Department of Defense
Non-Lethal Weapons Program

Overview for the Thesis Research Working Group

John P. Keenan
Principal Deputy, Technology Transition and Integration
Joint Non-Lethal Weapons Directorate (JNLWD)
Quantico, VA
21-24 March 2016

http://jnlwp.defense.gov
DoD Non-Lethal Weapons Program

DoD NLW Program Established 1996

• Operation United Shield (Somalia): General Anthony C. Zinni pioneered use of NLW

• FY96 National Defense Authorization Act directed DoD to centralize responsibility for NLW

Vision

“A fully integrated non-lethal competency within each Service, to complement lethal effects, enhance the Joint Force's adaptability, and support strategic objectives that include minimizing civilian casualties”

Program Highlights

• CMC designated Executive Agent
• Joint research and development funding
• Services responsible for NLW procurement

Non-Lethal Weapons

Applicability across “New Normal” scenarios
• Humanitarian Assistance/Disaster Relief
• FOB/Area Security/Security Cooperation
• Stability Operations

Non-Lethal capabilities assist operating forces in minimizing civilian casualties and collateral damage
DoD NLW Program Organization

USD(P)  
*Policy Oversight*

USD(AT&L)  
*Principal Oversight*

DoD NLW Program Executive Agent  
*CMC*

Chairman, JNLW Integrated Product Team  
*(DC PP&O)*

Joint Non-Lethal Weapons Program

Col Michael Coolican

Ms. Witkowsky  
Office of Special Operations/ Low Intensity Conflict

Mr. Gonzalez  
Office of Land Warfare and Munitions

General Neller

LtGen Bailey

Service-Unique Non-Lethal Weapons Programs

Service S&T  
Direct Oversight

Service RDT&E

Service Procurement

Service O&M

Joint Non-Lethal Weapons Directorate

Joint S&T  
Coordination

Joint R&D

DoD Non-Lethal Weapons Program

DoD NLW Program Organization

Distribution A: Approved for public release; distribution unlimited
Joint Non-Lethal Effects (JNLE) Tasks

**Top Ten Tasks**

1. Stop Vehicle (small, confined, single)
2. Stop Vehicle (medium, confined, single)
3. Stop Vehicle (large, confined, single)
4. Stop Vessel (small, confined, single, [friendly anchored])
5. Suppress Individuals (confined, single/few)
6. Suppress Individuals (open, many)
7. Stop Vessel (small, open, single, [friendly underway])
8. Deny Access into/out of an area to individuals (confined, single/few/many)
9. Deny Access into/out of an area to individuals (open, single/few/many)
10. Move Individuals through an area (open, many)

**JCIDS – Joint Non-Lethal Effects ICDs**
- Joint Capabilities Document signed February 2008
- CP & CM Initial Capability Documents signed April 2009
- Joint Non-Lethal Effects Tasks re-validated in 2013

**Counter-Personnel Tasks**
- Deny
- Move
- Disable
- Suppress

**Counter-Materiel Tasks**
- Stop Vehicle
- Disable Vehicle
- Stop Vessel
- Disable Vessel
- Stop Aircraft on Ground
- Disable Aircraft on Ground
- Divert Aircraft in Air
- Deny Access to Facility

**Capabilities Based Assessment Membership**

<table>
<thead>
<tr>
<th>J2/J3/J8</th>
<th>PACOM</th>
<th>USA</th>
<th>JNLWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>JFCOM</td>
<td>CENTCOM</td>
<td>USCG</td>
<td>OSD AT&amp;L</td>
</tr>
<tr>
<td>EUCOM</td>
<td>STRATCOM</td>
<td>USMC</td>
<td>HECOE</td>
</tr>
</tbody>
</table>
JNLWP FY16 S&T Portfolio

### Non-Lethal Effect Competency

#### Counter-Materiel

- Develop and demonstrate capabilities to stop/disable vehicle, vessels and other materiel targets.
- Improve the operational utility of emerging counter-materiel DE systems.

#### Counter-Personnel

- Extend the range and improve the operational suitability of counter-personnel non-lethal capabilities.

#### Human Effects and Effectiveness

- Conduct applied research and develop models to characterize non-lethal effects, effectiveness and risk of injury.

