



Bonn International Center for Conversion

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brief 49

Smart Technology
in SALW Control

Civilian Protection, the
UN-PoA, and Transfer
Control (SmartCon)



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Foreign Office



brief 49

Smart Technology in SALW Control

Civilian Protection, the
UN-PoA, and Transfer
Control (SmartCon)

Michael Ashkenazi, Elvan Isikozlu
and Marc Kösling (eds.)

Michael Ashkenazi and Marc Kösling

Introduction

Firearms, notably those labeled 'small arms and light weapons' (SALW) (generally speaking, military grade portable weapons carried and used by one person or a small crew¹) represent a major irritant for peaceful life around the globe. On the one hand, in the grand schemes of nations, individual SALW are not a major weapon—compared to tanks, aircraft and ships. On the other, in the aggregate, SALW account for more deaths and injuries than do the big ticket items. Partly this is due to the fact that *most* conflicts today are not major state-to-state conflicts, but more often either low level fights with, and within, civilian populations and partly because SALW are generally cheap and easy to acquire, use and maintain. The 800 million or so extant SALW² cause approximately 500,000 victims (dead and wounded; see Atwood, p. 9) per year. This includes weapons used in political and economic conflicts, crime, and accidents.

Modern firearms—rifles, shotguns, pistols, automatic weapons—have not changed radically in the past century and a half. The cartridge (combined ball, propellant, and case) came into use in the middle of the nineteenth century. Incremental improvements have been made, but in practice the cartridge (and therefore the material and mechanical requirements of a weapon to fire it) have remained unchanged. Signs of comprehensive change are beginning to emerge. The use of composite materials to make parts of a weapon are one aspect. The introduction of electronics—first into aiming devices, and later into other aspects of shooting—are another.

Given the lethality of SALW, and the continuous improvement of information technology (IT) devices (size, computing power, input/ output devices and other aspects) in the past fifty years, some thought has also gone into the use of IT devices as a means to limit casualties from SALW. The papers presented here are from an initial conference held in Berlin, sponsored by the German Federal Foreign Office in June 2013.

The objective of the conference was to consider all aspects of the installation and use of IT in firearms. Technical, economic, social, and political issues were



presented and discussed by presenters from different disciplines and backgrounds. A secondary objective was to consider the potential uses and implications for less developed and post-conflict countries, of IT-enhanced SALW, dubbed 'smart weapons'³ as a euphemism.

The origins of the interest of the German (and other) governments in the use of IT for better SALW control (in this context meaning a lowering of the total number of firearm casualties) is to be found in a series of United Nations protocols and agreements, which encouraged the use of technology as a means to ensure that SALW are manufactured, transferred, stored, and used in a safe manner congruent with the law.

The momentum for smart technologies in the framework of the United Nations

In the late 1990s, SALW became an important issue on the agenda of the international organizations and calls for an international control regime to limit SALW casualties became louder (e.g. Goose and Smyth, 1994; Hansel, 2012, p. 125). After the fall of the Iron Curtain, small arms, most notably Kalashnikovs, flooded conflict-prone areas such as south-eastern Europe and Africa. Conflicts in Bosnia-Herzegovina, Liberia, and elsewhere were fueled by weapons sold from stocks in former Soviet countries. The argument is not that those conflicts would not have taken place without those weapons, but that the easy and uncontrolled availability of SALW raised the death count significantly.

Building on this experience, the United Nations have adopted several documents dealing wholly or in part with this issue. Many of these include elements

¹ Small arms include revolvers and self loading pistols, sporting shotguns and rifles, craft produced firearms, military rifles and carbines, sub-machine guns, assault rifles, light machine guns. Light Weapons include heavy machine guns, hand-held under-barrel and mounted grenade launchers, portable anti-aircraft guns, portable anti-tank guns, recoilless rifles, portable launchers of anti-tank missile and rocket systems, man-portable air defense systems (MANPADS), mortars of calibers of less than 120mm (Greene and Marsh, 2012)

² The exact number is unknown; 800 million is a working number which may vary by 10 percent.

³ The terms 'smart weapon' or 'smart weapon technology' appears in single quotation marks here to indicate that it remains a contested term and is in no way official terminology. However, from hereonin, the term will no longer appear in single quotation marks throughout this brief in order to avoid their overuse.

supporting the use of new technologies for controlling the illegal spread of SALW.

United Nations Programme of Action (UN-PoA)

The PoA—short for the *Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects* (UN Document A/CONF.192/15)—was agreed upon at the UN Conference on Small Arms in 2001 and aims to support states in developing measures to strengthen their SALW policies and practice. The document consists of 83 points ranging from DDR (disarmament, demobilization, and reintegration) to PSSM (physical security and stockpile management).

The UN-PoA was adopted at the UN Conference on Small Arms by consensus, but is not legally binding. However, as Greene and Marsh (2012, p. 176) put it, the UN-PoA provides a “basic international normative and procedural framework” and counts as a basis for many SALW-concerned regulations that followed. To monitor the process and look at next steps undertaken in SALW control, Review Conferences (RevCon) are mandated, the most recent in 2012.

Firearms Protocol

The *Protocol against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition, supplementing the United Nations Convention against Transnational Organized Crime* (in short, the *Firearms Protocol*) (A/RES/55/255) is one of three protocols in the UN Convention against transnational organized crime and was adopted by the United Nations General Assembly (UNGA) in 2001, but did not enter into force until 2005. The purpose of the Firearms Protocol is to “promote, facilitate and strengthen cooperation among States Parties in order to prevent, combat and eradicate the illicit manufacturing of and trafficking in firearms, their parts and components and ammunition” (UN, 2001b, p. 3).

The Firearms Protocol is, in contrast to the UN-PoA, legally binding. However its focus is on crime and law-enforcement issues, whereas SALW control, and specifically the illicit trade, was to be handled by the upcoming small arms conference, which adopted the PoA. Nevertheless, the Firearms Protocol is a notable support to the introduction of smart weapon technologies⁴, since it places great emphasis on record-keeping, marking and tracing, and security and preventive measures: all areas to which smart weapon technologies can provide a major contribution.

⁴ Throughout the *brief*, the terms smart technology and smart gun technology are used interchangeably.

The Protocol also specifically calls for cooperation of states in training and technical assistance, and in particular calls on industrial nations to develop assistance to and collaborate with less developed countries in developing mechanisms to achieve success in areas such as PSSM. Though this call does not mention ‘smart’ technology directly, it lays the foundation for inter-state cooperation in relevant areas, including knowledge transfers and technical devices.

International Tracing Instrument (ITI)

The *International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons*, in short the *International Tracing Instrument (ITI)* (A/60/88) adopted by the United Nations General Assembly in 2005, built upon marking and record-keeping standards laid out in the UN-PoA. It specifically addresses a major problem in controlling official and private SALW stocks: the theft and transfer of weapons and their use for criminal purposes across borders. The ITI lays out comprehensive minimum standards for marking SALW and, no less importantly, for tracing stolen and lost weapons. While, here, too, smart weapon technologies are not mentioned, the need for tracing weapons is strongly underlined. It needs to be noted however, that the standards laid down for marking—mechanical marking of parts—do not encourage the use of electronic and optical-electronic marking systems, something that could become a problem with the development of componential weapons (see e.g. FN Herstal, 2013) and parts made of composites.

Arms Trade Treaty (ATT)

While the three previously mentioned documents deal largely with matters of illegal SALW, including stockpile leakages, diversion, etc., the *Arms Trade Treaty (ATT)* is the first global treaty to focus on the legal trade of arms in general. SALW is one of the eight weapon categories concerned (A/CONF.217/2013/L.3) The ATT was decided upon in the UNGA in April 2013, but will not enter into force until the 50th ratification paper is deposited at the United Nations. Once the Treaty enters into force, it will become a legally binding document.

The ATT lays great emphasis on two features of SALW control: Physical security and stockpile management (PSSM) and proper transport. Without actually determining how better PSSM and safer transfers are to be accomplished (this is within the prerogatives of states), the ATT does encourage states to use the most reliable solutions to the problems of leakage during transfer, end-user surety, and PSSM. In the industrial sphere,

most transfers and stock control are integrated with IT, which has a proven and effective record. Thus, in effect, the ATT encourages, once again, the use of smart weapon technologies for controlling weapons transfers and stockpiles.

Review Conference 2012

The 2012 Review Conference (RevCon) of the PoA was a major driver of the Conference whose proceedings are presented here. The Outcome Document A/CONF.192/2012/RC/4, Annex II, B.3(g) states *inter alia*:

(...)

(g) (...) to request the Secretary-General to submit an initial report [on]:

(i) The implications of recent developments in small arms and light weapons manufacturing, technology and design for effective marking, record-keeping and tracing;

(ii) Practical steps to ensure the continued and enhanced effectiveness of national marking, record-keeping and tracing systems in the light of such developments;

(iii) Relevant practices in relation to international assistance and capacity-building, including ways to support the transfer, uptake and effective utilization of relevant tools and technologies; (...)
(UN, 2012).

While not mentioning smart weapon technology in so many words, the RevCon was the direct precursor to the 2013 Berlin SmartCon, where the use of modern IT as an enhancement of effective marking, tracing, and control of SALW was to be discussed.

The smart and beyond

As in many other new conceptual and technological fields, it is easier to say what smart weapon technology, the Conference, and this publication are *not* than what they *are*. Smart weapon technology is not the silver bullet in controlling SALW, in reducing the threat of SALW, or in reducing casualties from firearms. It is part of the array of instruments, the foremost of which is human will, for limiting the scourge of uncontrolled SALW use. Similarly, the Conference was not intended to provide a definitive answer to the issue of smart weapons. To the contrary. From the start, it was viewed as an exploratory event, and a preparatory one. As an exploratory event, it allowed all interested parties—firearm manufacturers and users, control advocates, smart weapon devices manufacturers, development agency representatives, and representatives of governments—to explore both the advantages and limitations of this new technology. Partici-

pants came from developed industrial countries, and less-developed and post-conflict ones. As a preparatory event, we believe this Conference set the stage for public discussion at all levels of the benefits and disadvantages of using smart weapon technologies under different conditions. And, indeed, the one most prominent and common finding of the Conference, both in the presentations and in the discussions that followed, is the agreement that smart weapon technology has different effects, and differential benefits under different conditions and scenarios: What is likely to work in one country, or as a solution for a particular problem, may well not work elsewhere or for a different problem. Nevertheless, there is almost complete agreement that in many ways, smart weapon technology for SALW control will be a growing phenomenon in the coming years, notably as both the technology, and the economic sector it represents, matures and expands.

The contents of the *brief*

This *brief* contains the majority of papers presented at the SmartCon 2013 in Berlin. Unfortunately, for various reasons, not all presenters were able to contribute to the volume. Nevertheless, the overall opinions and data presented here represent most of the viewpoints (and cautions!) presented at the Conference.

The first two papers present the **underlying imperative for the use of smart weapon technologies**. Atwood's paper (p. 9) presents some of the findings about the abuse of SALW worldwide and the effects on human populations. Vranckx's paper (p. 18) demonstrates the need for better transfer control and PSSM through the example of a case study of weapons seized in Colombia.

Two papers, by Ashkenazi (p. 26) and by Greene (p. 34), look at the **technical and economic aspects** of smart weapon technologies. Ashkenazi argues that technical developments in the future are likely to bring about an industry that is more consumer than producer driven, as the industry is now. Greene shows how smart weapon technology interfaces with political and other factors, and has the potential to effect changes in some of the areas of SALW control.

Kalbusch and Johnson-Thomas, while generally supportive of the idea of smart weapon technology in arms control, also note and document the **difficulties of implementing the technology in Africa**. Kalbusch's paper (p. 41) emphasizes the need for more training and implementation of simple technologies and

basic practices of PSSM, which are often very weak in African states. Johnson-Thomas (p. 49) shows how, in the absence of better tracing technologies, states are able to use purchased arms in ways that contravene UN agreements and protocols, and suggests that for some of these ills, smart weapon technologies could be a solution.

Winbäck's and McCarthy's papers both address the **political and the diplomatic facets** of the smart technologies issue. Winbäck, a parliamentarian, casts light on the need for parliamentary work to ensure that smart weapon technologies are accepted at the national legal level, and shows the kinds of impediments and limits to such introduction (p. 53). McCarthy (p. 58) discusses the difficulties of incorporating smart weapon technologies into international discourse dominated by agreements that have not considered the use of these new technologies.

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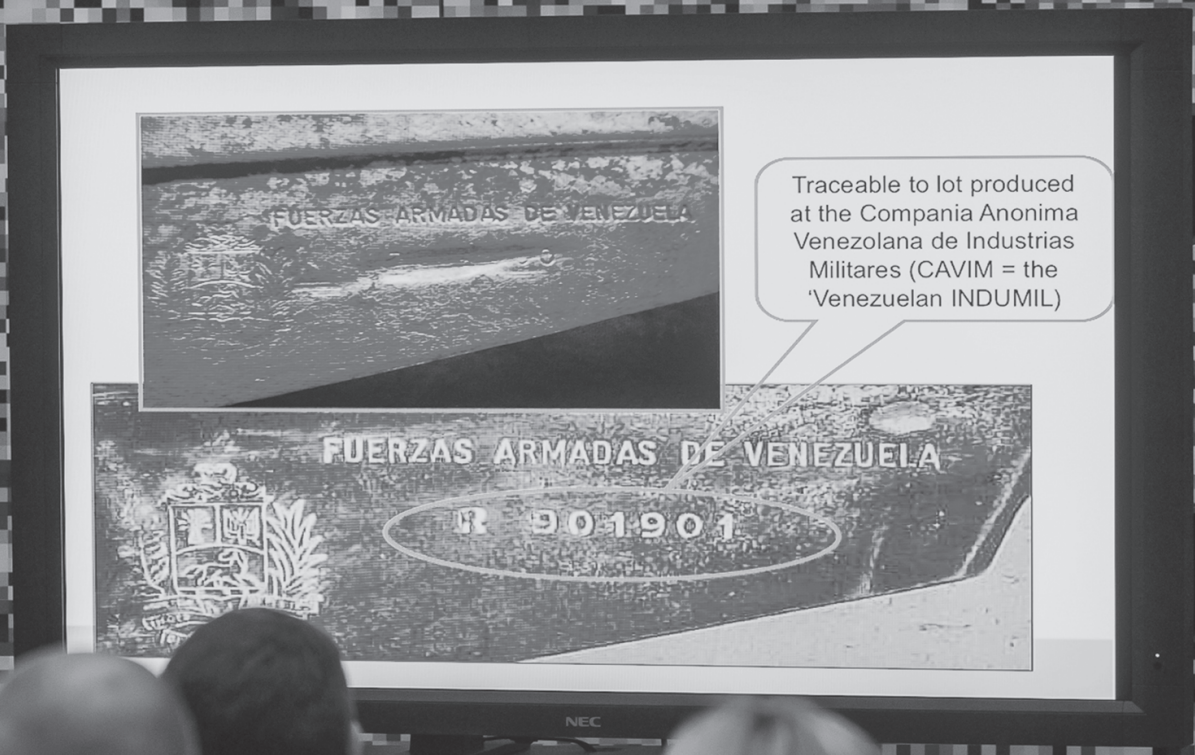
Many people contributed to the making of both Conference and *brief*. First and foremost, we would like to thank the German Federal Foreign Office for proposing and funding the Conference and this *brief*. The Foreign Office has supported the concept of smart technologies for weapons control for several years, and we expect that interest to continue. In particular we would like to thank Ambassador Rolf Nickel for his support and welcoming speech at the Conference.

