to encompass weapons and equipment which, although less likely than firearms to result in a serious or fatal injury, nevertheless carry some degree of risk. The objective is to provide the police with options to allow a use of force commensurate with the threat being faced. And also: “Weapons, devices or tactics designed to induce compliance without substantial risk of serious or permanent injury or death”.

Something more, the study of [1] shows that “many versions of the definition of "non-lethal [weapons/force]" exist, even within the various countries surveyed”.

The edited version of the US Department of Defense definition (in DODD 3000.3E, 2013), seems to be the most comprehensive and correct to date (it is already used in some last-years publications): “Department of Defense defines non-lethal weapons as ***weapons, devices, and munitions that are explicitly designed and primarily employed to incapacitate targeted personnel or materiel immediately, while minimizing fatalities, permanent injury to personnel, and undesired damage to property in the target area or environment. Non-lethal weapons are intended to have reversible effects on personnel and materiel***." [6]

The second part of this definitions stresses on the NLWs characteristics: ***“Unlike conventional lethal weapons that destroy their targets principally through blast, penetration and fragmentation, non-lethal weapons employ means other than gross physical destruction to prevent the target from functioning. Non-lethal weapons are intended to have one, or both, of the following characteristics: 1. They have relatively reversible effects on personnel or materiel. 2. They affect objects differently within their area of influence.“*** [6] The latter means that: The targets return to their former state without external help (in case of material targets it is profitable to fully restore their functionality rather than replace them); The NLWs may leave different targets within their radius of effect wholly or partially disabled, or totally unharmed.

Comparing the various definitions it can be noted that each of them reflects one or more of the NLWs purposes: to deter or neutralize targeted persons; not to kill and cause permanent or incidental injury; to have temporary and reversible effect; to cause minimum collateral damage on the property and the environment. Despite the differences and comprehensiveness of their formulation, it is evident that: 1) “All definitions share the mandatory requirement that the intention of non-lethal force includes avoiding death or permanent injuries”. [7]; 2) No definition includes full assurance of the absence of lethal effects.

Purpose, features and potential of NLWs embodied in the contemporary concept of "non-lethal weapons"

It seems that the existing definitions (especially in the presence of differences in their formulation, and the use of different terminology) are not sufficient to build a accurate and complete view of such a complex concept as non-lethal weapons.

Most confusions and incorrect understanding concerning the NLWs conception arouse from the contradiction between term “non-lethal” and definitions which include “minimizing” fatalities, injuries and damages. Furthermore, many official documents point out that NLWs are not risk free. For instance, the NATO Policy on NLWs states NLWs “shall not be required to have zero probability of causing fatalities or permanent injuries”. [8]

It is recognized that some NLWs, especially those used not only in passive and defensive mode but also in active and offensive operations, have the potential to cause serious undesired effects at certain conditions. From other hand, “many lethal weapons, such as rifle bullets and other fragmentation weapons, do not have a 100% lethality rate”. [2]

This requires clarifying a few questions: why these weapons are called "non-lethal", since they pose risks of significant injuries and fatal outcomes; why the risks of such consequences can not be completely eliminated; and, in that case, how they differ from conventional weapons. Some other important peculiarities, which are essential for the NLWs conception, will be further outlined.

A widespread criticism of NLWs is that many of them are not really non-lethal and can be highly painful. “Indeed, even improved NLWs would remain weapons and could be associated with various unpleasant consequences, especially if used in ways calculated to have such consequences”. [9] Undoubtedly, most inoffensive things or technologies can be used with the intent to kill, while powerful lethal weapons can be used in non-lethal actions, such as warning shots or “show of force”. This example supports the perception that not the technology chosen but the user’s intention is decisive for non-lethality. NLWs aim to disable, discourage, detain or repel the opponent without causing severe damage.

The label “non-lethal” has been invented to emphasize the intent of these capabilities. There are no guarantees with non-lethal weapons, “rather they represent a dedicated effort to provide additional options when use of lethal force is not desired”. [10] The zero lethality is a goal, not a guarantee. Therefore, the term "non-

lethal" should be understood as a function of intent. The emphasis on intent is crucial to the concept of the NLWs and determining factor that distinguishes them from conventional weapons.

According to the Strategic plan 2016-2025 of the Joint NLWs Directorate "At its core NLWs are defined by three tenets: Deliver immediate target response; Provide predictable and intended reversible effects; Minimize undesired collateral damage". Desired effects of a lethal weapon system can be described with regard to target lethality in a certain range or on a particular area. "Similarly, a NLW system's desired effects may be described in terms of a non-lethal outcome, such as denying an area or suppressing individuals, at a certain range, for a specified amount of time, or over a particular area. Those effects are further described in terms of reversibility, a unique aspect in characterizing NLW effects". [11]

The key factors determining the effect of a NLW are: the weapon characteristics, the context in which it is used and the targeted subject characteristics.

