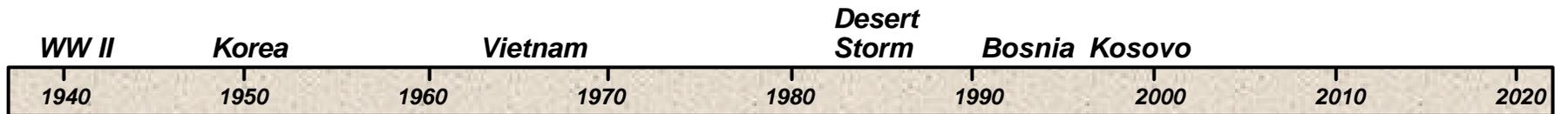
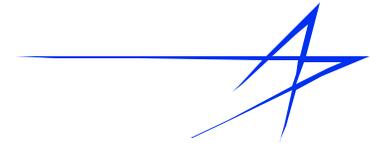




The
Operational Employment
of
Non-Lethal
Capabilities

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The Changing Face of Military Engagements



War ...

- Conflicts
- Humanitarian
- Peacekeeping
- NATO Interventions
- Counter in Surgency
- Anti-Terrorism
- Urban War



“Destroy the Enemy War Machine”

- His Weapons
- His Troops
- His Infrastructure
- His Will



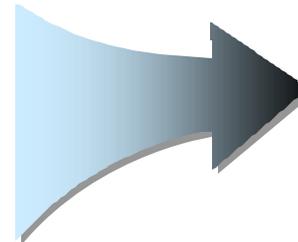
- Widespread Combatant Casualties
- Widespread Friendly Casualties
- Widespread Civilian Casualties
- Widespread Collateral Damage

“Neutralize the Adversary”

- His Weapons
- His Troops
- His Infrastructure
- His Will



- Minimum Casualties (Combatant and Non-Combatants)
- Minimum Collateral Damage



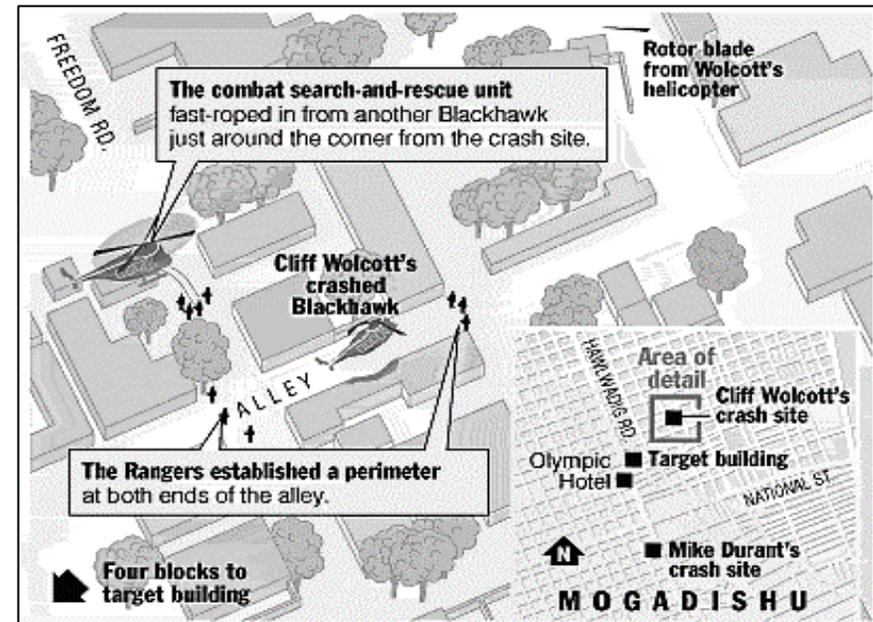
Superior Technology and TTPs Win!