---

### Projects

<table>
<thead>
<tr>
<th>Projects</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel Stopping Prototypes</td>
<td>HPM System Technology</td>
</tr>
<tr>
<td>Polymer Kelp</td>
<td>System Attack</td>
</tr>
<tr>
<td>RFVS Multi-Frequency</td>
<td>System Attack - Maritime</td>
</tr>
<tr>
<td>UUV Maritime Disablement Ops</td>
<td>Wide Area Scalable Effects Platform</td>
</tr>
<tr>
<td>Solid State Active Denial Technology</td>
<td>Compact Active Denial Technology</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Human Effects Modeling &amp; Analysis Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA-2 Funded</td>
</tr>
<tr>
<td>BA-3 Funded</td>
</tr>
</tbody>
</table>

---

**JNLWP Science and Technology Program**

The JNLWP S&T Program provides fundamental non-lethal effects research and matures promising technology solutions to identified capability gaps.

**MANAGER**

Alicia Owsiak  
Deputy Division Chief, Technology Division  
(703) 432-1823  
aricia.owsiak@usmc.mil

**NEAR-TERM DECISIONS and TRANSITIONS**

<table>
<thead>
<tr>
<th>Vessel Stopping Prototypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platform integration study and target characterization/validation in support of prototype user evaluation on USCG cutter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compact ADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 KW Skid Plate Demonstrator Path Forward</td>
</tr>
</tbody>
</table>

**Distribution A: Approved for public release; distribution unlimited**
• **Human Effects**: recognized as a critical issue in NLW development
  • Department of Defense Instruction (DoDI) 3200.19 - signed May 17, 2012

  • **Effectiveness**: The extent to which intended effect is achieved
  • **RSI**: The likelihood that a NLW system will cause a significant injury given the intended use
Previous NLW-Related Thesis Topics

• An Exploration of Equipping a Future Force Warrior Small Combat Unit With Non-lethal Weapons (June 2006)
   Author: Larry N. Wittwer; Advisor: Thomas Lucas

• Effectiveness of NL Capabilities in a Maritime Environment (Sept. 2006)
   Author: Lisa R. Sickinger; Advisor: Susan M. Sanchez

• Viable Short-Term Directed Energy Weapon Naval Solutions: A Systems Analysis of Current Prototypes (June 2013)
   Author: Team Bravo / Cohort 19; Advisor: Gary O. Langford
Suggested Topics for Research Sponsorship

Rules of Engagement for Non-Lethal Weapons

• **Research Objectives**: Identify/develop Rules of Engagement to support the use of less-than-lethal levels of force, in situations where the use of lethal force is not appropriate/authorized for military forces during noncombat operations (HA/DR, Stability Ops, etc).

A Methodology to Assess Probability of Injury and Effect for Non-Lethal Area Weapons

• **Research Objectives**: Summarize the mathematical and statistical "best practices" for lethal area weapons, and apply those methods, where appropriate, to assessing probability of injury and effect for non-lethal area weapons.

A Methodology to Assess Mission Effectiveness of Emergent Non-Lethal Weapons

• **Research Objectives**: Develop a methodology to analyze and evaluate, possibly using modeling and simulation, the contribution of emergent NL capabilities to applicable missions, such as vessel visit, board, search and seizure, clearing structures, vehicle checkpoint security, counter-piracy, stability operations, and humanitarian assistance/disaster relief, etc.

A Methodology to Assess the Marginal Utility Associated with Design Parameter Trade-Offs of Emergent Non-Lethal Capabilities

• **Research Objectives**: Develop an analytic assessment tool utilizing a systems approach which clearly articulates tradeoffs associated with emergent NL Systems to aid requirements analysis and investment decisions.

