Should DOD Integrate Nonlethal And Lethal Weapons Program?

CSC 2000

SUBJECT AREA Strategic Issues

Executive Summary

Title: Should DOD Integrate Nonlethal and Lethal Weapons Programs?

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Thesis: Should the nonlethal weapons program be integrated with lethal weapons programs?

Discussion: Political forces, in this era of the "CNN" effect, require the military, when involved in contingencies, to use restraint and to avoid excessive destruction and collateral damage. Within a force continuum that ranges from show of force to lethal force, nonlethal weapons can fill a gap between these two extremes. These weapons can offer forces the ability to respond in situations where rules of engagement may limit lethal weapons. With this in mind, is it practical to employ two different types of weapons in conflict: one nonlethal the other lethal? The next question, does it make sense to combine both capabilities into one weapon? This leads to the original question of integration. This paper will provide valid reasons why the two programs are separated. In some cases it makes sense to maintain separate stand-alone nonlethal and lethal weapons programs. This paper will also show that both joint and service visions support the concept of integration. However, there are challenges to overcome in order to realize this. By addressing these challenges and pursuing integration where appropriate, future forces will have more options on the battlefield.

Recommendation: Instead of considering weapons as either stand-alone nonlethal or lethal, an additional category of weapons should be considered. This third category would be based on the combination of both lethal and nonlethal effects into one weapons system. This could be accomplished by either modifying existing weapons systems or through integration with future weapons such as the joint strike fighter and the next generation tank. This modification would allow for mainstream military forces to be properly equipped for the future.

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
2000		**00-00-2000 to 00-00-2000**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Should DOD Integrate Nonlethal And Lethal Weapons Program?	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Marine Corps War College,Marine Corps University,Marine Corps Combat Development Command,Quantico,VA,22134-5067**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**65**	

Preface

A new and evolving concept, nonlethal weapons can potentially influence the character of war by offering commanders, at all levels, an additional force option. In recognition of this, the Department of Defense has taken steps to establish a nonlethal weapons program. Officially formed in 1997, this program is still in its infancy. Exactly how it will appear in the future is unclear. However, what is clear, is that decisions made in the near term will have lasting effects. Therefore, a major question that must be addressed is, should the nonlethal weapons program be integrated with lethal weapons programs?

The following paper attempts to answer this question. It begins by defining nonlethal weapons. Then it will examine both the evolution of the nonlethal weapons program and the types of nonlethal technologies. With a general understanding established, this paper will consider the factors that separate these two programs. Next, looking through the lenses of military theorists, joint vision, and service vision, reasons for integration will be explored. Finally, conclusions and recommendations are presented. The paper builds upon itself, from describing nonlethal weapons, all the way through to the requirement for the integration of the nonlethal and lethal weapons programs.

Political forces, in this era of the "CNN" effect, require the military, when involved in contingencies, to use restraint and to avoid excessive destruction and collateral

damage. Within a force continuum that ranges from show of force to lethal force, nonlethal weapons can fill a gap between these two extremes. These weapons can offer forces the ability to respond in situations where rules of engagement may limit lethal weapons. With this in mind, is it practical to employ two different types of weapons in conflict: one nonlethal the other lethal? The next question, does it make sense to combine both capabilities into one weapon? This leads to the original question of integration.

This paper will provide valid reasons why the two programs are separated. In some cases it makes sense to maintain separate stand-alone nonlethal and lethal weapons programs. This paper will also show that both joint and service visions support the concept of integration. However, there are challenges to overcome in order to realize this. By addressing these challenges and pursuing integration where appropriate, future forces will have more options on the battlefield.

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CHAPTER 1

OPTION FOR THE FUTURE

During the Cold War years, the U.S. had to prepare for an all out war against the Soviet Union. Had this war occurred, it would have involved large-scale ground battles on the plains of Europe along with sea and air battles throughout the world. At that time, military units had to prepare to fight for national survival. With such an important goal, issues such as collateral damage or unnecessary death and destruction were not in the forefront. This was in part due to the political will of the nation to survive, which included nuclear war.

Carl Von Clausewitz recognized this when he pointed out "that the probable character and general shape of any war should mainly be assessed in the light of political factors and conditions."[1] He goes on to observe that conflicts would tend to escalate towards absolute war unless restrained by external forces such as national policy. In the case of the Cold War, if actual conflict erupted between the U.S. and the Soviet Union, policy restraint would have most likely been minimal.

The U.S. National Military Strategy provides three levels of interests: *vital, important,* and *humanitarian.*[2] *Vital interests* involve national survival; *important*

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[1] Carl Von Clausewitz, On War, translated by Michael Howard and Peter Paret, (Princeton, NJ: Princeton Press, 1984), 607.
[2] National Military Strategy (Washington D.C.:Chairman of the Joint Chiefs of Staff, 1997), 6.

interests do not involve national survival but still warrant military action. *Humanitarian interests* require actions based on our values.

After the Cold War, with no world power left to threaten its survival, the U.S. national policy has shifted towards the support of humanitarian missions such as Somalia and Bosnia. Arguably, the vast majority of post-Cold War conflicts have been for *humanitarian interest*, except for Desert Storm, which was more of an *important interest*. These operations did not relate to national survival.

According to Clausewitz's teachings, one can assume that policy restraints would tend to restrict violence when military operations do not involve national survival. This is demonstrated today by the fact that military commanders must focus on issues such as Rules of Engagement, collateral damage and force protection. These issues were not as important in the midst of the Cold War

As a result of the changed strategic environment, the Chairman of the Joint Chiefs of Staff in 1997 published *Joint Vision 2010* (JV 2010). This document gives much attention to issues that relate to collateral damage such as the concepts of *precision engagement*. Also, the military is challenged to leverage technology and develop new operational concepts that will address an uncertain and challenging future.[3] In light of this challenge, the integration of nonlethal and lethal weapons programs warrants serious consideration.

[3] Joint Vision 2010 (Washington D.C.: Chairman of the Joint Chiefs of Staff, 1997), 1.

WHAT IS A NONLETHAL WEAPON?

The notion of a nonlethal weapon summons various expectations. Some like Professor Gregory D. Foster, *National Defense University*, sees a potential dominant role for these weapons in future conflicts. He states:

> A perhaps more discerning approach to combat attuned to the media age might seek simply to nullify the fighting effectiveness of an adversary without attendant harmful, costly collateral effects on innocent noncombatants, infrastructure and the environment…[4]

This statement offers one point of view, but for many, nonlethal weapons represent novelty items such as sticky foam, sticky-goo, or rubber bullets. Still others might consider a precision munition that minimizes collateral damage as a nonlethal weapon. The variation of options and expectations can be attributed to the newness of the concept.

Definitions for the term **nonlethal** even vary within DOD. In fact, there is not a definition for a "nonlethal weapon" in Joint Publication 1-02 *Department of Defense Dictionary of Military and Associated Terms*. Only under the definition of "fires" is the term **nonlethal** mentioned. Here it is defined as “the effect of lethal or **nonlethal** weapons.”[5]

Joint Publication 3-09 *Doctrine for Joint Fire Support* describes "**nonlethal** fires" as “fires which generally do not cause death or devastation directly.”[6] This document goes on to give examples of nonlethal fires such as electronic warfare, psychological

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[4] Gregory D. Foster, Nonlethality: Arming the Post Modern Military (Rusi Journal, October 1997), 61.
[5] Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms (Washington D.C.: Chairman of the Joint Chiefs of Staff, 1997), 187.
[6] Joint Publication 3-09, Doctrine for Joint Fire Support (Washington D.C.: Chairman of the Joint Chiefs of Staff, 1998), I-1.

operations, information operations, and the use of munitions such as illumination, smoke, and incapacitating agents (CS).

Official Definition

The Department of Defense (DOD) Directive 3000.3, which is DOD's policy on nonlethal weapons, states:

> Non-lethal weapons are weapons that are explicitly designed and primarily employed so as to **incapacitate personnel or material**, while **minimizing fatalities, permanent injury to personnel**, and undesirable damage to property and the environment.[7]

A Joint Concept for Nonlethal Weapons, produced by the Nonlethal Weapons Directorate, further refines this definition by eliminating information warfare, and electronic warfare from the category of nonlethal weapons. It also excludes any other military capability "not designed specifically for the purpose of minimizing fatalities, permanent injury to personnel and undesired damage to property and the environment."[8] (This paper will use the definition provided by the DOD Directive 3000.3).

Issues of Human Effect

While traditional weapons were designed to produce lethal effects, nonlethal weapons seek effectiveness by repelling or incapacitating an individual or rendering material inoperative. The challenge is to be effective while avoiding permanent injury or death. For material targets, lethal or nonlethal effects are hard to discern. For example, effects against a tank could range from loss of mobility to total destruction. The lethality or non-lethality of a weapon depends on how the operator of the tank is affected. In one

[7] Department of Defense Directive 3000.3, Policy for Nonlethal Weapons (Washington D.C.: Office of the Secretary of Defense, 1997), 1.
[8] Department of Defense Directive 3000.3,1.

case, a force that destroys a tank is considered nonlethal because the occupants are uninjured; however, a force that causes a loss in the tank's mobility, may also result in the occupants' death. In this case, the force is considered lethal.

Therefore it can be said that the focus of nonlethal force is based ultimately on the human effects. However, humans vary physically and psychologically. There are differences between the physical condition of a young male and an elderly woman, and between the psychological determination of a shy child and an enraged warrior. These are important issues when considering nonlethal force.

Swett Curve

The Swett curve, in Figure (1) on the next page, describes the conceptional relationship between a **population sample** and levels of **force**.[9] The vertical "population" axis accounts for different physical and psychological conditions like those previously described. The horizontal "force" axis represents levels of applied force. The three curves are labeled effective, permanent damage, and lethal. The meaning of the permanent damage and lethal curves is obvious. The effective curve means temporary incapacitation up to 30 minutes.

In this example, two vertical lines represent two levels of force. The line labeled (A) represents a force that is almost completely nonlethal, but is ineffective against some within the population. Vertical line (B), on the other hand, is almost 100 percent effective, but increases the likelihood of permanent injury and death.

[9] Dr. John M. Kenny, "Human Effects Advisory Panel Program" briefing, Quantico, VA., 10 Feb. 2000.