Lessons Learned In the Changing Face of Conflict



Somalia, Chechnya, and Kosovo Have Demonstrated That:

- Platform Superiority Does Not Ensure Certain Military Success
- Collateral Damage and High Casualties Both “Ours” and “Theirs” Are Unacceptable
- An Uncertain “Victory” Does Not Mean Success Or Peace



Nature Of Threat In The 21st Century Is Recognized

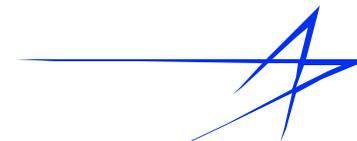


- ⌚ To Blunt The Effectiveness Of Overwhelming Lethality Hostile Elements Will Use Complex And Urban Terrain
- ⌚ Economic, Political, Public Opinion, And Ethical Requirements Will Not Accept Burning A City To The Ground To Save It
- ⌚ In The Urban Environment Collateral Damage And Casualties In the Non-Combatant Population and Friendly Forces Must Be Minimized
- ⌚ An Expanded Operational Capability Will Be Required To Satisfy These Requirements And Ensure Political/Military Success

“To ensure the US military has the ability to effectively operate on the urban battlefield, the CINCs and Services must continue to expand their present efforts of study and understanding of the urban environment and must develop an integrated approach that optimizes key warfighting capabilities for future operations on urban terrain.”

--DPG Pg 86

Joint Vision 2010 And Service Visions Are Preparing



Threat

- *Global War Threat Receded*
- *Regional Conflict Remains Possible*
- *Weapons of Mass Destruction Major Concern*
 - *Several Unpredictable Threats*

National Military Strategy

- *Shape, Respond, Prepare Now*

Joint Vision 2010

- *Dominant Maneuver*
- *Precision Engagement*
- *Full Spectrum Protection*
- *Focused Logistics*

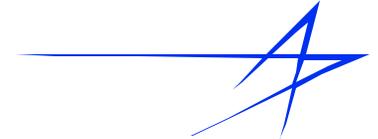
**Army -
Army After Next**

**Air Force -
Global Engagement**

**Navy/Marine Corps Team -
Forward From the Sea**

<i>Military Operations in Urban Terrain</i>	<i>Force Projection Dominant Maneuver</i>	<i>CBWD, Counter WMD</i>	<i>Precision Force</i>
<i>Conduct Military Operations in Urban Battlespace, With Minimum Casualties and Collateral Damage</i>	<i>Fast Deployment - Joint Forces - Minimum Casualties - Lethal and Non-Lethal Weapons</i>	<i>Counter Weapons of Mass Destruction; Decontamination of Chemical/Biological Agents</i>	<i>Neutralize Targets Efficiently, While Limiting Collateral Damage</i>