In general the complex of characteristics of a NLW should provide an appropriate balance between low probability of fatalities or permanent injuries and minimal collateral damage, and a high probability of achieving the desired effects. To reach such a balance, their future development is geared towards providing greater precision, increased range, repeatable/multiple effects, discriminatory effects and possibility of action from stand-off distance. This development is based on systematic research of the non-lethal weapons effects on humans.

The context in which a NLW is applied (building, open, confined space) plays significant role for its effect on target. A NLW which is fully effective and safety under certain conditions, in others may not achieve planned effect or may cause undesirable outcomes. Environmental factors such as time (day/night), weather conditions (rain, snowfall, fog), presence of screens, etc., also can increase or decrease the effect of some non-lethal technologies.

Understanding the effect on humans is momentous in the NLWs concept. Some compare NLWs effects to those associated with therapeutic drugs: both have desirable effects (disabling - therapy) and side effects (permanent damage - side effects). They can be characterized by the so-called "dose-response curves" - the dependence between the power/dose of the applied NLW/drug and the likelihood of response (desirable/unwanted) – *Fig. 1*. The difference between upper and lower thresholds (the "non-lethal envelop") is the boundaries within which a NLW can operate.

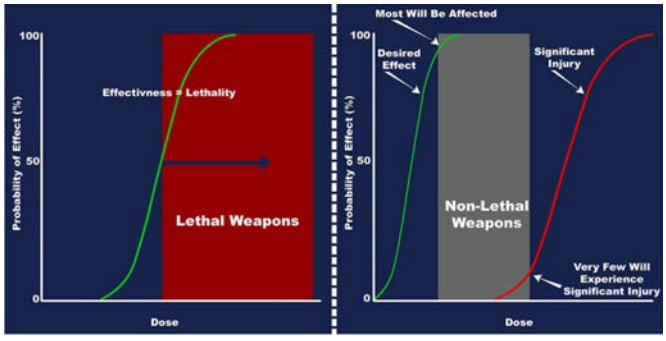

Fig.1. *Lethal and Non-Lethal Weapon Trade Space Comparison. [11]*

For some NLWs this window is narrow and delivering a dose of high impact and high safety is a serious technical challenge. As noted in [12], even with an "ideal" composition, there will be significant obstacles to non-lethality - delivering an effective but safe dose to each person in a given area, regardless of age, weight and health differences and problems of uneven concentrations and cumulative action of the agent. When applying NLWs within the extremely wide range of diverse surroundings and situations, against persons of various physical states, there is always an inherent, not liable to decrease, risk of accidents. [13] For example, a non-lethal mechanism which would produce a slight indisposition to a young soldier in the open air could be fatal for a child in closed room or for an elderly person in poor health. Other variables related to the NLW impact are the targeted person mental health, motivation, whether the person is under the influence of alcohol or drugs, the presence of protective counter-measures, etc.

With respect to incidents resulting from NLWs it should be pointed that "problems are rather in tactics, procedures, policies, training and use of NLWs than in technology itself". [14] There are data that many incidents, including amongst weapons users, are due to improper handling. For example, some NLWs, such as Taser's and kinetic weapons, could cause death if directed at wrong part of the human body (the latter also when used at too close distance).

The conclusion to be drawn is that the possibility of unintended fatalities and injuries always exists irrespective of the advancement of technology, security measures and proper use of the NLWs.

Another difficulty in understanding NLWs concept is related to the impressive diversity of technologies and means covered by this category, which operate on differing physical principles and have various design and applications.

The term "non-lethal" at first look seems to be connected with actions against humans (such as crowds control, people disabling, preventing access to certain areas, removing people from buildings or areas, etc.). However, this term includes also anti-material weapons designed for applications against materiel and infrastructure (such as protection of a given area from entry of vehicles, vessels or aircraft, disabling or neutralization of vehicles, equipment or infrastructure, etc.), though, some non-lethal actions against materials which lead to a structure or vehicle failure could have fatal consequences to personnel as well.

The NLW categorization by technologies also may contribute to the conception ambiguities. Various classifications can be found in the literature sources. Most common classification divides them into: kinetic energy technologies; chemical technologies; directed energy technologies; acoustic technologies; electrical technologies; mechanical (barriers and entanglements). Other classifications merge electromagnetic and acoustic weapons into the category "directed energy weapons" and kinetic weapons and mechanical means – into "kinetical-mechanical". In addition, there are NLWs with combined action - affecting two or more human senses, called "multisensory NLWs", which effects include various kinds of technologies (e.g. light-sound, light-sound-chemical, light-sound-kinetic, etc.), sometimes determined as a separate category.