Distribution A. Approved for public release; distribution is unlimited
DoD Non-Lethal Weapons Program Summary

• Provide operating forces with escalation-of-force options while minimizing casualties and collateral damage

• Always have lethal force overwatch/back-up

• Help fill the gap between shouting and shooting

• Offer options across the full spectrum of conflict

Contact Info: John Keenan, Joint Non-Lethal Weapons Directorate
John.keenan2@usmc.mil  Comm: 703-432-0893   DSN: 378-0893
Back-Ups
Previous NLW-Related Thesis Topics
(Abstracts)

An Exploration of Equipping a Future Force Warrior Small Combat Unit With Non-lethal Weapons (June 2006)
Author: Larry N. Wittwer; Advisor: Thomas Lucas

The U.S. military has an increasing requirement to prepare for and conduct urban operations (UO). This UO requirement spreads across the spectrum of conflict, from high intensity combat to peacekeeping and humanitarian missions (Stability and Support Operations—SASO), often simultaneously. Regardless of which portion(s) of the warfare spectrum U.S. forces are involved in, urban engagements are inevitable and present major challenges. Superior standoff weapons ranges and combined arms tactics are quickly negated in the confined terrain of a complex and usually unfamiliar urban environment. Often considerably more challenging is the ability to differentiate the enemy from noncombatants—endangering our Soldiers and their mission. Conventional forces, armed only with traditional weapons, normally have two options: the threat of a violent response (passive) or the use of deadly force (active). These two extremes have virtually no middle ground. The reluctance of military and/or peacekeeping forces to employ deadly force on unconfirmed enemy targets creates a vulnerability. This vulnerability may be mitigated by equipping a small combat unit (SCU) with a viable alternative to deadly force—non-lethal weapons (NLWs).

Using an imperfect friend or foe identification modeling framework within an agent-based simulation (ABS), an NLW is essentially used to interrogate (determine the intent of the person in order to identify friend or foe) rather than attempt to incapacitate a target. To determine the impacts of employing NLWs in an urban combat environment (with civilians on the battlefield), three factors were varied across 15 design points: the ability of U.S. military forces to positively identify a target, the range of the selected NLW, and the distribution/number of NLWs in an SCU. By replicating each design point and analyzing the resulting output data, the following insights were determined: the use of NLWs does not degrade U.S. survivability; NLWs are essential to neutralizing suicide attacks; and NLWs decrease civilian casualties.

Distribution A. Approved for public release; distribution is unlimited
Effectiveness of NL Capabilities in a Maritime Environment (Sept. 2006)
Author: Lisa R. Sickinger; Advisor: Susan M. Sanchez

The attack on the USS Cole within a civilian port, and the increased threat of pirating and terrorism on the high seas underscores the immediate need for a maritime non-lethal capability. This research uses modeling and simulation to explore the requirements and tactical use of non-lethal capabilities in a maritime force protection mission. Specifically, a multi-agent simulation emulates a tactical-level mission in which a U.S. Navy vessel returning to Naval Station, Norfolk, VA, encounters a variety of maritime surface threats. Data farming is the method used to address the research questions by applying high performance computing to the simulation model, with the intent of examining a wide range of possibilities and outcomes. The non-lethal capabilities are analyzed in their effectiveness to 1) determine intent, 2) deter inbound surface vessels, and 3) engage targets identified as hostile through the continuum of force.
Previous NLW-Related Thesis Topics
(Abstracts)

• Viable Short-Term Directed Energy Weapon Naval Solutions: A Systems Analysis of Current Prototypes (June 2013)
   Author: Team Bravo / Cohort 19; Advisor: Gary O. Langford
   With conventional weapons nearing their peak capability, the need to identify alternative war fighting solutions suggests a look at Directed Energy Weapons (DEWs). The goal is to change the means by which warfare is conducted to improve operational efficiencies and overall effectiveness. The Naval Postgraduate School Systems Engineering and Analysis (SEA-19B) Capstone project team examined how existing directed energy technologies can provide performance across multiple warfare area domains and mission subsets for the U.S. Navy. The aim was to identify and characterize the capability gaps with conventional weapons systems, produce a coherent vision of naval missions that incorporate DEWs, and generate a roadmap for a DEW fleet. By conducting a thorough Analysis of Alternatives based on system performance, integration, schedule, and cost, the project team identified that the Tactical Laser System (with a laser beam power of 10 kW) provided the best overall capability to defend surface combatants, although none of the analyzed DEWs have the capability to replace a current conventional weapon. The Active Denial System (microwave) provided a niche capability in the Anti-Terrorism/Force Protection mission set.

Distribution A. Approved for public release; distribution is unlimited