The presenters and participants at the SmartCon are owed a great many thanks for presenting, and often critically opposing, ideas and concepts presented at the Conference. The lively discussion was captured accurately by our colleague Christof Koenigler, who deserves a great deal of thanks for his hard work. The staff of the Foreign Ministry's hosting department helped ensure the Conference ran as smoothly as it did. As always, we are grateful for our colleagues at BICC who reviewed the papers, and in particular, Ms. Heike Webb, our copyeditor, for forcing us to stick to the schedule, and for taking on the task of producing the final product with her usual cheer and aplomb.

The views expressed in this *brief* are not necessarily the views of the editors or BICC.

1

The underlying imperative for the use of smart weapon technology



The context of armed violence

Introduction

The role that smart weapon technologies can play in the control of small arms and light weapons (SALW) is best understood when set in the broad realities of the use and mis-use of SALW. This paper briefly demonstrates some of what is currently known about these realities and the parameters of intervention strategies aimed at changing them. While not dealing directly with smart weapon technologies, the paper aims to provide a broad optic by which the potential contribution of these technologies to the prevention and reduction of armed violence can be judged.¹

Adopting an 'armed violence' perspective

The Geneva Declaration on Armed Violence and Development (GD), adopted by 42 countries in 2006 and with 112 adhering countries today, defines armed violence as "the intentional use of illegitimate force (actual or threatened) with arms or explosives, against a person, group community, or state that undermines people-centered security and sustainable development" (GD Secretariat, 2008: 2). This definition sits behind the work of the GD process and shapes the nature of the research on armed violence that has been done over recent years. Such an orientation naturally calls attention to many dimensions which can be seen to affect and be affected by SALW control measures.²

As we look at the realities of armed violence in our world today, perhaps the most obvious observation is that the traditional characterization of armed conflict—that of war between states—only explains a small part of what can be classified as armed conflict. Most armed conflict today is intra-state conflict, although, as in cases like the current civil war in Syria, there can be important transnational dimensions to some internal conflicts. But the experience of armed violence goes well beyond this inter- and intra-state distinction (cf. Small Arms Survey, 2013: 7–15).

¹ This paper draws largely on research undertaken by the Secretariat of the Geneva Declaration on armed violence and development and by its partner organization, the Small Arms Survey. The author wishes to extend sincere gratitude to all those who have produced the analyses and in many cases the actual words on which this paper is based.

² The definition of armed violence adopted by the GD does not include suicide deaths, as they do not fall within the realm of the "intentional use of illegitimate force." Nevertheless, suicide deaths number in the many hundreds of thousands and a firearm is often the means used. Later in this article, this suicide dimension is looked at as another area where the use of smart technologies can be a potential factor in reducing these numbers.



To better reflect the nature of contemporary armed violence, an "integrated" approach was adopted by the 2011 edition of the *Global Burden of Armed Violence* (GBAV) to provide a fuller picture of victimization from armed violence (GD Secretariat, 2011). There are various ways of understanding victimization; some groups count casualties in conflicts and others monitor homicides and crime. The integrated approach of the GBAV has aimed at gathering the full range of perceived types of victims of armed violence. Thus, the research counts not only victims killed in large and small wars, but also those killed in inter-communal and collective political violence, in struggles between criminal gangs, as victims of economically motivated violence, in inter-personal or gender-based violence, or in encounters with police and state officials.

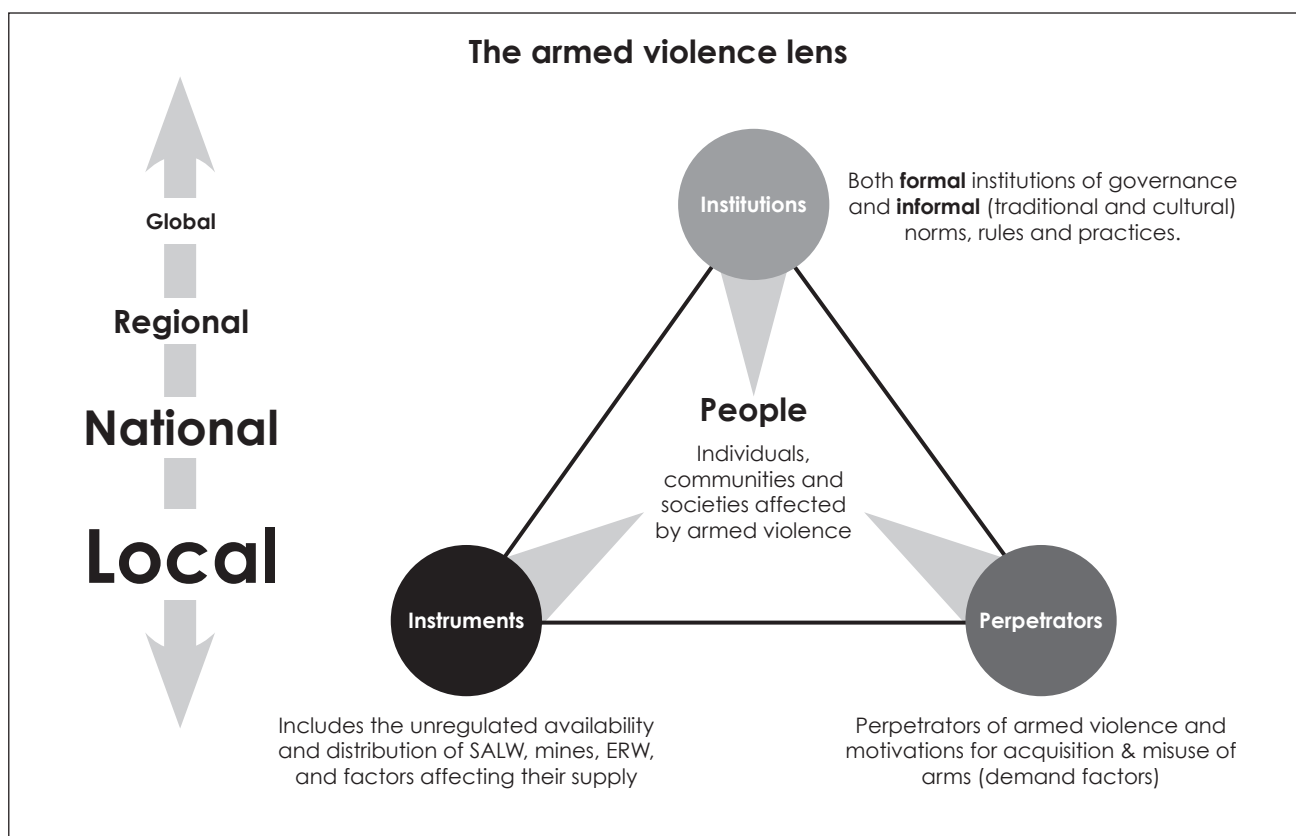
The main reasons for adopting this comprehensive approach to armed violence is to show that the lines between different forms of violence—political, economic and inter-personal—are increasingly blurred in both conflict and non-conflict settings; witness, for example, the current drug war in Mexico or widespread gang violence in Central America. In many such settings, it is increasingly difficult to categorize violent acts as purely conflict or crime-related.

The armed violence 'lens'

In examining the potential utility of smart weapon technologies to armed violence reduction and prevention strategies, a useful tool has been developed by researchers for helping policymakers and practitioners in contextualizing and refining the nature of proposed interventions. This is presented in Figure 1.

This 'lens' is offered here as a means for understanding just where and how the application of smart technologies might be understood in their impact on these strategies—and, equally, in understanding the elements that they won't affect.

Figure 1. The armed violence lens



Source: OECD DAC Policy Paper, 2009.

As this figure reveals, the development of approaches to armed violence reduction can be helped by considering:

- the people affected by armed violence—both direct and indirect victims;
- the perpetrators/ agents who commit such violence and the motivations behind those actions;
- the instruments of armed violence, with a focus on the availability of weapons; and
- the institutions or institutional/cultural environment that enables, or protects against, armed violence (OECD, 2011a).

As noted in the GBAV 2011 report,

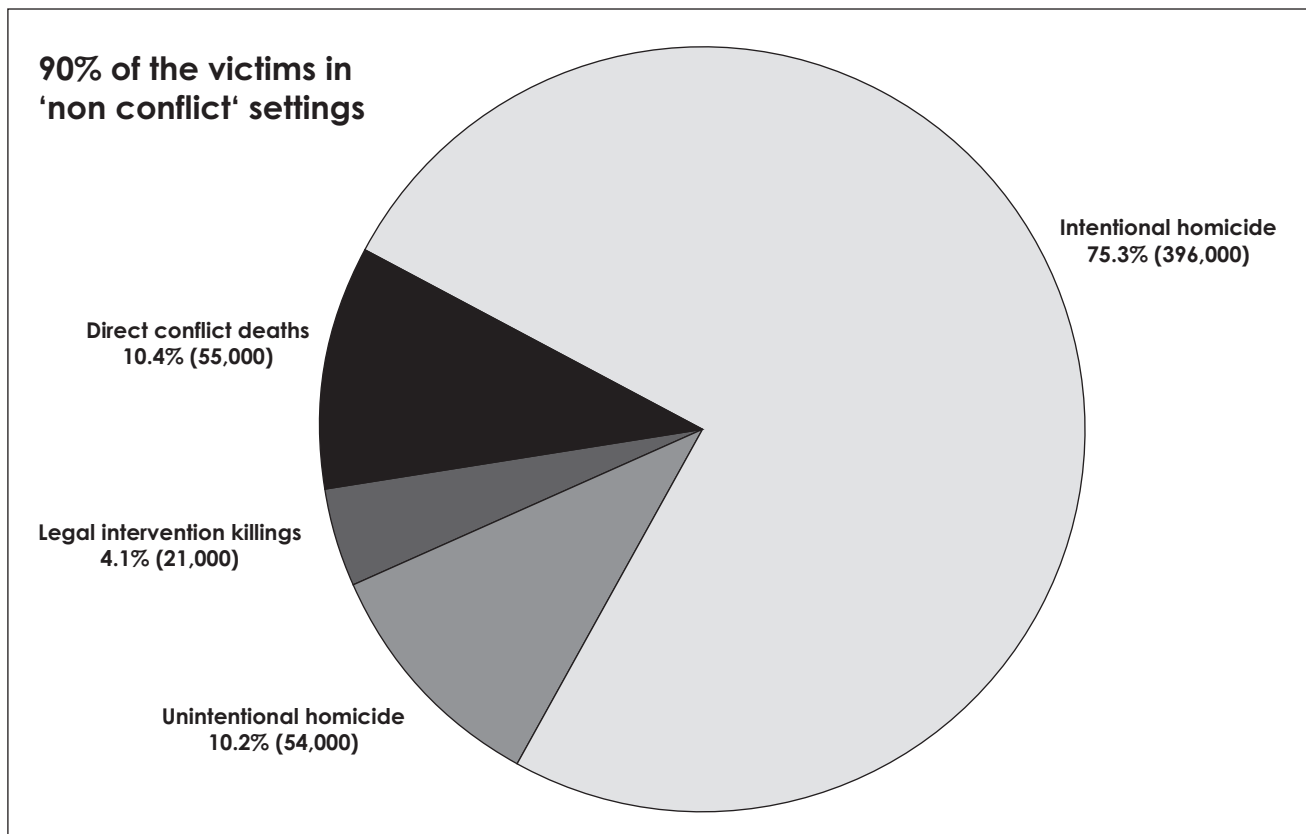
(t)he lens provides a flexible and unified framework for apprehending the contexts, motives, and risk factors associated with armed violence. Its three legs provide different entry points for armed violence prevention and reduction policies (...) (GD Secretariat, 2011: 36).

Important in the use of this lens are the linkages which can be understood between these four dimensions (with people at the center) as well as the linkages between different levels (local, national, regional, and global).

Dimensions of armed violence

This integrated approach to the examination of armed violence permits us to see important dimensions of the realities of armed violence in today's world. Figure 2 briefly summarizes the evidence of what this picture looked like in the second half of the last decade, according to the GBAV. These categories represent best estimates. They come with many caveats relating to the availability and consistency of data. Nevertheless, what is presented below can be taken as broadly indicative of the global situation, sufficient to suggest the range and the types of interventions that might be required to reduce these numbers.

Figure 2. Homicide deaths in conflict and non-conflict settings



Source: GBAV, 2011: 70

Perhaps the most shocking statistic of course is that an estimated 526,000 people died per year as a result of lethal violence during the period 2004–2009 (GD Secretariat, 2011: 43).³ Of great importance in looking at this overall number is that some 90 percent of these victims died in *non-conflict* situations. Of particular significance to considerations of the applications of smart weapon technology, the data show that roughly three-quarters (around 396,000) died as a direct result of inter-personal violence, gang violence, and economically motivated crime, settings in which small arms are particularly present. These intentional homicides hugely outnumber direct conflict deaths, estimated to average about 55,000 per year (just over 10 percent) for the years studied. The GBAV is currently being updated and new data will be presented in 2014 but there is no evidence so far to suggest that the distributions noted in the 2011 edition will have changed significantly, although some change in the percentage attributed to direct conflict deaths is likely due, in particular, to the civil war in Syria. Also

³ These overall data are derived from incident reporting systems and databases, such as public and criminal justice to measure the scale and magnitude of lethal violence.

of relevance to the consideration of the potential of smart weapon technologies is the rather substantial percentage, approximately equivalent to direct conflict deaths, attributed to 'unintentional homicide' (or, generally speaking, accidents).

These figures only record deaths. Not included but assumed to be many times higher are injuries from armed violence. Nor, as noted earlier, are suicide deaths included. In addition, these figures don't address the burden of indirect victims of conflict-related violence—those deaths from malnutrition, lack of access to clean water, or easily preventable diseases that result from the large-scale displacement of people from conflict zones. The 2008 edition of the GBAV suggested a global average ratio of four indirect deaths for every direct violent death due to armed conflict (GD Secretariat, 2008: 32). The addition of these dimensions, as imprecise as they are at the moment, provides a dramatic and tragic picture of victimization as a result of armed violence.

These macro statistics, however, mask the differing degrees to which armed violence affects particular

settings and victimizes individuals. The following points are presented as snapshots of some of these differences (GD Secretariat, 2011: 43–86; 87–112)⁴:

Countries are affected differently by armed violence.

Violent deaths are not distributed evenly around the world. This rather obvious statement, when unpacked, shows a range of important realities which must be taken into account when looking at policy and intervention strategies. According to the GBAV 2011 report, while the overall global violent death rate is 7.9/100,000 persons, 58 countries experience violent death rates of more than 10/100,000 population. One-quarter of the world's countries—comprising some 1.2 billion people—exhibit armed violence death rates that account for almost two-thirds of all violent deaths. Among these, 14 countries, home to only 4.6 percent of the world's population, experience violent death rates greater than 30/100,000 and account for one-quarter of all violent deaths. Only six of these countries were active conflict zones in the period 2004–2009 (Iraq, Colombia, Sri Lanka, Central African Republic, Sudan and the Democratic Republic of the Congo). Thus, most of the states worst affected by armed violence are *not* at war, and the levels of armed violence in non-conflict settings are sometimes higher than in many war zones.