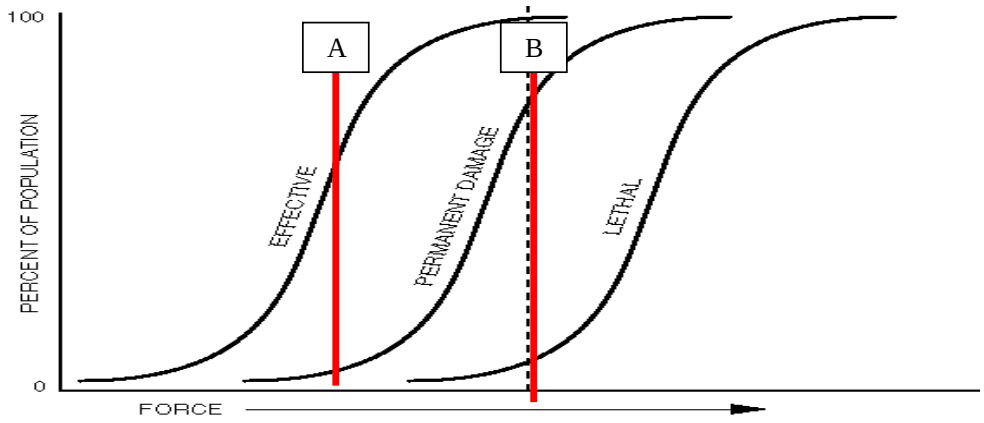

Figure 1

As shown with the Swett curve, some nonlethal weapons will cause unintentional injury. The term "nonlethal" is misleading because it leads one to believe that these weapons do not cause fatalities. The DOD Directive 3000.3 attempted to avoid this expectation by adding the phrase "…while minimizing fatalities…." to its definition. For legal purposes, civilian law enforcement uses the term “less than lethal” to convey that these weapons can unintentionally kill.[10] The head of the Joint Nonlethal Weapons Directorate, Colonel George P. Fenton, USMC, acknowledges that the term "nonlethal" is misleading.[11] However, he states that there is no plan within DOD to change the name.

LETHAL WEAPONS

Unlike their nonlethal counterparts, lethal weapons need no special introduction. They have been in existence since the time of the caveman. Modern examples include

[10] Maj Joseph W. Cook, et al,. Nonlethal Technologies, Legalities, and Potential Polices (Airpower Journal, Special Edition 1995),77-91.
[11] Col George P. Fenton, "Views form the Director of the JNLW Program" briefing, Quantico, VA.., 24 Feb. 2000.

rifles, machineguns, tanks, and attack aircraft. *Webster's Dictionary* defines the term "lethal" as "deadly or mortal." The term is so well known that the joint dictionary does not bother to provide a definition.

This paper makes the assumption up front that lethal weapons will be relevant in the future. Thus the focus will be on establishing a requirement for nonlethal weapons and the requirements to integrate the nonlethal and lethal weapons programs. Requirements that support integration are also, indirectly, requirements for nonlethal weapons. The following chapters will examine the evolution of nonlethal weapons (Chapter 2), the types of nonlethal technologies (Chapter 3), why nonlethal and lethal programs are separated (Chapter 4), and why they should be integrated (Chapter 5). All conclusions and recommendations made in Chapter 6 are drawn from material in Chapters 1-5. Due to the amount of information covered in the previous chapters, Chapter 6 will not summarize previous material.

CHAPTER 2

EVOLUTION OF NONLETHAL WEAPONS

During Desert Storm the world witnessed, courtesy of CNN, the surgical effect of precision guided weapons that caused minimal "collateral" damage. The world became fascinated by these capabilities of modern warfare. The ability to "surgically" strike targets while avoiding unnecessary or undesired death and devastation summoned thoughts of ways to make war less destructive.

Government studies on nonlethal weapons started as early as 1991 with a Secretary of Defense study group.[12] By 1994 a report issued by the *Office of the Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict* (OASD-SO/LIC) concluded that nonlethal weapons could be of benefit in low intensity conflicts.

UNITED SHIELD

On 10 January 1995 the Pentagon announced that 2,600 U.S. Marines would be deployed to Somalia for Operation *United Shield.* Their mission was to assist with the final withdrawal of United Nations peacekeeping troops from Somalia. About 1,800 US

[12] David A. Morehouse, Nonlethal Weapons: War Without Death (Westport, Connecticut: Praeger Publishers, 1996), 9.

Marines and 350 Italian Marines landed on 01 March to safeguard the withdrawal of 2,500 Pakistani and Bangladeshi peacekeepers.[13]

This is where the U. S. Marines provided nonlethal weapons an international debut. Included with these weapons were items such as 40mm sponge grenades, pepper sprays, stinger grenades, flash bangs, and sticky foam.[14] Additionally, sticky foam and foam barriers where used along with more conventional riot control items such as rubber bullets. Efforts by Marine Corps reservist Warrant Officer Charles Heal helped make this possible. His civil job with the Los Angeles Sheriffs department gave him exposure to riot control techniques and he was able to pass this knowledge on to the Marines.[15] Although not employed, these weapons attracted much media attention.

FORMATION OF THE JOINT NONLETHAL PROGRAM

Soon after the events of *United Shield*, a very influential non-governmental organization, the *Council on Foreign Relations*, published a 1995 report that was favorable towards the development of nonlethal weapons. The committee, which included former high-ranking government officials, made the following conclusion:

> The ability to employ non-lethal technologies may provide advantageous options to the United States as it enters the 21st century. In many respects non-lethal technologies could be particularly effective in a number of situations of low-level conflict, often involving nonstate or failed state actors, observed instantly by many publics whose support may be desirable. [16]

[13] Federation of American Scientists, Operation Untied Shield, online edition (www.fas.org/man/dod-101/ops/united_shield.html), 14 April 1998.
[14] F. M. Lorenz, Non-Lethal Force: The Slippery Slope to War? (Parameters, Autumn 1996), 52–62. .
[15] CWO5 Charles Heal, Nonlethal Technology and Why We Think of Force (Marine Corps Gazette, January 1997), 26-28.
[16] Report of an Independent Task Force, Non-Lethal Technologies: Military Options and Implications, (New York, Council on Foreign Relations, 1995).

While not discounting their use in a major conflict, the committee report viewed nonlethal weapons predominately for *Military Operations other Than War* (MOOTW). This report went on to caution that nonlethal weapons were not a panacea and also urged the *National Security Council* (NSC) to take the lead in coordinating the evolution of these new technologies. (To date there has been no guidance from the NSC).[17]

In 1996 the *National Defense Authorization Act* tasked the *Secretary of Defense* to assign centralized responsibility for development of nonlethal weapons technology. The Secretary accomplished this by dividing the nonlethal program into two branches: one for policy and one for acquisition & technology (see figure 2). Under the policy branch, OASD-SO/LIC wrote the DOD Nonlethal Weapon Policy. Under the Acquisition & Technology branch, the Commandant of the U.S. Marine Corps was designated as the Executive Agent for the Nonlethal Weapons Program and became responsible for the "hardware" aspects of the program.[18]

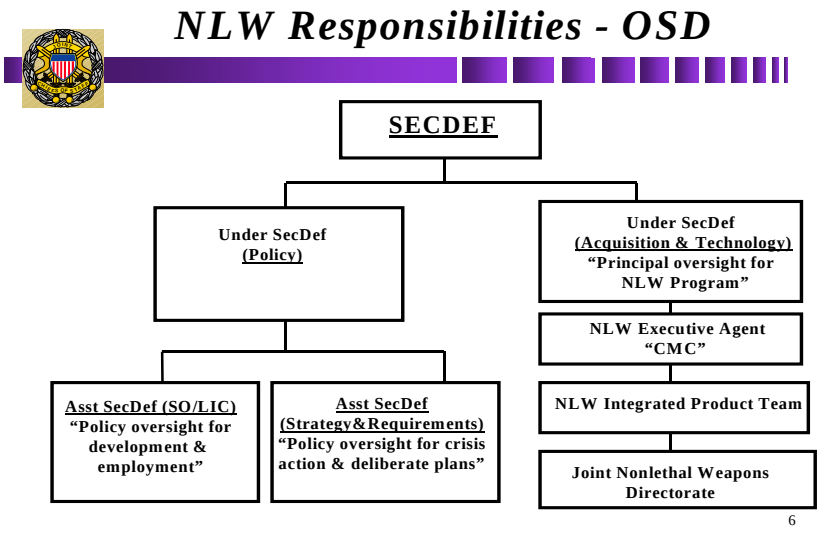

Figure 2

[17] Col George P. Fenton.
[18] Col George P. Fenton.

Joint Nonlethal Weapons Directorate

Next, in January 1997, the Joint Nonlethal Weapons Directorate was formed as a result of a memorandum of agreement signed by the military service chiefs. Funding for this organization, which to this day ranges between $25-37 million annually, is for research and development.[19] In a relatively short time, the Directorate has produced several significant products which include a vision statement called the *Joint Concept on Nonlethal Weapons* and a doctrinal publication titled *Multiservice Procedures for the Tactical Employment of Nonlethal Weapons*.

It has also assisted in the fielding of a prepackaged crowd control set called the *Nonlethal Weapon Capability Set*. These sets are designed to provide a 200 man rifle company the capability to conduct crowd/riot control. A set includes riot batons, portable bullhorns, 40mm sponge grenades, pepper spray, face, and body shields. The Marine Corps has provided these sets, along with training, to deploying Marine Expeditionary Units and the Army has plans to acquire about 300 sets.[20]

Additionally, the Directorate has been active selling the concept of nonlethal weapons to the combatant commanders through identifying their capability gaps mainly in the areas of crowd control and rear area force protection. These gaps are as follows:

- Crowd Control
- Incapacitate Personnel
- Deny Area Personnel
- Deny Area Vehicles
- Disable Vehicle, Aircraft, Facilities and Vessels
- Clear Facilities of Personnel

[19] Col George P. Fenton.
[20] Col George P. Fenton.

