

A TASER International representative displays a prototype for the TASER XREP, a 12-gauge wireless neuro-muscular incapacitation projectile, at a trade show for the Canadian Association of Chiefs of Police in Montreal, August 2008.
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Procurement and Policy

POLICE USE OF EMERGING WEAPONS TECHNOLOGY

INTRODUCTION

In most Western countries, two factors condition the use of force by domestic security agencies: operational guidelines and the type of weaponry available. The relationship between use-of-force policy and weapons procurement is close but complex. The adoption of new weapons may call for new policies, while the need to meet international norms in policing, for example, can affect weapons procurement. Market forces and trends in both civilian and military firearms development and procurement also play influential roles in the adoption of new weapons technology.

On the streets of cities such as Chicago, Manchester, and Marseille, police officers have increasingly adopted so-called 'less-lethal' weapons into their day-to-day activities. A comprehensive review of the use of these weapons by Western police has not yet been undertaken, but police experience in France,¹ the United Kingdom, and the United States suggests that countries are facing similar use-of-force challenges that are drawing them to use these weapons. By examining recent trends in police weapons technology and procurement by law enforcement agencies, as well as their use-of-force policies, this chapter highlights the alignment of policies and practices in a small but important sample of the West's 'leading-edge' states.

Among the chapter's conclusions are the following:

- Aside from the use of new materials to reduce weight and facilitate customization, law enforcement firearms have not recently experienced significant technological development.
- While Western European agencies still predominantly use 9 mm handguns for public order policing, US law enforcement agencies are procuring larger-calibre handguns and semi-automatic rifles to counter armed criminal violence.
- The latest generation of 'less-lethal' weapons allows police officers to engage targets that are farther away and provides them with more flexibility in the use of force across the spectrum from non-lethal to lethal.
- In its effort to adapt police practice and doctrine to new firearms and less-lethal weaponry, the US law enforcement community draws its primary inspiration from the military.
- Use-of-force policies have not kept up with the procurement of some weapons technology by police organizations. In terms of doctrine, practice, and equipment requirements, this discrepancy is accentuated by the absence of consensus among countries and law enforcement agencies.

This chapter begins by reviewing the concepts of the 'use-of-force continuum', 'less-lethal' technology, and the heterogeneity of law enforcement arrangements and needs. The section that follows identifies recent developments and procurement trends in law enforcement firearms and less-lethal weapons. The final section highlights a number of issues concerning the matching of police policies and procedures and emerging weapons technology.

SETTING THE STAGE

Force continuum

The proportionate use of force is key to law enforcement practice, accountability, and perceived legitimacy. Officers learn that the level of force in response to a given situation should match the actual threat. The use of lethal force is usually regarded as a last resort. The UN Code of Conduct for Law Enforcement Officials articulates the basic principles of the proportional, minimum, and discriminate use of force (UNGA, 1979, p. 2). The UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials call for law enforcement officers to apply non-violent means before resorting to the use of any weapons (UN, 1990, para. 4). If the use of force or armed response is unavoidable, then it should be limited to what is necessary and proportionate to the seriousness of the offence (para. 5a). The Basic Principles also formalize the need for ‘various types of weapons and ammunition that would allow for a differentiated use of force and firearms’ (para. 2).²

Western police organizations illustrate and conceptualize the use-of-force continuum using various charts and schematics, and mainly as a training tool. Such charts present a spectrum of options that reflect increasing levels of threat and indicate what is considered an adequate response. Figure 3.1 shows seven threat levels and matching appropriate police responses, ranging from the officer's mere presence to the use of lethal force. Force continuum models may also seek to match police response to different types of subject behaviour—such as cooperation, passive resistance, active resistance, and assault (Braidwood Commission, 2009, p. 8). In the section on ‘Matching weaponry with doctrine’ (see below), this chapter studies the factors that can reduce or widen the gap that separates the use of less-lethal weapons from the use of firearms.

Rather than being a fixed, homogeneous concept among police organizations, force continuum models now serve primarily as training tools. Officers in the field cannot reasonably be expected to escalate or de-escalate systematically through every step of a continuum. Use-of-force policies are thus usually upheld nationally by legal standards.

A training officer for the Los Angeles County Sheriff's Department displays an Arwen launcher and the rubber projectile it fires during a demonstration of non-lethal and lethal weaponry at the sheriff's training academy in Whittier, California, November 1995. © Reed Saxon/AP Photo





Figure 3.1 Example of use-of-force continuum

Type of situation	Police response
<p>Most serious</p> <p>▲</p> <p>▼</p> <p>Least serious</p>	<ul style="list-style-type: none"> • Firearm • Intermediate weapons: TASER and impact projectiles • 'Hard' control techniques and compliance • Chemical agents: pepper spray (oleoresin capsicum) • 'Soft' empty-hand control techniques • Verbal commands • Officer presence

In the United States, for instance, the standard of 'objective reasonableness', found in the US Constitution's Fourth Amendment, is more permissive for officers than the force continuum because it addresses the misuse of power but does not require that an officer use the least intrusive means (Peters, 2006). The US Supreme Court has spelled out three general factors for officers to evaluate which degree of force is reasonable and necessary: the severity of the crime, the threat posed by the suspect to surrounding officers or the public, and the suspect's active resistance or attempt to evade arrest (MPD, 2005, p. 10). As such, this standard provides more leeway for officers and more protection against litigation than does the force continuum. The Los Angeles Police Department incorporated the standard of objective reasonableness into its use-of-force policy in 2008 (LAPD, 2009, p. 10; Sargent, 2010).

The diversity of law enforcement

The UN Code of Conduct defines law enforcement officials as:

officers of the law, whether appointed or elected, who exercise police powers, especially the powers of arrest or detention. In countries where police powers are exercised by military authorities, whether uniformed or not, or by State security forces, the definition of law enforcement officials shall be regarded as including officers of such services (UNGA, 1979, art. 1, commentary (a)).

The European Code of Police Ethics, in defining its scope of application, asserts that public police forces are 'empowered by the state to use force and/or special powers for these purposes' (CoE, 2001, appendix).

Each law enforcement agency's characteristics significantly affect its weapons policies and procurement. These include its degree of centralization, whether the force is civilian or military, force size, and structure. An agency may opt for the purchase of a single handgun model for the whole force, or for a system of firearms in full-size, compact, and subcompact models in various calibres but from the same manufacturer (Kaestle and Buehler, 2005). The former option facilitates training and maintenance, while the latter offers more mission flexibility.

Police organizations are diverse and rarely agree on common weapon requirements.

Another decisive factor is the police budget. Before 2003, the French police had close to 40 different types of firearms in service, with eight different calibres. The 9 mm SIG SAUER SP2022 was adopted in 2003 by gendarmerie, police, customs, and the penitentiary services to harmonize national procurement and logistics, at significant cost. In 2010, annual firearm maintenance and ammunition procurement cost the French police an estimated EUR 9–10 million (USD 12–13 million), and the gendarmerie an estimated EUR 6–8 million (USD 8–11 million) (DGPN, 2010, p. 10; DGGN, 2010, p. 2). National procurement of new firearms tends to occur in 20-year cycles; officials estimate that the multi-year renewal of a firearm system for the whole police force represents a EUR 25 million (USD 34 million) expenditure (DGPN, 2010, p. 10).

Police organizations are a very difficult market to target because their requirements and doctrine are extremely diverse. Police authorities rarely agree on common weapon requirements, which may explain why some small arms manufacturers mainly focus on military procurement.³ While NATO standardizes army requirements for infantry small arms, police requirements vary and change frequently. This lack of uniformity makes it difficult for manufacturers to design police-tailored solutions, which, in turn, may explain why some police units follow procurement trends originally observed in the civilian (handgun) or military (rifle) markets.

Defining 'less-lethal'

There is little agreement on what constitutes the class of weapons variously called 'non-lethal', 'less-than-lethal', or 'less-lethal'. In the United States and the United Kingdom, the military generally applies the term 'non-lethal' to what law enforcement and criminal justice communities label 'less-lethal' weapons (USDOD, 1996; USDOJ, 2004; UKSG, 2006). Law enforcement organizations often distinguish less-lethal options (such as TASERS and bean bags) from non-lethal ones (such as firm grips, punches, or physical force) (LAPD, 2009, p. 7). These three terms describe what the weapons are *not* supposed to do rather than their specialized effects and the kinds of situations to which they may be suited. They also form a misleading dichotomy, which incorrectly implies that traditional firearms are *systematically* lethal in their effects.

More appropriate names would arguably refer to the ability of these intermediate weapons, when properly used, to neutralize or temporarily incapacitate subjects in medium-threat situations (DGPN, 2010, p. 6). At the same time, manufacturers use marketing terms such as 'conducted energy devices', 'calmatives', 'optical distracters', and 'acoustic hailing devices', which, while descriptive of the technology, may be aimed at softening perceptions and increasing public acceptance of these devices, while playing down their risks (Davison, 2009, pp. 6–7).

The naming of devices may be more than just a question of semantics. If states classify them as firearms, the devices become subject to the same licensing procedures and export control restrictions, which makes them more difficult for manufacturers to market internationally. In France, for instance, the COUGAR and CHOUKA less-lethal projectile launchers manufactured by LACROIX–Alsetex are classified as fourth-category firearms according to national legislation, and can only be exported with an *autorisation d'exportation de matériels de guerre* delivered by the French Ministry of Defence and the Customs administration (France, 2010).⁴



LACROIX-Alsetex's COUGAR and CHOUKA 56 mm calibre less-lethal launchers, on display at the 2010 Eurosatory show.
© Pierre Gobinet

This chapter uses the term 'less-lethal' to reflect the fact that lack of training for or improper use of such weapons can inflict serious or lethal injury on the target.