The characteristics of lethal violence differ widely from region to region. Looking at the global figures, there is great regional variation in reasons why people are being killed. For example, for 11 countries in the Americas that have been examined, the most common types of lethal violence are associated with gangs or organized crime, with robbery or theft and intimate partner or family violence following behind. For the six countries in Asia and the nine countries in Europe that have been examined, a higher percentage of lethal violence is associated with intimate partner or family violence, with gangs or organized crime following in both regions as major causes. For Africa, no such information is available, but, of course, many contemporary armed conflicts are concentrated on that continent and they are an important cause of victimization.⁵

Lethal violence is not distributed evenly within countries. If lethal violence is not distributed evenly between countries, the same will also be true within countries. In addition, where and how it manifests itself can change quickly over time. One currently poignant example is Mexico. In 2007, there was only one Mexican state (Sonora) with a homicide death rate as high as between 10 and 20/100,000 population. By 2010, largely due to violence associated with the shifting activities of organized criminal or armed groups, six states had reached homicide rates of more than 30/100,000 (GD Secretariat, 2011: 30–32). An additional dimension of variation that is important to note is that violence within urban settings can also vary greatly from one part of a city to another.

How armed violence burdens societies

Armed violence destroys lives and livelihoods, breeds insecurity, fear and terror, and has a profoundly negative impact on human development. Whether in situations of conflict or crime, it imposes enormous costs on states, communities and individuals (Geneva Declaration, 2006).

These words from the opening paragraph of the Geneva Declaration on Armed Violence and Development summarize crisply why there has been growing attention paid to the realities of armed violence. The understanding of the impact of armed violence has deepened since the Geneva Declaration was agreed, committing adhering States to seek measurable reductions in the global burden of armed violence by 2015. The World Bank's 2011 World Development Report *Conflict, Security, and Development* pointed out that no low-income country affected by conflict or high levels of violence had yet achieved a single Millennium Development Goal and few were expected to by 2015 (World Bank, 2011: 63) This report exemplifies a growing range of studies seeking to understand the complex relationship between armed violence and development. As noted in the 2011 GBAV,

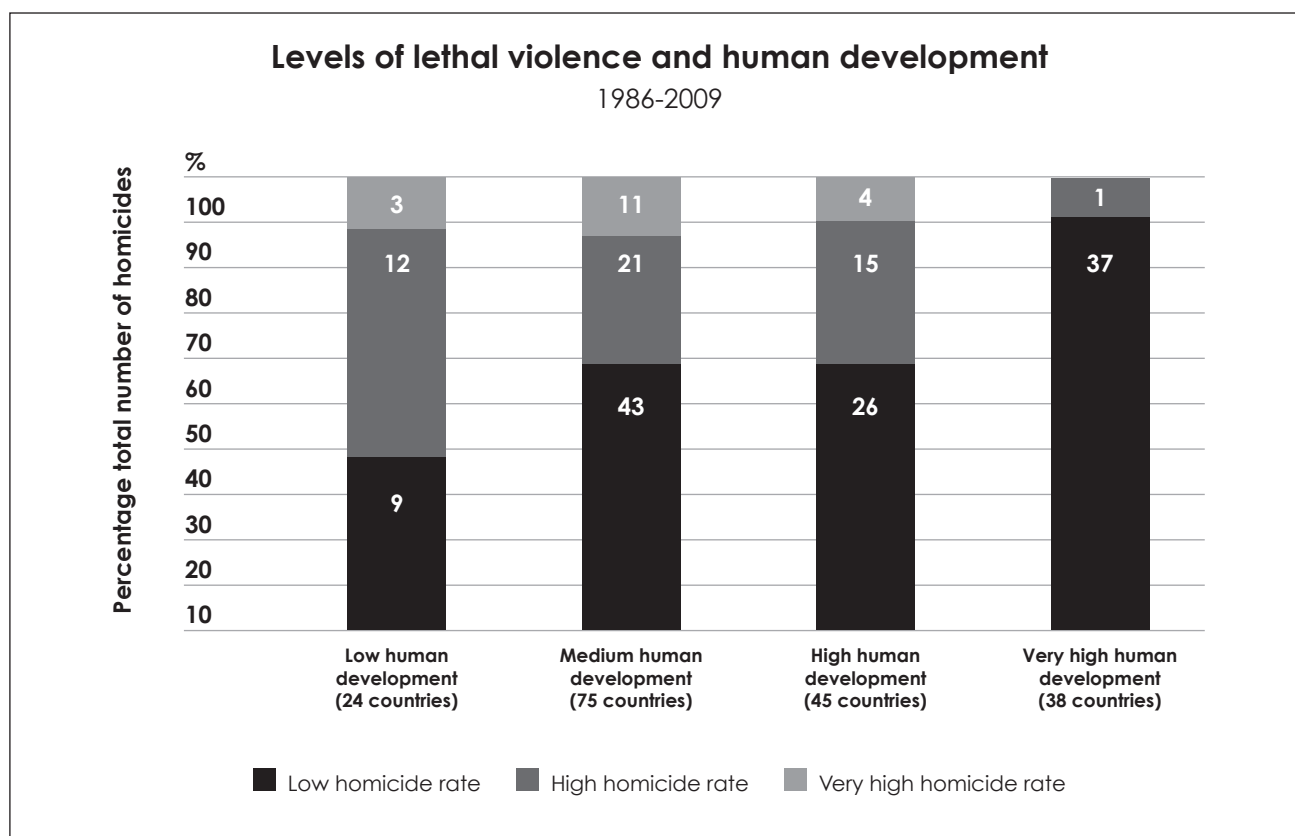
(a)id agencies and governments now widely accept that there is a relationship between higher levels of armed violence and fragile institutional capacities, and that there is a strong association between insecurity and underdevelopment (GD Secretariat, 2011: 9).

Research undertaken for the GBAV 2011 demonstrates the relationship that can be seen between levels of lethal violence and development, with countries that score low on the Human Development Index (HDI)

⁴ The following points draw on the full analysis that is provided in Chapter 2 "Trends and Patterns of Lethal Violence" and Chapter 3 "Characteristics of Armed Violence" (GD Secretariat, 2011).

⁵ It is expected that the 2014 version of the Global Burden of Armed Violence and the awaited 2013 edition of the UN Office on Drugs and Crime World Homicide Report will shed new light on these regional dimensions.

Figure 3: The relationship between levels of lethal violence and human development indicators



Source: GBAV, 2011: 152

showing high or very high homicide rates, whereas those countries that register high on the HDI are more likely to exhibit lower levels of lethal violence.⁶ Figure 3 demonstrates this relationship.

Many social dimensions can be understood as risk factors for levels of armed violence in non-conflict settings. Understanding the social dimensions that can be seen as most importantly associated with levels of armed violence is key to the development of appropriate policies and interventions. A short, but by no means exhaustive, list of such factors can be mentioned. Geneva Declaration data, for example, show that specific forms of violence—both intimate partner and economically motivated violence—are higher in countries with greater income inequality. Research also shows that higher levels of violence are strongly associated with settings in which the rule of law and institutional development is weak, suggesting

⁶ Care must be taken in attributing causality in these observations, but there is a growing body of research that identifies a robust relationship between income inequality and violent criminality. See Chapter 5 “More Violence. Less Development,” in GBAV 2011 for fuller explanation of this complex relationship.

that the development of a functioning and fair criminal justice system can be seen as an important factor for armed violence prevention and reduction in affected settings (cf. UNODC, 2011a; UNODC, 2011b: 33–34; World Bank. n.d.). In many settings, levels of youth unemployment can also be seen as associated with higher levels of armed violence.

Firearms and armed violence

Among important risk factors related to armed violence is also, of course, the availability of small arms and light weapons (SALW). The relationship between firearms availability and the realities of armed violence is, however, most usefully understood in the connections between firearms and other social dimensions. Detailed information is lacking from many countries about the nature of these relationships and how they work. Better knowledge is crucial to designing effective policies and programs for violence reduction and prevention. Nevertheless, there is an expanding foundation of research shedding light on this key area. SALW control very often focuses on ‘supply’ solutions,

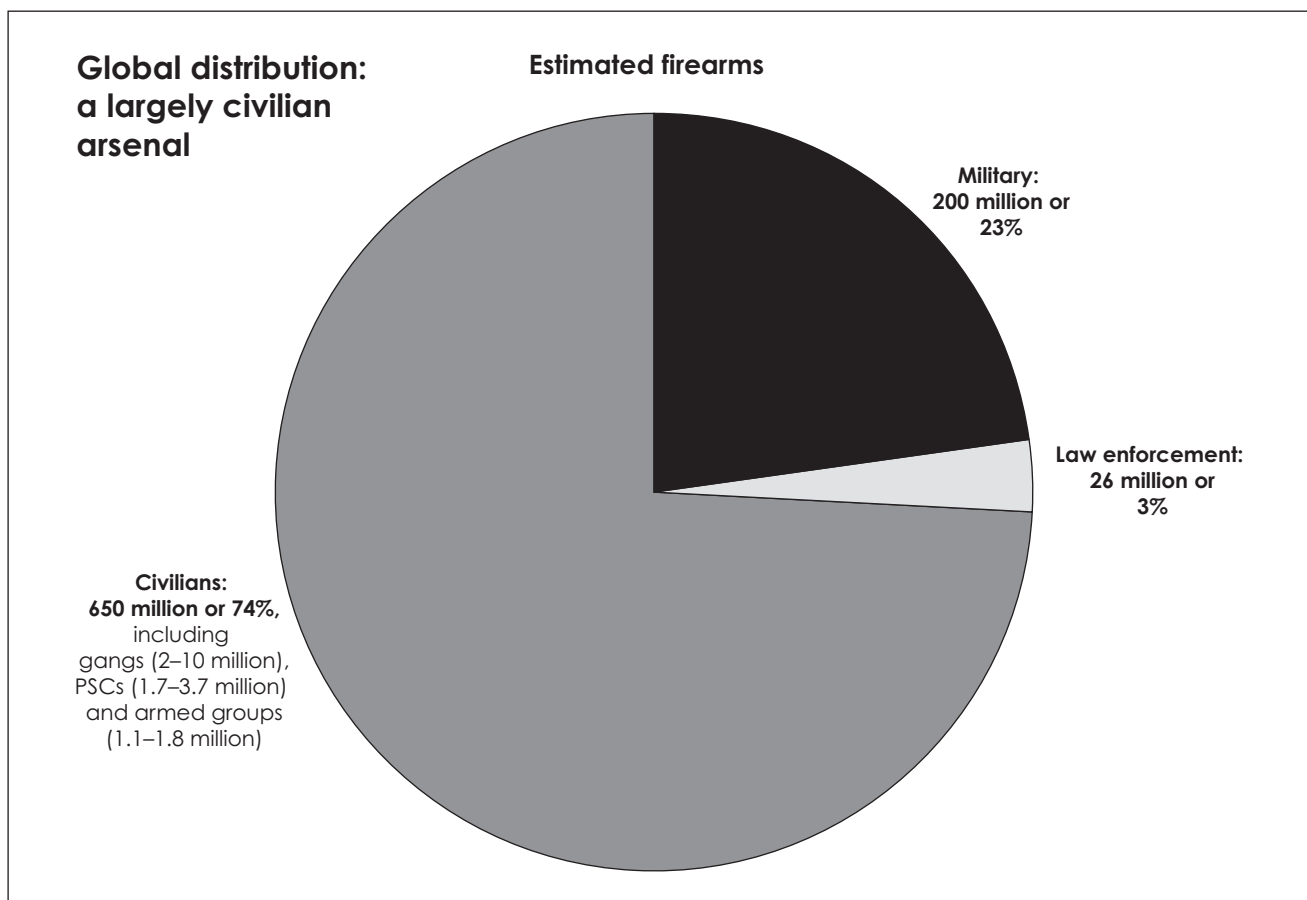
but they alone will not solve the problem of reducing or preventing armed violence. A brief exposition is offered here of some dimensions of the presence of firearms and their use that seem of particular relevance to shaping appropriate applications of smart technologies to SALW control.

Firearms: Who has them and where are they? The Small Arms Survey estimates that there are an estimated 875 million firearms around the world. Roughly two-thirds of these are in civilian hands, with a comparatively small percentage of the total in the hands of armed groups and criminal gangs. Figure 4 shows this distribution more fully. Approximately 270 million of these civilian firearms are in the United States, with around 88 firearms per 100 persons. It is important to note that states in the global south—Africa and Asia in particular—have relatively few weapons per 100 people. In countries in Central America, where levels

of violence are sometimes extremely high, levels of firearm ownership among the general population is relatively low, but armed violence is concentrated among particular groups of the population: young men in armed groups and criminal gangs, involved in drug trafficking or other illicit activities, with ready access to firearms (Small Arms Survey, 2010).⁷

Firearms in relation to armed violence. Worldwide, on average, guns account for somewhere between 42 and 60 percent of violent deaths (UNODC, 2011; GD Secretariat, 2008).⁸ While there is no clear-cut relationship between the availability of firearms and their use in armed violence, what can be shown is that firearms are important vectors of violence. However, this is usually in combination with other factors such as illicit trafficking, organized armed or criminal groups, or long-standing conflict—or other small arms 'demand' factors, such as those risk factors mentioned in the previous section.

Figure 4: Firearms: Who has them?



Source: Small Arms Survey, 2010: 103.

⁷ See especially Chapter 4 "Elusive Arsenals: Gangs and Group Firearms" (Small Arms Survey, 2010).

⁸ The 42 percent estimate is that of the UNODC in its Global Study on Homicide, 2011. The 60 percent estimate is based on the research of the Geneva Declaration Secretariat (see GD Secretariat, 2008).

While the percentage of violent deaths from firearms varies greatly from region to region, country to country, it also appears that, as violent death rates go up, the percentage of homicides committed with firearms also seems to increase. This can be seen particularly in Latin America and the Caribbean, where countries plagued by high levels of homicides also have higher proportions of homicides committed with firearms (Small Arms Survey, 2012: 9–39).⁹

Non-lethal gun-related violence. While most research has focused on homicides, it is also important to look at gun-related violence that does not result in death, but nevertheless contributes to the burden of armed violence. Although data on this dimension is much less robust than homicide data, some things can be said. It is estimated that for each person killed by firearms, at least three more survive and that worldwide at least two million people are living with firearms injuries sustained in non-conflict settings. Such injuries generate considerable direct and indirect costs, such as lost productivity. Whether firearm injury leads to severe disability or death is influenced by such factors as firearm type, ammunition velocity and caliber, and the availability and quality of medical care. The lethality of guns compared to other means of committing violence suggests that, even if violence still occurs by other means, the odds of it resulting in death are lower (Small Arms Survey, 2012b: 79–105).¹⁰

Suicide and firearms. Although, as noted earlier, the definition of armed violence that the Geneva Declaration uses does not include suicide, the firearms availability/ suicide relationship is nevertheless an important one and is of particular relevance to the question of the application of smart weapon technologies. The 2002 *World Report on Violence and Health* of the World Health Organization (WHO) showed, for example, that self-inflicted violence is a very large part of the global burden of violence. At that point the WHO estimated that more than 815,000 people/ year take their own lives. Although the choice of firearms as the means for suicide varies from country to country—and gun availability has a good deal to do with this—firearms are one of the most lethal means of suicide forms, i.e., if you attempt suicide with a gun, you're likely to succeed. Thus, from a public health perspective, evidence is strong that taking regulatory measures to reduce the availability of firearms in private households can strengthen the prevention of firearms suicides (Hemenway and Miller, 2013: 2033–35).

Firearms and violence against women.¹¹ A brief summary of this complex area does damage to the importance of the subject. However, some things of significance can be said with regard to the potential applicability of smart weapon technologies. Although on the whole, men are five times more likely to be victims of homicide, women are six times more likely to be killed by their partner or ex-partner. More women than men are killed, injured and intimidated by firearms in the context of intimate partner violence. There is compelling evidence, therefore, that a gun in the home is a risk factor for intimidation and the killing of women in their homes. On average, firearms were used in one-third of all femicides worldwide. Where firearm violence is high, the risk that intimate partner violence involves firearms is higher than elsewhere. Research suggests that violence against women is distinct from other forms of violence and that, as societies and communities develop methods to prevent and reduce conflict, large-scale criminal violence, and inter-personal violence, distinct approaches to addressing violence against women and girls are required.