Two issues unique to nonlethal weapons that concern the Directorate are human effects and public perception. Currently there is not much data on how nonlethal weapons affect a human. When commanders are issued a nonlethal weapon, they expect to know its characteristics. To address this issue, the Directorate in early 1998 established a Human Effects Advisory Panel (HEAP). The HEAP is composed of non-DOD personnel and includes doctors from a variety of medical specialties. This panel was focused specifically on blunt trauma munitions such as rubber bullets. Their task was to determine the human effects in terms of incapacitation and reversibility. Their initial findings, which apply today, were as follows:[21]

- There is insufficient data to create desired effect curves
- There exists no models that predicted incapacitation
- There is a distinct disconnect between the expectations of the user community and the information that is being provided by the data collection and modeling community
- There does not appear to be an organization that is responsible for generating non-lethal effect curves or determining incapacitation caused by blunt impact weapons

The Directorate has also established a Public Acceptance Advisory Team (PAAT) to basically sell the concept of nonlethal weapons.[22] The team is composed of experts from various fields of expertise to include public affairs, security, policy, and law. Part of their charter is to review new nonlethal technologies for acceptance. They also can coordinate the introduction of new nonlethal technologies to national and military leaders to help improve chances for acceptance and understanding. The Army and Air Force have similar programs.

[21] Dr. John M. Kenny, "Human Effects Advisory Panel Program" briefing, Quantico, VA.., 10 Feb. 2000.
[22] LtCol David Berger, "Policy Division J-5, Non-Lethal Weapons Strategy & Policy" briefing, Quantico, VA., 02 March 2000.

Separate Service Programs

While the Directorate 's function is oriented on tactical nonlethal weapons, the Air Force and Navy have worked on nonlethal technologies of their own, separate from the directorate.[23] This is because a stipulation in the 1997 MOA allowed this by limiting the Directorate to "tactical ground" nonlethal weapons. The Air Force and Navy programs are exempt from direct oversight because their programs are considered "operational/strategic."[24] The Directorate desires to expand beyond just tactical ground weapons.

LATE DEVELOPMENTS

During November 1996, when the program was forming, a Presidential Review Directive (PRD) 54 was issued to accomplish the following tasks:[25]

- Increase interagency awareness
- Develop policies commensurate with strategic needs
- Anticipate future public debates
- Coordinate internal U.S. government arms control discussions and nonlethal weapons development

As a result of this directive, the *Office of the Under Secretary of Defense for Policy* contracted the *Center for Strategic and International Studies* to conduct a study. The final report, which was published over two years later, concluded that nonlethal weapons could provide U.S. leaders with significant, strategic capabilities, with greatly reduced human and material loss.[26] The study also concluded that a national policy on nonlethal

[23] Memorandum of Agreement, DOD Nonlethal Weapons (NLW) Program (Signed by all four service chiefs and Commander in Chief United State Special Operations Command, 1997), 2.
[24] Col George P. Fenton.
[25] LtCol David Berger, "Policy Division J-5, Non-Lethal Weapons Strategy & Policy" briefing, Quantico, VA., 02 Mar. 2000.
[26] Center for Strategic and International Studies, Non-Lethal Weapons Policy Study Final Report, Study, On assignment from the Office of the Under Secretary of Defense for Policy, February 1999, 79.

weapons was not warranted at that time due mainly to the immaturity of the technology. The study went on to recommend that further evaluation be made by the Executive Agent to accomplish the following tasks:[27]

- Expand Science and Technology activities to address the issues identified.
- Conduct an Analysis of Alternatives for a weapon platform suitable for strategic applications of non-lethal technologies.
- Facilitate the development of Mission Need Statements.
  Establish Milestone 0 (Concept Exploration) activities if appropriate.

To date, the Directorate is active in all three of these areas.

A FINAL WORD

The main conclusion from this chapter is that the requirement for nonlethal weapons is valid; however, the technology is still in its early stages of development.

The cited government studies concluded that there is utility for these type weapons specifically in a MOOTW scenario and its conclusion is highlighted by the fact that policy for the program resides in the *Office of the Assistant Secretary of Defense for* ***Special Operations*** *and* ***Low-Intensity Conflict*** (OASD-SO/LIC).

[27] Center for Strategic and International Studies, Non-Lethal Weapons Policy Study Final Report, 82.

CHAPTER 3

NONLETHAL WEAPONS TECHNOLOGIES

DOD does not provide official categories of nonlethal weapons. This omission reflects the "wait and see" position advocated by the cited *Center for Strategic and International Studies* report. However, a comprehensive listing can be found in the 1996 report to OASD-SO/LIC that organized nonlethal technologies into six categories.[28] (See figure 3 on the following page for a detailed list of categories).

- Mechanical
- Electromagnetic
- Acoustic
- Biological
- Chemical
- Supporting Technologies

This chapter will provide a familiarization of each category with a general description followed by examples of possible uses. Where applicable, comments will be made concerning current DOD programs that relate to each category. Classified programs will not be addressed.

[28] Timothy J. Hannigan, et al, Mission Applications of Non-Lethal Weapons, Report for Office of the Assistant Secretary of Defense for Special Operations and Low Intensity Conflict (Policy Planning), August 1996, Appendix C.

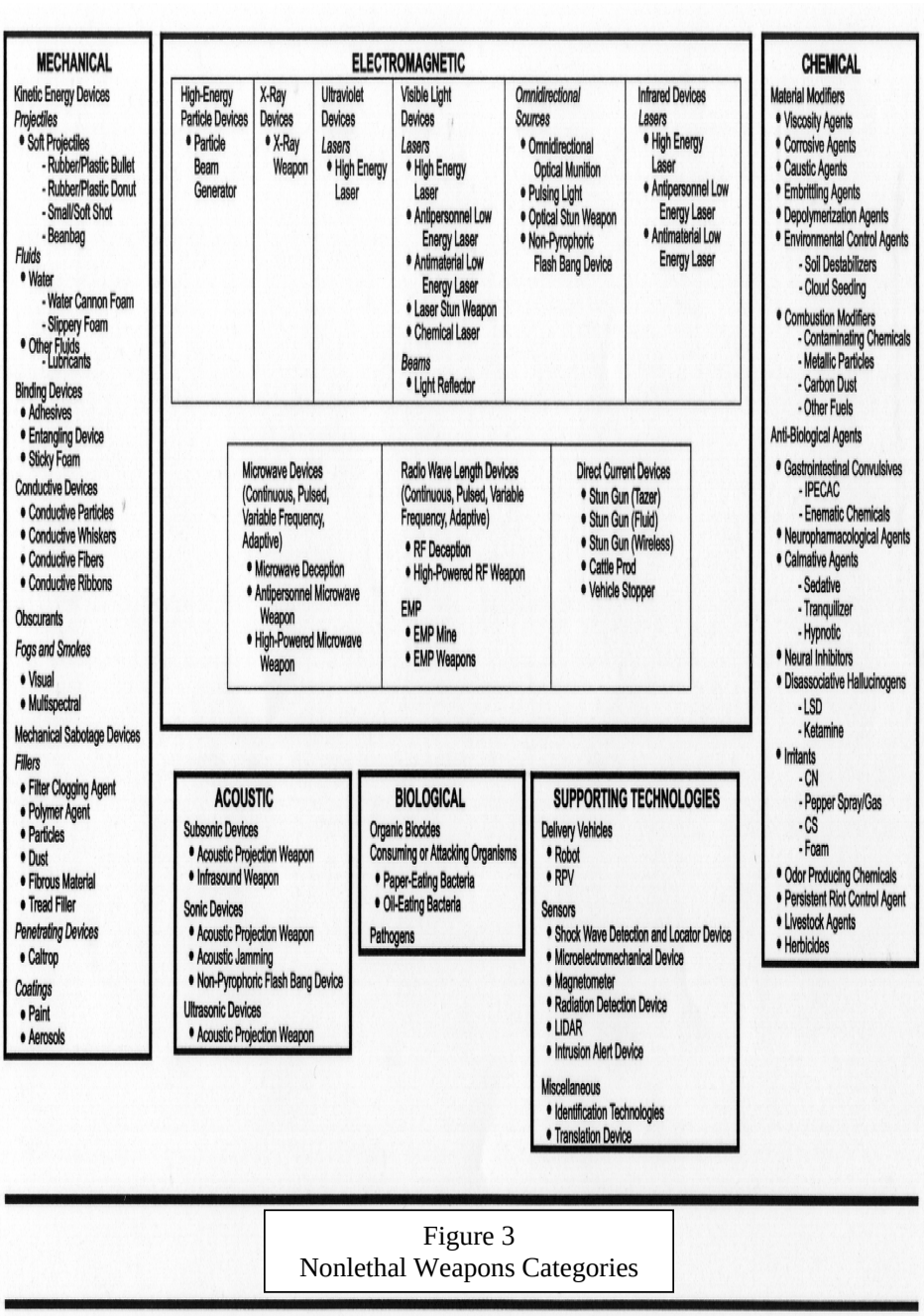

Figure 3
Nonlethal Weapons Categories

MECHANICAL

Examples of mechanical nonlethal technologies are already fielded. They include projectiles, fluids, binding agents, conductive devices, obscurants, and mechanical sabotage devices. These technologies have both counterpersonnel and countermateriel applications. The current *Nonlethal Weapon Capability Set* is an example of this category.

Newer initiatives, which the Directorate is researching, include binding and lubricant technologies. [29] Binding agents were brought to the public's attention during operation *United Shield* with the introduction of "sticky foam." This foam incapacitates a person in the same manner as a fly on flypaper. In the case of *United Shield*, these items were acquired through civilian sources and not through a DOD program because none existed. Other examples include a fluid called "slickem" that causes a loss of traction. Once applied, this material is extremely difficult to remove and is able to adhere to virtually any porous substance. Possible uses include area denial with personnel or vehicles.[30] .

Strategic use of nonlethal weapons has already occurred with the employment of conductive carbon fibers in both operations *Desert Storm* and *Allied Force*. In these examples, large amounts of small conductive fiber were released over power stations by cruise missiles. [31] These fibers contacted the electrical wires and caused widespread power outages, which provided the theater commander a way to influence the enemy without extensive damage to infrastructure.

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[29] Col George P. Fenton.
[30] John Alexander, Future War: Non-Lethal weapons in Twenty-First Century Warfare (New York: St. Martin's Press,1999), 24.
Combination for Strategic Psrslysis (Airpower Journal, Special Edition 1995), 42-51.

ELECTROMAGNETIC

Within the electromagnetic spectrum are technologies that deal with directed energies such as lasers and high power microwaves. Figure (4) shows the relationship between electromagnetic technologies.