There Is No Simple Conflict Solution

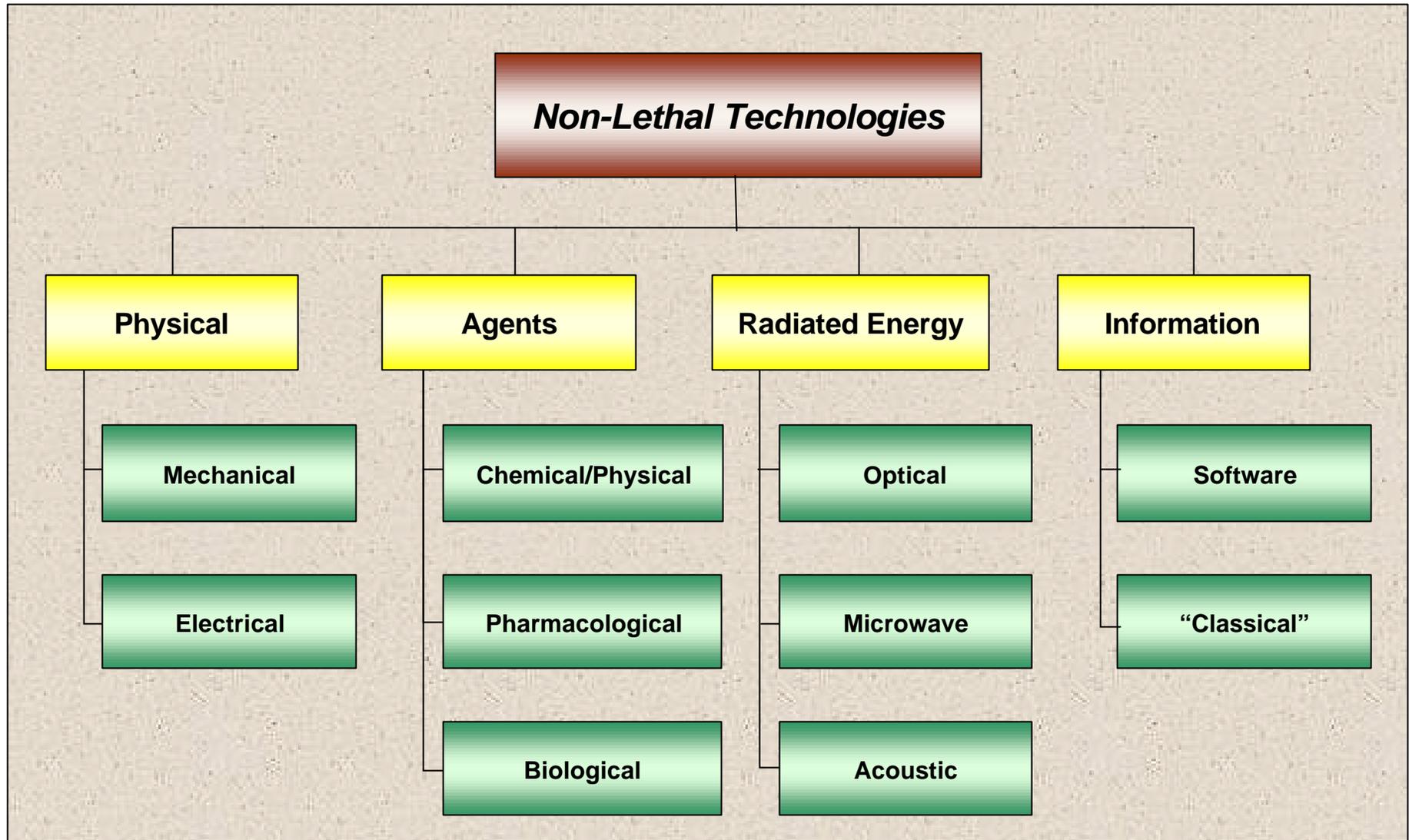


The Challenges Are Demanding:

- **Conduct Operations In A Multi-Dimensional Urban Battlespace**
- **Ensure Force Protection**
- **Limit Collateral Damage and Non-Combatant Casualties**



Available Non-Lethal Payload Firesupport Options



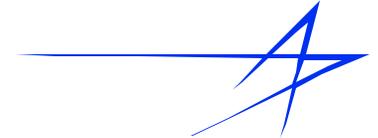
Desired Features In Non-Lethal Firesupport Capabilities



- **Low Cost**
- **Operationally Viable**
- **Automatic Target ID**
- **Precision Delivery**
- **Ability to Navigate the Urban Canyon**
- **Survivable and Maneuverable**
- **Powered for Precision Egress and Flight Termination**



Non-Lethal Weapon Core Capabilities*



Counterpersonnel:

Crowd Control - Influencing Behavior & Activities of Potentially Hostile Crowds, As Well As Bringing a Mob Engaged in a Riot Under Control.

Incapacitation of Personnel - Readily Reversible and Preferably Self-reversing Through the Passage of Time.

Area Denial to Personnel - Utilization of Physical Barriers, or Systems That Produce Physical or Mental Discomfort, or Incapacitation, to Those Who Enter.

Clearing Facilities of Personnel - Clear Facilities and Structures of Personnel, Making It Temporarily Uninhabitable or Otherwise Undesirable for Human Occupation.

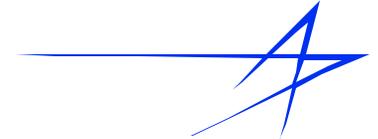
Countermaterial:

Area Denial to Vehicles - Barrier or System That Artificially Reduces the Terrain's Ability to Support Traffic of Wheeled, Tracked, Surface Effect, and Grounded Aircraft. Include Denying Access to Ships and Maritime Vessel Entry or Access to Specific Areas.

Disabling Vehicles, Vessels and Facilities - Disable And/or Neutralize Vehicles, Aircraft, Vessels and Facilities / Equipment.