Conclusion

This paper has sought to draw attention to some important dimensions of the realities of armed violence in our world. As noted, this is a very complex subject area with detailed information for many parts of the world still missing. Only snapshots of what is understood have been able to be provided here, but perhaps these will be useful in thinking through the possible applications of smart weapon technologies.

Although the research challenge for better knowledge continues, there is considerable evidence of innovative policies and programs to prevent and reduce armed violence. At the beginning of this paper, the general orientation provided by the 'armed violence lens' pointed to particular dimensions of the picture of possible relevance to smart weapon technology thinking. As a conclusion to this paper, a further orientation, drawing on work of the OECD and others, is offered here as an additional tool in identifying how smart weapon technologies might be seen to fit in the development of policies and programs aimed at interventions towards armed violence reduction and prevention.

⁹ See Small Arms Survey, 2012a, Chapter 1.

¹⁰ See Chapter 3.

¹¹ This section draws on evidence compiled by the Small Arms Survey. For more detail see Small Arms Survey, 2013. See also GD Secretariat, 2011, Chapter 4.

Violence is an ill that can be cured. The good news is that there are many innovative and practical programs that have been tried. The OECD has undertaken a range of studies to examine different kinds of armed violence reduction and prevention programs. In its 2011 inventory, published jointly with the Geneva Declaration and the UN Development Programme, the study distinguishes among three general types of programs:

- *Direct programs* that focus on such things as measures to reduce access to firearms (e.g. legislative reforms; weapons collection programs; improving stockpile management; public education and awareness raising); measures targeting the perpetrators and victims of armed violence (e.g. addressing gang violence; disarmament demobilization and reintegration (DDR) programs; victim support; addressing gender-based violence); and measures targeting the institutional environment that enables armed violence (e.g. improving law enforcement and criminal justice; enhancing access to justice programs, including support for the victims of violence; community safety and security programs; conflict prevention and peace-building programs; cross-border programs for law enforcement cooperation and community dialogue).
- *Indirect programs* that focus on addressing risk factors that create an environment in which armed violence is more likely (e.g. measures to reduce access to and harmful use of alcohol; youth programming; improved urban and local governance; environmental design features like improved public lighting, development of recreational spaces).
- *Broader development programming* that, while not having prevention and reduction of violence as a primary object, can nevertheless produce such benefits (e.g. large-scale urban renewal schemes; public transport; environmental resource management; population health monitoring) (OECD, 2011b).¹²

Addressing the availability of SALW, including the many factors which define that availability, remains a critical element in the design and implementation of policies and programs seeking to address how armed violence affects people. Availability approaches, like the introduction of smart technologies, are most effectively understood as a part of a much wider understanding of what needs to be done and what works.

¹² See also Bellis et al., 2010; Eavis, 2011.

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A case of SALW-control and diversion in the real world

Introduction

Organized crime syndicates and other illegal armed non-state actors account for a significant share of firearms-related homicides committed around the globe. And yet, they hold a mere two percent of the global small arms and light weapons (SALW) stockpile (Small Arms Survey, 2010). SALW kept legally by other civilians are occasionally put to problematic use, but more rarely. Illegal non-state SALW ownership would appear to represent a manageable problem for the global community to focus on. Reducing the number of illegal firearms even further is an important objective. Encouraging all states to extend control over SALW and ammunition stockpiles on their territories, adopt legislation in line with the UN Firearms Protocol, and implement the UN Programme of Action to Prevent, Combat and Eradicate Illicit Trafficking of SALW In All Its Aspects (UN PoA) and the International Tracing Instrument (ITI) are useful steps in that direction. The two percent of global SALW under problematic ownership is not evenly distributed over the globe. Illegal non-state groups hold a far larger share of SALW in certain regions, countries and cities, especially where states lack capacities for adequate record-keeping, marking, forensics and where transparency is poor. To some extent, that situation is being redressed with technical assistance and resources from donors, such as the United States—by far the largest donor to support SALW control worldwide—the European Union, and some of its Member States. Several such donor countries are also major SALW manufacturers and exporters. It is thus in their interest to prevent the arms they export ending up outside state control. The remainder of this chapter examines preventive measures to stop non-state actors from procuring SALW and seeks to assess the effectiveness of these measures, based on detailed empirical evidence from Colombia.

Procurement through leakage and diversion

Illegal non-state actors rarely fabricate SALW and ammunition. Most of the SALW they possess were originally owned by military or law enforcement agencies, or by law-abiding citizens in countries that allow SALW for recreational and defensive use. Arms in state armories where legally obtained SALW are stored are accessible by force, by theft, or by bribery. SALW that leak from such armories may be used directly by a non-state armed group, but also are an important source for local and regional black markets that in turn supply those who are ineligible to buy SALW on the legal, controlled market.



Larger and better-organized non-state groups are also believed to have staged large-scale trans-border and even trans-continental smuggling operations to obtain their SALW. Some smuggled arms are sourced by diverting arms transfers that began their journey 'above the radar'—in other words legally—in a country of export or transit where proper export control systems are in place. 'Proper export controls' in this context means that state authorities in a country have issued a license for export or transit, upon receiving an end-user certificate signed on behalf of the client or end-user in the country of destination, either the importing state itself, or a licensed dealer.

Export control authorities are advised by best-practice guides to control the veracity of end-user certificates and conduct background checks on buyers and intermediaries.¹ They also request end-users to report non-delivery, as well as theft of the transferred goods after delivery, and to refrain from re-transferring the imported arms to third parties—in the same country or beyond its borders—without obtaining prior consent from the original exporter. Such mitigating measures may increase the veracity of export licensing endeavors, but are not guaranteed to stop SALW from being diverted, nor ensure cases of diversion go reported. End-users that exporters intend to supply may not even be aware that doctored end-user certificates were drawn up in their name.

Diversion and leakage tend to go unreported. Their global contribution to illegal non-state actors' procurement of SALW cannot be assessed with any degree of accuracy. This epistemic constellation rules out a comprehensive answer to the question how the estimated two percent of global SALW stocks came to be owned by illegal armed non-state groups. Different answers would be given for different non-state groups,

¹ The User's Guide to European Union Council Common Position 2008/944/CFSP provides guidance for EU countries' authorities to assess the risk of diversion and take measures to avoid that risk.

in different regions, countries, and towns on different continents, and in reference to different times. For example, whereas illegal non-state groups operating in Sub-Saharan Africa were formerly equipped largely with SALW received directly or indirectly from former Soviet armories, the arms they possess today are more likely to have been manufactured fairly recently in China. Chinese-made SALW are not believed to be supplied to non-state groups directly from China, but their presence does not come as an entire surprise, in light of the weak stockpile facility control which characterizes most Sub-Saharan states.

In the following section, one case study that attempts to identify quantitatively and qualitatively the sources of non-state armed group weapons is presented. The weapons examined were collected from an illegal non-state group in Colombia.

A Colombian case study

Illegal non-state groups of different stripes have been committing lethal armed violence in Colombia over the past six decades, if not longer. Different guerrilla groups engaged state armed forces as well as 'anti-guerrilla' militia that were formed from the mid-1970s onwards. Although the Colombian state declared these militias illegal in the late 1980s, they continued their expansion. Before the turn of the century, the militias reorganized under an umbrella organization, known as Autodefensas Unidas de Colombia (AUC).

Over three million mostly rural Colombians fled the violence committed by militiamen and guerrilla forces alike. The extent of the violence was exacerbated by criminal violence committed by cocaine traffickers' private armies, other organized crime syndicates, as well as common crime. By the turn of the century, Colombia had a record for the world's highest number of homicides per 100,000 inhabitants.²

By December 2002, the Colombian government, then under the first Uribe administration, began talks with AUC commanders who agreed to begin demobilizing their troops by the end of 2003. Colombian authorities and inspection teams from the Organization of American States (OAS) decommissioned thousands of arms from former AUC militiamen.

The table below summarizes data from the Colombian Instituto de Medicina Legal and Ciencias Forenses. It demonstrates the relevance AUC troops and the decommissioning of their arsenal had on the peak and decline in Colombian homicide statistics.

Table 1: Firearm deaths and total homicides in Colombia 2002–2012

Year	Total homicides	Firearm deaths
2002	28,534	24,340
2003	22,199	18,433
2004	18,888	14,545
2005	17,331	12,040
2006	16,274	11,655
2007	16,269	11,604
2008	15,251	10,820
2009	17,717	13,825
2010	17,459	13,549
2011	16,554	12,819
2012	15,727	12,208

Source: Data obtained from the Colombian Instituto Nacional de Medicina Legal.

The sharp drop in homicides from 2003 onwards coincides with the start of AUC talks and demobilization of AUC blocks that surrendered their arms (2003–2006). The increase in homicides in 2009 tends to be attributed to a coincidental upsurge of '*bandas criminales emergentes*' (emergent criminal groups—BACRIM) that was brought under control soon after. Since 2010, homicide numbers have continued to decrease. In 2012, the total number was 15,727, 12,208 of which (around 77%) were attributed to a '*proyector de arma de fuego*' (projectile launched by a firearm), according to Tello Pedraza (2013).

The significant contribution of SALW held by illegal non-state groups in Colombia is not the sole reason why case study findings from that country merit a closer look. The country is thought to offer an excellent opportunity to examine the impact and availability of SALW. The Colombian state monopoly on arms possession, fabrication, import and commercialization is enshrined in Article §223 of the Constitution of 1991, and further regulated by Decreto Ley 2535 of 1993, Decreto 1809 of 1994 and a complementary Decreto 356 enacted that same year. Colombia enforces this monopoly on arms imports and sales through the state-owned arms producer (*industria militar*—

² In 2004, Colombia's country average of 67 homicides per 100,000 inhabitants was still the world's highest registered homicide rate in that year. Colombia lost that top homicide position from 2005 onwards.

INDUMIL) that is under the control of the Ministry of Defense. INDUMIL is the sole authorized manufacturer and importer of arms.

Colombia began importing German-designed G3 assault rifles for its Armed Forces in 1975. A German license was later issued that allowed for assembling and maintenance of these rifles in Colombia. A similar economic strategy was followed for the Galil assault rifles that Colombian Armed Forces issued from 1993 onwards. The first of these rifles were imported from Israel. INDUMIL then obtained a license to produce the Galil in Colombia, and is now reported to produce 30,000 Galil per year, some of which are actually exported to Israel.

Since the 1970s, records have also been kept of arms seized in Colombia from civilians whose permit to possess those arms had expired. The absence of a valid permit made these arms 'illegal' in an administrative sense, even if these had been imported and commercialized by INDUMIL. The records also contain reference to arms that were never imported through INDUMIL. This presents a rather interesting source to determine what types of arms have really been available in Colombia over the years, whether through legal imports or black market sales.

The records reveal that authorities seized over half a million firearms from 2000 to 2009. Roughly 51,000 of these arms were from (former) members of illegal non-state groups: those who deserted from different guerrilla forces, were captured, or slain, and troops that collectively demobilized from AUC militia. The latter group consisted of over 31,000 former AUC militiamen who handed in over 18,000 pieces of armament—probably the highest amount of weapons per troop ratio recorded in demobilizations worldwide so far.³

Colombian authorities and OAS teams received and inspected each of the 18,000 pieces of armament. Records of over half of these pieces of armament were additionally verified and analyzed by a team from the Colombian think tank Ideas para la Paz and with the help of independent researchers from Belgium, Germany, and Norway. Llorente and Vranckx (2012), Vranckx (2009a), and Vranckx (2010) record findings of that analysis. A summary of the findings is presented here.

³ These 18,000 pieces of armament may not be all SALW AUC militia held at one time. While the numbers may not add up entirely, they did hand in specimens of the full range of armament that AUC blocks were reported (e.g. in Colombian intelligence reports) to dispose of prior to demobilization.

- 3.5 percent of the arsenal surrendered by former AUC militiamen consisted of SALW, mostly assault rifles, which INDUMIL imported or produced in Colombia for the regular state armed forces. The rifles that were found in the AUC stockpile can be assumed to have leaked from state ownership. The number is low, and somewhat belies the assumption entertained by many in Colombia and elsewhere that regular armed forces had backed up the AUC until long after these militias were declared illegal (in 1989). Armed forces may not have actively supported the illegal militia in donating arms from their own armories, but it is clear on record that they engaged AUC troops much less frequently than guerrilla groups, offering the militias little opportunity to seize state SALW in combat.⁴
- Another 25 percent of the AUC arsenal consisted of SALW manufactured in the United States and other countries from which INDUMIL was known to have imported arms in the past—though not necessarily the types of SALW found in the AUC stockpile. A portion of that 25 percent may have proceeded from INDUMIL imports; another portion is more likely to have been smuggled in, breaching the state monopoly enforced through INDUMIL.
- The remaining fraction of the stockpile, over 70 percent, is the more intriguing one. It contains SALW fabricated in China (about 15 percent) and North Korea (10 percent). The presence of SALW from these sources is hard to explain, as neither such exports were recorded to Colombia nor to the wider region. Another quarter of this fraction of the AUC stockpile was manufactured in Soviet Russia during the Cold War. These are assault rifles believed to have been sourced from a surplus stock in Nicaragua, which a broker in Guatemala set up to sell to the Panamanian police force at the turn of the century. The SALW were shipped on the *Otterloo*, a tramp steamer, and diverted to Colombia, where they were offloaded at a private banana company port terminal near Turbo. The diversion is well documented as the 'Otterloo case' (cf. Vranckx, 2009b).