TRENDS AND DEVELOPMENTS

This section reviews current developments in lethal and less-lethal weaponry, along with several examples of recent procurement. The weapons described here are either 'individual' (assigned to each officer) or 'collective' (shared by officers in the same unit, from one shift to another, or dedicated to special tactical teams and crowd control units). This section presents weapons in a 'lethal' vs. 'less-lethal' dichotomy to highlight the disparity in models procured by Western police units as well as the difficulty of covering both weapons categories in a single, coherent doctrine.

Firearms

Law enforcement firearms have not recently experienced significant technological breakthroughs; improvements have been incremental. The Small Arms Survey reached this conclusion in 2003 and the situation has not changed significantly since then (CAST et al., 2003, pp. 20–25). Research shows that military and civilian markets exert significantly more influence over the procurement of police firearms in the United States than they do in Western Europe. In general, developments in conventional firearm technology emphasize increased compactness, customization, and weight reduction.

The arms race of US law enforcement: handguns and semi-automatic rifles

The .40 S&W cartridge is increasingly procured by US law enforcement agencies. Confronted with significant armed criminality, the law enforcement community in the United States is spearheading the progressive switch to higher-calibre firearms. In 2009, firearms were used in 67.1 per cent of murders, 42.6 per cent of robberies, and 20.9 per cent of aggravated assaults in the United States (USDOJ, 2010b). In 2008, guns were used in almost 10,000 gun murders (Gun Policy, 2010). National statistics seem to indicate, however, that the annual rate of US firearm homicides has stabilized somewhat between 3 and 5 per 100,000 since 2005, well below the peaks of the 1980s and 1990s (Gun Policy, 2010; Hazen and Stevenson, 2008, p. 282).

Western law enforcement agencies most commonly use four handgun calibres, including the 9 mm Parabellum, .40 Smith & Wesson (S&W), .357 Magnum, and .45 Automatic Colt Pistol (ACP),⁵ all of which progressively replaced the traditional .38 Special S&W cartridge more commonly fired by revolvers. Semi-automatic pistols have more recently been favoured by US and European police agencies. Advantages of 9 mm semi-automatic pistols include their smaller size, higher magazine capacities, and lower recoil compared to handguns chambered for the more powerful .45 automatic round, for instance (Kaestle and Buehler, 2005).

In the United States, the .40 S&W cartridge has increasingly been presented as an efficient upgrade for law enforcement use. Its larger bullet, though slower, applies greater force to the target; expanding bullets further heighten the impact through a ‘mushrooming’ effect, which seems to be an important criterion in the US ammunition selection process.⁶ Although firearm instructors advocate the importance of shot placement and training rather than calibre or power (Kaestle and Buehler, 2005), US police departments consistently argue that the switch from 9 mm to .40 S&W is a necessary measure to avoid being ‘outgunned’ by local gangs and drug traffickers (Matteucci, 2010).

In September 2010, the US Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) awarded two ten-year contracts worth USD 40 million each to GLOCK and S&W for .40 calibre service sidearms, namely the GLOCK 22 Gen4, GLOCK 27, and M&P40 pistols (*Atlanta Business Chronicle*, 2010; Sharp, 2010). In July 2010, the Federal Bureau of Investigation also purchased almost 3,000 GLOCK 23 pistols chambered in .40 S&W (FBO, 2010).

This trend may be influencing some police agencies outside of the United States. In October 2010, the Victoria police in Australia announced the replacement of their .38 Special S&W revolvers by semi-automatic S&W M&P pistols in .40 S&W (*Sydney Morning Herald*, 2010). In contrast, Western European countries with more centralized forces still procure 9 mm handguns and are not upgrading to larger-calibre weapon systems. The Dutch police force, for instance, recently chose the 9 mm SIG SAUER PPNL (Politie Pistool Nederland) as its new service pistol (Rijksoverheid, 2011).⁷

Many US police departments are also pushing for the procurement of powerful ‘patrol carbines’ or ‘tactical rifles’ (McKenzie, 2010; Spice, 2009). These semi-automatic rifles⁸ use the .223 Remington/5.56 mm calibre initially carried by Special Weapons and Tactics (SWAT) teams in large metropolitan police departments. They are now procured by ‘regular’ police units on the grounds that their field officers encounter increasingly well-equipped gang members and criminals, some of whom have benefited from previous army firearms training (Main, 2010).

The rifles are typically ‘collective’; that is, shared by officers from one shift to another. While this approach keeps costs down, semi-automatic rifles such as these require significant training, and large police forces may be unable to provide systematic, standardized training to all their personnel (Levenson and Slack, 2009). Procurement of the weapons, locking racks, ammunition, and training requirements represents a substantial expenditure for any police agency. For example, Pittsburgh’s Public Safety Director reported a 2009 state contract order of 46 S&W M&P15 semi-automatic rifles totaling more than USD 37,000; the locking racks added an additional USD 30,000 (Lord, 2009).

Ultimately, the greater distribution of tactical rifles in the field can lead to losses and theft from police departments’ patrol vehicles (Matteucci, 2010). Some experts also believe that, by being seen with these weapons, police officers will create ‘concomitant pressure within the domestic population for individuals to arm themselves with similar weapons’ (DeClerq, 1999, p. 38).

Focusing on ammunition: sub-machine guns, rifles, and sniper rifles

Firearm manufacturers have traditionally developed sub-machine guns, assault rifles, and sniper rifles with the more standardized needs of the military in mind. Consequently, domestic security organizations seeking to upgrade their traditional handguns and shotguns with more effective small arms have turned to the military market (see Table 3.1). For instance, standard bolt-action precision rifles traditionally used by Western police units are now upgraded with



Armed with SIG SG 550 assault rifles, members of a Swiss police intervention team arrive at a house in which an unidentified man barricaded himself, Biel, September 2010. © Pascal Lauener/Reuters

Table 3.1 Selected sub-machine guns, semi-automatic and assault rifles, and sniper rifles

Sub-machine guns	Semi-automatic and assault rifles	Sniper rifles
<ul style="list-style-type: none"> • Beretta M12 • Brügger & Thomet MP9 • CZ Scorpion Evo3 A1 • FN Herstal P90 (5.7 x 28) • Heckler & Koch MP5 and UMP • Heckler & Koch MP7 A1 (4.6 x 30) • Israel Weapon Industries UZI PRO (polymer) • Rock River Arms PDS Pistol • SAAB-Bofors CBJ (6.5 x 25) • ST Kinetics CPW 	<ul style="list-style-type: none"> • Bushmaster Model XM15-E2S and Adaptive Combat Rifle (ACR) • Colt M4 and Modular Carbine Model CM901 • FN Herstal Special Operations Forces Combat Assault Rifle (SCAR) • Heckler & Koch G36, 416 (= HK M27 IAR) and 417 • Ruger SR 556 • SIG SAUER 516, 551, 556 • S&W M&P15 • Vektor R5 	<ul style="list-style-type: none"> • Blaser LRS2 • HS Precision Pro Series 2000 HTR • Knight's Armament Company M110 Semi-Automatic Sniper System • PGM Précision Ultima ratio and Hécate II • Remington Model 700 TWS (.308 Win.); M24 Sniper Weapon System • Savage 110BA • Tikka T3T

the free-floated barrels⁹ found on their military counterparts. Despite the fact that some manufacturers now capitalize on the law enforcement niche, the technological thrust invariably comes from the military community. The best way to anticipate what Western police units will be showcasing as 'collective' weapons in the near future is thus to look at military small arms and, more specifically, *ammunition* developments.

In this regard, the conflict in Afghanistan has been instrumental in upgrading the standard NATO 5.56 mm SS109/M855 ammunition, which has been rumoured to suffer from range limitation, erratic target effectiveness, and poor barrier penetration (Arvidsson, n.d.). In 2010, the US Marine Corps announced its intention to upgrade a sizeable proportion of its conventional M855 5.56 mm ammunition stocks in Afghanistan with 5.56 mm Special Operations Science and Technology open-tip¹⁰ rounds. The new round, formerly known as MK318 MOD 0, was specifically developed for short-barrelled rifles and designed to improve accuracy and 'barrier blind' performance against wind-screens, car doors, and other objects (Lamothe, 2010).

Almost simultaneously, the US Army issued more than 200 million rounds of a new 5.56 x 45 M855A1 Enhanced Performance Round to troops in Afghanistan to replace the general-purpose M855 ammunition. The M855A1 is referred to as 'green ammo' because it uses a lead-free projectile (Cox, 2010; PPAO, 2010). If the Marines and Army evaluations of both rounds remain positive, the rounds will probably draw the attention of the law enforcement community as well.

Experts hint that the Afghan conflict has also highlighted a gap between the 5.56 mm and the 7.62 mm, and that a new, versatile family of general-purpose small arms should be conceived around an intermediate calibre (Williams, 2010). Many of the features and requirements envisioned for these next-generation military small arms would also make them ideal for special law enforcement applications.