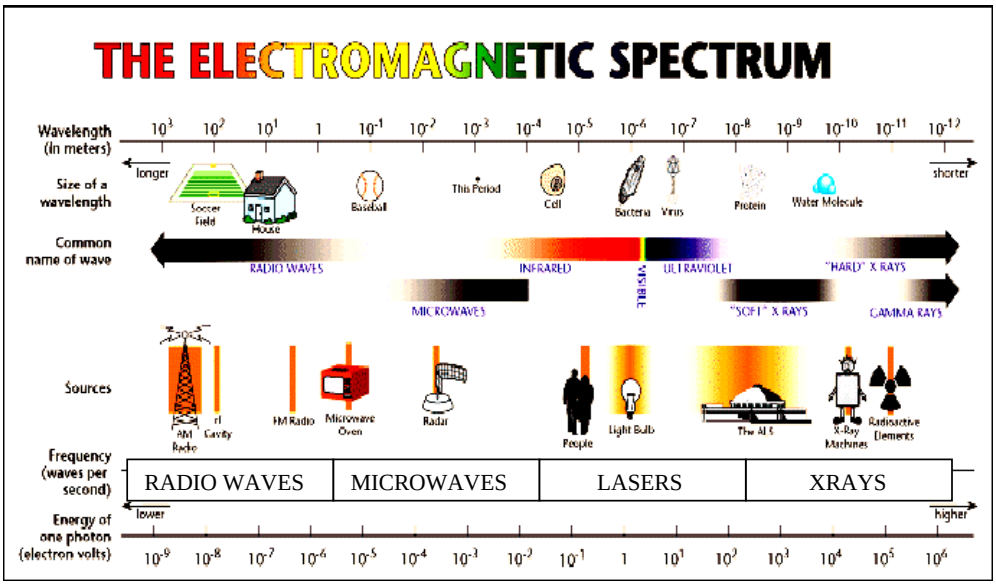

Figure 4
Electromagnetic Spectrum

Current military uses are limited to electronic warfare tasks that deny portions of the electromagnetic spectrum or to laser range finding and designating devises

Lasers

Laser, which stands for Light Amplification by Stimulated Emission of Radiation, operates in the ultraviolet, visible light, and infrared regions of the spectrum. It includes both visible and invisible energy. An advantage with this type of weapon is that it

operates in the electromagnetic realm where its ammunition comes from a power source. Ammunition resupply is not an issue as long as a power source is available.

Lasers are more commonly used for range finding and target designation, while some forms of low power lasers can "dazzle" or disorient personnel. Two examples of this technology (off-the-shelf) are the Saber 203 and the Dissuader; both use a visible red beam to disorient personnel at night through temporary flash blindness or glare, such as with a windshield.[32] There is also evidence that alternating colors such as green and red can cause a disorienting effect.[33] Like a common flashlight, these devises are limited to nighttime use.

A chemical pulse laser, which is more powerful, heats the surface of a target to high temperatures and results in a countermateriel effect.[34] This technology is being used in both strategic and theater anti-ballistic missile research programs. The Directorate is considering a MV-22 mounted variant that could also be used in a tactical anti-ballistic role.

If the power on this type laser could be controlled, to produce less heat, then counterpersonnel applications may also be possible. However, blindness is likely with current high power lasers and the U.S. has signed the Blinding Laser Weapons Band which prohibits using lasers as blinding weapons. [35]

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[32] Dr Richard Dennis, "Lasers and Optical Munitions" briefing, Quantico, VA.,17 Feb. 2000.
[33] Dr Richard Dennis.
[34] Nick Lewer and Steven Schofield, Non-Lethal Weapons: A Fatal Attraction? (London: Zed Books, 1997), 10.
[35] Protocol IV to the 1980 UN Convention on Conventional Weapons that bans the use and transfer of any laser weapon specifically designed to cause permanent blindness, 1998.

High Power Microwaves

A sub-category of non-nuclear electromagnetic pulse (EMP), high power microwave technology is still in a research and development phase. It offers a good option for nonlethal technologies and like lasers, it is not limited by ammunition in the conventional sense. There are basically two types of weapons in this category: low frequency and high frequency microwaves. Additionally, there are two methods of producing microwave energy. The first is through a device that continuously produces pulses. The other is through a controlled explosion that produces a single EMP pulse.

Low frequency microwaves are shorter range, but better able to penetrate material. They work by heating internal organs and can cause symptoms that range from discomfort to incapacitation.[36] They can also be used to damage unprotected electrical circuits in computers and information networks.[37]

While it is possible to protect components from microwave energy, the cost is great. Of all the technologies discussed, this type perhaps poses the greatest threat to the United States both civilian and military due to our heavy reliance on computers and information systems. A draw back to this technology is that the power source, under current technology, would be the size of a large semi-tractor truck and trailer. However, advances in technology have shown that size can be reduced.

High frequency microwaves cause a counterpersonnel effect by heating the skin's surface as opposed to internal organs. [38] This energy can be increased to a point at which the subject feels a burning sensation, but is not physically burned. This is possible

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[36] Douglas Pasternak, Wonder Weapons, (*US News,* 7 July 1997).

[37] Col. Joseph Siniscalchi, USAF, Nonlethal Technologies: Implications for Military Strategy, Center for Strategy and Technology Air War College Occasional Paper No.3, 1998. 9.

[38] Douglas Pasternak, Wonder Weapons, (*US News,* 7 July 1997).

because the skin's pain threshold is reached before burning actually takes place and thus the subject is repulsed by pain.[39] Due to limited penetrating ability, they are not well suited for countermateriel applications.

ACOUSTIC

Acoustic technologies can produce effects in the form of high intensity sound and infrasound. High intensity sound weapons produce pain through sound measured in decibels.[40] The human pain threshold is about 120 decibels and at about 160 decibels the eardrum bursts. In Northern Ireland, the British used an acoustic device called the "Curdler" that used high intensity sound to disperse crowds.[41] The limitations with this system include a lack of directional control and rapid dissipation of power as distance from the source is increased. (Once the subject experiences hearing loss, the weapon is ineffective).

Infrasound deals with a frequency range of 1 to 20 Hertz (cycles per second) and a weapon of this type would use tunable, ultralow frequency to cause neurological disruptions.[42] The concept is that low frequency vibration could cause incapacitating counterpersonnel effects. However, a limitation with infrasound, as with all forms of acoustic energy, is it dissipates quickly in air. The only evidence of a capability like this was with a test in which a monkey exposed to infrasound did experience a momentary loss of balance, but that was it.[43] This technology does not seem promising.

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[39] Douglas Pasternak, Wonder Weapons, (*US News*, 7 July 1997).
[40] Maj Franz Gayl, High Intensity Sound As a Nonlethal Weapon (Marine Corps Gazette, Jan 1998).
[41] Maj Joseph W. Cook, 77-91.
[42] Personal interview with Dr. David C. Swanson, Applied Research Laboratory, Penn State University, 20 Jan. 2000.
[43] Dr. David C. Swanson.

Another form of acoustic technology is the notion of acoustic bullets, which was first researched in the 1920's.[44] An example of this is the “sound vortex” which is a ring of sound generated and propelled by a chemical reaction. [45] The concept involves the use of a tube or barrel to direct a vortex ring towards a target. Attempts to leverage this technology have been unsuccessful, especially when trying to aim the vortex.[46] The intent was to lace the vortex with a substance such as CS gas. However, again, the vortex tended to quickly dissipate in the open air.

One bright spot, underwater acoustics are effective due to the water's ability to transmit sound.[47] The Navy has developed an underwater acoustic weapon called the *Acoustic Firing System*, which uses acoustic generated energy in the form of overpressure to detonate underwater mines.[48] A more futuristic version of the same concept also under examination by the Navy, involves a mechanism that produces an underwater acoustic "bow wave" effect that not only detonates underwater mines, but also clears underwater obstacles.[49]

BIOLOGICAL

Living organisms or their products, called biological agents, offer potential counterpersonnel and countermateriel applications. In the countermateriel role these agents could be used to contaminate an adversary’s fuel supply by microorganisms through either introduction of the microorganism or through reproduction stimulation of

[44] Dr Ken Collins, "Nonlethal Chemical and Biological Technologies" briefing, Quantico, VA., 3 Feb. 2000.
[45] Dr. David C. Swanson.
[46] Dr Ken Collins.
[47] Dr. David C. Swanson.
[48] LtCol Bob McKenzie, "Mine Countermeasures in the Littoral" briefing, Quantico, VA., 25 Feb. 2000.
[49] LtCol Bob McKenzie.

microorganisms already in the fuel.[50] This is a form of biology called "Combustional Alteration technology." The advantage of biological agents over chemical agents is that it requires a much smaller amount of biological agent to accomplish the same task as a chemical agent does.

Biological agents are controversial due to the provisions within the Biological Weapon Convention (BWC) that ban the use of biological agents for other than peaceful purposes.[51] These technologies would likely meet legal challenges and political resistance. Of the six technologies examined, the counterpersonnel use of nonlethal biological technologies would face the toughest legal and political challenge.

CHEMICAL

As with biological weapons, weapons use of chemical technology is controversial. However, the nonlethal use of chemicals appears to be more acceptable, as evident by DOD authorizing nonlethal chemical weapons research and development.[52] For example, the Directorate is researching the *Overhead Chemical Agent Dispersal System* (OCADS), as the name describes, allows for overhead dispersal of a nonlethal chemical agent at long range with weapons such as the grenade launcher or mortars.[53]

Future uses may include supercorrosives, supercaustics, and liquid metal embrittlements. These materials work by altering the chemical makeup of a selected material such as a tank barrel or components of an artillery piece. This material can be

[50] Dr Ken Collins.
[51] Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, 1972.
[52] Personal interview with Maj Stephanie C. Smith, Navy Judge Advocate General International and Operational Law Division., 24 Feb. 2000.
[53] Joint Nonlethal Weapons Program: 1998 A Year of Progress, (Quantico, VA.: Joint Nonlethal Weapons Directorate, 1999), 13.

applied on a target in a liquid, powder, or jell and can be engineered not to harm humans.[54] Chemical agents can also be used to attack fuel supplies with *Combustional Alteration technology.*

An issue is the Chemical Weapons Convention (CWC), which is an international agreement that bans the production, acquisition, stockpiling, transfer and use of chemical weapons. However, it does permit chemicals to be used for law enforcement activities including domestic riot control.[55] To date the CWC has not been ratified by Congress. The DOD position, based on executive direction, is that nonlethal countermateriel uses are acceptable, while counterpersonnel uses would require more scrutiny.[56]

SUPPORTING TECHNOLOGIES

Supporting technologies include those items that facilitate the use of nonlethal weapons. Examples would include both manned aircraft and Unmanned Aerial Vehicles (UAV) as a delivery means. Additionally, with proper modifications, any weapon system could employ these technologies.

