

2015

Introduction to Non-lethal Weapons Markets & Technologies



Homeland Security Research Corp.

Introduction to Non-lethal Weapons Markets & Technologies

August 2015

Homeland Security Research Corp. (HSRC) is an international market and technology research firm specializing in the Homeland Security (HLS) & Public Safety (PS) Industry. HSRC provides premium market reports on present and emerging technologies and industry expertise, enabling global clients to gain time-critical insight into business opportunities. HSRC's clients include U.S. Congress, DHS, U.S. Army, U.S. Navy, NATO, DOD, DOT, GAO, and EU, among others; as well as HLS & PS government agencies in Japan, Korea, Taiwan, Israel, Canada, UK, Germany, Australia, Sweden, Finland, Singapore. With over 750 private sector clients (72% repeat customers), including major defense and security contractors, and Fortune 500 companies. HSRC earned the reputation as the industry's Gold Standard for HLS & PS market reports.

**Washington D.C. 20004, 601 Pennsylvania Ave., NW Suite 900,
Tel: 202-455-0966, info@hsrc.biz, www.homelandsecurityresearch.com**

Table of Contents

1	Executive Summary	Error! Bookmark not defined.
1.1	Major Findings	Error! Bookmark not defined.
1.2	Major Conclusions	9

List of Tables

Table 1 - Major NLW Technologies.....	8
---------------------------------------	---

List of Figures

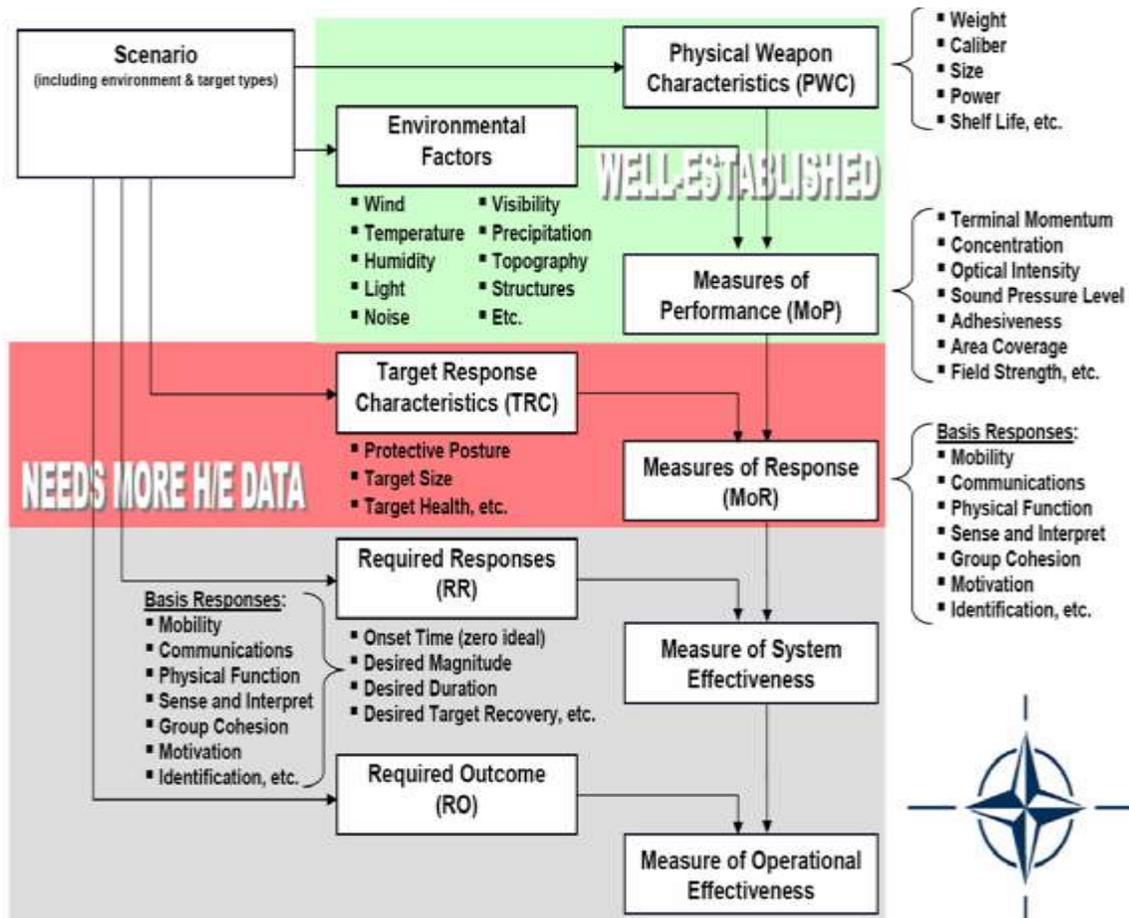
Figure 1 - NLW Measures of Effectiveness Framework.....	6
---	---