* as defined by the "Joint Concept for Non-Lethal Weapons", U.S. DoD

NLW - Issues and Capabilities



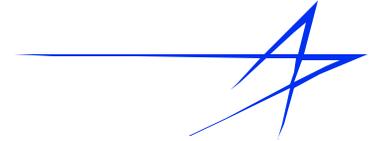
Issues

- **Cleanup** - Can Area, Facility or Equipment Be Inhabited and/or Utilized by Friendly Forces Following NLW Application
- **Variable Vulnerability** - Potential for Variances in Target Vulnerability Can Result in Unexpected Consequences
- **Environmental** - Is Performance of NLW Significantly Altered by Potential Conditions
- **Legality** - Violation of International Conventions, Accords, Treaties, etc..
- **Employment Safety** - Potential for Fratricide or Self-exposure to NLW Effects
- **Assessment** - Can Effectiveness Be Reliably Assessed Without Hazardous Exposure to Friendly Forces

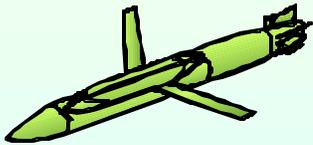
General Capabilities

- **Rheostatic** - Capable of Projecting “Tunable” Effects on Target From a Single Weapon or Via a Continuum of Available Weapons
- **Standoff** - Maximum Possible Separation Between Friendly Assets and Intended Target Via Range Enhancement, Remote or Autonomous Deployment. (Range > 100m*)
- **Reversible** - Effects on Personnel Completely Reversible With Passage of Time Only (Controllable Duration?)
- **Augment Lethal Force** - Designed to be Seamlessly Integrated With the Application of Traditional / Conventional Lethal Weapons

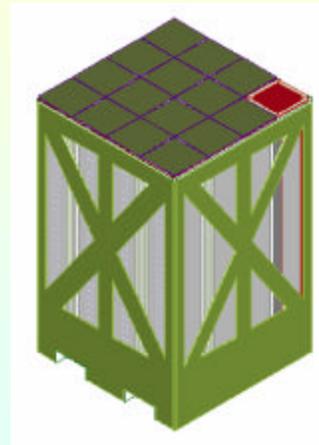
Non-Lethal Long Range Delivery Systems Options



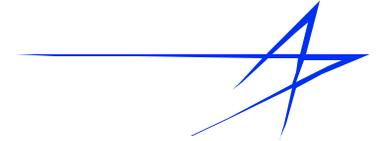
Retrofit Existing Platforms with Non-Lethal Payloads



Create New, Non-Lethal Specific Weapon Based on Existing Technology



Summary



- ***There Is a Need for Non-lethal Firesupport Capabilities to Support the Tactical and Operational Level of 21st Century Conflict***
 - ***Military Operations in Complex and Urban Terrain***
 - ***Force Protection***
 - ***Minimize Casualties***
 - ***Minimize Collateral Damage***
- ***Appropriate Non-lethal Payload Technologies Are Being Developed***
- ***Present and Emerging, Air, Ground, and Naval Fire Support Weapon System Platforms Are Viable for the Long Range Delivery of Non-lethal Payloads***
- ***Non-lethal Firesupport Capabilities Will Enhance the Operational Flexibility of Field Commanders of the Future.***

The Operational Employment of Non-Lethal Capabilities

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Conflict in the 21st Century will be a complex, dynamic, and operationally challenging affair. It will be dominated by political, diplomatic, and economic requirements to minimize casualties and limit collateral damage. Simultaneously, 21st Century conflict will demand quick and decisive results. Such conflict will involve open combat, operations other than war, peacekeeping operations, humanitarian operations in both benign and hostile environments, and noncombatant evacuations. Examples of such requirements dominate much of our current military thinking, as a result of operations in the Persian Gulf, Somalia, Bosnia, Kosovo, and Chechnya. This recent history in combination with current social uncertainty, economic and political instability, ethnic and religious unrest, and continuing threats presented by the world's remaining dictatorial regimes present a very flammable geopolitical future.