IN CLOSING

As mentioned in the previous chapter, many nonlethal weapons technologies are in their early stage. Some exist today in the operating forces, while others remain in a research and development stage. Some are vision and may never leave the drawing board. However, within these six categories are the technologies that warrant serious

[54] Morehouse pg 115
[55] Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction, 1993.
[56] Maj Stephanie C. Smith.

consideration for future weapons. Some of the more credible technologies will be referred to again as part of a futuristic scenario presented in the last chapter.

CHAPTER 4

SEPARATE LETHAL AND NONLETHAL WEAPONS PROGRAMS

With a good understanding of nonlethal weapons established, now it is time to explore issues that separate the nonlethal and lethal weapons programs. The term separate in this case means separate in terms of funding, training, and concept of employment. The reasons relate to issues both internal and external to DOD. The internal issues are a result of program design, lack of professional military education and a lack of a stated requirement by the services and combatant commanders. External influences are a result of legal, policy, and technical issues.

DOD ORGANIZATIONAL INFLUENCES

The design of the nonlethal weapons program contributes to its separation from lethal weapons programs. The nonlethal weapons discussion is little more than three years in age and it is striving to become more mainstream and less a novelty item.

Nonlethal Weapons Program Design and Doctrine

DOD directive 3000.3 declares that "…**unlike lethal weapons** that destroy their targets principally through blast, penetration, and fragmentation, nonlethal weapons

employ means other than gross physical destruction…."[57] With this statement, a clear, unmistakable distinction is made between these two weapons. However, nonlethal weapons policy does encourage the availability of nonlethal force to "expand the range of options available to the commander."[58]

The *Joint Concept for Nonlethal Weapons* states a requirement for weapons that are "…**designed specifically** for the purpose of minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment."[59] This guidance would tend to steer research and development away from **designing** weapons that are capable of both a lethal and nonlethal effects. While the official concept advocates the use of nonlethal weapons in conjunction with lethal weapons, it does not require a single integrated system. Again this suggests that two separate sets of weapons must be developed, deployed and employed.

The doctrinal document, FM 90-40/MCRP 3-15.8 *Multiservice Procedures for the Tactical Employment of Nonlethal Weapons* (not a joint document), reflects this guidance also. It was developed to support training on the *Nonlethal Weapons Capability Set*. These sets require different handling procedures than do lethal weapons and thus require special training to employ them properly. This doctrinal document acknowledges that nonlethal weapons are separate from lethal weapons by stating that "nonlethal capabilities provide a wider range of options that **augment** but do not replace traditional means of deadly force."[60]

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[57] DOD Directive 3000.3, 1.
[58] DOD Directive 3000.3, 1.
[59] A Joint Concept for Nonlethal Weapons (Washington D.C.: Commandant of the Marine Corps, 1998), 1.
[60] Multiservice Procedures for the Tactical Employment of Nonlethal Weapons (Washington D.C.: Departments of the Navy and Army, 1998), I-2.

Current Service and Combatant Commander Requirements

Interestingly, neither the services nor the combatant commanders have requested integration of lethal and nonlethal programs. In fact, there are no specific requests for nonlethal weapons all. The Integrated Priority List (IPL), which is the instrument the combatant commanders use to articulate requirements and short falls, does not mention nonlethal weapons.[61] Additionally, the Joint Requirements Oversight Council (JROC), which validates requirements, has not received a Mission Need Statement (MNS) from any of the services articulating requirements that would cause the integration of the nonlethal and lethal weapons programs. [62] In most cases, IPL and MNS's are necessary to initiate services weapons programs.

As a first step, the Directorate has initiated work with JROC to formulate a MNS for nonlethal weapons on its own. However, this statement will not likely articulate a requirement for integration.

Service Education and Training

Few DOD professional military educational institutions have included nonlethal weapons technologies into their core curriculum. To date, the U.S. Marine Corps has the only career or intermediate level officer school that offers such a course.[63]

Within the operating forces, the Army and Marine Corps offer nonlethal weapons training focused on tactical level crowd control. This borrows heavily from military and civilian police training. At a higher level, joint training exercises traditionally do not

[61] Joint Review Panel meeting, Nonlethal Weapons Program Brief, 01 Feb. 2000 (Washington D.C., Joint Requirements Oversight Council, 2000).
[62] Joint Review Panel meeting.
[63] Personal interview with Ron Madrid, Program manager for the Marine Corps Research University and the Institute for Nonlethal Defense Technologies (INLDT) at the Applied Research Laboratory., 17 Feb. 2000.

incorporate nonlethal technology. As Operation *Allied Force* demonstrated, nonlethal technologies are not predominately incorporated in conflicts, but rather relegated to MOOTW and law enforcement oriented tasks.

INFLUENCES EXTERNAL TO DOD

Legal, policy, and technical issues also have a role in separating the two programs and tend to be beyond DOD's ability to influence.

Legal

Before a new weapon is approved, it must be subjected to a legal review by the service proposing the weapon. This review takes into account the law of armed conflict, which is a collection of treaties and conventions related to war. This form of international law began with the introduction of agreements such as the *Leber Code*, signed by Abraham Lincoln in 1863. Following the *Leber Code* there were various instruments of law that attempted to limit the violence of war. Two such conventions are *The Hague* and *Geneva Convention*. Other examples, such as the *Biological Weapons Convention* and *Chemical Weapons Convention*, have a direct impact on nonlethal weapons development.

Protocol I to the *Geneva Convention*, which was designed to protect victims of international armed conflict, prohibits the employment of weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering.[64] Using this as a guide, nonlethal effects must be reversible and have a low likelihood of causing unnecessary suffering.

[64] The Geneva Conventions of 12 August 1949, and Relating To The Protection of Victims of International Armed Conflict (Protocol I), 8 Jun. 1977.

Within the department of the Navy, the *International and Operational Law Division of the Deputy Assistant Judge Advocate General of the Navy* conducts these legal reviews in conjunction with similar organizations in the other services. They review nonlethal weapons technology specifically to see if it meets the criteria set for by DOD 3000.3. Items on their "approved for use" list included technologies such as calmative agents, pepper spray, smokes and fogs, riot control agents (CS and CN) and countermateriel substances such as surface polymerization, adhesives, embrittling agents, and combustion modifiers.[65] This evaluation criteria places nonlethal weapons technologies into a separate category from lethal weapons.[66]

As stated, the human effect is most likely the most important consideration. Currently, there is little data to support predictions of "unnecessary suffering." Without this type of data, there may not be enough confidence in these technologies to integrate them into mainstream weapons programs.

Policy and Political Influences

A national policy concerning nonlethal weapons would help provide the attention necessary for them to gain mainstream acceptance within the military establishment. A 1999 study conducted by the *Council on Foreign Relations* stated:

> To date, the president and National Security Council have not issued a policy on nonlethal weaponry. Some look to such a national policy statement as a means of speeding the development of effective technologies and their incorporation into U.S. military forces… [67]

[65] LTC Margaret-Anne Coppernoll, The Nonlethal Weapons Debate (Naval War College Review, Spring 1999).
[66] Maj Stephanie C. Smith,.
[67] Report of an Independent Task Force, Non-Lethal Technologies: Progress and Prospects, (New York, Council on Foreign Relations, 1999).

The report specifically identifies the *National Security Council* as the agency that needs to provide guidance (The highest level guidance at this time is the DOD Directive 3000.3). This study conflicts with the study directed by PRD-54 that concluded that it is too early to issue a policy.

Technology

As alluded to earlier, many nonlethal technologies are at an early stage of development and are not ready to be employed. This makes integration in the near term impractical. Committing millions of dollars to a program based on an unproven technology can be risky. A large-scale weapons program takes many years to develop. Systems introduced today may take 10 years to develop. Hence decisions made today will have an effect on weapons 10 years or more. At this time, the Directorate is not heavily invested in any one technology.[68]

CONCLUSION: SEPARATE NONLETHAL AND LETHAL WEAPONS PROGRAMS

One reason nonlethal and lethal weapons are in separate programs is because DOD has purposely designed the nonlethal program to be that way. No where within any of the directives or MOA's is there a statement that explains why the programs must be separated. Other reasons include challenges such as the state of technology, along with legal and political considerations.

Based on current nonlethal weapons policy, weapons are either nonlethal or lethal but can not be both. This could lead to problems if nonlethal weapons were in

[68] Joint Nonlethal Weapons Program: 1998 A Year of Progress, 4-18.

widespread production as a stand-alone system. This also means there would be two separate weapons with two separate logistical requirements, two separate ways of training, and additional gear for troops to transport. During an operation, if the situation changes from one that requires lethal force to one that requires nonlethal force, time would be needed for weapon exchanges. Ultimately, the tempo of operations is affected as a result of this seam created from transition. Additionally, in an environment with limited strategic lift, additional weapons systems requirements could overburden an already heavily taxed transportation system needlessly.

CHAPTER 5

REASONS TO INTEGRATE NONLETHAL AND LETHAL WEAPONS PROGRAMS

> *When Marines deploy into urban areas today and in the future, they will need the flexibility to address a wide variety of crises. In one city block, a Marine will provide food, care, and comfort for an emaciated child. In the next block, you will see this Marine with outstretched arms, separating two warring tribes. Then, in a third city block, this same Marine will engage in intense house-to-house fighting with hostile forces.*[69]
>
> -General C.C. Krulak

Comment [P1]:

While the last chapter provided reasons why the nonlethal and lethal weapons programs are separated, this chapter will explore requirements for integration. This will be accomplished by examining both lessons of the past and visions of the future. Perspectives from some of the great military theorists will be examined in terms of how they relate to concepts of lethality and nonlethality. After that, *DOD* requirements, in the form of joint and service vision, will be examined to see whether or not they support integration.

MILITARY THEORISTS

Carl Von Clausewitz and Sun Tzu offer insight on war that relate to the requirement for lethal and nonlethal force.