Some recently marketed products attempt to bridge the demands for interchangeability and versatility by combining the technical strengths of short-barrelled 5.56 mm rifles and long-range 7.62 mm rifles. Remington's Adaptive Combat Rifle, developed in cooperation with Bushmaster and Magpul Industries, boasts modular components and ambidextrous controls. The shooter can change calibres (5.56 mm, 6.5 mm, 6.8 mm Special Purpose Cartridge), barrel lengths, and stock configurations at will (Remington Military, 2010). FN Herstal emphasizes similar interchangeability capacity in marketing both versions of the Special Operations Forces Combat Assault Rifle (SCAR), the MK16 in 5.56 mm and

the MK17 in 7.62 mm (Military.com, 2010). According to an industry expert, rifle modularity is still purely a military demand.¹¹ Yet, in the coming years, Western police units may procure some of these new rifles in their favoured calibre.

Regardless of the calibre issue, a reduction in weight is also appealing for law enforcement use. Nevertheless, the format of short-barrelled 5.56 x 45 rifles has considerable drawbacks for police use and training, such as excessive power, muzzle flash, blast, and recoil. Alternatives exist mainly in the form of pistol-calibre sub-machine guns, which are usually variants of compact military personal defence weapons (PDWs). Small-calibre, high-velocity rounds, presented as possible alternatives to the 9 x 19 mm calibre, have been developed for these weapons.

The 5.7 x 28 mm SS190 cartridge used in FN's P90 PDW and Five-seveN pistol is significantly slimmer and lighter than the 9 x 19 mm ball ammunition. This high-velocity, full metal jacket round was designed to increase short-range lethality. The round is meant to deposit most of its energy in the target, thereby limiting risks of ricochets in populated areas. In the 1990s, Heckler & Koch introduced a similar concept with the 4.6 x 30 mm cartridge for the MP7 machine pistol. The latest newcomers to the 'intermediate round' market appear to be Sweden's CBJ Tech with the 6.5 x 25 CBJ cartridge, and Knight's Armament Company's PDW in the new calibre of 6 x 35 mm (Williams, 2009).

Police tactical teams procure limited numbers of small-calibre, high-velocity systems. A small arms inventory provided by the French police administration mentions that its intervention unit procured a small but undisclosed number of FN P90 rifles (DGPN, 2010, p. 4). The costs of replacement and the requirements of calibre standardization prevent any mass procurement of these cartridges by large police organizations. In this context, it may not be clear why law enforcement agencies would need these intermediate calibres, especially since the use of soft-nosed and expanding bullets¹² by law enforcement officers in a necessary and proportionate use-of-force context has become common.¹³ Many manufacturers market an extensive array of expanding ammunition specifically for law enforcement use. Examples include RUAG's Sintox Action 4 and Federal Premium's LE Tactical HST round—which features a copper jacket that folds out of the way during penetration while the round's petals fully expand (ATK, n.d.).

Manufacturers have developed firearms with the more standardized needs of the military in mind.

Inputs from the civilian market: polymers, accessories, and customization

While soldiers are the primary source of inspiration for firearm manufacturers, it is clear that the customization niche, which bolstered the development of optical sights, light mounts, polymer frames, and ancillary equipment, has been greatly influenced by the sports shooting and hunting communities.

Law enforcement firearms have benefited from incremental developments leading to size and weight reduction. Handguns come in three categories—full-size, compact, and subcompact—with decreasing magazine capacities. Agencies typically choose the first two categories for general issue while specialized units, such as undercover or criminal investigation squads, prefer subcompact models as backup or concealed-carry firearms. Balancing between weight reduction, magazine capacity, and overall compactness has resulted in the development of models such as the SIG P238 (in .380 ACP), the S&W M&P compact, and the Springfield Armory XD(M) 3.8 (see Table 3.2).

Semi-automatic rifles will eventually benefit from similar developments. Experts increasingly refer to the 'bullpup' design—in which the barrel is moved back into the stock and the action and magazine are placed behind the trigger system—as the way forward. The concept is not new and can be combined with polymer technology and heat-resistant alloys to develop lighter, more manoeuvrable firearms while maintaining barrel length, and thus accuracy. For instance, Austrian and French law enforcement have been using the AUG Steyr and MAS FAMAS, respectively, for a number of years. It also appears that China has chosen this type of technology for its new service rifle, the QBZ-95G in 5.8 x 42 mm calibre. Further advances will most probably enhance magazine capacity (Crane, 2010).

Modern mouldings and polymer technology enable manufacturers to produce guns that combine various materials, for instance steel for the slide and aluminium or polymer for the frame. These materials allow handguns to be tailored to various uses, benefiting from the rust-resistant properties of stainless steel and from the tactical advantage provided by matte black, non-reflective finishes. The market is mostly populated by polymer-framed handguns featuring specific metal inserts, a combination favoured because of its durability and ease of maintenance (see Table 3.3). In addition, the use of polymers—which can be translucent—in the production of assault rifle magazines allows for rapid checks of ammunition supply.

Modern sights, developed to enhance target acquisition capabilities, are the driving force behind firearm development technology. Although advanced rifle sights are mainly procured by tactical teams, collective patrol rifles now feature Picatinny accessory rails that allow for the mounting of flashlights and laser sights to complement the basic iron sights (see Table 3.4). Low-powered 1X to 4X optic sights are being upgraded to variable-power optics with higher magnification in the 5–25X range. Modern riflescopes can now assist long-range target engagement without sacrificing the ability to deal with close threats. Not only do new systems magnify vision, but they can also accurately determine ranges using built-in laser range finders and image intensifiers to aim in low-light conditions. The US Defense Advanced Research Projects Agency is working on the ‘One Shot’ sniper scope programme, whose stated aim is to develop a ballistic calculation system prototype to fully assess ballistic trajectory and ‘enable snipers to hit targets with the first round, under crosswind conditions, up to the maximum effective range of the weapon’ (DARPA, 2010, p. 4; Calamia, 2010). Crosswind detection and compensation is in effect the cornerstone of future sniper scope developments. In this context, the Israeli Soreq Nuclear Research Center is developing ‘Laser Identification Detection and Ranging’ to detect the direction and velocity of any crosswind (Williams, 2010).

Safety features: opportunities for ‘police-specific’ developments

Safety features are among the few technological developments specifically tailored for law enforcement use. Traditional safety options are external devices, such as cable locks. For the more popular semi-automatic handguns, integral safety features can be as diverse as standard manual hammer blocks, de-cocking levers, and trigger or magazine disconnect safeties. For manufacturers, reliable safety options represent important value added in firearm

Table 3.2 Selected compact handguns

- Beretta Px4 Storm Type F subcompact
- Boberg Arms XR-9S pistol
- GLOCK 26
- Heckler & Koch USP Compact
- Ruger LCP (.380 ACP)
- S&W M&P compact pistol
- SIG P238 series (.380 ACP) & P290
- Springfield Armory XD(M) 3.8 Compact

Table 3.3 Selected polymer handguns

- Beretta 92FS, Px4 Storm
- Caracal
- FN Herstal NP9 and FNP40
- GLOCK series
- Israel Weapon Industries Jericho B
- Ruger LCR Double-Action Revolver and SR40
- SIG SAUER SP 2340, 2022, P226
- S&W M&P compact pistol
- Springfield Armory XD

Table 3.4 Selected ancillary equipment

- Aimpoint Concealed Engagement Unit
- Eotech Holographic Sights
- Horus Vision 1.5-8 x 24 mm BlackBird
- Corner Shot
- Leupold 1.1-8 x 24 mm CQBSS
- Premier Reticles V8 1.1-8 x 24 Tactical

design, since law enforcement agencies rely on them to prevent or minimize unintentional discharges. Procurement agencies have the choice between single-action, double-action/single-action (DA/SA), or double-action-only handguns, depending on mission requirements and the level of training of personnel. Single-action handguns require the hammer to be cocked manually before the first round is fired; the slide cocks the hammer on subsequent shots. In handguns with double-action-only triggers, the trigger cocks the hammer and releases it; the trigger pull is thus longer and requires more weight, which can prevent negligent discharges. The hammer returns to its de-cocked position after each shot. Double-action/single-action handguns combine double-action for the first shot and single-action for subsequent shots. Some semi-automatic handguns now feature complex triggers with pre-set strikers or hammers, intended to reduce the hard trigger pull associated with the double-action mechanism. They also have a number of safety features that require specific training and familiarization (Kastle and Buehler, 2005).

Safety features are among the few technological developments specifically tailored for law enforcement use.

Despite these systems, preventable injuries and deaths do occur, including of police officers. Between 2000 and 2009 in the United States, at least 41 officers were killed with their own weapon, and 69 had their weapon stolen (USDOJ, 2010a, table 13). Friendly fire accidents and shootings of police officers with their own service firearm periodically revive debates about the feasibility of ‘smart’, or personalized, gun systems (Long, 2009; Main et al., 2010). In the mid-1990s a number of US manufacturers received federal grants to explore and test personalized safety options. The US National Institute of Justice provided research funds to develop a safe gun system that would:

- operate reliably in all environments;
- have all the capabilities of a current firearm;
- be able to be fired by other police officers;
- be easy to operate and maintain;
- verify and approve the user in the time it takes to draw and aim;
- only work when the transponder is behind the gun;
- include an indicator that tells the user if the system is enabled;
- fire even if the electronics fail (Taylor, 2000).