The rest, 37 percent, was traced to manufacturers from 16 European countries. SALW manufacturers and exporters based in the European Union supplying the

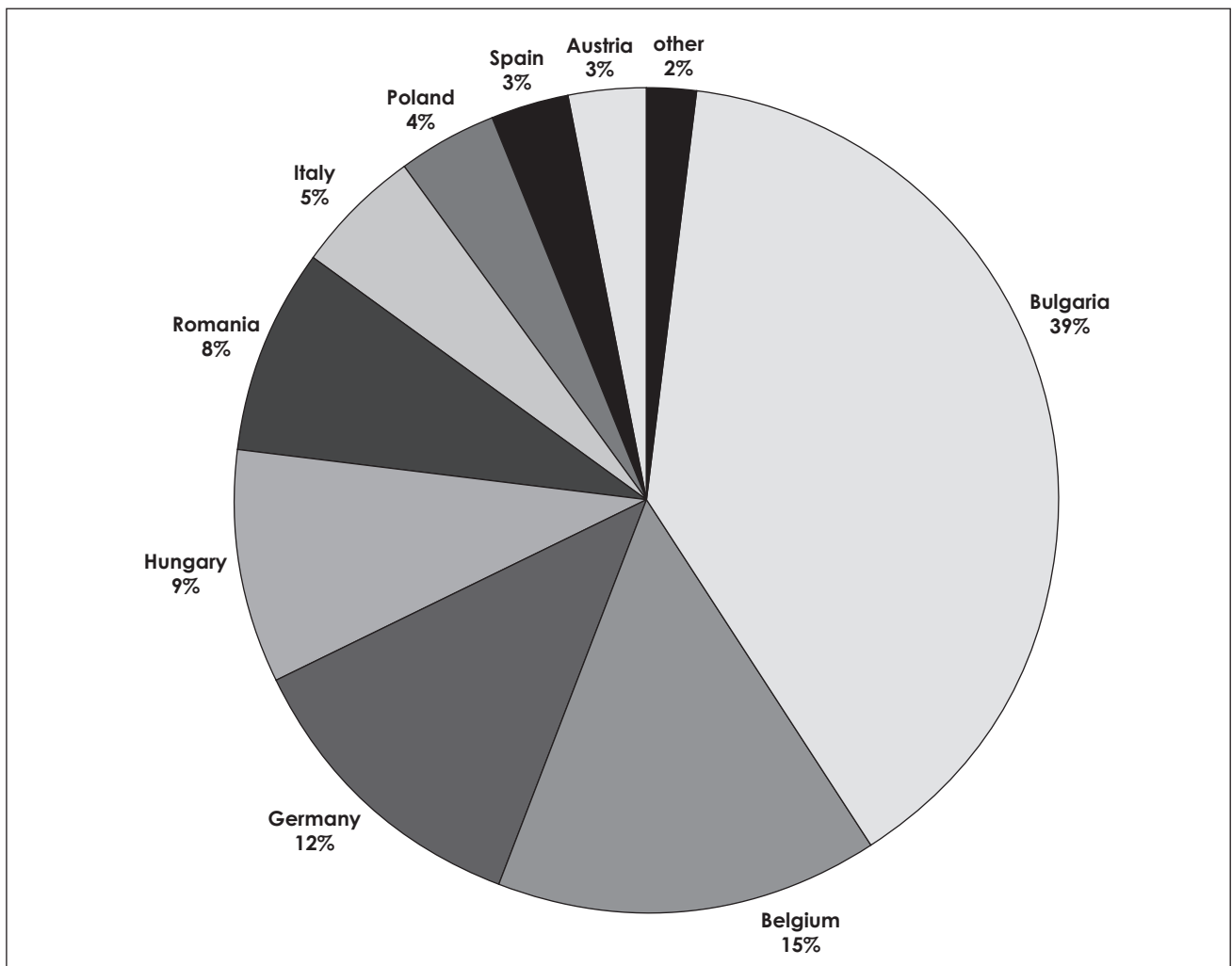
⁴ FARC and other guerrilla forces are still to lay down their arms. The arsenals they will eventually surrender can be assumed to contain relatively more SALW imported, produced, and in any case issued to State Armed Forces.

AUC over the board would have been violating the Joint Action on Small Arms that the Council of the European Union put in place in 1998 to prevent (official) transfer of SALW to non-state armed groups. But INDUMIL recorded very few imports from Europe since the EU Council put the Joint Action, and other instruments to control the export of conventional arms, in place. Reports on compliance with these EU instruments confirm that imports to Colombia have been extremely limited. In 2002, arms exports from EU countries even amounted to zero, a historical low that some ascribed to stringent application of the EU arms export regulations vis-à-vis the Colombian armed conflict and rampant human rights violations.⁵

And yet, numerous items in the AUC stockpile were sourced from European countries identified in Figure 2.

The presence of German SALW in the stockpile would appear to be easiest to explain. Most of these were G3 rifles that were issued to the Colombian Armed Forces before 1993. Not all of these rifles would have been properly disposed of when Colombian Armed Forces began to be issued Galil rifles instead. G3 continue to be on offer on black markets in the wider region, and the specimens in the AUC stockpile may have leaked from Colombian arsenals prior to their official decommissioning in the early 1990s.

Figure 2: European sources of AUC arms



Source: Reproduced from Vranckx, 2009a.

⁵ In 2004, the export of Czech guns to Colombia began, but until 2006 such and other European-sourced sales to Colombia were worth less than three million euro a year.

The large Bulgarian fraction on the graph relates largely to a type of Kalashnikov caliber 5.56 produced by Arsenalad Kasanlak that became subject of another well-documented case of diversion (Vranckx, 2009b). Bulgarian authorities issued official permits for these assault rifles to be exported to Colombia in 1999, believing the end-user to be INDUMIL. In actuality, the arms were diverted upon arrival in Colombia, and were delivered to AUC contacts in the port of Buenaventura. Closer inspection of the end-user certificate by Bulgarian authorities would have set off alarms. The document was signed by an army captain, an officer too low in rank to do so, and concerned more than 7,500 assault rifles of a type not in use by the Colombian Armed Forces. INDUMIL was neither involved, nor aware of the deal. The (retired) captain who had signed the end-user certificate was later prosecuted in Colombia. The negligence of the Bulgarian authorities in checking the veracity of the documents before issuing the relevant export permits in 1999 is not known to have led to criminal charges in Bulgaria. As not all Bulgarian-made arms found in the AUC sample can be traced to these 1999 exports, it is assumed similar deals may have been arranged that have not yet come to light and Bulgarian-made arms could also have been diverted to Colombia through other routes.

Specimens in the stockpile shown to have markings that link them to (other) European countries may have been diverted with or without the complicity of end-users in third countries. Several such third countries were identified by inspecting seized arms and by photos taken of seized arms since destroyed. This exercise has also led to the identification of various importers based in the United States, thereby adding weight to the hypothesis that the US civilian market is a 'loophole' through which European-made arms are diverted to Latin America. Markings on other arms, especially assault rifles, brought to light some of their former users' identification marks. These include the armed forces of several of Colombia's neighbors, including Ecuador, Panama, Peru and Venezuela. The arms are assumed to have leaked from armories in those countries before they found their way to the Colombian black market.

On closer inspection, many of the assault rifles marked for the armed forces of Colombia's neighbors derived from licensed production arrangements whereby a licensor in Europe allowed local assembly of the SALW. Some of the parts to be assembled continue to be shipped in from the country where the licensor is based. Authorities in the licensor's country can exer-

cise some control over overseas production, through licensing export of the parts for assembly. An example of this type of arrangement was concluded in the mid-1970s between the manufacturer Compania Anónima Venezolano de Industrias Militares (CAVIM) and the Belgian Fabrique National (FN). SALW components were regularly exported to honor that contract. In 2002, Belgian exports categorized as 'parts' and worth nearly euro 20 million were authorized for export to Venezuela, even though by that time, Belgian authorities had reasons to be cautious: Parliamentary records reveal that in February 2001, the then Belgian Minister of Foreign Affairs, Louis Michel, had already been asked whether Belgian foreign relations took into account reports that "in the last four years, semi-automatic small arms and ammunition had been supplied to the FARC⁶ guerrilla from pipelines in Venezuela, including arms that proceed from Belgian licensed production at CAVIM-facilities" (Belgische Kamer van Volksvertegenwoordigers, 2001).⁷ An inspection of the AUC arsenal, a mere five years later, indicated that the FARC were not the only illegal non-state armed group to absorb SALW that leaked from Venezuela.

Conclusion

The case described here may well be unique. It may only have limited use to understanding how illegal non-state armed groups elsewhere are procuring SALW. Proceeds from the illegal cocaine trade, pilfered petrol and lootable commodities, such as emeralds, allowed the AUC to procure SALW on local, regional, and even international markets.

More interestingly, the case is indicative of the Colombian state's determination to stop its monopoly of violence from being undermined. Having suffered civil war-like situations for decades, it enacted legislation to impose a monopoly on the production, import, and distribution of SALW on its territory. The monopoly was enforced by those having the best interest to do so—the security services—being in the firing line of all types of illegal non-state armed groups. Seizures in combat, rather than pilfering from armories, are believed to have been the source of a limited fraction of SALW in the AUC stockpile, which once belonged to regular armed forces. In this respect, the findings of the Colombian case study would suggest that countries under siege can exert control over the SALW on

⁶ Fuerzas Armadas Revolucionarias de Colombia – Ejército del Pueblo.

⁷ Author's translation. The question was formulated by then senator Lode Van Oost, of the Flemish ecologist party, on 23 February 2001. Minister Michel responded on 2 April 2001.

their territory, if their authorities chose to do so. Such determination may be more effective than international SALW control cooperation schemes that Colombia was not a beneficiary of.

Finally, the case study indicates that efforts to contain uncontrolled SALW proliferation from the supply side have not been entirely effective. This also applies to Europe, the region generally believed to have the world's most 'ethical' arms control regime. The European Union further has available instruments specifically designed to keep SALW away from those engaged in an armed conflict and allocates budget lines to helping SALW-affected regions combat illicit trade. The case study gives no reason to doubt the soundness of these endeavors, but it does suggest that existing instruments could be applied with greater caution. In the case described, and apart from the 'Bulgarian case' where doctored end-user certificates were in play, export authorities from European countries refrained from supplying end-users in Colombia, including state agencies. The grounds for denying such export licenses most commonly referred to the observation that Colombia was embroiled in an armed conflict and that human rights were under threat of 'internal repression'.⁸ This 'virtual embargo' also applied to exports to the regular armed forces tasked with protecting the Colombian population, and its human rights, against a plethora of heavily armed, illegal non-state groups. Authorities in Europe ignored evidence that these groups had access to SALW from nearby states that European manufacturers were supplying. Export licensing authorities seemed appeased by the supposed fact that the end-user was located in a country across a (large fictional) border from a country embroiled in armed conflict, and chose to ignore weak governance alerts from that country, including on compromised stockpile security.

European SALW manufacturers and exporters, as well as authorities that control their exports, have no interest in maintaining systems that lack effectiveness. They may want to draw lessons from the Colombian case to make their systems more effective and

avoid repetition of similar problems elsewhere. Thus, further SALW export licensing decisions ought to take a more regional perspective and if possible one that is informed on governance constellations in destination countries.

Cost-effective devices that emit signals revealing their geographical position are available these days. Such devices can easily be tagged to arms shipments, as suggested by several contributors at the SmartCon conference. Even though such technologies would, at least in theory, make it easier to keep track of the shipments of new arms, they would not solve the problematic re-export of older arms stockpiles, the mechanisms that very probably sourced most of the arms which we found to be in problematic hands in the 'Colombian case'.

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⁸ These grounds for denying export licences and the conclusion that Colombia was under a 'virtual embargo' for exports from EU Member States, can be teased out from the Consolidated Reports that the EU Council has published annually since 1999, on EU Member States' compliance with its arms export control regime (the Code of Conduct on Arms Exports, as adopted on 5 June 1998, 8675/2/98 REV 2, DGE – PESC IV, and the Common Position 2008/944/CFSP of 8 December 2008 defining common rules governing control of exports of military technology and equipment, as published in the *Official Journal of the European Union* on 13 December 2008 as L 335/99.

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2

Technical and economic aspects of smart weapon technology



Michael Ashkenazi

Smart guns and smart people: The technology and its future

For the past couple of centuries, firearms have been the most powerful weapons of choice on and off the battlefield. Simple firearms have diverged, creating a family of weapons now known as SALW (small arms and light weapons). Relatively small and portable by individuals or small groups, the manufacture and nature of SALW has not been too different conceptually from those of the nineteenth century.

With the incorporation of digital technology into all areas of life, SALW have started changing too. SALW have acquired electronics. Targeting, ammunition counts, and sensors to improve accuracy and lethality are becoming commonplace. Yet safety and security systems have remained the same, unchanged since the early twentieth century. While cars and houses have electronic locks, weapons have none. Computers can be tracked after theft, arms cannot. Thus SALW have not taken full advantage of developments in electronics.

The Conference where this paper was initially presented was a first attempt to understand and assess the potential impacts of so-called smart guns, an offhand colloquialism labeling a family of products which ensure that only authorized users can use, and possess, properly equipped weapons. This paper explores the meaning and implications of the smart gun concept, and attempts to look at potential future developments.

Introduction and background

To start, it is useful to ask “What makes a weapon ‘smart’?” Essentially, we are speaking about the different application of the same principles that make up the computers, the mobile phones, and hundreds of home appliances we are all familiar with. Basically, this means a sensor, which senses some external input, a central processing unit (CPU) that processes that input, and provides signals to some output device, all of this run by a software program. In our particular case, the sensor is set to accept a set of inputs—from a radio-frequency identification (RFID) chip or a scanner—and send it to the CPU, which analyzes the signal, and, if valid, sends an ‘unlock’ code to the output device, which unlocks the weapon.

The problems with guns

As the two opening papers in this volume have demonstrated, the ‘problem’ of guns consists of a family of related issues, not all of which afflict the same populations at the same time. Some such



issues are universal. In any given year, thousands of people harm themselves, deliberately or otherwise, with their own weapons. During the same time period, many firearms are discharged by children who lack an understanding of the very real consequences of discharging a firearm. These are related, but the problems and solutions to these are likely to be quite different: Someone taking his own life is likely to know how to disarm any protective device installed on his own firearm, a child might not. Other problems vary extensively. Criminal theft and use of stolen guns is a universal problem. Use of stolen guns to advance political causes is limited to some area of the world at some times. Use of police guns, rented for the purpose, by criminals, is common in only some places in the world. Guns lost—at work, on trips, on the battlefield—a common phenomenon. Each of these requires a different set of responses.

Attempts to make guns safer by incorporating electronic locks are a fairly recent phenomenon, with the first conceptual models emerging in the 1980s (Teret, 2013). Electronic tagging of various sorts, as well as computerized stocktaking for military stockpiles are a common feature in the armories of the developed world.

The smart gun label coined by one manufacturer, and used euphemistically throughout much of the discussion, is perhaps the most challenging and controversial version of this family of technologies. Often going by the term ‘user-authorized weapon’, smart guns that have been developed consist largely of devices—a ring or watch with an RFID chip, a handprint identification module, or even numerical coding—necessary to release the gun for use. This has many advantages: Cases of police officers having their weapons snatched and used against them are uncommon, but do occur, and the theft of civilian or state arms from storage is one of the major sources of illegally used weapons (Jackson, 2010). Ensuring that only

the user can utilize the weapon has obvious advantages. It has practical *disadvantages* as well. For use by security forces (police, military) such a system must have qualities such as transferability (more than one person may use the weapon), 100 percent reliability (whose computer has never failed?), and be difficult to modify.

The current market for smart gun technology is minuscule. This is likely due to a number of factors. Lack of customer familiarity, combined with market misidentification by manufacturers is one. Strong practical opposition by armed forces (given that any information technology (IT)-based item can be interfered with, if sufficient resources are brought into play) another. Automatic, ideologically motivated resistance, largely in the US American market by gun associations, which limits manufacturers' ability to explore and exploit the technology, yet a third. Nevertheless, the technology represents an innovation in the manufacturing, marketing, and safety features of firearms that needs to be explored, and hopefully used, for a generally agreed-upon goal of limiting the threat of small arms. To understand why this is likely to be the case, we need to explore the technology in its general form, rather than on its specifics.

The technology analyzed

Roughly put, smart technology is little more than the combination of firearms with well-proven computer technologies that are the basis for post-industrial society. Put in this way, smart gun technology (or, following the term used here, smart weapon technology or SWT) consists of a small computer embedded in a weapon which, following a program, executes certain functions: input, output, and processing.

Input

Inputting data into any CPU is limited by memory, size of CPU, and most importantly the imagination of the designer. Current smart gun designers have limited themselves (to my mind, artificially) to three input devices: magnets, radio (RFID) signals, and palm-print identification sensors. These are intended to ensure that only the authorized user is identified and able to activate the weapon. In theory, however, there is no logical (nor technical) barrier to including other forms of input, which would also have a positive impact on SALW control. Consider three examples, which could be included, and *could* become important safety features: location, sound, and vision.

Location input, supplied either by future inertial navigation chips (see e.g. Miller, 2006), or current global positioning system (GPS) chips can map the location of an object to within meters. Certainly it would be fairly simple to map distance to a gun safe, as well as unauthorized removal (something some manufacturers have provision for). Location would also be important for tracing missing weapons, as well as for logging (see below).