As a result of such global uncertainties, the U.S. and its allies are in the process of developing a wide range of military capabilities, tactics, techniques, and procedures to protect their vital interests, security, and maintain regional stability around the world. Where these interests, security, or regional stability is threatened they are developing the means to rapidly deploy capable forces to contain that threat. The Joint Chiefs of Staff JOINT VISION 2010 provides focus and direction to this effort, as summarized in Figure 1.

Currently, the primary means under development to address such threats are systems of overwhelming lethality and the support and C4ISR systems to employ them in the most effective

Figure 1. The Joint Vision 2010

manner possible. Given the diversity of threats and the probable nature of 21st Century conflict, such powerful combat systems and advanced employment means are a necessity. They are not, however, the only dimension of military capability, or necessarily the most appropriate or effective means, required to cope with the scope and scale of projected conflict. What is necessary is a 21st Century solution, as opposed to the accelerated evolution or polished refinement of the military means utilized during the past century. Real “new” tactics, techniques, procedures, and means must be researched, developed, and applied to deal with the realities of the 21st Century. Conventional paradigms must be overcome and technological leaps, shown in Figure 2, taken to develop the appropriate spectrum of capabilities and satisfy the social and ethical issues involved in 21st Century conflict.

To the arsenal of technologically sophisticated, strategic, operational, and tactical lethality must be added equally sophisticated non-lethal weaponry. These weapons, which incorporate unique capabilities and attributes as shown in Figure 2, are not meant to vaporize or decimate but designed and employed to dominate an opponent, establish and maintain the initiative, control the operational battlespace, protect the forces using them, and those in their charge. As a consequence, their effects are temporary or reversible rather than permanent. They provide by their nature a rheostatic capability, enabling a force commander to easily apply an appropriate level of response to any given operational or tactical situation. In this sense they are multi-mission capable. When used by themselves, they offer a low end of response meant to exert control or strong influence on the conflict environment, hostile personnel, and their means for conducting hostilities. When used in conjunction with or in support of, the application of lethal force they enhance and magnify the effects and effectiveness of lethal weaponry. This increase in the dimension of force and weaponry, as well as the scope and scale of their effects, parallels the evolution of the battlespace from a linear battlefield; and conflict from “simple-and-straight-

Figure 2. General Employment Characteristics of Non-Lethal Weaponry

forward-warfare” into the complexity and chaos of multi-spectrum conflict involving urban terrain and the proximity of large non-combatant populations.

To date, the focus for the development of non-lethal capabilities has involved close-in tactical applications more akin to police actions rather than military operations. Emphasis has been placed on controlling unruly individuals and crowds in the urban environment and providing enhanced force protection capabilities without the need to unnecessarily resort to lethal force. Such lethal force would inflict unacceptable casualties and produce needless collateral damage. Given the probability of conflict in urban terrain and its associated uncertainty and difficulties, these developments are necessary. Conflict in urban areas also calls for close combat, non-lethal capabilities. However, these applications do not represent the fullest potential for non-lethal capabilities, or their most effective employment.

The commanders of the future require a continuum of options for coping with the complexities and uncertainties they will experience. A necessary element of that continuum of options is the ability to employ tactically effective non-lethal capabilities in depth over the battlefield. In essence, non-lethal options, shown in Figure 3, must be added to the range of fire support capabilities available to support U.S. forces engaged in conflict. This capability will prove most operationally useful in connection with operations involving urban terrain or in efforts to demonstrate U.S. will and deter or inhibit the expansion or development of armed conflict. In both instances they provide the commander with the means to take direct action to interdict or neutralize a hostile capability or action without inflicting casualties or destroying infrastructure necessary to the community involved. Aside from proving tactically and operationally effective, such direct action that results in a minimum of damage could also prove politically significant.

Figure 3. Non-Lethal Technologies Available for Operational Employment

The concept of non-lethal fire support for Military Operations in Urbanized Terrain (MOUT) is a challenge that is now being addressed by the Department of Defense. Once considered “too difficult”, urban fire support will soon become a reality due to significant advances in technology and the equally significant need. Correspondingly, fire support in urban terrain, with the mandate of minimum casualties and low collateral damage, presents several noteworthy

technical challenges. Effective fire support for MOUT operations requires precision delivery, first, foremost, and always. In addition, the ability to accurately locate the precise target desired, possibly a mobile target, within the urban battlespace presents a considerable challenge. Once the target is located and positively identified, the fire support asset must precisely deliver the payload on target and then exit the urban terrain in a benign way to minimize damage and casualties. Once the payload has been dispensed there must be no residual airframe to catastrophically impact the urban structures such as schools, churches, hospitals, or residences. This challenge has been met. Today, revolutionary advances in sensors, communication electronics, propulsion systems, non-lethal payloads, and guidance and control software are paving the way for non-lethal fire support in urban terrain.