In response, Colt developed a wristwatch containing a transponder chip; Smith & Wesson explored a fully electronic locking system using a PIN code; and FN Herstal looked into microelectronic and ultrasonic wave technology. Industry interest soon faded, however. The main issue was the requirement for total reliability. Systems that use radio frequencies, for instance, could potentially be vulnerable to interference. Second, the stringent weapon requirements probably doomed the project from the start, not least because police consultants wanted the weapon to fail ‘live’—that is, still be able to fire in case of system failure. This requirement is, according to an industry official, technically impossible to meet¹⁴. Moreover, the private sector preferred the weapon to fail ‘dead’ in order to make it more acceptable to the public (Taylor, 2000, p. 19). Furthermore, stakeholders of the project expressed uncertainties as to how this technology would influence civilian gun ownership—possibly creating additional unnecessary demand.¹⁵

In 2003, Australian gun maker Metal Storm briefly collaborated with the New Jersey Institute of Technology’s Dynamic Grip Recognition programme. The system used biometric technology to match a single user to a single gun (NJIT, 2003; Di Justo, 2005). The resulting O’Dwyer variable lethality personalized smart gun prototype was designed to feature lethal and non-lethal capacities, as well as an aural signal to indicate readiness.¹⁶ However, a lack of funding stopped further development of this technology.¹⁷

A man holds a prototype of a smart gun by Armatix during an international gun exhibition in Nuremberg, Germany, March 2009.

© Michaela Rehle/Reuters



Law enforcement and industry interest in personalized gun technology may again be growing. The US states of New Jersey and Maryland anticipated these trends and tasked oversight bodies to monitor the development of personalized handgun technology, and to report on its availability on the retail market (LCAV, 2008). One company investing in personalized gun technology is Germany's Armatix. Its iP1 pistol design incorporates most of the initial requirements of the US National Institute of Justice. Because the weapon is a .22 LR calibre, typically subject to fewer user restrictions, it may become widely known. According to the company's head of development, Armatix is currently approaching gun manufacturers worldwide to promote the iP1's Smart System technology. Armatix partnered with Anschütz to present a biathlon rifle with user and target control at the World Shooting Championship in Munich in July 2010.¹⁸

Less-lethal weapons

Less-lethal weapons have rapidly become the public and private sectors' primary technological response to perceived gaps in the force continuum. The defence industry trade show Eurosatory 2010 catalogue lists 17 exhibitors as either manufacturers or retailers of 'reduced lethality or incapacitating weapons and munitions', excluding lasers (barred from the exhibition) and anti-riot vehicle manufacturers (Eurosatory, 2010).

Much of today's less-lethal technology attempts to meet the military and law enforcement demand for longer-range weapons with variable effects. This section covers less-lethal technology that Western law enforcement agencies currently use or may use in the near future. It focuses on kinetic (impact), electric-shock, acoustic, and directed-energy weapons that a trained officer can use *discriminately* and *proportionately*. It omits incapacitating chemical weapons, which are distinct from riot control agents and have not been endorsed for police use by Western governments.

Increasing 'stand off' and accuracy

First-generation less-lethal weapons were designed for close engagement (less than ten metres). Some newer less-lethal systems, however, feature increased 'stand-off' range and discrimination capability; they allow security personnel to accurately engage or mark targets at a greater distance. As described below, they are commonly marketed as both individual targeting weapons and crowd control force multipliers; police use-of-force regulations do not always emphasize the doctrinal difference.

Kinetic energy weapons deliver blunt or penetrating trauma impact to the target. Some law enforcement agencies have been deploying very short-range, smoothbore, oversized-calibre launchers for a number of years, including the French 44 x 83 mm Verney-Carron Flash-Ball munitions (180 to 200 joules), with a limited stand-off range of about 12 metres (Verney-Carron, n.d.; Martin, 2008). Similarly, the 56 mm COUGAR and CHOUKA launchers manufactured by LACROIX-Alsetex fire 'oversized'-diameter impact projectiles but also dye-marking canisters, CS gas canisters, or combined-effects rounds. The COUGAR's 'Bliniz' round is filled with talcum and designed to maximize projectile deformation upon impact at very short distances (7–10 m). The round's diameter reportedly prevents any eye penetration. Nevertheless, the projectile delivers a significant 157 joules of energy at five metres.¹⁹

Most kinetic launchers now feature smaller diameters, 37 or 40 mm (see Table 3.5). Projectiles are either flexible or rigid, the latter increasingly fin-stabilized, full-bore diameter rubber projectiles used for long-range, accurate direct-fire shots. US companies such as Defense Technology Corporation, Combined Tactical Systems (which sells Combined Systems, Inc., products), and NonLethal Technologies, Inc., are major exporters of this type of ammunition (Mispo.org, 2010). The latest approach taken up by manufacturers and law enforcement agencies involves the use of single-shot, purpose-built *rifled* grenade launchers with break-open configurations that provide greater accuracy than traditional smoothbore launchers. Police agencies favour the single-shot configuration for weight reduction (see Table 3.5).²⁰

In addition to extending the range, the obvious advantage of having a rifled tube is that, thanks to the gyroscopic effect, the projectile arrives nose first rather than tumbling. In the UK, the soft nose Attenuating Energy Projectile replaced the L21A1 round in June 2005. The rounds were submitted to the Defence Ordnance Safety Group for testing and to the Defence Scientific Advisory Council subcommittee on the Medical Implications of Less-Lethal Weapons for medical evaluation trials. The projectile was designed in 37 mm calibre to be used with the Heckler & Koch L104A1 launcher. The authorities that oversaw its development also argued that its non-standard calibre would reduce the likelihood of ammunition confusion (UKSG, 2006). Similarly, the French police have deployed the 40 x 46 Brügger & Thomet GL-06 single-shot launcher since 2008. Brügger & Thomet's technical sheet for the GL-06 advertises

Table 3.5 Selected purpose-built less-lethal launchers

Single-shot	Multiple-shot
<ul style="list-style-type: none"> • Brügger & Thomet LL-06 & GL-06 (40 mm) • Condor AM 640 (40 mm) • Defense Technology Corp. Rifled Barrel Launcher (40 mm) • LACROIX-Alsetex COUGAR/CHOUKA (56 mm) • Police Ordnance Company Inc. ARWEN ACE (37 mm) • Sage Control Ordnance SL-1 (37 mm) 	<ul style="list-style-type: none"> • FN Herstal FN 303 (.68 calibre = 18 mm) • Police Ordnance Company Inc. ARWEN (37 mm) • Sage Control Ordnance SL-6 (37 mm) • Verney-Carron Flash-Ball Super Pro & Compact (44 mm)

a 112-joule energy output capacity at five metres and 86 joules at 50 metres (Brügger & Thomet, n.d.). It is often fitted with an EOTech 512 electronic sight (DGPN, 2010, p. 6).

Modern kinetic energy weapons still suffer from deteriorating accuracy at longer distances (Kenny, Heal, and Grossman, 2001, p. 1). Officers thus face a conundrum whenever they have to balance range, accuracy, and kinetic energy if the impact is to remain less-lethal. According to US military research from the early 1970s, kinetic impact weapons that deliver energy greater than 122 joules inflict severe damage and should be considered lethal (Omega Foundation, 2000, p. 26, citing Egner, 1973). Recent research provides a more nuanced assessment, highlighting numerous criteria for blunt trauma depending on the type of injury one wants to avoid—skin penetration, head injury, or chest injury (Paulissen, 2010). It is therefore difficult to quantify effectiveness universally and impose a single threshold value for the muzzle velocity of impact projectiles (Papy and Pirlot, 2007). Energy delivery is not the only technical criterion worth considering: stand-off range, calibre, and projectile structure (gradient of hardness or softness) are equally critical, and the law enforcement community has yet to agree on common criteria for selection.



Police officers demonstrate the LRAD portable loud hailer—which was used to communicate with crowds during the G8 and G20 summits—during a technical briefing for media in Toronto, June 2010. © Mike Cassese/Reuters

Another domain that has directly benefited from the demand for increased ‘stand-off’ distances is acoustic technology. Acoustic devices are becoming increasingly accepted in US military and law enforcement circles thanks to a well-targeted marketing campaign. These devices use audible sound technology to deliver warning messages such as speeches, recordings, or ‘alert’ warning tones across a distance of up to 3 km (LRAD Corporation, n.d.b). Sceptics have been quick to point out that ‘hailing devices’ such as the ones manufactured and sold by the LRAD Corporation (specifically, the Long Range Acoustic Device) can produce tones of 150 decibels at one metre (Altmann, 2008, p. 45). Very short exposures to levels of 120 decibels can result in hearing loss (Lewer and Davison, 2005, p. 41). Considering the risk of permanent hearing damage, some analysts argue that these devices should be qualified as ‘weapons’ so that their procurement and deployment by government agencies may be properly monitored (Altmann, 2008, p. 53).

Acoustic weapons remain expensive and cumbersome to use; they have yet to be miniaturized in order to be of any significant interest for most law enforcement agencies. Nevertheless, the US police departments of Boston, New York, Pittsburgh, San Diego, and Santa Ana advertise their use of LRAD systems for a range of public order applications (LRAD Corporation, n.d.a). According to Mispo.org, the LRAD was used against protesters in 2007 in Tbilisi, Georgia, and in the US city of Pittsburgh during the 2010 G20 Summit (Mispo.org, 2010). In June 2010, a ruling by Ontario’s Superior Court of Justice restricted the use of the ‘alert’ function (as opposed to the loudspeaker mode) on the 100X and 300X models purchased by the Toronto Police Service (Ontario, 2010). At the time of writing, there was no evidence of these devices being extensively procured or used by Western European law enforcement agencies. Nor does it appear that this family of less-lethal weapons has substantially affected use-of-force doctrine.