1 Key Facts

- ❑ Non-lethal Weapons are 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 NLW to innocent people, property, and environment shall be minimized.
- ❑ Interest in non-lethal weapons has grown significantly all over the world, during the past decade. Shifts in the strategic environment and the nature of warfare and law enforcement are among the reasons for this increased interest and market
- ❑ Technological advances have facilitated the development of new types of non-lethal weapons, in view of these rapid changes in the field
- ❑ The use of non-lethal weapons (NLW) provides a set of moderate options in cases of violent conflicts between the uses of diplomacy and psychological means and the use of lethal force. NLW provides a valuable alternative for law enforcement and military commanders to use less-lethal means between the other options of “Shout And Shoot”. Non-lethal weapons provide flexible options to avert violent scenarios by creating time and space, control the level of violence and fills the gap in the options between diplomatic and lethal force.
- ❑ NLW have been available for use over the last three decades. Media and political establishment discussions have often focused on the risks and problems associated with NLW technologies. But it is also important to consider its benefits.
- ❑ The US DoD defines NLW as those means that are “explicitly designed and primarily employed to incapacitate personnel or material while minimizing fatalities, permanent injury and undesired damage to the property and environment.”
- ❑ In asymmetrical warfare and terror events, adversaries seek to shape conditions to their advantage. Their tactics will try to change the nature of the conflict or use capabilities that they believe are difficult for the blue forces to counter. They will use complex terrain, human shield and populated urban environments and force dispersal methods to offset the advantages of blue forces.
- ❑ When properly used, non-lethal weapons result in no injuries, fatalities or after effects. When used in military and law enforcement applications, non-lethal weapons are useful in crowd control and riot situations where hostile forces take cover in crowds, in operations in urban terrain, in anti-terrorist actions where they minimize collateral damage, in counter-terror activities, or in hostage situations.

- ❑ Less-lethal weapons provide police with a wider range of options to choose from in dealing with persons who resist police authority in various situations—in some cases because they have a mental illness or are under the influence of drugs. Each new less-lethal weapon brings its own set of advantages and limitations that must be managed if officers are to choose the best options in a given situation.
- ❑ Non-lethal means enable a visible demonstration of intent or disruption of war fighting, public violence and crime related law enforcement with minimal casualties and material damage. NLW offer a potentially powerful and flexible coercive tool that can be applicable across a range of military options, crowd control and law enforcement.
- ❑ Most contemporary armed conflicts are asymmetrical thereby requiring cooperation with combined and joint forces and enmeshing a multitude of NLW and lethal weapons adapted to local, social and cultural differences of the conflict.
- ❑ NLW have inherent characteristics of precision effects, selectivity of engagement, and versatility. The ability to control weapon effects and minimize violence creates a flexible military capability that can respond across the spectrum of conflict.
- ❑ Non-lethal options enable intervention at a lower threshold of conflict. Early intervention may reduce the cost of intervention and the risk of escalation. NLWs have utility in major combat operations. In the near future, some non-lethal capabilities may actually exceed those of lethal forces, particularly in the area of chemical, biological, and nuclear counter-capability.
- ❑ Employment of NLW is most effective as part of a synergistic strategy. The non-lethal strategy must be closely coordinated and executed in conjunction with the respective political and economic efforts. The combined effects produce a powerful, coercive tool to achieve national policy goals without incurring the risks of traditional military actions.

Figure 1 - NLW Measures of Effectiveness Framework



(Source: NATO)

- ❑ Non-lethal technologies are not usable in all situations. The success of non-lethal technologies is dependent on the specific situation, political goals, and the identified vulnerabilities of the threat.
- ❑ Multi-billion NLW RDT&E funding, driven by the war in Iraq and Afghanistan by the US by DoD and DOJ, failed to meet the techno-tactical NLW needs of the US coalition lead forces.
- ❑ Most less-lethal weapons adopted during the past ten years by the defense establishment and law enforcement bodies are “commercially off-the-shelf” (COTS) available products developed in the past by the private sector. For example, the major developers and manufacturers of kinetic launchers and ammunition are companies like Defense Technology Corporation, Combined Tactical Systems (which sells Combined Systems, Inc., products), and NonLethal Technologies, Inc.
- ❑ Military personnel are now involved in many operations other than traditional wars. Such operations may require military personnel to

perform duties where current military skills and equipment may not be appropriate, e.g. tasks routinely undertaken by police officers. NLW may enable military personnel to take action that is more appropriate in such situations.

- ❑ Non-lethal weapons are becoming more widely applicable across the conflict spectrum. This is due to the locus of war shifting from the battlefield to urban areas. The world is becoming more urban. Urban dwellers are forecasted to reach four billion by 2025, or 61 percent of the world population. Moreover, the Armed Forces will be unable to avoid built up areas in maneuver warfare. Urban warfare poses unique problems for less discriminating and catastrophic use of force. Non-lethal weapons will be vital in urban warfare.
- ❑ The past years were challenging for the NLW industry and its customers. The core law enforcement customers faced significant economic constraints with imposed budget cuts requiring force reductions.
- ❑ There has been an increase in the number of companies that manufacture and trade Non-Lethal equipment; today, approximately 450 companies in 52 countries manufacture NLW systems.
- ❑ There are three NLW core capabilities and eight functional areas:
 - Counter-personnel
 - Crowd Control
 - Incapacitate Individuals
 - Deny Area to People
 - Clear and control Facilities/Structures/Areas
 - Counter-material
 - Area Denial to Vehicles (land, sea, and/or airspace)
 - Disable/Neutralize Vehicles, Vessels, Aircraft, and Equipment
 - Counter-capability
 - Disable/Neutralize threats
 - Deny Use of Weapons of Mass Destruction
- ❑ NLW technologies are presented in brief in the following figure.