Finally, the label "weapon" seems quite inappropriate to some means included in the category of NLWs, such as malodorous substances, markers, lubricants, barriers, spikes, ropes for stopping vehicles and vessels, and many others.

It is equally important to clarify what the term "non-lethal weapons" does not include. Although essentially of non-lethal nature, the psychological operations, cyberspace operations and electronic warfare are excluded from the NLWs category. A lethal weapon used in a non-lethal way also does not fall into the scope of the non-lethal weapons.

The Strategic plan 2016-2025 science and technology (to the Joint Non-lethal Weapons Program) [15], specifies the NLWs mission as pragmatic use of force which is intended to minimize the loss of life while achieving the military purposes. The use of NLWs aims: avoiding unintended human casualties; controlled levels of physical injuries; expanded capabilities for commanders.

According to the NATO and US DoD directives [4, 6, 8] non-lethal weapons have the potential to increase the opportunities for: deterring, discouraging, delaying or preventing hostile actions or threats; preventing access to buildings and areas, moving or disposing of persons; stopping, disabling, diverting or preventing access to vehicles; adapting the escalation options to the operating environment; implementing capabilities to temporarily disabling people and equipment; mitigating situations in order to exclude the use of lethal weapons; precise targeting; increasing the efficiency and effectiveness of the lethal agents; capturing or incapacitating high value targets; improving protection of own forces.

Currently NLWs are seen not only as potential opportunities for application but as technologies behind which there is an operational need. It is generally accepted that NLWs create options for controlled actions and can prevent the use of conventional weapons in crisis situations where previously used political, diplomatic, economic and other measures have failed. They can strengthen the deterrent effect, providing opportunities for graded counteraction against a wide range of threats and allow an early, thought-out response by gradual, growing and measured impacts without lethal consequences. NLWs have the potential to hold an intermediate position within the force continuum - somewhere between the non-use of force and the use of lethal force.

Finally, the main question related to the expectations which humanists assign to non-lethality, comes: whether it is possible for NLWs to replace conventional weapons and launch a new era without unnecessary bloodshed and suffering?

Many people are convinced that non-lethal weapons are the most humane weapons. Some see them as an alternative to the conventional, and in the near future, even to nuclear weapons. Others claim that NLWs are not more than an extension of force to fill the gap between warnings and deadly force, and lethal weapons will always be available.

Undoubtedly, NLWs play an essential role in today's law enforcement, peace supporting, anti-terrorist and other operations and will become increasingly relevant in the future. They not only offer a complement to the lethal force, but are capable to completely replace its use in a number of situations. In fact, although very effective for performing various operational tasks, they are not adequate in all cases since their success largely depends on the specificity of the situation and the degree of threat. At present their military application is limited to the use of a narrow range of NLWs, for several reasons, including because they are considered to be insufficiently effective on the battlefield in major armed conflicts. Consequently NLWs can not completely replace the use of lethal force at the current stage.

Conclusion

Existing literary sources concerning different aspects of NLWs indicate that some of their features are still not fully understood by non-specialists and the general public. Uncertainties contained in the different definitions, terminology and classifications significantly contribute to this ambiguity.

Clarifying the concept of NLWs is a complex task requiring consideration of all aspects of the non-lethal weapons. The main features of the NLWs can be briefly summarized as follows:

• The term "non-lethal" refers to the ultimate goal of avoiding fatal accidents and unnecessary destruction which would be caused by conventional weapons used in the same circumstances. The emphasis on intent is crucial to NLWs concept and determining factor that distinguishes them from conventional weapons.

• NLWs use such levels of impact which produce immediate, predictable and planned effect allowing the targeted subject to recover its former functions. They have to disable, discourage, detain or repel the opponent without causing severe damage.

• The effect of a NLW depends not only on technology and weapons characteristics, but also on the context in which it is used, the targeted subject characteristics, the weapon proper use and many other factors. Therefore, there is always a probability of causing undesired outcomes under certain circumstances.

• NLWs create options for controlled actions and can prevent the use of conventional weapons in crisis situations. They can strengthen the deterrent effect, providing opportunities for graded counteraction against a wide range of threats. NLWs fill the gap between the non-use of force and the use of lethal force, holding an intermediate position within the force continuum.

• NLWs are widely employed in law enforcement, peace supporting and other operations, but their capabilities for use in major military conflicts remain underestimated and underutilized.

• NLWs not only offer a complement to the lethal force, but are capable to entirely replace its use in a number of situations. However, NLWs can not completely replace the use of lethal weapons, at least at the current stage.

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