Sound input, while not a reliable safety feature in general, *can* distinguish fairly easily between adult and children's voices, for example. Moreover, voice activation commands, while they have drawbacks as well as advantages from a weapon user's perspective, are essentially non-problematic from the *technical* perspective.

Visual input. Incorporated into a weapon, mini cameras such as those common in cell phones and computers could offer views of both shooter and target. Fore- and rear-view cameras provide images and potentially film results that can be processed by the CPU, stored in a log, or used to trigger output functions.

Output

In output as in input, a number of output devices have been miniaturized by manufacturers for other purposes. These too are potentially incorporable into weapon technology. Again, some examples will suffice:

Sound, as has been noted, is available as an input format, but even more as an output: both warning sounds and spoken words can be output at essentially little outlay. Sound is crucial, because there are a great many outputs possible, turning this output format into quite a useful tool. Spoken and alarm sounds could provide an additional dimension to weapon use as well as weapon safety and security.

Electronic signals can output a variety of relevant data: location, use, and wear come to mind. Knowing the location of legal firearms is a major form of ensuring they are used for legitimate purposes, but a smart gun with the right kind of output could also provide data, in text form, on other aspects of the weapon's state. These in turn, in addition to helping the shooter (e.g. "I am out of ammunition") would also have a role in police forensics (e.g. "At time X, location Y, this weapon fired Z rounds").

And processing

The power of memory chips and CPUs is growing exponentially. Computing power is constantly on the increase. In the 1980s, 32 kilobyte memory computers with an 8 byte CPU required a two liter box by volume. In 2013, a 16 gigabyte memory with a quad-core 8 megabyte CPU is a bagatelle. The connection between input and output devices is not only faster, but the computations more agile, and 'smarter', able to handle a number of independent or interrelated tasks without problem.

This implies something crucial: The ability to combine and use a variety of input and output signals into a coherent artificially intelligent decision-making set, which in turn produces output, possibly linking to more input. This means that processing, for a smart weapon could have a great many safety- and security-related functions incorporated, which means that small arms of the future would likely be more secure and safe from a purely technical point of view.

To summarize this section, the introduction of IT into arms manufacture offers a multitude of potential uses for safety and security. Inasmuch as more and more electronics are being introduced to make weapons more effective (e.g. sights [TechBlog, 2013] ammunition counters [Johnson, 2013]) the addition of technologies to ensure safe and secure usage of weapons has to do more with human issues—will and legislation—than with the purely technical.

And the many faces of smart weapons

IT in weapons (that is, improvements in accuracy, lethality, and function; see TechBlog, 2013; Rowe, 2010) is a feature of many new military weapons today, and has already leaked into the civilian sphere. Since such technologies are already a desirable standard, it seems that a requirement for installing smart weapon technology (SWT) (i.e. technology to control and limit use of the weapon) in all new arms, should be made a requirement as a means to increase safety and security. While this would *not* solve the issue of existing weapons, which cause much of the current carnage, it would help in developing a system to ensure lower risks of misuse and victimization in the future.

Unfortunately, smart guns may also mean more deadly guns. The incorporation of electronics into guns, which is at the heart of the SWT concept, has two sides to it. On the one hand, it could make weapons safer in many dimensions, including unin-

tended discharge during transit, during storage, and in many different configurations (private, state, and public). On the other hand, the same type of technologies can also be exploited to make small arms more deadly, more effective, and possibly less amenable to control. We need, therefore, to ask what types of technological innovation would enhance safety and security, given the likelihood that IT will be incorporated into weapons as a standard in the future.

User-authorized weapons: Mjólnir returns

The use of legitimate user activation, as exemplified by current SWT, is the beginning of the road. A number of systems for ensuring locking and unlocking weapons by electronic means are already on the market (Bodhani, 2013; Committee on User-Authorized Handguns, 2005; Garret, 2001). Given the nature of IT development, this is by no means the only thing that can be done.

The United States is a prime locus of both gun ownership and gun fatalities. One aspect of the argument is about the duty of the government (to safeguard the population from harm) versus the rights of individuals to protect themselves. Disregarding the pervasive anti-government ideology that supposedly drives much gun rhetoric in the United States for the moment, the use of smart weapons offers a number of solutions to a complex of problems. For instance, locking a gun to a location such as a home or office ensures the right of self-defense (of the premises) on the one hand, while lowering the likelihood a weapon would be stolen and used at a distance from the home-based RFID chip.

GPS chips, which are getting cheaper all the time, could ensure the same thing: Locating a gun in space, while it may offend die-hard US Libertarians, is an excellent way of ensuring that stolen weapons can be traced. Notably, if GPS and RFID chips (or any future locking technology) can output to a use/ location log, some of the problems of stolen weapons can be eased. A gun that can easily be traced represents a risk, rather than a benefit, to a criminal, and a lesser threat to a legitimate owner/ user.

Finally, the inclusion of gun cameras is another input device worth considering. Target cameras, which show whom the gun was fired at, and user cameras that note who is using the weapon are feasible. Like any other technology, this can be overridden and disabled, but forensically speaking, disabling this function can be indicative in itself. The same is true

of audio: Ongoing audio recording provides a use log, just as it may be able to identify certain classes of forbidden users, e.g. children, and lock a weapon before the child can discharge the weapon at a playmate or sibling.

System-attuned stockpiles: The Hall of Susano-wo

Throughout the Euro-Asian continent can be found a common myth about the young thief who tries to steal a giant/ demon/ god's sacred harp/ goose. As soon as the stolen object passes through the storehouse doors, it starts calling out "I'm being stolen!" Smart guns offer the opportunity to include such capabilities in all weapons: Remove them from the stockpile without authorization, and they will loudly complain (electronically, if not vocally). Denying exit control of listed weapons from a stockpile is essentially a passive activity: the weapon is recorded (or not) by an agent who might as well be a machine.

System-attuned stockpiles are more complex organisms than smart guns. Nevertheless, they represent substantial developments in terms of ensuring the proper placement of SALW in stockpiles. Obviously, the weapon's cry for help does not need to be sonic: electronic alarms could function just as well. One of the major sources of illegal weapons are state stockpiles (Jackson, 2010). The introduction of an additional security layer helps secure these stockpiles from additional leakage.

A third possibility must also be considered. One repeated problem in the developed world, which has struck countries including Germany, the United Kingdom, and the United States, is mass shootings for political, social, or psychological reasons by lone gunmen. The presence of a local broadcast system to disable a smart gun would help lower the likelihood of such incidents occurring. A smart weapon brought into range would be disabled. Note 'lower the likelihood', not 'eliminate': smart weapon technology is *not* a panacea.

Smart trades

Transfer diversions are a major source of illegal SALW. Control of transfers is effectuated by visually examining shipment samples (or, more often, the sealed crates *supposedly* containing the shipment) against paper documents. A second barrier against post-shipment diversion is the (in)famous 'end-user certificate' (Stohl, 2004). Neither end-user certificates nor sealed crates have proved particularly effective (Bromley and Griffiths, 2010).

Smart weapons, and associated smart packaging, allow for far better and finer control over routing of weapons from producer through exporter, broker, importer, and final user. While electronic systems can be outwitted by determined criminals, electronic tagging and logistical systems provide additional layers of security for the vexing issue of transfer and diversion.

In addition, provision can be made for 'end-location unlock': Only upon arrival at the formally registered end-point, can the shipment be unlocked, either by the vendor, or by coding through a trustee. This may be a critically important function in weapon transfers between states, or between producer and end-user. It is certainly an important device to track confiscated weapons shipped to storage or destruction, as, notably in many post-conflict countries, the transfer and local storage of confiscated weapons represents a serious loophole in ensuring that confiscated/seized weapons will not be reused, with the potential of igniting further conflict.

Reporting weapon use

Another possible implementation of SWT is one not yet widely discussed: forensic reporting. Given the fear user-keyed weapons instill, perhaps it is time to look at SWT from the criminal side. "Call-home" anti-theft software is already available (see e.g. Whitehead et al., 2010) and does not seem to have raised the hackles of the US American pro-gun lobby. It is a possible (though not trivial) task to incorporate such software and hardware into a weapon. There are a number of ways this can work. A purely automatic system would (a) record the weapon's location; (b) record weapon use; (c) transmit those on a regular basis (once a day? During a substantive change?) to a secure location. So long as the weapon is in the possession of a legitimate owner, this data could be erased on a regular schedule. If the weapon was missing, the data would be handed to the authorities who could pursue the missing weapon.

Crucially, such a system would override the objection to 'Big Government interference/ surveillance'. With sufficient ingenuity, the system would only need to thwart someone trying to disable it for the time it would take to track the signal down (perhaps a few hours).

Moreover, a sufficiently sophisticated logging system should not be objected to by the pro-gun lobby. The log (which might, as said previously, include visual, acoustic, usage, and location data) would only be made available upon criminal use. Firing in self-defense would be validated by the weapon's log.

Smart people: The consumption of smart weapons

There are a number of actors who fit under the general category of 'consumers' of smart weapon products. The security forces, military, police, and clandestine services among them, are obvious. Personal defense—more in fashion in some countries than others—another. Sport users a third.

Most of these users face a similar set of contradictions. On the one hand, the weapon should be available when needed. On the other, there must be protection against misuse, which comes in a number of flavors: theft, accidental discharge, criminal use, loss. In addition, of course, are actions which an authorized user can carry out maliciously or illegally: shooting in a place that puts people at risk, deliberate harm, intimidation. Obviously, SWT is not able to address all of these issues. Just as obviously, however, the technology can and should address serious concerns of the general public.

Smart people will always be able to outwit and outmaneuver electronic guardians. That, however, is not the point. Widespread use of smart weapons helps to ensure that, over a period of time and of space, the number of misuses will drop. Smart guns are less attractive to burglars who would not be able to use them, or to footpads who would not be able to turn the smart weapon against its former owner-turned-victim. Smart guns would allow fewer accidental discharges and the harm done to innocent bystanders. Crucially, if paired with effective policing, smart weapons would provide better forensic control, and perhaps change the balance of legal to illegal firearm discharges in a positive vector.

Military actors and smart weapons

The military, of course, has a well-founded fear of smart weapons. Simply put, weapons that can be disabled by one side, can be disabled by the other. This means that no military planner is likely to accept a weapon that can be disabled—by any party—at a distance. Nevertheless, even the military are potential clients for some aspects of smart weapons. Securing

stockpiles is, of course, the most obvious. Electronic systems that identify and trace the presence of weapons supposed to be in a physical stockpile are currently sold by some manufacturers (Armatix, TriggerSmart). Finding lost weapons (every military loses some weapons on a regular basis), and, crucially, active logging of weapon use and status are likely attractants. Safe weapon transit is, for all military formations, a crucial problem, and smart technology could ensure that such transfers—within a state or between states—are less vulnerable to theft. Whether these would then morph into other aspects such as firearm safety, is a separate question.

Police: A known problem with the police of many fragile states is the use of official police firearms for criminal activities (e.g. Baker, 2003; Vines, 1998). Commonly, an individual policeman will rent out an assigned weapon during off-duty hours for use by criminals. Here, the use of smart weapon technology is one of the solutions, and it would seem a particularly effective one. Remote automatic logging of official weapons lowers the likelihood that any off-duty policeman will rent his weapon to criminals, or will retain a weapon inappropriately.

Furthermore, logging weapon activities is likely to become, even in the United States, a major legal tool. 'Righteous' discharges of firearms would be strongly assisted by the forensic data in a smart gun logging routine, combined perhaps with GPS, audio, and video evidence. While individual policemen may well object, the fact is that this type of technology has enormous appeal to innocent civilians and their politicians, under threat of unregulated or improper discharge of firearms, as historical precedent demonstrates (Prenzler et al., 2013).

NSAG/ militia: A common pattern for states in crisis is to finance and support NSAG (non-state armed groups) or militias (unofficial armed proponents of the state in question). The problem almost always has been how to recover weapons given to such groups once the emergency is over. Smart gun technology offers an opportunity to recover such weapons, or disable them by either using some form of time-based lock that needs to be renewed with the authorities on a regular basis, or a location system which informs the authorities where the weapons are. Given that militias in particular are supposed to be a *temporary* solution to a security crisis, this suggests one avenue of encouraging smart weapon use, and reducing the undesirable spread of SALW.

Summary: The examples presented above are by no means exhaustive. To the contrary: As SWT develops, we can expect more and more uses to be found. Some of these uses are likely to be niche uses, in which a particular application of one member of this family of technologies is exploited by a particular user or set of users. Other applications will likely be more general. Which will be which is impossible to predict. Previous technological advances such as the cell phone have demonstrated that new, unexpected, and unforeseen uses will be found for new technologies as they percolate to other areas than their origin (Hellström and Tröften, 2010). Nevertheless, we can see two features that need to be kept in mind: First, SWT offers interesting and fruitful solutions to some problems of SALW control during transfer, storage, and use. Second, these solutions are *specific* to given situations and problems, not general. In other words, this is no magical solution, but one among an array.

The future of smart weapons

Having discussed some of the patterns of potential use of SWT, and given the fact that the technology—as a consumer device and as an economic segment—is still embryonic, it is nonetheless useful to look at possible and potential pathways for SWT to enter the mainstream. Crucially, we need to ask how such a progressive change could happen.

Feature Improvement

Every consumer and user of modern technology knows that the battle between different manufacturers is not about the basic principles embodied in the technology, but about adding features, and improving existing ones, what in Japanese manufacturing doctrine is called *kaizen* ("continuous improvement")—for example, from a one megapixel camera to a 10 megapixel camera, and, in the arms realm, from a six-shooter to a 17 round weapon. These improvements are generally incremental. They have to do with the miniaturization of current functions as well as other improvements in various dimensions such as materials and manufacturing techniques. The same can be said about smart weapons. Improvements in recognition technology, miniaturization, convenience, and added features will be needed, and thus likely to be provided, by manufacturers anxious to surpass their competition, *when potential customers are plenty enough, and sophisticated enough to demand them.*

In other words, we are at the start of the smart weapons phenomenon. Market forces, driven by combinations of the actors described previously, will drive different elements of the input, output, and processing cycle. Each of these potential consumers is likely to take a different piece of the whole. At present, with the industry in an embryonic state, improvement is driven, if at all, by manufacturers' assumptions. This is largely due to the fact that while there are clear reasons for using some forms of SWT, consumers and potential consumers are either unaware of the technology, or have yet to put demands on it, shaping the product sector as a whole into a viable commercial sector.

Accessibility

Smart guns, insofar as they are sold today, are luxury items: They are more expensive, cannot be retrofitted, and need specialist and rare services. However, as they come more into demand—more likely by catching consumer attention, less likely by government fiat—the price will go down, and thus the accessibility will go up, to the point when the technology is available to consumers in the equivalent of high-street service shops. Accessibility to Everyman (by way of price and by way of local manufacture) will likely grow, *provided* manufacturers are able to promote one or another interest point for consumers.

The mechanism that drives these changes is consumer demand. The consumer may be a direct one—the purchaser of the item—or an indirect one, such as a government whose regulations dictate the use of certain safety devices (as is the case for car safety belts). Different consumers—governments, international bodies, police, military, sportsmen, legislators, ordinary man seeking self-protection—will drive different features. As demand for these features becomes apparent and public, so too will demand for additional features with lower costs for extant features becoming prominent.