Table 1 - Major NLW Technologies

Electromagnetic					
Electrical	Radio Frequency	Microwave Frequency	Infrared	Visible Light	Ultraviolet
Direct current	RF devices	High power microwave	Chemical oxygen iodine lasers	Argon Lasers	Laser Ionizer
Pulsed current	Wide/ ultrawide band	Millimeter wave	Hydrogen/ deuterium fluoride lasers Solid state lasers	Isotopic radiators Flashes, flares, and strobes	

Mechanical and Kinetic	Acoustic	Ancillary	Chemical
Blunt Impact Devices	Audible/Optical	Markers	Riot Control Agents
Barriers	Audible	Encapsulants	Foams
Entanglements	Ultrasound	Non-lethal casing	Anti - traction Malodorants Obscurants Nanoparticles Thermobarics Reactants

2 Conclusions

- ❑ Non-lethal weapons have been used effectively around the globe. Political and cultural factors have significantly affected individual countries' policies and practices.
- ❑ The greatest single factor in whether a weapon is truly non-lethal is not how it was made but how it is used. Accordingly, knowledge in how best to employ a particular NLW system is a critical component for both effectiveness and safety.
- ❑ Over the next ten years, the non-lethal weapons market is forecasted to emerge as a key domain for asymmetric warfare and law enforcement technology providers. Governments worldwide have undoubtedly understood the function of non-lethal weapons following lessons learned in Iraq, Afghanistan. Unforeseen street riots and mass demonstrations over the last decade have revealed the loopholes in the security dogma of the 21st century. As a result, many governments have entered into non-lethal weapons RDT&E and NLW procurement dedicated to the full spectrum of public safety, law enforcement, crowd control and asymmetric warfare.
- ❑ Although some future conflicts may emerge as conventional wars, it is essential that armed forces have an appropriate arsenal of non-lethal weapons available to accomplish their missions. Sending them into such situations armed only with conventional weapons is highly problematic.
- ❑ The 2001-2011 armed conflicts in Iraq and Afghanistan, the turmoil in the Arab world, violent events like the August 2011 UK streets violence and the Israeli- Palestinian conflict drove governments, police and defense decision makers to seek cost-effective NLW means. These decision makers understand that the 21st century "New Media" limits the use of lethal weapons and a new generation of NLW is desperately needed.
- ❑ Asymmetrical violent conflicts, including asymmetrical wars, crowd control and law enforcement require three categories of means to mitigate the conflict. Psychological warfare, including diplomatic measures, Non-lethal weapons and lethal weapons enmeshing a multitude of new NLW technologies adapted to social and cultural differences.
- ❑ There is a growing demand from combatant commanders, law enforcement officers and political establishments for NLW capabilities. This demand is driven by the need to help them win the hearts and minds of non-combatant population and prevent world outcry and media attention due to non-combatant casualties.
- ❑ With regard to military scenarios, the last few years have seen a shift in the use of NLW from police operations like crowd riot control to military

missions such as the protection of fixed military installations and mobile military equipment or the operations themselves. In practice this means, for example, camp or convoy protection or control of check points.

- ❑ Current non-lethal weapons have been developed to work at ranges typical for crowd riot control situations; the new operational challenges indicate a need for non-lethal capabilities with much longer ranges. Besides this, accuracy and effectiveness at such distances pose a significant challenge.
- ❑ The availability of NLW has increased, thus resulting in greater choice and also a need to carry more equipment to exploit this capability. The current challenge is to continue offering these options - or even to improve and expand them - and provide scalable effects within one weapon. Emerging trends in development include adaptive NLW, platforms, handheld weapons and munitions.
- ❑ There are still situations in which NLW are inadequate to fill the capability gap, for example in preventing suspected suicide bomber attacks.
- ❑ NLW are not a universal replacement for lethal capabilities.
- ❑ Terrorism as a norm raises questions concerning collateral casualties. Recent events in many places in the world have demonstrated that terrorists can and do strike in heavily populated areas. In such attacks, it is difficult to react to terrorists while insuring the safety of innocent civilians who become unwilling participants of hostages. Therefore, it is essential that the development of incapacitating agents be dramatically accelerated.
- ❑ NLW may improve local economies as terrorism rises. When people are insecure, they reduce their activities and often stay at home. A wider use of NLW can provide an improved sense of security, thus leading to stronger local economies.

More information can be found at:

[Non-Lethal Weapons \(NLW\): Industry, Technologies & Global Market - 2014-2020](#)