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[69] United States Marines Warfighting Concepts for the 21st Century (Quantico, VA. Marine Corps Combat Development Command, 1999), VII-6

Carl Von Clausewitz

Clausewitz points out that war is "… an act of force to compel the enemy to do our will."[70] From a national prospective, compelling an enemy to do our will can be accomplished through a combination of diplomatic, informational, military, and economic means. Military force is but one, usually extreme, means of national power. Military options typically consist of either a show of force or the use of lethal force.

Clausewitz observed that policy restraints could affect the nature of war. He noted that policy could change a "…terrible battlesword…into a light handy rapier-sometimes just a foil for the exchange of thrust, feints and parries."[71] He goes on to point out that "…wars between civilized nations are far less cruel and destructive than wars between savages…."[72] He recognized the role that the state, through policy, has in determining the character of war. This ties in with the catagories of national interests discussed in Chapter 1.

In this information age, images from the battlefield can be instantly shown in living rooms across the world. As is the case with the United States, citizens of modern countries demand reduced violence, especially when military forces are employed for *humanitarian interests*. Elected representatives reflect this demand through policy. This was clearly demonstrated during the Kosovo conflict by both the Clinton administration's reluctance to commit ground troops and by NATO's restriction on aircraft operating below 15,000 feet. Additionally, television scenes with dead Albania noncombatants, mistaken for a Serbian military convoy, increased world negative opinion in this case.

[70] On War, 75.
[71] On War, 606.
[72] On War, 76.

On the other hand, Clausewitz pointed out that policy makers can present military commanders with a dilemma when he observed: "Kind-hearted people might of course think there is some ingenious way to disarm an enemy without to much bloodshed…mistakes which come from kindness are the very worst."[73] This quote sums up the current and future challenges that face the military. On one hand, policy restraints demand that warfighters minimize death and destruction; however, the very nature of war is in conflict with these restraints. Commanders in these situations are best served when both nonlethal and lethal force is readily available.

Sun Tzu

Sun Tzu showed that he understood the importance of nonlethal and lethal force through his teachings. The main object, as he points out, did not necessarily require the physical destruction of the enemy. Over 2,500 years ago he wrote: "For to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill."[74] In another passage he relates to non-lethality in the statement "Hence to fight and conquer in all your battles is not supreme excellence; supreme excellence consists in breaking the enemy's resistance without fighting."[75] Sun Tzu understood that there were other ways to accomplish goals besides means of destruction. However, he did not discount lethal force when required.

JOINT VISION

In this modern era, the military struggles to meet evolving policy requirements and

[73] On War, 75.
[74] Sun Tzu, The Art of War. trans. James Griffith (New York: Oxford University Press, 1982).
[75]Sun Tzu,. chap. 3, axiom 3.

an example of this is *Joint Vision 2010 (JV 2010)*. Published in 1997, it is the Chairman of the Joint Chiefs of Staff's vision statement. JV 2010's purpose is to provide a conceptional road map for the future military. Ultimately, weapons programs are shaped by this type of military policy. These programs reflect the guidance from the President of the United States in the form of the *National Security Strategy*. Executive level guidance is also reflected in the *Quadrennial Defense Review (QDR)* and the *National Military Strategy (NMS).* The *QDR*, congressionally mandated, is an overall strategic planning document for DOD and provides a plan for specific military capabilities and challenges from 1997 to 2015 and is based on *JV 2010*. Building on both the *National Security Strategy* and the *QDR*, the *NMS* is developed in conjunction with the service chiefs and combatant commanders. It lays out a strategic direction for a three to five year period. In light of its relatively short-range view, the *NMS* will not be discussed. However, *JV 2010*, which is the best representative of DOD's long range vision, will be examined further.

Joint Vision 2010

Joint Vision 2010 provides a road map into the 21st Century and is meant to shape service and combatant commander requirements. Its operational concepts are **precision engagement, dominant maneuver, focused logistics,** and **full dimensional protection,** under the umbrella of **full spectrum dominance**.[76]

Full spectrum dominance represents dominance in a full range of potential military operations from humanitarian assistance to high intensity conflict.[77] In light of this, a unit

[76] Joint Vision 2010, 1.
[77] Joint Vision 2010, 25.

must train and be equipped to operate across the spectrum of operations, from the handling of diverse missions such as food distribution in Africa to conducting high-intensity combat in Korea. The same serviceman handing out food must also be prepared to deploy to Korea and fight a conventional war. The key tenant of **full spectrum dominance** is flexibility rather than overspecialization. This concept advocates the use of technology to develop these response options.

JV 2010 describes **precision engagement** as an ability to rapidly locate and effectively engage targets while minimizing both risks to operators and collateral damage. Looking forward to new technologies, this document directly advocates integration of nonlethal and lethal weapons systems with the following statement:

> The ability to produce a **broader range of potential weapons effects**, from less-lethal to hard target kill, from sensor-fused to directed energy weapons, will further enhance precision capability. Advances in target effects technologies will be **integrated** into existing weapons and give commanders greater flexibility. [78]

This statement recognizes how nonlethal and lethal technologies, when used together, can enhance a commander's flexibility.

Under **dominant maneuver,** JV 2010 mentions the ability to operate in a fast pace environment where the commander needs flexibility to respond in various manners. As the document states, "the accelerated tempo and greater integration requirements will likely create a more stressful, faster moving decision environment." [79] In these situations, it would be more efficient for a serviceman to use one weapon, capable of both nonlethal and lethal force, rather than to use two separate weapons. With this concept, the operator

[78] Joint Vision 2010, 12.
[79] Joint Vision 2010, 15.

can remain flexible and keep pace with a dynamic environment where one moment there is a need for crowd control, but in the next, the operator is faced with an attack by a hostile force armed with AK-47's and Rocket Propelled Grenades. This is the "three-block war" described at the beginning of this chapter.

Focused logistics is a means to support these concepts. It's goal is to "track and shift assets even while enroute, and to deliver tailored logistics packages and sustainment directly at the strategic operational, and tactical level of operations."[80] Integrated nonlethal and lethal weapons would require less support than two separate systems. This also enhances the logistics organization's flexibility and responsiveness.

Finally, **Full-dimensional protection** is a means to ensure "…forces can maintain freedom of action while providing multi-layered defenses for our forces and facilities at all levels."[81] Integration of lethal and nonlethal weapons systems enhances full-dimensional protection in the same manner it does for other concepts, in that it provides flexibility and responsiveness. Flexibility and efficiency is gained through the ability to use the same weapon or weapon technology in multiple roles, to include force protection.

The Joint Concept for Nonlethal Weapons

Interestingly enough, the nonlethal programs own document, *A Joint Concept for Non-lethal Weapons*, provides compelling points that support integration. It identifies a need for nonlethal weapons to be "…compatible with, easily **integrated** with, and complementary to current and planned conventional weapons systems."[82] This statement acknowledges that integration is desirable but does not further clarify integration.

[80] Joint Vision 2010, 24.
[81] Joint Vision 2010, 22.
[82] United States Marine Corps Warfighting Concepts for the 21st Century, XII-8.

Another statement within this text mentions a “rheostatic…tunable ” capability as desirable features. Taken a step further, this rheostatic capability could mean that a weapon is either lethal or nonlethal based on operator input.

SERVICE VISION

Common themes that resonate throughout service vision statements are flexibility, versatility and capability to function across the spectrum of operations. These themes are echoes of Joint vision 2010.

Army

The U.S. Army's vision statement titled *The Army Vision: Soldiers On Point for the Nation: Persuasive in Peace, Invincible in War* also identifies a requirement to operate across the spectrum of operations. To accomplish this, they are exploring ways to make their force more deployable by acquiring a lighter, more easily transportable force. At the same time, they desire this force to be both lethal and survivable. Its future force is described as follows: [83]

- Responsive
- Deployable
- Agile
- Versatile
- Lethal
- Survivable
- Sustainable

Of all these traits, nonlethal and lethal weapons integration best supports the category of **versatility**. This characteristic allows Army forces to quickly transition from

[83] Joint Vision 2010 The Army Vision: Solder On Point for the Nation…Persuasive in Peace, Invincible in War (Washington D.C.: Department of the Army, 1999), 1.

one part of the spectrum of operations to another.[84] These forces will require a means to respond with an appropriate level of force when conducting diverse missions such as peacekeeping or a major war. The ability to produce both nonlethal and lethal force provides versatility while reducing the logistical footprint. All of this contributes to another Army principle: **agility**.

Navy

The Navy's vision statement sees five future roles as follows:[85]

- Projection of power from sea to land
- Sea control and maritime supremacy
- Strategic deterrence
- Strategic sealift
- Forward naval presence

Like the other services, the Navy acknowledges its potential involvement in a broad range of missions. The tasks of **projection of power from sea to land** and **forward naval presence** are a shift from the "blue water" operations focus, characterized by fleet on fleet engagements, to the operations focused on littoral regions. It must also consider that some of its forces, like tactical aviation, will operate ashore with ground forces.

Within littoral regions there are potential for encounters with small craft that are difficult to identify as hostile or non-hostile. Additionally, the Navy finds itself involved in other tasks such as peacetime ship searches in support of the United Nations, as is the case in the Arabian Gulf. These missions require the ability to project both nonlethal and

[84] Joint Vision 2010 The Army Vision: Solder On Point for the Nation…Persuasive in Peace, Invincible in War, 1.
[85] Forward …from the sea (Washington D.C. Department of the Navy, 1997), 1.

lethal force. At the same time, these forces must be prepared to conduct traditional **sea control and maritime supremacy**, operations that require a more lethal force. These diverse missions also call for both lethal and nonlethal weapons.

Air Force

The Air Force's vision for the future is titled *Global Engagement: A vision for the 21st Century*. It too reflects JV 2010 with the following core competencies:

- Air and space superiority
- Global attack
- Rapid global mobility,
- Precision engagement
- Information superiority
- Agile Combat Support

Of these core competencies, **precision engagement** provides a requirement to integrate nonlethal and lethal weapons. In reference to this competency, Dr. Sheila E. Widnall, Secretary of the Air Force, states " Because it saves lives of friends, foes and civilians, the Air Force core competency of precision engagement will remain a top priority in the 21st Century."[86] The Air Force currently envisions this being accomplished through force applied with precision to achieve the desired effect with minimal risk and collateral damage.

The document goes on to point out the limitations with current forms of air power by using as an example an operation in Bosnia called *Deliberate Force*. It noted that even though this operation was "militarily robust, it was politically fragile."[87] Any civilian casualties or collateral damage that occurred would place political pressure on the Allies.