To date, no single weapons technology has enabled users to switch at will from non-lethal to lethal.

The dream of rheostatic

The second axis of technological development for less-lethal weapons involves the search for a device that can deliver variable—or ‘rheostatic’—effects along a continuum from lethal to non-lethal. Harkening back to science-fiction novels and comic books, the idea inspired the development of the new less-lethal products and ‘combinations’ found off-the-shelf today (see Box 3.1). Yet to date, no single weapons technology has enabled users to switch at will from non-lethal to lethal. As a result, practitioners have sought to fill the gap by combining less-lethal weapons with firearms.

Kinetic energy weapon developers are taking two distinct approaches to meet the perceived need for variable weapons. The first assumes that less-lethal launchers should be versatile, dual-purpose firearms or military grenade launchers that can be used either as stand-alone or mixed (under-barrel) systems (see Table 3.6). Standard 12-gauge pump-action shotguns, such as the Remington 870 and Mossberg 500, can fire a range of impact projectiles and bean bags. The advantage of using a shotgun for riot control is that the user can switch quickly from less-lethal projectiles to lethal shells; yet such switching increases the risk that the wrong ammunition will be used.

Modern dual-purpose shotguns, however, seem to be gaining in popularity. Metal Storm’s semi-automatic MAUL shotgun prototype, for example, is actively marketed to law enforcement agencies. It fires a mix of blunt impact, frangible-nose chemical, and marker munitions, as well as lethal and door-breaching 12-gauge shells. It is sold either as a stand-alone weapon or as a module on a combat rifle. According to Metal Storm, the shotgun is still undergoing certification in the United States. In July 2010, the company announced a USD 3.4 million production contract to supply 500 MAUL shotguns and 50,000 rounds of non-lethal ammunition for the Correctional Service of Papua New Guinea. The first 50 weapons were due for delivery by February 2011.²¹

Box 3.1 Science fiction and less-lethal weapons

Science fiction and public relations campaigns have influenced policy and technology for law enforcement and military weapons, creating unrealistic expectations about less-lethal capabilities and colouring public perceptions.

In the 1960s and 1970s, private US companies sought to capitalize on the search for new unconventional law enforcement weapons. One idea that would later have a great impact on police use of force around the world was contained in a patent filed by Jack Cover in 1970 and awarded in 1974 for a 'weapon for immobilization and capture' (US Patent, 1974). In naming the weapon, Cover, an aerospace engineer who worked for NASA, was inspired by the 1911 children's adventure novel, *Tom Swift and His Electric Rifle*, in which the protagonist invents an 'electric rifle' that is adjustable from stun to kill. The adapted expression 'Thomas A. Swift's Electrical Rifle' provided the acronym he used: TASER (Woo, 2009; Kroll and Ho, 2009, p. 11).

Greater investment in more exotic weapons technology began in the early 1990s, in response to support in US military policy circles. Several of the key advocates in this process were science fiction enthusiasts. Janet and Chris Morris are science fiction authors who, in the late 1980s, worked at an influential think tank in Washington, DC, the US Global Strategy Council, led by former CIA Deputy Director Ray Cline. In 1990 Janet Morris authored *Nonlethality: A Global Strategy*, which presented an argument for particular policy on 'non-lethal' weapons and set out proposed weapons technology to fulfil it (Morris, 1990). Cline took up the issue with US President George H.W. Bush and Secretary of Defense Dick Cheney, and a strategy group was established, although initial policy proposals did not gain traction. The Global Strategy Council generated publicity along with others at the national laboratories, where the majority of research and development was taking place (Swett, 1993). Janet and Chris Morris joined an Independent Task Force set up by another Washington think tank, the Council on Foreign Relations, whose 1995 report on 'non-lethal' weapons contributed to the institutionalization of this policy in the US Department of Defense (CFR, 1995). The Morris team then began receiving military contracts to help develop these weapons (M2 Technologies, n.d.). They were also members of subsequent Council on Foreign Relations panels on the subject, publishing reports in 1999 and 2004 (CFR, 1999; Allison, Kelley, and Garwin, 2004).

A key individual at the Los Alamos National Laboratory, and also a science fiction enthusiast, was John Alexander, a former US Army colonel who has remained a high-profile proponent of these weapons. His 1980 article in *Military Review*—'The New Mental Battlefield: "Beam Me Up, Spock!"—called for US Army attention to 'psychotronic' weapons 'effecting sight, sound, smell, temperature, electromagnetic energy or sensory deprivation' as well as 'parapsychological' techniques such as remote viewing and extrasensory perception (Alexander, 1980). Alexander's involvement in US Army exploration of these fields was portrayed in Jon Ronson's lighthearted book, *The Men Who Stare at Goats*, adapted into a feature film in 2009 (Ronson, 2004). Alexander was closely connected with policy discussions and weapons development via the national laboratories and the military. He subsequently published two books advocating increased investment in these weapons (Alexander, 1999; 2003).

Proceeding alongside efforts to gain internal policy support in military and law enforcement organizations, concerted public relations campaigns, reflected in the media, have often exaggerated the capability of laser, microwave, acoustic, and chemical weapons technology. In 2002 George Fenton, then director of the Joint Non-Lethal Weapons Directorate, the US military body tasked with coordinating related weapons research and development, described a prototype 'pulsed energy projectile' weapon to a military industry magazine as 'the closest thing we have right now to the phasers on the television series *Star Trek*' (Kennedy, 2002). The programme has since been cancelled, although basic research continues on pulsed lasers with the aim of developing a weapon to cause pain without permanent damage (Hambling, 2008a). Fenton, now retired from the military, is a vice president for government and military programmes at TASER International (TASER International, n.d.a).

In late 2005 some details emerged about a previously secret laser weapons programme called the Personnel Halting and Stimulation Response (PHaSR), co-funded by US law enforcement and military agencies (Knight, 2005; Hambling, 2008b). It was specifically named by the developers as a tribute to *Star Trek* (Burgess, 2005). The weapon, which in its most recent prototype form had two lasers (one to temporarily blind, and the other to heat the skin), has not been fielded. According to Davison, the numerous claims about new weapons capabilities and the public relations efforts to persuade people that the real-life *Star Trek* phaser has arrived have created a demand for weapons that do not yet exist (Davison, 2010).

The myth of harmlessness is arguably perpetuated through the portrayal of certain weapons in fictional films. In a scene from *The Hangover* (2009), for instance, a police officer invites a group of children in a classroom to shoot a TASER at the groin and face of the two main characters. In real life, probe deployments targeting the eyes or genitals present serious risks of injury. In another comedy, *Meet the Fockers* (2004), a police officer uses a TASER in 'drive stun' mode directly against the chest of the lead character. Again, in real life, this type of use would be dangerous. Even TASER International advises against aiming the weapon at the chest (CNN, 2009). These new weapons are also portrayed and promoted in non-fiction. Perhaps the most popular television documentary series in this area is *Future Weapons* on the Discovery Channel. The documentary popularizes all manner of weapons, and the website invites viewers to 'test out' these weapons virtually (Discovery Channel, 2010).

Source: Davison (2010)

Table 3.6 Selected dual-purpose launchers

Shotguns	Single-shot grenade launchers	Multiple grenade launchers
<ul style="list-style-type: none"> • Metal Storm MAUL (semi-automatic) • Mossberg 500 • Remington 870 	<ul style="list-style-type: none"> • Česká Zbrojovka 805 G1 • Colt M203 (40 mm) • Heckler & Koch AG36, AG-C/GLM, HK69A1 • Springfield Armory M79 (40 mm) 	<ul style="list-style-type: none"> • Metal Storm 3GL • Milkor M32, MGL-140, MGL-105 • Rippel Effect MSG40

The second approach is taken by manufacturers who develop purpose-built, less-lethal launchers (see Table 3.5) that can be combined with firearms in under-barrel configurations. The best representative of this category is FN Herstal's FN 303 in .68 calibre. Since its initial development in 1994, US police and military units have procured the FN 303; in 2004, the weapon was involved in a controversial incident in Boston (see below). The FN 303's innovation came from the fact that it was developed using paintball marker technology; it can be used to 'mark' aggressive individuals in a crowd, and single them out prior to arrest. The semi-automatic weapon uses compressed air to fire a range of less-lethal ammunition, such as paint capsules filled with oleoresin capsicum, which fracture on impact. Manufacturer specifications state that the kinetic impact at 15 metres is 29 joules (15J/cm²)—enough to stop any suspect (Jacobs, n.d.). The FN 303 can be integrated as a separate module under a rifle, a characteristic that is marketed as giving the police officer or soldier the ability to use a less-lethal system as well as a conventional firearm. There is no consensus on requirements among manufacturers or police agencies on this issue. France's LACROIX, for instance, has chosen *not* to develop modular launchers.²²

'Rheostatic' implies variable electrical resistance, and electric-shock weapons are direct descendants of this concept. In the past ten years, TASER International, Inc., has had a significant presence in the less-lethal market, with an increased diversification of products that cater to the military, law enforcement agencies, and the civilian self-defence niche. Other companies have capitalized on this success, such as Stinger Systems with its S-200 AT, an alternative two-dart projectile stun device. The technology used in the TASER Models M26 and X26 is therefore not new;²³ in the United States, it has arguably influenced police use-of-force doctrine like no other weapon in the less-lethal category (see below).