Smart people and smart weapons

And once again, back to people. As a matter of principle, and certainly for the next century, we need to accept the reality that no technical solution will be foolproof. Designed by humans, a system can be deconstructed by humans. Put a shooter identification camera into a smart gun, and someone will cover it with duct tape. Add a routine that will stop the gun if the camera is covered, and someone will stick a picture on the lens. If the camera demands video,

project an MPEG¹ sequence into the camera, and so on. What this implies is that, as usual, smart criminals will be able to avoid many of the difficulties (to them) inherent in SWT. That, however, counts against SWT *only* if one expects a perfect 100 percent solution, which SWT is not, nor should it claim to be. The *potential* of SWT to reduce the statistical likelihood of, for example, accidental discharge, firearm theft, or street use against an owner, is the reasonable objective the technology aims at.

I'm rather proud of human beings: Faced with a difficulty imposed by nature or government, they will find a way around it. This is desirable and necessary. What it does mean, however, is that trying to solve the problem of firearm prevalence, victims, and stockpiling, is highly unlikely ever to be achieved by purely technical means. The need for legal solutions, human solutions, regulation and enforcement by humans we are likely to always have with us.

Conclusion

Smart guns are at the beginning of their journey, technologically, socially, and commercially. Like all immature technologies, SWT has yet to define a commercial or security niche.

There are a great number of ways smart guns can serve the public good, which depend largely on manufacturer imagination, since the technology is already here. SWT has both security and commercial *potential*. The expansion of this commercial sector is largely up to the manufacturers, as they struggle to support imaginative demands made, and to be made, by consumers.

Demand by a variety of consumers is likely to drive further development of smart guns. Feedback from customers with actual experience in using SWT to *support their own purposes* is crucial to the development of this technology. To date, the database of successful installation and use is relatively limited, though growing. Focusing attention on purchases in the developed world, which basically means the United States (the single largest gun market) may be misplaced. Hampered by laws and powerful lobby groups whose aim is to stonewall any restrictions on gun ownership, possession, and use will likely hamper SWT for decades. Identifying and supporting

customers in other countries, with needs and demands of their own, should provide additional evidence of SWT potential, as well as creating a market dynamic.

It is incumbent upon us to see that at least some control is exercised by using a potentially beneficial technology. There is a crucial need to address the issue at the policy level, to establish a basis for ensuring that the most effective, and most desirable of these technologies be incorporated into future legislation and international agreements. Granted, few agencies or states would want to open long-disputed and discussed agreements such as the International Tracing Instrument (ITI) to further discussion. However, an addendum is something that ought to be considered by signatories in e.g. the Biennial Meeting of States in 2014. The implication of firearm 'improvements' needs to be considered as well, since, even in the private realm, they offer challenges to the control of firearms, as well as enhancements to their lethality.

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Examining the policy agendas and implications of smart gun technologies

The cluster of smart gun technologies examined in this *brief* are certainly highly policy relevant. However, experience shows that it is important to be careful when considering the implications of an emerging technology for government, international or industry policy. The significance of a technology depends not only on its 'engineering' technical characteristics and capabilities, but also on the characteristics of its diffusion, take-up, and use by a wide variety of actors in different contexts. This is always not only a complex social process, but also prone to many uncertainties and surprises.

This paper aims to explore the possible policy implications of these smart gun technologies. It begins with a discussion of issues relating to the 'framing' of the issue in relation to policy debates, including some cautionary concerns. It then proceeds to identify the range of potential types of policy agendas associated with this cluster of technologies, which are briefly specified for clarity. This discussion aims to highlight the importance of moving beyond the agendas on which smart gun technologies have so far captured most public attention. It also provides an initial assessment and prioritization—in terms of feasibility and 'ripeness' for possible regulatory action. I then explore in some more detail the opportunities, constraints and priorities for policy development, and identify the policy spheres and frameworks within which these may best be developed.

A 'useful contribution', not a panacea

All policy initiatives stimulated by emerging technologies first have to overcome resistance to such agenda setting—which may be motivated by many, often diffuse, factors, including healthy skepticism. In this context, it is important not to over-sell the implications of these technologies. The importance of smart gun technologies cannot reasonably be described as deeply transformative. They are based on the application of well-established science and technologies. This is a strength in relation to their likely feasibility, reliability and potential of dissemination. But it also means that they are still 'emerging'—decades after they first became technically feasible. There may be many explanations for this delay, but limited demand and market resistance are likely to be amongst these factors.

As for all technologies, their effectiveness depends not only on the physical weapon technologies but also on the capacities, interests, and awareness of the people involved and on the wider social and regula-



tory systems and practices in which they operate. The rates and patterns of adoption and diffusion of new technologies are always complex, and depend on many factors including the incentives and constraints of relevant markets, and regulatory environments and expectations.

The smart gun technologies certainly do not offer any panacea in practice; and efforts to suggest that they might do so risk playing into the hands of skeptics. It is important for policy agenda-setting purposes that these technologies are presented more as useful contributions to enhance existing problem-solving measures than as potentially transformative.

As discussed in the earlier chapters of this *brief*, the types of problems that these technologies can help to address are those of enhancing controls on arms and ammunition; particularly small arms and light weapons (SALW), but also potentially other categories of arms. More specifically, they have the potential to contribute usefully to enhancing controls to improve safety and to prevent and reduce misuse and unauthorized diversion of arms transfers and holdings—as one element within a wider control agenda.

Within this context, the societal constraints on the take-up and use of such technologies are immediately apparent. In our context, many of the countries severely affected by excessive or inadequately controlled SALW, which in principle could benefit most from rapid adoption of these SALW control technologies, have markets for SALW that are almost by definition dominated by actors that can effectively resist controls on availability and use of SALW. Where the governments of such countries have strong political will to enhance controls on SALW—which is quite rarely the case—in practice they may lack the institutions and regulatory capacities to take full advantage of these emerging technologies for SALW control.

Similarly, most state agencies with large authorized holdings of SALW and other conventional arms, including militaries and police forces, are understandably nervous of any smart weapon technology controls that might compromise reliable immediate use of arms during operations. Traditionally such institutions have relied on a combination of professional discipline and institutionalized stockpile management and control systems to prevent diversion or misuse. These institutions may well be interested in the possible contributions that smart gun technologies might provide to supplement or improve the efficiency of their existing stockpile management systems. But they will prefer new technologies that fit well into their existing institutional systems.

In relation to civilian firearms markets—where the potential benefits of smart gun technologies have so far been mostly strongly promoted—there is high national variability. Unfortunately, from the perspective of those concerned with enhancing SALW controls, several of the biggest national markets for civilian firearms are in countries where there are highly mobilized lobby groups that resist regulatory constraints on firearms availability for civilians and where national laws allow civilian firearms possession for the purposes of individual self-defense. Above all, the United States is by far the biggest commercial market for civilian firearms, where there are major political and market-based obstacles to promotion (or regulatory requirements) of incorporating smart gun technologies. The National Rifle Association (NRA), for example, has successfully mobilized consumer boycotts of firearms production companies interested in developing smart gun technologies that restrict use to authorized owners. Firearms companies have learned hard lessons from this experience.

It is important not to over-emphasize this latter constraint. These limits on technology take-up for civilian firearms do not apply to many developed or industrializing countries. Many countries insist on (or aim for) strong regulatory controls over civilian firearms, and thus there is potential for rapid take-up of enhanced control technologies if national regulators decide that this would be useful.

Moreover, for example, nearly all states in the European Union do not authorize civilian firearms possession for self-defense purposes—only for hunting, sporting, or cultural purposes (Austria providing a limited exception). Thus resistance to an adoption of smart gun technologies to restrict use to authorized users (on grounds of risks that this might reduce gun

reliability in response to sudden attack) has no legitimacy in these and many similar countries.

Overall, the analysis in this section implies that there are substantial constraints to a rapid and wide adoption of at least some categories of smart gun technologies in many countries in the world. However, it does not imply that the emerging cluster of smart gun technologies explored in this *brief* do not have exciting policy implications. On the contrary, as I argue below. But it does imply that policy initiatives in this area need to be framed and prioritized within the framework of the constraints outlined above.

New technologies for SALW control, not smart gun technologies: The importance of terminology in developing policy agendas

So far in this chapter, I have not contested the terminology of smart gun technologies. However, it is time to do so. The term smart gun technologies has been popularized, but it now carries substantial historical baggage. This could prove to be an obstacle to effective policy agenda-setting or the development of cooperative actions and agreements to promote or adopt these technologies for the purposes of enhancing controls to prevent or reduce diversion or misuse of SALW and possibly other categories of arms. This is particularly the case in regional and international policy forums or in the United Nations. Experience shows that policy debates aimed at achieving agreements or good practice guidelines to enhance SALW controls are highly contested. Much has been achieved since 2000, but only with high and concerted diplomatic and political efforts, and against strong resistance from a significant number of states. More generally, all arms control negotiations are highly prone to get bogged down on debates about terminology and definitions, and this is particularly true in relation to technologies. It is advisable to use a more neutral, and diplomatically careful, term than smart gun technologies.

This argument is further reinforced by the fact that the term 'smart gun technology' refers in fact to a cluster of rather disparate technologies. However, the 'smart' technology which has so far been most popularized concentrates on just one or the several potential uses: to prevent firearms misuse by technically restricting use of a firearm to the owner or authorized user. As argued below, this is only one of several major purposes for this cluster of technologies, and it is important not to be over-focused on

it. Skeptics and well-mobilized lobby groups resisting smart technology take-up have already developed well-rehearsed arguments against this particular use (such as the National Rifle Association (NRA) and their allies). These can be contested, but it is also important to facilitate efforts to side-step such debates where this is appropriate.

Thus, we propose that we abandon the term smart gun technologies in policy context from now on. The more neutral term of 'new technologies for weapons control' or 'new technologies for SALW control' is less contentious, carries little political baggage, and invites people to explore a variety of possible technologies and policy uses. The latter is focused on SALW, which is probably premature in many ways. However, in a policy context, it has advantages. It is widely understood, and much progress has been achieved on international and regional SALW controls which would have been much more difficult if wider categories of arms are potentially included in the scope.

The cluster of 'new technologies for SALW control' now needs closer definition and categorization to make it more digestible for policy initiatives. In technical and engineering terms, we might be tempted to develop categories according to the types of physical technologies employed. The new technologies under consideration generally make use of mechanical, electronic or pattern-recognition designs and devices to enhance controls against misuse of a range of small arms and light weapons, and also potentially some other categories of conventional weapons.

However, for policy purposes, it is most important to categorize the different types of new technologies for SALW control according to the control purposes for which they are designed. To clarify our subsequent discussion, I briefly outline these categories below.

Policy initiatives to take advantage of the new technologies for SALW control can be classified according to the following purposes.

Personalized guns and firearm safety devices relate to mechanical and electronic technologies integral to the weapon that are designed to prevent the firearm being used by anyone other than the authorized user. Integral mechanical safety features are already in wide use, including standard manual hammer blocks, decocking levers, and trigger disconnect safety levers. The emerging gun safety technologies incorporate electronic technologies such as RFID chips (radio-frequency identification), magnetic rings,

or fingerprint recognition devices. More sophisticated technologies have been developed that can block use of the weapon against targets identified through pre-programming as 'friendly'.

SALW locking and deactivation devices combine mechanical and electronic devices to render a weapon unusable during transit or storage. They are customized according to the type of weapon involved, but can range from relatively straightforward blocks inserted into gun barrels (which cannot be removed without relevant codes without destroying the weapon) to more sophisticated locks on MANPADS (man-portable air defense systems).

Pre-programmed de-activation technologies include integral electronic devices that can be pre-programmed to deactivate a SALW after a specified period of time. The technology is designed so that the weapon cannot be reactivated without input of authorized codes.

Remote de-activation technologies include integral electronic devices that can be used to deactivate the weapon remotely through coded radio-frequency transmissions. As above, the weapon cannot be reactivated without input of authorized codes.

SALW marking and traceability devices. Under national and international regulations, all SALW should be visibly marked with a unique ID. There are many well-established mechanical technologies for this purpose (including punching, engraving, and, recently, laser markings). These can now be supplemented with electronically readable unique IDs, which promise to be less vulnerable to removal or to misreading/ misidentification by non-experts—and thus enhance traceability.

Potential policy agendas for new technologies for SALW control

An important characteristic of all of the above technologies is that they make use of well-understood underlying science and technology, and are thus in principle ready for industrial production. However, as discussed in the first section above, societal and market constraints are significant. Although there probably is an existing market for some devices for the purposes outlined above, the normal challenges of market take-up are reinforced by resistance from many civilian gun-users and lobby groups. Thus the wide adoption of these technologies will probably depend on regulatory action—an issue that needs to

be justified in relation to achieving socially and nationally useful objectives.

Each of these possible objectives need to be considered separately, on their own merits. The following paragraphs briefly discuss each in turn.

Ensuring deactivation during transit in the context of authorized SALW transfers, as a safeguard against diversion to unauthorized users.

The SALW (and potentially other categories of conventional arms) would be deactivated during transit, and then permanently reactivated once the delivery is received by the authorized end-user (i.e. blocks or other deactivation devices would be removed or themselves deactivated).

International transfers of SALW often have relatively long and complex routes, with many points of potential diversion from the point of departure from the authorized provider through transit points, transshipment, and import in the recipient country to delivery to the final authorized end-user.

This purpose appears to offer strong opportunities for policy initiatives, which sidesteps some of the resistances to adoption of the new technologies outline above. Many states are now legally or politically committed to take careful account of the risks of diversion before authorizing any export of arms or ammunition, including the European Union, the Organization for Security and Co-operation in Europe (OSCE) and Latin American states. In relation to SALW, the UN Programme of Action (UN PoA), the International Tracing Instrument (ITI), and its associated regional agreements have long established not only the international norms that diversion of transfers should be prevented and combated, but also practical measures and co-operation to promote implementation of such norms. The recently signed Arms Trade Treaty (ATT) reinforces, expands the scope, and universalizes such norms and obligations—not only for exporters but also for transit, transshipment, and importing states.

If there are high risks of diversion, states should not authorize transfers. But there are many transfers—probably the majority—which are authorized in the context of some risks of diversion that are considered acceptable due to other factors.

The use of new technologies for SALW control to disable weapons during the whole SALW transfer process (from initial export through to authorized end-

user) appears to offer major opportunities for greatly reducing risks of diversion. They could be potentially transformative within this limited sphere. Since the relevant devices are re-useable and relatively cheap, the costs of adoption promise to be limited and mainly transitional. Moreover, they can primarily be regulated and enforced by the exporting state, to which the ATT and also several SALW agreements assign primary responsibility for preventing diversion. Exporting states tend to have relatively higher regulatory and technical capacity to ensure controls and can, if they wish, impose the related costs on the commercial companies concerned. Moreover, use of such new technologies would go with the grain of existing policy initiatives and good practices, including enhanced use and verification of end use/ user guarantees.

Ensuring deactivation of decommissioned SALW or other weapons designated for destruction

There are many contexts in which SALW and other weapons are collected or transported for permanent deactivation and destruction. These include post-conflict disarmament, demobilization and reintegration (DDR) and arms reduction programs; civilian and other voluntary weapons collection programs in conflict affected or 'severely affected' (by armed violence) countries; disposal of surplus during weapons replacement programs or after illicit arms have been confiscated; and more general security sector reform or weapons management programs.

Security of such weapons destined for decommissioning and destruction is generally a major concern—during transitional storage, transport to destruction sites, and also during the destruction process. The provision of adequate security adds substantially to the costs of such processes. Moreover, the vulnerability to capture or loss during transit adds to risks of diversion and other losses. Incidents of such losses not only contribute to insecurity but also badly damage the reputation of those involved, including the United Nations and donor agencies (as they often endorse or support such programs).