Given the requirement to precisely employ and deliver non-lethal payloads to attain their maximum effectiveness, they are best delivered to the urban target via a submunition or unmanned aerial vehicle, (UAV) which itself could be launched from traditional fire support asset. These traditional fire support assets include both fixed and rotary winged aircraft, as well as field artillery assets as shown in Figure 4, or a tactical launcher of either the vertical launch or catapult design. Such employment of a smart submunition or UAV, coupled with its organic propulsion, navigation, loitering, and precision target identification and engagement could provide the field commander with a potent, versatile and effective non-lethal fire support capability. As with any fire support capability the non-lethal fire support weapon system can be used to interdict hostile capabilities, shape the battlespace, support maneuver forces in either defensive or offensive operations, provide force protection, or suppress hostile force capabilities. These missions are accomplished using a variety of precision delivered non-lethal payloads designed to disable or destroy hostile weapon systems, neutralize hostile support capabilities, perform area denial, or perform crowd control functions all with a minimum of destruction,

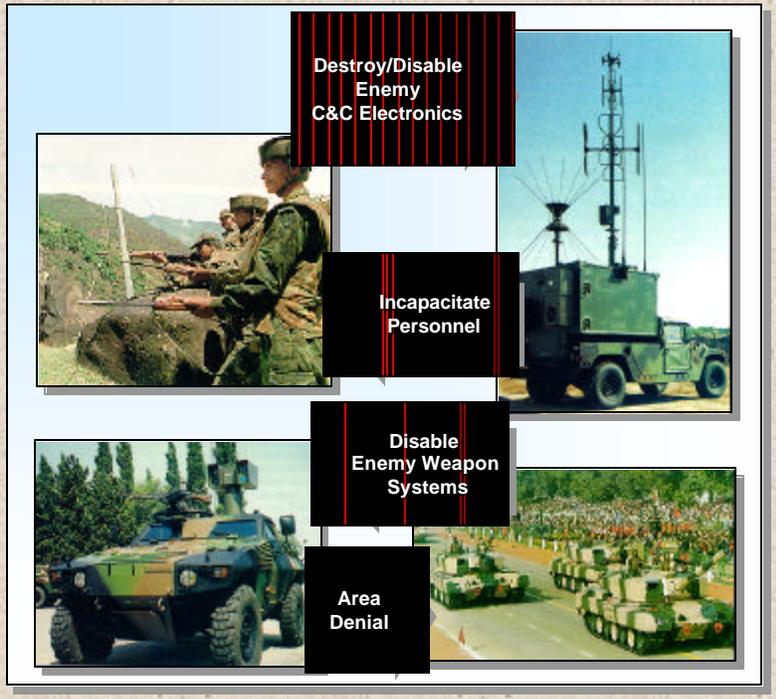
Figure 4. Notional Non-Lethal Fire Support Weapon Systems

collateral damage, or the danger of inflicting casualties.

In summary, the burgeoning growth of population in urban areas forecasts that our future battles will take place in complex terrain and certainly complex urban settings. The recent conflict in Grozny is a sobering reminder what the future may hold. Our ability to effectively apply technology to satisfy the challenges such situations present will facilitate development of non-lethal fire support weapon systems, such as notional examples shown in Figure 4, for use in urban terrain. With these unique weapon capabilities in our arsenal we can foresee successfully meeting the challenge of Joint Vision 2010's minimum casualties/minimum collateral damage operational capability for Military Operations in Urbanized Terrain.

#2

- Low Cost
- Automatic Target ID
- Precision Delivery
- Ability to Navigate the Urban Canyon
- Small Size for Survivability and Maneuverability
- Powered for Precision Egress and Flight Termination with Low Collateral Damage



#3