TASERs are actively marketed as ideal alternatives to impact projectiles and hand-held CS sprays. Yet electric-shock weapons follow development paths surprisingly similar to their kinetic energy siblings: range extension, and the possibility of combination with firearms. The X-Rail System can be used to clip a TASER X26 to assault rifles, mimicking the modularity of 40 mm grenade launchers. More significantly, the new eXtended Range Electro-Muscular Projectile (XREP) can be fired from any 12-gauge shotgun to a range of 30 metres. The projectile thus combines the kinetic energy of blunt impact with an electric shock that causes the target's muscles to contract involuntarily. The recently marketed X3 model replicates the spread of multiple-projectile kinetic ammunition. Finally, the TASER Shockwave Remote Area Denial system fulfils the needs of area denial by juxtaposing multiple units to extend area coverage and allow multiple salvos (TASER International, n.d.b).

Directed-energy weapons are another offshoot of the US military's research into rheostatic capability. Such research has produced weapon prototypes, including high-power microwave weapons designed to destroy the

circuits of electronic equipment. The best-documented example is the Active Denial System, which uses millimetre waves to heat up water and fat molecules in the subcutaneous layers of the skin. Raytheon Corp. has been marketing the product to military and law enforcement agencies since 2007 under the name Silent Guardian. While military directed-energy weapon prototypes are generally too bulky for individual law enforcement use, the US National Institute of Justice and Raytheon Corp. are reportedly developing smaller versions (Davison, 2009, p. 170). In mid-2010, the Los Angeles County Sheriff's Department equipped the Pitchess Detention Center with a 2.3-metre, tripod-mounted version of the Active Denial System, dubbed the Assault Intervention Device, for a six-month trial (Hadhazy, 2011; Shachtman, 2010).

Today's most appropriate, off-the-shelf options for law enforcement applications are light-emitting diode (LED)-based systems dubbed 'illuminators' or 'dazzlers', such as the LED Incapacitator. Developed by Intelligent Optical Systems, Inc., in collaboration with the US Department of Homeland Security and the Defense Advanced Research Projects Agency, LED Incapacitators are marketed as:

diversionary devices [that] utilize high powered, multicolored light emitting diode (LED) clusters and complex optical concentrators to produce a temporary high level of visual impairment and potential disorientation of the targeted subject(s), while optical intensities remain at eye-safe levels (Intelligent Optical Systems, n.d.).

Directed-energy weapons are an offshoot of the US military's research into 'rheostatic' capability.

Laser-based weapons, such as the Dissuader Laser Illuminator, have been in use for a number of years. This weapon is described in a US Department of Justice report as a handheld laser 'flashlight' that produces a powerful variable-width beam of red light 'that forces adversaries to signal their intent to retreat, surrender, or continue aggressive behavior' (USDOJ, 2004, p. 35). Modern laser 'dazzlers' use green lasers because the human eye is more sensitive to their wavelength (Davison, 2009, p. 151). The US military's deployment of dazzlers in Iraq and Afghanistan is likely to inspire law enforcement units to adopt them in the near future.

MATCHING WEAPONRY WITH DOCTRINE

Police and military overlap

In the United States, the militarization of police firearms described above also applies to less-lethal weaponry. The cross-fertilization of police and military procurement is even clearer in this category because it highlights the fact that agencies with supposedly very different operational cultures are nevertheless using the same arsenal. The US law enforcement community's strong shift towards militarization is characterized by the development, procurement, and use of weapons that tend to blur law enforcement use of force and military doctrine. In contrast, European doctrine emphasizes the specificity of law enforcement approaches to the use of force.

In October 1999, NATO approved a new Non-Lethal Doctrine to facilitate their future peacekeeping and peace-enforcement deployments (NATO, 1999). Interestingly, transfers of non-lethal technology from the military to state and local police forces in the United States also began to be institutionalized in the late 1990s (USDOJ and USDOD, 1997, p. 8). In fact, the development of less-lethal weaponry involved both military and law enforcement input, usually in the form of joint research and funding from the National Institute of Justice—the research, development, and evaluation arm of the US Department of Justice—and the Department of Defense's Joint Non-Lethal Weapons Program (Davison, 2010). Thus many less-lethal weapons programmes were initiated with both military and domestic law enforcement applications in mind.

Despite these research and development efforts, most of the less-lethal weapons recently adopted by the US military and law enforcement are ‘off-the-shelf’, commercially available products developed by the private sector (such as the TASER X26 and FN 303). This may explain why police departments and infantry units actually procure very similar less-lethal arsenals. The *Department of Defense Nonlethal Weapons and Equipment Review* enumerates a series of commercially produced impact projectiles (such as Defense Technology Corp.’s 40 mm Area Round) that it considers suited for both law enforcement and military use (USDOJ, 2004, p. 28). Similarly, Non-Lethal Capability Sets used by the US Marines and Army include off-the-shelf kinetic (FN 303) and electric (M26 and X26) TASERs, along with chemical, optical, and flash-bang systems (Davison, 2007, p. 19; Calloway, 2008).

Police and military applications are not the same, however. The US military sees ‘non-lethal’ weapons primarily as an adjunct to lethal force (USDOD, 1996, para. 4.7). Recent military documentation refers to these weapons as battlefield force multipliers that can be used to coerce enemies ‘to move from hiding, and thereby be exposed to lethal effects’ (TRADOC, 2008, p. 84). This approach emphasizes less-lethal weapons as a *prelude* to lethal force, not an alternative. It may also explain why, in the force continuum, the gap between the use of less-lethal weapons and firearms is relatively small in US law enforcement, whereas it is more significant in European policing practice.²⁴

The military approach ignores the constraints and weapon requirements specific to domestic law enforcement.

Yet the military approach ignores the constraints and weapon requirements specific to law enforcement, such as:

- portability;
- affordability;
- shorter stand-off ranges;
- high safety standards;
- compatibility with domestic use-of-force legislation;
- ‘acceptability’ to local and national media; and
- the presence of civil society and democratic control mechanisms.

Since police officers traditionally work within a strict legal framework based on minimum, discriminate, and proportionate use of force, they should arguably be setting the norms and technical development standards for less-lethal weapons to be used both domestically and abroad, such as in peacekeeping settings. The French approach, for instance, sees law enforcement as the primary provider of crowd and riot control know-how to the military. French Army infantry units are trained for crowd control by law enforcement personnel; they procure less-lethal weapons that have been tried, tested, and used domestically for years.²⁵ French infantry units serving in Kosovo in early 2000 were first trained by gendarmerie instructors and provided with domestic crowd control equipment before being sent to the Balkans (de Laforcade, n.d., p. 20; Merchet, 2008). The military clearly attributes the techniques and equipment they are using abroad to the gendarmerie:

Obviously, during such out-of-area crowd control actions, the committed units apply, at the subordinate levels (company-taskforce, platoon) the know-how used by Gendarmerie on the national territory (de Laforcade, n.d., p. 6).

In 2008, the South African Police Service asked the French Compagnies Républicaines de Sécurité, the riot control body of the civilian *police nationale*, and the gendarmerie to train their public order and rapid response teams in crowd management techniques in preparation for the 2010 FIFA World Cup. The training focused on platoon manoeuvrability in a simulation of clashes between supporters and stadium stewards, intimidation of players, and the

evacuation of VIPs (Gabara, 2008). This cooperation undoubtedly created business opportunities for riot control equipment manufacturers. Moreover, the South African police clearly chose to upgrade their doctrine as much as their gear. French crowd control methods have been described as deliberately passive and defensive (France24, 2009; Mispo.org, 2010); these had already been proven effective during the 1998 Football World Cup and the 2007 Rugby World Cup. Every year, the Centre national d'entraînement des forces de gendarmerie in Saint-Astier trains close to 10,000 officers from various French and European security organizations (CNEFG, n.d.). The centre has traditionally promoted *passive* riot control techniques in which weapons are displayed by troops at the very last moment in order to promote a high threshold for the use of force (Gendarmerie Nationale, 2007, p. 8).

Discriminate targeting or crowd control?

The proliferation of off-the-shelf less-lethal products sometimes encourages police agencies to procure weapons without considering whether the equipment is intended for individual targeting or crowd control requirements. Whereas CS grenades are tacitly understood by police as a means to break up unruly crowds *indiscriminately*, there is no official international standard on how other, more recent weapons systems, such as kinetic launchers, should be used. In many cases, manufacturer recommendations substitute for doctrine-led procurement.

A case in point is the controversial death of Victoria Snelgrove in Boston during baseball's 2004 American League Championship Series. When police resolved to clear a crowd celebrating a Boston Red Sox victory, an officer fired two pepper ball rounds from an FN 303 launcher, allegedly aiming for a specific individual moving in the crowd. Although Victoria Snelgrove was not close to the group, one of the rounds hit her left eye, entered the brain, and killed her. The 2005 Stern Commission report notes that the Boston Police Department procurement officials knew very little about the FN 303's technical characteristics, maintenance, or operational deployment prior to purchasing

the weapons. Furthermore, the weapons had been deployed in the field without a solid training programme or accompanying rules for use. The report also highlights significant gaps in the operational planning of the event, which further contributed to the FN 303 launchers being deployed improperly due to a blurry chain of command (Stern et al., 2005, pp. 3–5; Conley, 2005).