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[86] Global Engagement: A vision for the 21st Century (Washington, D.C.: Department of the Air Force.
[87] Global Engagement: A vision for the 21st Century**.**

In this example, the document cites that through superior intelligence and aircrew preparation, major political fall out was prevented. However, civilian causalities witnessed during operation *Allied Force*, which occurred after this document was published, revealed the potential shortfalls of relying solely on precision lethal munitions.

Marines

Of the four services, the U.S. Marines have provided the clearest requirement for the integration of nonlethal and lethal weapons. In their vision piece titled *United States Marine Corps Warfighting Concepts for the 21st Century*, which includes the concept of *Operational Maneuver from the Sea* (OMFTS), they have expended tremendous efforts in preparing for what they perceive as a likely location of future conflict in the littoral: urbanized terrain. As General Krulak's earlier quote alluded to, military forces must be flexible and responsive. In a "Three Block War," servicemen must be prepared to operate across the spectrum of operations in locations separated by a few blocks. Implied with this is need to also operate across the continuum from nonlethal to lethal force.

With the high numbers of noncombatants likely to remain in the city during combat, their safety must be taken into consideration. The Russian operation in Chechnya demonstrates what complications can arise with noncombatant casualties in terms of world opinion. The Marine Corps addresses this in its *Concept for Military Operations on Urbanized Terrain*. This document uses the term *Measured firepower*, which is the manipulation of force to reduce the likelihood of injury to noncombatants when required.[88] Integration clearly supports this concept.

[88] A Concept of the Future Military Operations in Urban Terrain (Quantico, VA. Marine Corps Combat Development Command, 1999), VII-11.

CONCLUSIONS: REASONS TO INTEGRATE NONLETHAL AND LETHAL WEAPONS PROGRAMS

Integration supports joint and service requirements. JV 2010 clearly states this in the following quotation: "advances in target effects technologies will be **integrated** into existing weapons and give commanders greater flexibility."[89] However, the manner in which nonlethal weapons are being handled, as described in Chapter 4, does not allow this to occur.

Integration is efficient because it combines the capability of nonlethal and lethal weapons into one. This is important for four reasons. First, it provides commanders with the flexibility to respond across the force continuum in various situations from humanitarian relief to major war. Second, operators are not required to carry or to be trained on two type weapons. Third, funding two separate large scale weapons programs is too expensive and fourth, the logistics burden is less.

[89] Joint Vision 2010, 12.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

The previous chapters laid the groundwork for the following conclusions:

It can now be deduced that both nonlethal and lethal, as stand alone weapons, will continue to have validity in the future. In the case of stand-alone nonlethal weapons, their employment is limited to crowd control, rear area security and some special operations functions. These tasks are generally associated with MOOTW, but can occur across the spectrum of operations. Therefore, these types of nonlethal weapons should remain in a separate program.

It was also shown that nonlethal force could provide policy makers and military commanders another option besides lethal force. This is important because, ROE may restrict military units equipped only with lethal weapons. These units may be unable to respond in certain situations due to ROE restrictions on lethal or destructive force. As a result, a response "gap" is created. Nonlethal force can fill this gap. However, equipping the majority of military combat units with separate stand-alone nonlethal and lethal weapons is neither practical nor desirable. Rather, it is the integration of these capabilities that meet future military requirements. By separating these programs, DOD misses an opportunity to broaden its response options.

As the Marine Corps Doctrinal Publication *Warfighting* states "…the challenge is to develop a concept of warfighting consistent with our understanding of the theory and nature of war and realities of the modern battlefield."[90] This paper submits that this integration support the JV 2010 and services concepts of warfighting and relate to the theory and nature of war as described by the great thinkers Clausewitz and Sun Tzu.

Instead of considering weapons as either stand-alone nonlethal or lethal, an additional category of weapons should be considered. This third category would be based on the combination of both lethal and nonlethal effects into one weapons system. This could be accomplished by either modifying existing weapons systems or through integration with future weapons such as the joint strike fighter and the next generation tank. This modification would allow for mainstream military forces to be properly equipped for the future. In the end there would be three general categories of weapons: nonlethal, lethal, and Flexible Force.

A NEW CONCEPT

A concept of integration that allows military forces to operate effectively across the spectrum of operations can be called Flexible Force. A simplistic example of this is the Phaser used by Captain Kurk on the television series *Star Trek*, "Gentlemen set your phasers on stun." The intent is to have the **flexibility** or ability to respond with either lethal or nonlethal force in a given situation.

What is Flexible Force?

The author defines flexible Force as follows*:*

[90] Marine Corps Doctrinal Publication 1, Warfighting (Washington D.C.: Department of the Navy, 1997), 71.

A weapon or weapon system, **based on operator input**, able to produce either **nonlethal or lethal effects** on the intended target based on **rheostatic input** or by the type **munitions** employed.

To better explain the Flexible Force concept, the Swett Curve will be re-examined (Figure 5). As explained earlier, the goal of nonlethal weapons is to minimize both lethality and permanent damage, while allowing for the desired target effect. This is represented by line labeled B. The goal with lethal weapons is the effect represented by line labeled C. Flexible Force combines the effects of both, while avoiding levels of force between lines B and C, which would likely produce unnecessary suffering and thus violate the law of armed conflict.

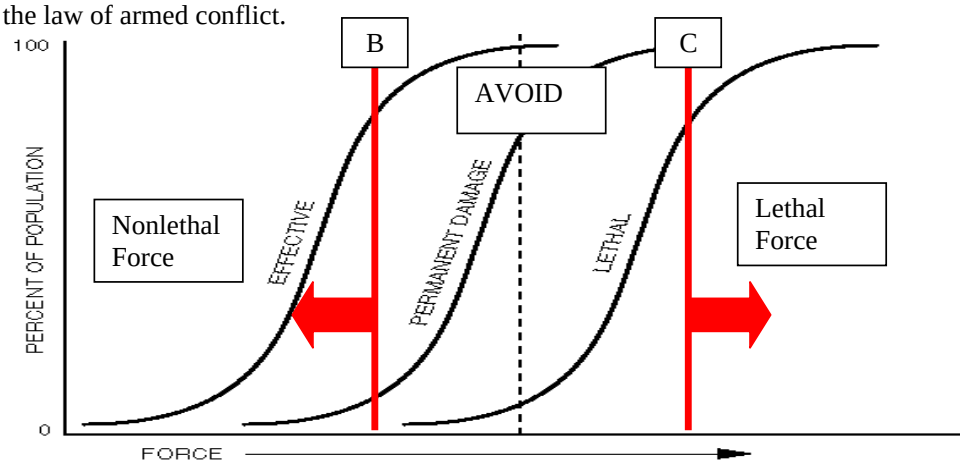

Figure 5

Training

An advantage with the concept of Flexible Force is that it would facilitate common tactics and training with a single weapon. The decision to use lethal or nonlethal force in many cases would be based on commander guidance and ROE. However, ROE cannot address each and every scenario, servicemen will have to have the appropriate training to deal with the dilemma of whether to use nonlethal or lethal force. The ability to quickly transition from one level of force to the next is critical. While military and civil police

tactics and procedures are helpful; they should only supplement, not replace, warfighting focused training.

FURTURE SCENARIO

To better illustrate the concept of *Flexible Force* and how it relates with nonlethal and traditional lethal weapons, a futuristic scenario will be presented. The technologies used are based on those discussed in Chapter 2. For simplicity, the general situation will be the same as that with *Operation Allied Force* in Kosovo, except this time it takes place sometime after the year 2010. The assumption is that over time technological developments have allowed for the production and fielding of Flexible Force and nonlethal type weapons. Additionally, more capable Unmanned Aerial Vehicles (UAV), advanced tactical aircraft, and ground weapons systems have been introduced.

This campaign has three goals:

- Stop ethnic cleansing in Kosovo.
- Serbian armed forces withdraw from Kosovo.
- Assist in establishment of a democratic government in Kosovo.

Towards these goals, all forms of national and international power, except military force, have been exhausted to the point that NATO governments have authorized military force. However, not all members are supportive of this decision. They insist that more time should be allowed for sanctions to have an effect. Additionally, Russia and China have registered protests.

The NATO commander is under intense political pressure to minimize collateral damage. While authorizing all means of force necessary to ensure the safety of the troops, the commander is sensitive to the fact that unnecessary "collateral" damage could

jeopardize NATO consensus. The commander then tasks his staff to begin to formulate a plan that is decisive while taking into account the political realities. Having mentored this paper earlier in his career, he directs maximum use of Flexible Force weapons in conjunction with strictly lethal and nonlethal weapons in the targeting process. Flexible Force capability, at this future time, is inherent with many weapons systems across the force including both manned and unmanned aircraft, missiles, artillery, ground vehicles, and individual weapons.

Since tactical actions may have strategic/political implications, the staff examines the four phases of the campaign to determine appropriate uses for these weapons at both the operational and tactical levels of war. These four phases are as follows:

Phase I (Shaping). The Combined Force Air Component Commander (CFACC) as the main effort will conduct shaping operations aimed at driving Serbian ground forces from Kosovo through direct action against the military forces, Serbian economy, and Serbian government. As a supporting effort, the Combined Force Land Component Commander (CFLCC) will occupy assembly areas in vicinity of Kosovo in support of the CFACC. Both the Combined Force Maritime Component Commander (CFMCC) the Combined Force Special Operations Component Commander (CFSOCC) will support the main effort.
End State: Serbian Forces withdraw from Kosovo and/or the NATO commander decides to conduct ground attack.

Phase II (Introduction). The CFLCC as the main effort will conduct attacks to defeat remaining Serbian military and paramilitary forces and provide support for humanitarian relief efforts. The CFACC, CFMCC, and CFSOCC are in support of the main effort.
End State: Serbian military and paramilitary forces defeated. CFLCC forces established in their respective sectors.

Phase III (Decisive Action). The CFLCC as the main effort will conduct decisive operations and continue to support for humanitarian relief efforts. The CFACC, CFMCC, and CFSOCC are in support of the main effort.
End State: No organized armed resistance in Kosovo. Humanitarian agencies established. NATO forces prepared to conduct transfer of control to UN forces.

Phase IV (Transition to UN control). The CFLCC as the main effort will continue to support for humanitarian relief efforts. The CFACC, CFMCC, CFSOCC are in support of the main effort. UN assumes control of AO.
End State: UN forces assume control of Kosovo. NATO forces depart Kosovo or

transfer to UN control. (This phase will not be addressed because of its similarity to phase IV).

