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**CENTRE FOR CONFLICT RESOLUTION**  
Department of Peace Studies University of Bradford

**BRADFORD  
NON-LETHAL WEAPONS  
RESEARCH PROJECT**

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**Geneva Forum  
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**NLW Presentation**

Today We Will

- Define Non-Lethal Weapons
- Look at why there is an increasing interest in NLWs
- Review key non-lethal technologies
- Identify NLW impacts (human effects, conventions, civil liberties)

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**What is a Non-Lethal Weapon?**

**A NLW is explicitly designed, and primarily employed, to incapacitate people or materiel while minimising fatalities or permanent injury and undesired damage to property and the environment**

Policy for Non-Lethal Weapons, United States Department of Defense, Directive No.3000.3, 9 July 1996.

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## Non-Lethal Weapons

Also referred to as:

- Less-lethal weapons
- Pre-lethal weapons
- Disabling/Incapacitating
- Soft-kill
- Worse-than-lethal
- Weapons which do not cross the death barrier

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## Why the Growing Interest in Non-Lethal Weapons? - 1

- qualitative advances in non-lethal weapons technology, including dual-use technology applications in civilian/military operations.
- a need to find alternatives to lethal methods in peacekeeping operations.
- situations in which combatants and non-combatants are mixed together, sometimes deliberately.

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## Why the Growing Interest in Non-Lethal Weapons? - 2

- increasing resistance by domestic constituencies to accept deaths in war operations
- requests from civilian law enforcement agencies and prison services for non-lethal arrest and restraint techniques
- the concept of being able to fight a 'bloodless and humane' war

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### Why the Growing Interest in Non-Lethal Weapons? - 3

- the presence of international media in war zones and civil disturbances recording the brutality of violent conflict and responses to it
- an increasing role for military forces in operations other than war (OOTW) and military operations in urban terrain (MOUT), including peacekeeping operations.

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### Why the Growing Interest in Non-Lethal Weapons? - 4

- debates concerning the 'revolution in military affairs', the 'revolution in military technology', and the 'revolution in political affairs'.

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### Why the Growing Interest in Non-Lethal Weapons? - 5

- For use in terrorist incidents especially during hostage taking situations such as:
  - civilian aircraft
  - buildings (eg. Moscow Theatre siege)
  - public transport

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## Non-Lethal Technologies

- Kinetic Energy
- Barriers and Entanglements
- Electrical
- Acoustic
- Directed Energy
- Chemical
- Biological
- Combined Technologies
- Delivery Systems



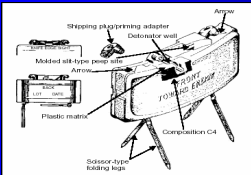

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## Kinetic Energy - 1

- Truncheons 
- Plastic and Rubber Bullets (Sponge Tipped)  
- Bean Bags 

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## Kinetic Energy - 2

- Rubber Balls  
- Modular Crowd Control Munition  

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### Barriers and Entanglements

- Ground Vehicles
- Individuals
- Building Access
- Surface Water Vehicles



The slide features three small images at the bottom. The first image shows a green van being pushed or pulled by a person. The second image shows a similar scene with a different angle. The third image shows a person in a white shirt being captured by another person in a dark shirt, with the word 'Capture' written in red below the image.

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### Electrical - 1

- Stun Guns
- Electrical Batons
- Electrified Shields
- Electrified Nets
- Electrified Water cannon
- 'Sticky Shockers'
- Stun Belts
- Taser Guns
- Landmines

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### Electrical - 2

<p>'Sticky Shocker'</p> 	<p>Stun Gun</p> 	<p>Stun Baton</p> 
<p>X26 Taser</p> 		<p>X26 Taser Electrical darts</p> 


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### Electrical - 3

Electric Shield



Electric Net



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### Acoustic - 1

- Infrasound, ultrasound, and audible sound
- Sirens, whistles, loud music, explosives
- Directed sound
  - ‘Sonic Firehose’
  - Directed Stick Radiator
  - Long Range Acoustic Device (LRAD)
- Vortex generators - acoustic projectiles

Sonic Firehose



Early Prototype Vortex Generator



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### Acoustic - 2

- Long Range Acoustic Device (LRAD)
  - Being tested in Iraq by US Marine Corps
  - Can be used for loud verbal warnings
  - Can direct high pitched, directed, piercing tone (2,100 - 3,100hertz, up to 150 db)
  - Should only be used in short bursts
  - Range 300 yards or less




Developed by American Technology Corp  
Source: [www.cnn.com](http://www.cnn.com)

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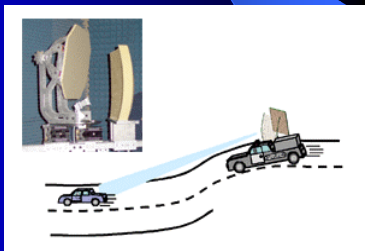
### Directed Energy - Electromagnetic

- VMADS - Vehicle Mounted Active Denial System (electromagnetic energy)
- High Power Microwave Vehicle Stopper

VMADS



HPM Vehicle Stopper (SARA)



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### Directed Energy - Laser - 1

- 'Dazzlers' and 'Illuminators'

Saber 203



Laser Dazzler



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### Directed Energy - Laser - 2

Advanced Tactical Laser (ATL) - anti-materiel



Pulsed Energy Projectile - anti-personnel



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## Chemical

- Riot Control Agents (irritants/lachrymators)
- Incapacitants ('calmatives')
- Malodorants ('skunk shots')
- Anti-materiel (embrittlement, caustic, corrosive, fuel contaminants)
- Anti-traction (slippery foams, adhesives)



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## Riot Control Agents - Irritants