Other incidents involving extended-range impact weapons in crowd control were reported in Seattle during the 1999 World Trade Organization protests, in Los Angeles during the Democratic National Convention in 2000, in Cincinnati during demonstrations following the controversial police shooting of Timothy Thomas in 2001, and during anti-war protests at the Port of Oakland in April 2003 (Stone, Buchner, and



Crowd control training at the Centre national d'entraînement des forces de gendarmerie in Saint-Astier, France, 2001. Unable to use less-lethal launchers to accurately target fast-moving rioters through curtains of smoke, the troops use extended batons in barrage formation. © Pierre Gobinet

Dash, 2005). The issue was also raised in Paris when a 16-year-old student was hit in the eye and wounded, this time at short range, by a 44 x 83mm Verney-Carron Flash-Ball projectile during the October 2010 pension reform demonstrations (*Le Figaro*, 2010).

These events highlight the pitfalls of using long-range impact weapons for crowd control without a strict, specific use-of-force policy and proper personnel training. Among other things, use-of-force doctrine should allow for clear distinctions between discriminate targeting and crowd control. A 2006 report by the UK Steering Group in consultation with the Association of Chief Police Officers clearly states that the new Attenuating Energy Projectile:

has not been designed for use as a crowd control technology but has been designed for use as a less lethal option in situations where officers are faced with individual aggressors whether such aggressors are acting on their own or as part of a group (UKSG, 2006, p. 7).

Distinguishing lethal from less-lethal in the field

A common argument in academic and advocacy circles is that the wide availability of less-lethal weapons has led to the relaxed use of such weapons as well as to an erosion of proportionality in the use of force. The weapons are criticized as making the use of force more acceptable and, overall, more widespread. Since the early 1990s, progress has been made by the scientific community to provide independent biomedical research, and by less-lethal weapons manufacturers to improve quality control at the production level. Yet developments are hampered by a glaring lack of internationally agreed tests and standards (Paulissen, 2010). While it is clear that less-lethal weapons have important weaknesses, in considering their overall utility it is important to weigh the alternatives, including the use of firearms.

The recent generation of less-lethal weapons does not replace lethal weapons but is deployed in addition to them.

Electric-shock weapons exemplify some of the uncertainties inherent in use-of-force decision-making. The police community generally endorses the proportionate use of TASERS to save lives, reduce injuries to officers and suspects, and ultimately contribute to a positive outcome (Hawk, 2010). In 2010, for instance, the San Francisco Police Department undertook an elaborate and comparative statistical analysis of annual officer-involved shootings to advocate, in the end, for the procurement of TASERS to reduce the use of firearms even further (Wyllie, 2010). In the minds of some practitioners, there is thus no question that TASERS have provided police with a much needed use-of-force option.

Opponents of the use of TASERS point out that the alleged flexibility they offer can conflict with norms governing the proportionate use of force. General Provision 2 of the UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials advocates the development and use of non-lethal incapacitating weapons (1) 'with a view to increasingly restraining the application of means capable of causing death or injury to persons', but also (2) 'to decrease the need to use weapons of any kind' (UN, 1990). It is not clear that either has happened.

The recent generation of less-lethal weapons, and specifically TASERS, is not *substituted* for lethal weapons, but deployed *in addition* to them, with officers who already carry a sidearm (South Yorkshire Police, n.d.).²⁶ This approach is deeply rooted in police practice. In September 2007, the UK Home Secretary provided an exception by allowing non-firearms officers to use TASERS under a controversial pilot scheme; the initiative was refused by some of the country's largest forces, including the Metropolitan Police (Whitehead, 2009).

Other examples cast doubt as to whether less-lethal weapons have effectively reduced the police use of firearms. A recent audit of the Houston Police Department reported no significant reduction in the number of police shootings of civilians since the introduction of electric-shock weapons (Parker and Schoonover, 2008, p. 12). A 2010 report on

the use of TASER weapons by the Western Australia Police found that despite an overall 25 per cent increase in TASER use between 2007 and 2009, the use of firearms by police doubled during the same period (CCC, 2010, p. 13, para. 7).

Secondly, academic, police, and media reports suggest that the increased availability of less-lethal weapons for routine police operations may have lowered the threshold for use-of-force against passive resisters, and widened the net of people against whom the police has used coercion, including minorities (Davison, 2009, p. 5; CNN, 2010; AI, 2008, p. 22).

According to a 2010 company press kit, more than 15,500 law enforcement agencies in 40 countries have purchased at least 499,000 TASER devices since 1998 (TASER International, 2010). The company website states that more than 86 per cent of these agencies place the use of a TASER device at the level of pepper spray deployment. Yet police agencies have not come to any consensus with respect to where TASERS should be deployed within a use-of-force continuum. In Figure 3.1, the use of less-lethal weapons is just one step below firearms, meaning that it ranks as a responding officer's final attempt to avoid the use of lethal force.

Inversely, agency policy can place TASERS *early* in the use-of-force continuum, notably at active resistance level, in order to *prevent* the conflict from escalating into assault. However, if TASER deployment is placed too close to the beginning of the continuum, for example as an accessory to verbal action, their use may be seen as trivialized, with verbal exchanges quickly escalating to the use of physical force. Indeed, TASERS have

Wearing crowd-control gear, police hold shotguns during a demonstration in Oakland, California, after Johannes Meherle was found guilty of involuntary manslaughter in the shooting death of Oscar Grant, July 2010. © Paul Sakuma/AP Photo





reportedly been used as compliance tools on restrained individuals or passive resisters (Cook, 2010).

A number of cases have seen officers immediately deploying and firing a TASER on the grounds that the suspect was visibly disturbed, delusional, or prone to 'excited delirium', and thus not receptive to verbal efforts to de-escalate the situation. This argument was provided by the Royal Canadian Mounted Police officers who used TASERs against Robert Dziekanski at Vancouver International Airport in October 2007. Dziekanski, who did not speak English, had spent ten hours at the airport and had begun throwing furniture in the international terminal because he was unable to find his mother or communicate with anyone. Dziekanski was 'tased' a total of five times by four officers; he subsequently died. An enquiry into the event concludes that, in the case of emotionally disturbed subjects, 'the best practice is to de-escalate the agitation, which can best be achieved through the application of recognized crisis intervention techniques' (Braidwood Commission, 2009, p. 15).

Nevertheless, the placement of TASERs further up the continuum, as an *accessory* to firearms, can facilitate confusion regarding weapons use among improperly trained personnel.²⁷ In the United States, one of the most controversial recent cases of weapons confusion involving a TASER and a handgun is the shooting of Oscar Grant by police officer Johannes Mehserle on a Bay Area Rapid Transit platform in Oakland, California, on 1 January 2009. Following a fight on a train involving New Year's Eve revellers, police proceeded to handcuff and detain a number of people, including Grant. A bystander's

cell-phone video footage shows the latter being taken to the ground to be handcuffed, and physically resisting. The use-of-force expert involved in the trial testified that Mehserle, visibly under stress, attempted to undo what he thought was a TASER holster safety strap, and instead ended up pulling out his SIG SAUER P226. He performed all the steps consistent with a TASER dart deployment and fired once in Grant's back (Meyer, 2010).

The expert explained the role that holster configurations may have played in Mehserle's mistake and advocated for TASERS to be placed in weak-side holsters requiring a weak-hand draw to reduce the risk of weapon confusion. His testimony also highlights the department's lack of realistic, stress-inducing training scenarios to practice force-options decision-making. A few months later, the local media reported that the Bay Area Rapid Transit Police Department had removed TASERS from the field after an officer had fired the darts at a 13-year-old boy fleeing from police in Richmond on his bicycle. Police staff declared that the force would be retrained in updated TASER use policies (Bulwa, 2010).

Police do not agree on where TASERS should be deployed within a use-of-force continuum.

The private sector is actively working to bridge the divide between lethal and less-lethal weapons. The Portugal-based company Inventarium Security, Research & Development is apparently looking to commercialize the Biggun, or 'Begane', a weapon that can alternately be used as a .38 Special-calibre firearm, a baton, an electrical discharge weapon, or a pepper spray launcher (Begane, 2010). Whatever their tactical advantages, such products will probably present increased risks of weapons confusion.

Doctrine defines the tools

In 2007, the Boston Police Department melted down their FN 303 semi-automatic less-lethal launchers and refashioned them into sewer caps (Shea, 2007). According to local media, in 2006 the family of Victoria Snelgrove settled a USD 10 million wrongful death suit against FN Herstal. They argued that the FN 303 was inherently inaccurate and lethal, thus shifting the responsibility from the Boston police to the launcher's manufacturer (Murphy, 2006). Yet the Stern Commission determined that the lack of proper tactical judgement, training, and doctrine contributed as much to Snelgrove's death as did the launchers (Stern et al., 2005, pp. 3–5).

It is clear that standard operating procedures and tactical rules of engagement, which together define the implementation of police use of force, need to take precedence over the procurement of hardware. This rule of thumb explains the UK Home Office's decision to revoke the licence of Pro-Tect Systems, a company that had supplied X12 TASERS and XREP ammunition directly to the Northumbria Police during a six-hour stand-off with a gunman. At that time, these TASER models had only been available for supply to the Home Office science and development branch for testing (BBC News, 2010).