The first two phases will reflect traditional wartime ROE with some restrictions relating to protection of noncombatant and selected structures. The use of Flexible Force will allow the NATO forces more response options in light of this ROE, especially when lethal force is prohibited. During the third and fourth phases, as operations shift towards peace keeping, ROE will become even more restrictive.

Phase I

The staff begins by examining the *Shaping* phase. During this phase the enemy's operational center of gravity is determined to be its *Fourth Corps* that has its headquarters located in the vicinity of Pristina. This force is composed of about 45,000 troops within two mechanized divisions and an independent armor brigade, both of which are equipped with main battle tanks, armored personnel carriers, artillery, AAA, and SAM's. The targets in order of priority are determined to be command and control, integrated air defense systems, armor and indirect fire weapons. *Fourth Corps' Critical Vulnerability* (CV) is their vulnerability to air attack. The staff decides to exploit this CV, in part, through the use of a combination of Flexible Force and lethal weapons. These weapons will be delivered mainly by air, but also by surface to surface guided missiles, indirect fires, and special operations forces.

Next they determine which of these weapons will be used against which targets. For flexible force weapons, the most appropriate targets are those that are subject to restrictive ROE, that for what ever reason, prohibits employment of high explosive kinetic weapons. Manned and unmanned tactical jet aircraft will employ both High Power Microwave (HPM) and Chemical Pulse Lasers, carried within pods beneath their

wings. The targets will be the Corps air defense and command and control networks. Microwave energy will be directed at the Corps headquarters in downtown Pristina and an air defense command center located in a nearby village. The intent is to destroy electrical circuits while minimizing damage in the surrounding area. Other aircraft armed with chemical pulse lasers and traditional precision guided munitions will attack SAM sights. Electrical service to the Corps area will simultaneously be disrupted by carbon filaments dropped on power and relay stations by low flying cruise missiles and UAV's. For selected harden targets, especially those in isolated areas, these same air assets can employ precision high explosive bombs. If required, these electromagnetic weapons could be used in a counterpersonnel role. In this role, the energy of the weapon can be rheostatically increased or decreased to produce either nonlethal or lethal force.

For armored and indirect fire assets UAV's will deliver countermateriel chemical agents. These agents have been engineered to affect selected metallic and composite material while not being harmful to humans or the environment. These UAV's will locate these targets and then dispense embrittlement or corrosive in the same manner as a crop duster. These agents will act quickly to render their targets inoperable. For targets of opportunity, these UAV's will also carry several Hellfire missile variants.

For denial of lines of communications, UAV's or manned aircraft can employ viscosity agents near bridges and main roads. This material is extremely slick and requires great effort to remove. At choke points, this weapon could be effective in delaying forces and in some cases deny passage. If required, these same craft are equipped to cover these areas with lethal fire.

Additionally, special operations forces have added chemical *Combustion Modifiers* to contaminate Serbian fuel storage areas. This will contaminate key reserves without destroying these facilities.

To support these operations, the staff intends to include, within the *Information Operations* plan means to reassure the general public and noncombatants in Kosovo that these weapons are safe, and in some cases, better alternative to lethal weapons. It is also important to explain why lethal weapons are required, because some may advocate the use of only nonlethal weapons. Information will also be released to inform the Serbians that they are not under a deadly chemical attack by UAV's.

Phase II

For this *Introduction* phase, the assumption is that the Serbian forces are either defeated or that their combat effectiveness is reduced to an acceptable level. For this phase, the enemy's operational center of gravity is determined to be the capability to conduct asymmetrical warfare against U.S. ground forces. Their CV is determined to be a lack of support by Albanian noncombatants, which will enhance NATO's human intelligence collection abilities. The key NATO vulnerability involves inability to politically justify a large number of noncombatant or NATO troop casualties. During this phase the staff will consider both countermateriel and counterpersonnel weapons.

Against isolated Serbian forces, the same array of air delivered weapons will be available. Additionally, selected rounds fired from 155mm artillery pieces will be electromagnetic pulse capable or countermateriel chemical capable. For both variants the round, at a specific height above the target, will either produce a non-nuclear

electromagnetic single pulse of energy to disrupt and destroy electronics or deploy countermateriel chemicals on designated targets.

Against ground troops selected military vehicles such as tanks and armor personnel, along with their main guns or cannons, all outfitted with removable pods capable of producing directed counterpersonnel microwave energy. These pods produce either high or low frequency multiple pulse energy. High frequency energy is capable of producing a burning sensation on the skin, while low frequency energy causes temporary incapacitation. In the high frequency mode, these weapons are effective at dispersing crowds. In the low frequency mode, these weapons are effective in subduing insurgent forces while not destroying the surrounding structure or unintentionally harming noncombatants. If required, the power for the low frequency variants could be increased to produce a counterpersonnel lethal effect. These weapons pods are designed to be versatile and interchangeable between weapon systems. For instance, they can be attached to weapons platforms such as attack helicopters.

Additionally, infantry units will be required to deal with both isolated pockets of resistance and civil disobedience. Along with the support previously described, the individual Infantryman will possess modified versions of the M-16 that are capable of firing both lethal and nonlethal projectiles. The main part of the weapon consists of the traditional assembly that fires a 5.56mm round. Connected to the barrel is an attachment similar to the M203 that is able to fire either a standard M203 round or nonlethal foam round. The force of this foam round can be adjusted, through moving a lever, to several levels of force depending on the nature of the target. At the highest setting the foam

round is propelled at enough speed to produce a lethal effect. Along with rifles, these units also have 12 gauge shot guns capable of employing nonlethal rounds.

Phase III

During the stabilization phase, forces will focus more on peace keeping and local security and less on conventional combat. Patrolling in towns will become common place and the most common occurrence will be civil disturbances. All weapons are available; however, ROE will become more restrictive causing the focus to shift more towards nonlethal force options. Forces will have a wide variety of equipment capable of both nonlethal and lethal force. Due to nonlethal force capability, weapons previously used for conventional combat in phases one and two are now useful for maintaining civil order.

For security operations, stand-alone nonlethal weapons will be introduced. These weapons include electromagnetic technologies used as vehicle stoppers in a force protection role. Through an electronic pulse these devises can interrupt many type automobile engines. Additionally, electromagnetic weapons will be used for area denial in and around base camps.

Scenario Overview

This scenario has helped highlight both the technologies presented in Chapter 3 and the benefits gained through integration of both nonlethal and lethal programs. These examples represent the author's best effort to project what could be possible in the next 10 to 15 years.

A CHANGE IN FOCUS

Based on this concept, there should be changes made with the current nonlethal weapons program to facilitate integration. To do otherwise, will leave the program isolated from future mainstream programs and worst of all, inaction may lead to a missed opportunity to enhance warfighting capability.

The Nonlethal Weapons Directorate should be viewed as a step in the integration process: an incubator for the nonlethal and flexible force concepts. Its goals should be to educate those within DOD on the capabilities and limitations of these concepts and their technologies. It should also explore ways to convert lethal weapons systems into Flexible Force weapons that are as lethal as before, but with added capability. A rewrite of DOD Directive 3000.3 should include provisions for flexible force per the definition introduced in this chapter.

The Directorate should have a major role in addressing the following obstacles standing in the way of integration:

- Technology
- Bureaucratic inertia
- Human effects
- Policy

The technology obstacle can be overcome with time and resources. Technologies formally considered as only "nonlethal" could be developed faster and incorporated into programs such as the Joint Strike Fighter and the Advanced Amphibious Assault Vehicle (AAAV). As the Directorate's budget shows, there is little funding available for strictly nonlethal weapons.

The idea of integration also needs to be sold to the military establishment. Currently, as demonstrated by a lack of stated requirements, the services and combatant

commanders have given nonlethal weapons a cool reception. However, this can be reversed through education, professional articles, and technology demonstrations. As familiarization increases, a requirement will likely arise.

Human effects will remain an issue and the Directorate has leaned forward by establishing the Human Effects Advisory Panel (HEAP). The challenge is that each human is different so what may be lethal to an elderly individual may be nonlethal to another. One approach produces effects manuals for humans similar to how the Joint Munition Effectiveness Manual (JMEM) provides material effects. For example, the JMEM provides a pilot, planning an attack on a tank, a probability of a mobility kill, firepower kill, or just a kill. This concept can be adapted to determining probabilities of incapacitation, permanent injury, or lethality.

The Public Acceptance Advisory Team is also applicable to Flexible Force. If weapons appear too exotic, there could be a public backlash that kills a valid program. Care must be taken to introduce technologies to the public in a manner that does not cause suspicion. A negative perception could result from either misinformation or from a lack of information on new weapons based on electromagnetic technologies. New technologies such as microwave, if not properly introduced, may prove to be politically unemployable due to public distaste for weapons that produce an invisible and "mysterious" force. New uses of old technology such as those that use chemicals carry the baggage of past experiences of World War One. However, care should be taken to ensure sensitive technologies are not compromised to potential adversaries.

As time goes on and awareness and acceptance grows, the Directorate could be phased out leaving behind in its place the concept of nonlethal and Flexible Force. This

concept would be embedded into all weapons systems and weapons programs. In the future, the name "Nonlethal Weapons Directorate" would seem as out of place as a "Lethal Weapons Directorate" would today. A time line for this transition would be based on advances in technology and institutional acceptance of integration.

Policy makers must consider the unintentional consequences as well. Perhaps there is a potential Pandora's box waiting to be opened with the proliferation of these new weapons. Would positive benefits with these weapons then be negated with misuse by other countries or organizations? Additionally, rogue states or organizations may use these weapons for torture or control for criminal purposes. In the case of EMP weapons, the United States is the most vulnerable when compared to some of our less technologically developed rivals such as Iran or North Korea. These type weapons could in fact provide foes a means to attack our electronically dependent weapons and command and control infrastructure. So in light of this, countermeasures must be developed regardless whether or not the U.S. decides to pursue these technologies, because most likely someone else will.

FINAL THOUGHT

Flexible force weapons are a means to bridge the gap between tomorrow's vision and today's reality. It is incumbent upon the services and the combatant commanders to take the lead in this process to make this vision a reality. Political influences will continue to characterize the nature of conflict and its level of violence. Military professionals must recognize this and equip the future commanders and their troops with an additional force option.

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