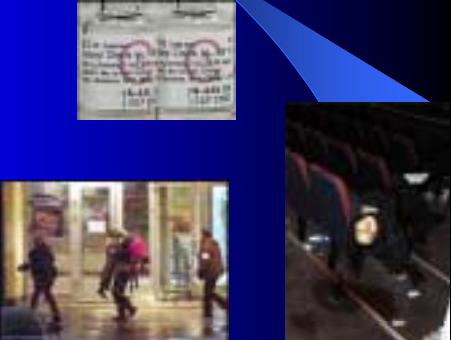
- CN, CS and CR gas
  - CN gas causes a flow of tears and itching skin.
  - CS gas causes a heavy flow of tears, respiratory discomfort, coughing, stinging, or burning on moist skin, sinus irritation.
  - CR is the strongest variant of these RCAs.
- Oleoresin Capsicum (OC) or "pepper spray"
  - Naturally occurring irritant compound produced by pepper plants.
- PAVA
  - Synthetic version of OC. Increased potency.



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## Incapacitants / Disabling Chemicals - 1

- Classes of compound under consideration:
  - Opioid analgesics (fentanyl & analogues)
  - Sedatives
  - Anaesthetics
  - Anxiolytics
  - Anti-psychotics
  - Anti-depressants
  - 'Club' drugs



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## Incapacitants / Disabling Chemicals - 2

- Long history - Cold War
- Increasing interest - Sept 11, Moscow 2002
- Technological drivers
  - Neuroscience - increased understanding of chemical transmission in the brain
  - Genomics and receptor systems - new targets
  - Combinatorial chemistry - new agents
- Pharmaceutical Industry
  - Drug development for mental illnesses
- The future..... more agents affecting:
  - perception, sensation, cognition, emotion, mood, volition, bodily control, or alertness. <sup>1</sup>

1 Wheelis, M. (2002) Biotechnology and Biochemical Weapons. *The Nonproliferation Review*. Volume 9, Number 1.

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## Biological

- Anti-materiel agents
  - Micro-organisms that degrade various substances (metal, rubber, explosives, fuel etc.)
- Drug crop pathogens
  - Coca in Columbia
  - Opium poppy in Afghanistan
- ‘Taggants’
  - Genetically engineered fluorescent micro-organisms to mark targets

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## Combined Technologies

- Multi-Sensory Incapacitation  
**sight, sound, taste, smell, touch**
  - Pepperball System (Chemnetics: Kinetic and Chemical)
  - Water Cannons (Kinetic, Electrical, Chemical)
  - Ring Airfoil projectile (Kinetic and Chemical)
  - Multi-Sensory Grenade
    - In development for US Marine Corps combines sound, light, and odour.
    - Source: sara.com



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## Delivery Systems

- **Encapsulation**
  - Similar to a paintball



- **Microencapsulation (1 micron - 1mm)**
  - Incapacitants, malodorants, anti-materiel agents
  - Controlled release
- **Non-lethal munitions**
  - 81mm Non-lethal mortar (25m<sup>3</sup> coverage, 2.5km range)
  - Rifle-launched, non-lethal cargo dispenser

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## Delivery Systems: Unmanned Vehicles

**Aerial Vehicles (UAVs)**  
**Dragon Drone**



**Surface Watercraft (USVs)**  
**Roboski**



**Ground Vehicles (UGVs)**  
**Gladiator**



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## NLW Research & Development

- **Military**
  - Joint Non-Lethal Weapons Directorate (JNLWD) [US]
  - Defence Science and Technology Laboratory (Dstl) [UK]
- **Law enforcement**
  - National Institute of Justice (NIJ), Department of Justice [US]
- **Academia**
  - Institute for Non-Lethal Defense Technologies (INLDT), Penn State University [US]
  - Non-Lethal Technology Innovation Center (NTIC), University of New Hampshire [US]
- **Private sector**
  - Various companies

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## Human Effects

- Lack of data on human effects for new technologies
- Lack of independent research
- Recognition of these issues in the military and law enforcement fields
  - Human Effects Advisory Panel (HEAP) formed at INLDT, Penn State University in 1998.
  - NATO Panel - report forthcoming: *Human Effects of Non-Lethal Technologies*.

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## Implications for International Law - 1

David Fidler provides us with an analytic framework with which to analyse the relationship between NLWs and IL.

- Compliance Perspective
- Selective Change Perspective
- Radical Change Perspective

Source: David Fidler. 'Non-Lethal Weapons' and International Law. Lewer, N (Ed)., 2002.

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## Implications for International Law - 2

- **Compliance Perspective**

Places obedience to existing rules of international law above NLW development and use, even if this prevents certain NLWs or deployment. Does not accept that the changing nature of warfare and war fighting technologies undermines the existing moral and legal principles regulating the use of force and armed conflict.

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### Implications for International Law - 3

- **Selective Change Perspective**

Posits that IL should, in certain situations, have different rules for NLWs than for lethal weapons. Does not hold compliance with existing IL in high esteem because warfare and war-fighting technologies are have, and will continue, to change. NLWs need to be clearly defined so that particular parts of IL regimes can be changed on a case-by-case basis.

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### Implications for International Law - 4

- **Radical Change Perspective**

As NLWs become more sophisticated and powerful, their potential may alter how experts look at the morality and legality of humanitarian intervention, anticipatory self-defence, and enforcement actions. The underlying military and humanitarian reasons for developing and using NLWs, combined with the successful development of NLW technologies, will have radical implications for IL.

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### Books



The slide displays six book covers arranged in two rows of three. The top row includes 'The Rise of Non-Lethal Warfare' (green cover), 'Non-Lethal Weapons' (green cover), and 'Future Warfare' by Tom Clancy (yellow cover). The bottom row includes a red cover, a blue cover, and 'An Assessment of Non-Lethal Weapons Science and Technology' (brown cover).

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