In countries where law enforcement is fragmented and decentralized, each police department may use different use-of-force guidelines. In some cases, doctrine defines the tools. Wisler describes the differences in crowd control doctrines employed by Switzerland's French- and German-speaking police, and how the doctrines have dictated the use of different weapons. Geneva police units train for riot control with their French counterparts; they thus use more traditional methods, allowing proximity and physical contact with the crowd. In contrast, police in Zurich systematically *avoid* direct contact. Zurich riot police therefore employ CS grenades and impact projectiles on a regular basis. Their colleagues in Geneva do not, although they are legally allowed to (Wisler, 1997, p. 7).

In cases where a police agency's weapons procurement has overtaken its doctrine, two important measures can reverse the trend. The first is provincial, national, or federal harmonization. In Canada, the Braidwood Commission highlighted a lack of consistency regarding electric-shock weapon use and training policy, as well as a lack of direction

from provincial governments (Braidwood Commission, 2009, p. 9). In the United States, the final recommendations of the Stern Commission call for the federal government to issue more guidance on national standards, testing, and certification for new less-lethal weapons, regardless of the technology being used (Stern et al., 2005, p. 42). Centralized police organizations seem structurally better suited to the harmonization of use-of-force doctrine, as evidenced by a national directive regarding the standard use of electric-shock weapons by gendarmerie units (DGGN, 2006).

The second factor is accountability and independent civilian oversight (Coginta, 2010). The UN Basic Principles assert that:

Governments and law enforcement agencies shall ensure that an effective review process is available and that independent administrative or prosecutorial authorities are in a position to exercise jurisdiction in appropriate circumstances (UN, 1990, art. 22).

The Stern Commission echoes this concern by urging independent civilian oversight of police actions (Stern et al., 2005, pp. 41–42; Stone, Buchner, and Dash, 2005, p. 6). Similarly, the Braidwood Commission recommends the creation of a civilian-based criminal investigative body in British Columbia, the Independent Investigation Office (Braidwood Commission, 2010, p. 24).

The private sector is well aware that the need for accountability introduces market opportunities. Most of the electric-shock weapons procured by Western law enforcement agencies already feature miniature cameras and the bar-coded serialization of each cartridge to improve traceability and officer accountability. Another development in this field comes from the Brazilian manufacturer Condor, which produces the I-REF line of traceable grenades. All of the company's non-lethal, tear gas, flash-bang, and smoke grenades are assigned a reference number that can be read electronically. This allows traceability and accountability throughout a product's life cycle—even after detonation, as each grenade's components can be traced back to the user.²⁸ This initiative could catch on with other kinetic energy projectiles, which are often criticized for their lack of ballistic traceability.

CONCLUSION

This chapter identifies the trends that are likely to influence the development and procurement of firearms and less-lethal weapons by Western law enforcement agencies.

In general, the procurement of new police weaponry reflects military trends and precepts. In the case of US law enforcement, this pattern is exemplified by the increased use of .40 S&W handguns, and tactical rifles to match criminal firepower. Observing military small arms development is the most reliable way to predict what police officers will be issued in the near future. Conversely, the only area to benefit from direct police input is the development of firearm safety features, which has yet to attract significant research funds and continued manufacturer interest.

Since firearms have not undergone any evolution significant enough to modify the police approach to use of force, all hopes have turned to less-lethal weapons to provide much needed force-option flexibility in the field. Less-lethal weapons have not replaced firearms but have been added to the police officer's tools for intermediate coercive means. Whereas first-generation less-lethal weapons originally permitted only close engagements, new technology increasingly allows officers to target discriminately from a distance. Moreover, the private sector appears intent on progressively marketing fully scalable, lethal-to-non-lethal weapons. To date, for lack of a truly 'rheostatic' option, manufacturers are addressing the demand for technology by combining less-lethal systems with firearms.

Decentralized, market-driven procurement of some intermediate weapons technology can prove detrimental to the development of a coherent use-of-force doctrine and related police training. There is a risk, as in the United States, that new technology—and associated marketing efforts—influence police procurement and use-of-force doctrine, not the other way around. Police forces may be acquiring new products and operational policies that are not suited to their structure, doctrine, or environment. This trend is not as present in Western Europe, where more centralized police structures have helped strengthen and harmonize use-of-force policies. Nevertheless, it remains to be seen whether marketing and ‘peer’ pressure will prompt European law enforcement agencies to adopt procurement patterns similar to those in the United States.

In the end, the notion of a force continuum, designed to represent proportionate responses to specific threats, can only serve as a guide to decision-making in the field. It does not account for the complexity of circumstances faced by individual officers. Nor does it imply that there should be a weapon capable of covering the whole range of options. Despite the fact that a number of less-lethal weapons have already proven effective, it is clear that these weapons cannot, on their own, improve police use of force, or replace proper doctrine and training. ■

LIST OF ABBREVIATIONS

ACP	Automatic Colt Pistol
ATF	US Bureau of Alcohol, Tobacco, Firearms and Explosives
LED	Light-emitting diode
LRAD	Long Range Acoustic Device
M&P	Military & Police
PDW	Personal defence weapon
S&W	Smith & Wesson
XREP	eXtended Range Electro-Muscular Projectile

ENDNOTES

- 1 France has a dual law enforcement structure, composed of the civilian *police nationale* and the military *gendarmerie nationale*—both of which have public order, judicial policing, and crowd control duties. For convenience, these two components are described jointly as ‘law enforcement’ or ‘police’ in this chapter. See Gobinet (2008) for more on dual police structures.
- 2 For further information on the UN Basic Principles, see Wood and McDonald (2004).
- 3 Author interview with a marketing representative from a Western small arms and light weapons manufacturer, July 2010.
- 4 Author interview with Bertrand Colin and Marc-Antoine Galzin, LACROIX–Alsetex, Paris, 3 September 2010.
- 5 European calibre notations use projectile diameter multiplied by length of casing in millimetres with bullet mass expressed in grams (g). US notations use projectile diameter in decimal fractions of an inch, with bullet mass expressed in grains (gr).
- 6 Author interview with a marketing representative from a Western small arms and light weapons manufacturer, July 2010.
- 7 See also the above reference to France’s purchase of 9 mm SIG SAUER SP2022 handguns.
- 8 On semi-automatic rifles, the trigger must be pulled each time a shot is fired. Fully automatic rifles continue firing when the trigger is pulled. The term ‘assault rifle’ usually includes the requirement that the weapon can be switched from semi-automatic to fully automatic (‘selective fire’).
- 9 The barrel never touches the stock material. When fired, the bullet creates a whipping action in the barrel, enhancing consistency of the shots.
- 10 In the past, US authorities have stressed the structural and legal distinctions between open-tip and hollow-point bullets to legalize the use of sniper ammunition such as the M852 Sierra MatchKing or M118 rounds (Parks, 1990).
- 11 Author interview with a marketing representative from a Western small arms and light weapons manufacturer, July 2010.

- 12 Soft-nosed ammunition applies most of its kinetic energy to the target by deforming on impact, thus producing a larger wound cavity. Consequently, the projectile is less susceptible to ricochet and less likely to cause collateral casualties in a densely populated area.
- 13 Law enforcement agencies (and hunters alike) use considerably more effective expanding bullets that are otherwise explicitly forbidden for warfare by the Hague Declaration concerning expanding bullets of 29 July 1899 (Coupland and Loye, 2003).
- 14 Author interview with a marketing representative from a Western small arms and light weapons manufacturer, July 2010.
- 15 Author interview with a marketing representative from a Western small arms and light weapons manufacturer, July 2010.
- 16 Author correspondence with Arthur Schatz, vice president of business development, Metal Storm, 14 June 2010.
- 17 Author correspondence with Arthur Schatz, vice president of business development, Metal Storm, 14 June 2010.
- 18 Author correspondence with Karl Giebel, head of development, Armatix, 11 August 2010.
- 19 Author interview with Bertrand Colin and Marc-Antoine Galzin, LACROIX-Alsetex, Paris, 3 September 2010.
- 20 Author correspondence with Massilon Miranda, international business manager, Condor Naoletal, 10 August 2010.
- 21 Author correspondence with Arthur Schatz, vice president of business development, Metal Storm, 10 July 2010.
- 22 Author interview with Bertrand Colin and Marc-Antoine Galzin, LACROIX-Alsetex, Paris, 3 September 2010.
- 23 The M26 advanced TASER fires two probes up to 6 m from a gas cartridge. These probes are connected to the weapon by high-voltage insulated wire. The weapon uses electro-muscular disruption to override the central nervous system and trigger an uncontrollable contraction of the muscle tissue.
- 24 This view was also expressed by a marketing representative from a Western small arms and light weapons manufacturer, July 2010.
- 25 Author interview with Bertrand Colin and Marc-Antoine Galzin, LACROIX-Alsetex, Paris, 3 September 2010.
- 26 The situation is different for crowd control technologies. Aggressive rioters in the first half of the 20th century were often contained by regular police troops (or even army units) using firearms. In most Western countries, the introduction of specialized, non-lethal riot control equipment, such as CS grenades, undeniably allowed many police organizations to professionalize their riot control doctrine and practice, and thus replace the use of firearms altogether.
- 27 Author interview with a business representative from a Western small arms and light weapons manufacturer, July 2010.
- 28 Author correspondence with Massilon Miranda, International Business Manager, Condor Naoletal, 10 August 2010.

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