New deactivation technologies could be very useful to help to address this concern. If the weapons are rendered unusable as soon as they enter such deactivation or destruction programs, then the above risks can be greatly reduced. As for other uses of deactivation technologies, the re-usability and relative cheapness of the devices concerned reduce the barriers to take up. Again, within this limited policy sphere, the adoption of such technologies could be transformative.

Enhancing the management and security of authorized SALW holdings and stockpiles.

Evidence conclusively shows that diversion or loss from authorized stockpiles or holdings of SALW is a major, and often the main, source of illicit or inadequately controlled arms. This is the case in poor, fragile, transitional or conflict-affected countries. It is also true in many relatively stable developed or developing countries. Enhancing physical security and stockpile management (PSSM) is thus a high policy priority: nationally, regionally, and internationally.

Effective arms and ammunition stockpile security requires effective systems for physical security, institutional control and monitoring procedures, and so on. The new technologies would need to fit within these frameworks. In this context, controls could be enhanced through electronic locking devices, either integral to each weapon or integral to larger storage units. In addition, stockpile management and checking could be enhanced by use of electronic monitoring systems and also scanning systems that ensure up-to-date stockpile accounting.

Within well-established and regulated PSSM, the new technologies promise to offer numerous supplementary advantages. The contributions probably become even greater in relation to highly distributed small authorized stocks (such as in local police stations). This is also the case in contexts where the institutional control facilities and systems are weak—where the introduction of some direct, readily monitored, physical control systems could make a difference. It is thus potentially applicable in contexts of conflict affected or fragile states, as part of a wider security-building or capacity-building program.

Enhancing the traceability of illicit or confiscated SALW.

International commitments to marking, record-keeping, and cooperation in tracing SALW, particularly under the ITI, provide the legal and administrative framework to effectively trace lines of supply and diversion points of seized unauthorized SALW.

In practice, processes of identification and tracing of illicit arms or weapons seized in the context of conflict can be cumbersome. This is partly due to lack of political will, but it is also due to unwieldy processes and often unreliable capacities to consistently identify and communicate markings, check records, and trace often complex routes of supply. Adoption of supplementary electronic marking and identification technologies could help to facilitate the process.

In this context, it is particularly important to emphasize that the adoption of these new technologies should be regarded as *supplementary* to the physical marking systems and other hard-negotiated obligations under the UN Firearms Protocol and the ITI. It would not be appropriate to consider the possibility of superseding or re-negotiating such existing obligations.

Enhancing enforcement of national firearms licensing regulations.

National criteria and systems for licensing authorized possession of firearms by civilians vary substantially; and the potential uses of emerging SALW control technologies also vary accordingly. For example, national systems involving time-limited firearms possession licenses might benefit from uses of pre-programmed deactivation technologies, which would deactivate firearms at the end of the licensing period. They could then be reactivated by authorized officials for another pre-programmed period of time if the license were to be renewed.

In this and other ways, the new technologies appear to offer a wide variety of possibilities for national regulatory agencies seeking to enhance enforcement of civilian firearms licensing systems.

Personalized firearms and electronic firearms safety mechanisms.

These are presently the most widely publicized potential uses of these technologies. Enhanced safeguards against use by unauthorized individuals (including children) could help to prevent many gun deaths and injuries.

As noted above, in the United States, the NRA has actively campaigned against the adoption of these technologies, of a variety of grounds including the risks that the safeguards could render the firearms less reliable for use for self-defense purposes. There are counter-arguments, including manufacturer statements on the high potential reliability of the personalized systems. However, in the many countries (including nearly all EU Member States) that do not permit ordinary civilians to hold firearms for self-defense purposes—only for sporting or hunting purposes—these considerations are irrelevant. In these national contexts, the way would appear to be relatively open for regulatory actions to promote or require adoption of such new technologies, where a good case can be made that they can be effective and make a difference.

There is a similar debate relating to the possible adoption of personalized firearms for law-enforcement services. In these cases, the firearms can definitely legitimately be used for self-defense purposes, and thus each national authority will need to decide the case for such additional safeguards on an assessment of the balance of risks.

In all cases, a strong argument can be made in favor of promoting the adoption of technologies to enhance security of licensed firearms during storage—for example, at home, shooters' clubs, or local police stations.

Remote deactivation to prevent unauthorized uses.

There are technological opportunities to integrate technologies that could be used remotely to de-activate SALW or other weapons; where they have been diverted or misused in ways that are illegitimate or undesirable for the supplier or authorities. It is possible to envisage some contexts in which this would be not only desirable for the regulator or seller but also acceptable to the buyer or authorized user. However, these contexts are probably rather limited; and thus this use seems to be a relatively low priority at present.

Relevant policy-making and regulatory contexts

Finally, we briefly address relevant policy contexts in which the use of new technologies for SALW control can most appropriately be promoted. As noted, the extent to which this cluster of emerging SALW control technologies actually contributes to safety and reduces risks of diversion and misuse will depend greatly on whether they are promoted or required by regulatory authorities.

Once again, it is important to emphasize that policies relating to new technologies for SALW control are still at a very initial stage. They will require substantial further discussion and development before they are ripe for substantial agreements or new regulatory obligations—particularly at the regional and international level. However, they do appear to be ripe for pilot projects and specific limited uses by interested governments and national regulatory authorities.

At the international and regional levels, therefore, the first step is probably to consider recommendations for the adoption of some of these technologies within the context of good practice or practitioner guidelines.

The possible policy and regulatory contexts include the following:

- UN, EU, and other donors' assistance and support in adopting selected SALW control technologies by developing or transitional country partners, as an element in wider programs to enhance not only their domestic stockpile security, firearms licensing, and other controls, but also their capacities to ensure effective controls against diversion of SALW transfers.
- Requirements or promotion by states that authorize exports or transfers of SALW, or other arms or SALW control technologies to prevent and reduce risks of diversion of authorized international transfers of SALW (and other conventional arms) from (or through) ATT Member States.
- Promotion of good practice guidelines relating to the adoption and use of new SALW control technologies in the context of relevant regional agreements (such as the OSCE) and UN/ international agreements (such as the UN PoA, the ITI, the UN Firearms Protocol, and the ATT).
- Adoption by EU Member States and other national regulatory authorities for the purposes of national controls of SALW (domestically, and in relation to transfers).
- Adoption by the European Union (for example in an EU Directive) to enhance controls (for example in relation to intra-community arms transfers).

Conclusion

This paper aims only to provide an initial analysis of the policy implications, and potential policy initiatives associated with the new technologies for SALW control. It also argues that there are policy uses which could usefully be prioritized, not only due to their potential contribution but also because the societal and political constraints to adoption are relatively benign. This is still very much an emerging policy agenda. The next steps are to raise awareness, promote adoption as part of good practice, and establish practical experience from which lessons can be learned.

3

Smart weapon technology in the context of developing and post-conflict countries



Smart guns in Africa: Needs and opportunities

Introduction

The 2001 UN Programme of Action (UN PoA) envisaged the use of technology as a measure to combat the illicit trade in small arms and light weapons (SALW). It encourages states to consider international cooperation and assistance in examining technologies that would improve the tracing and detection of illicit trade in SALW, as well as measures to facilitate the transfer of such technologies (United Nations, 2001).

Technology for so-called smart guns and smart stockpile management is now available, but is—as the presentations and debates at the Smart Weapons Conference (SmartCon) held at the Federal Foreign Office in Berlin in June 2013 showed—not widely used, met with skepticism from conventional manufacturers and is perceived to be almost prohibitively expensive. This may lead the observer to the *prima facie* conclusion that this technology is currently not an option to address the illicit proliferation of SALW and its, often lethal, consequences in Africa.

When observing the current debate on 'smart guns', one may be inclined to think that it focuses on the very particular situation in North America, particularly in the United States, with the objective to lower the number of preventable and accidental deaths caused by firearms. This appears to be caused by the discussion around the availability of firearms and the question of whether or not this is linked to the crime rate (Greene and Marsh, 2012; Stolzenberg and D'Alessio, 2000; Lott and Mustard, 1997; Bartley, 1999).

The situation in Africa is slightly different, despite similar high levels of firearm-related crimes related to urban insecurity in some of the continent's large agglomerations in ostensibly stable countries (Bartolucci and Kanneworff, 2012; Small Arms Survey, 2013). SALW continue to exacerbate conflict, civil unrest and criminal activities in the region, and their trafficking and proliferation remain a threat to fragile countries and sub-regions. In most post-conflict countries of the continent, security is volatile and the risk of renewed hostility persists. Arms proliferation still poses a great threat to Africa's peace and security. Furthermore, there is an increase in criminal activity, facilitated by the possession of SALW by non-state actors such as criminal groups, self-defense structures, communities (e.g. pastoralists), private security companies



and individual civilians. African governments have reacted to these challenges and have placed the small arms debate on the regional and international agenda (Kytömäki and Yankey-Wayne, 2006).

Africa's needs

Smart technology in small arms and light weapons would have to be introduced so that the technology responds to the needs of the continent. Addressing the proliferation and influx of SALW into already unstable states is probably the biggest concern for the region (United Nations, 2012). In many states, "illegal trade in weapons runs parallel to the legal trade, sourcing weapons from the legal trade as well as via cross-border ant-trade and craft manufacture," with a strong regional dimension, in addition to the legal trade, which appears to be more globalized (Bourne, 2012). The illicit trade and trafficking in arms takes place across vast porous borders, facilitated by a lack of trained border personnel, adequate material and financial resources, and competing development priorities, at times combined with weak governance and the quasi-absence of an effective rule of law. Other critical areas that facilitate the illicit trade and often the diversion of SALW from licit, regulated structures within the state to illicit possession are weaknesses in the physical security and stockpile management, inappropriate marking, and the lack of record-keeping and tracing mechanisms. For African states, a key concern remains the easy accessibility of small arms to non-state actors (Kytömäki and Yankey-Wayne, 2006), which until now was facilitated by the absence of adequate international legally binding norms or policy documents.

¹ The views expressed in this paper are those of the author and do not necessarily reflect the views of the United Nations Secretariat. The author thanks Matilda Ohlin Knutsson and Christina Arabia for their contributions.

Implementing the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects

The above mentioned critical areas have been highlighted by African Member States in their national reports on the implementation of the PoA. In their reports, African States also stressed the need to address the root causes of conflicts and, more specifically, the “small arms problem within the nexus of peace, security, humanitarian and development dimensions” (Kyr m ki and Yankey-Wayne, 2006; United Nations, 2012a).

The needs on the continent, however, are not homogeneous. Therefore, any technological solution must respond to the specific needs of a country or a sub-region.

A country in transition, in a *post-conflict context*, will need to overcome hurdles and bridge gaps before taking the necessary steps towards achieving lasting peace. In such a context, “the use and ownership of weapons is often hotly contested” (Kreutz, Marsh and Torre, 2012). In order to be effective, disarmament, demobilization and reintegration (DDR) programs will have to include physical security and stockpile management (PSSM) activities. Ineffective or badly managed stockpiles could potentially become a new factor of instability. Security sector reform (SSR) programs will need to address the day-to-day safe use of weapons by members of a country’s security services that may not have had any previous formal military or police training. Those former combatants who do not find their place in a post-conflict society may turn to criminal activities or offer their services as mercenaries in other conflict-affected countries, taking with them the tools of their trade and contributing to the diffusion of arms. The fact that many non-combatants may have acquired small arms for the protection of their families and properties also needs to be addressed when a country goes through a transition from armed conflict to peace.

Other countries on the continent that have enjoyed relative peace and stability face different challenges. Although they may not be in a post-conflict situation, they may face other forms of armed violence and thus require different solutions. SALW can be used in a struggle for political control of a country without meeting the threshold of an armed conflict. They are also the weapons of choice for criminal gangs, vigilante groups and other non-state actors operating in the virtual absence of state authority. Similarly, in

countries where the rule of law is weak, where grazing and farmland is scarce, and the soil may be rich in minerals, small arms become a tool for communities and individuals to take the law into their own hands to defend or take what is perceived to be one’s rightful property (Bartolucci and Kanneworff, 2012; Small Arms Survey, 2013).

The diversion of small arms from government stockpiles into the illicit market is a common problem, and is not only limited to countries that suffer from a weak or virtually absent rule of law. The South African Police Service reported that between 2006 and 2007, nearly 4,000 government-owned firearms could not be accounted for (Stohl and Tuttle, 2009) and estimated that another 14,461 firearms and ammunition were in illegal possession, both of which contributed to the illicit weapon availability in the country (South African Police Service, 2012). Small arms, however, do not only enter the illicit circuit through sales and other forms of changing ownership. Countries also face the challenge of a rental market for small arms, where members of law enforcement agencies rent out the arms issued to them for the performance of their duties to individuals who use them for illicit or illegal purposes (Bartolucci and Kanneworff, 2012; Small Arms Survey, 2013).

Implementation of regional instruments

African Member States to the PoA also need support in meeting their international obligations for SALW control. The continent’s sub-regional instruments on SALW are, unlike the PoA, legally binding. Introducing smart gun technology would therefore have to take into account the States Parties’ commitments under these regional instruments.

Three regional instruments are currently in force: the Southern African Development Community (SADC) Protocol on Control of Firearms, Ammunition and Other Related Materials (2001); the Nairobi Protocol for the Prevention, Control and Reduction of Small Arms and Light Weapons in the Great Lakes Region and the Horn of Africa (2004); and the Economic Community of West African States (ECOWAS) Convention on Small Arms and Light Weapons, their Ammunition and other Related Material (2006). Combined, these instruments have 31 States Parties (SIPRI, 2013). The Central African Convention for the Control of Small Arms and Light Weapons, their Ammunition and all Parts and Components that can be used for their Manufacture, Repair and Assembly (so-called Kinshasa Convention, 2011) will enter into force once six States have

deposited their instruments of ratification or accession with the United Nations Secretary-General.

In its Article 3, the ECOWAS Convention, in principle, prohibits the transfer of SALW. ECOWAS may grant an exemption of that prohibition when the transfer is necessary for its national security and defense or needed for the conduct of peace operations under United Nations, African Union, ECOWAS or any other mandate from a regional or sub-regional organization of which the State Party is a member. An exemption may be refused if there is a risk that arms may be diverted during the transfer process, either in transit or in the importing state. States parties to the ECOWAS Convention have also committed themselves to controlling the production and assembly of SALW in their national territory and to taking measures that include, but are not limited to, marking and registration. States parties are further committed to maintaining a national register and database of SALW, which contains data on every weapons transaction, among other information. The Convention also requests States Parties to establish specific operation mechanisms, such as the control of civilian-owned SALW, measures for PSSM, marking, tracing, and brokering. States are further required to establish mechanisms for the collection and destruction of weapons, harmonization of legislation and the strengthening of border controls (ECOWAS Convention, 2006).

The Kinshasa Convention, which was developed by Central African states with the technical support of the United Nations Regional Centre for Peace and Disarmament in Africa (UNREC), addresses several aspects of SALW control in more detail than previous regional instruments. Under Article 5.5 of the Convention, States Parties shall be denied a transfer authorization if there is, among others, the possibility of diversion to unauthorized users, illicit trade or re-export, or that the transfer would violate an international arms embargo. Under the convention the States Parties are committed to taking several arms control measures that could benefit from the use of smart technology; e.g. when setting norms and standards for the proper management of weapons and ammunition stocks in the possession of civilians, particularly manufacturers or dealers (Article 9.3) or government stockpiles (Article 16), for the authorization and control of manufacture, distribution or repair (Articles 11 and 12), or when adopting legislation and procedures for marking, tracing and registration (Articles 14 and 15) or for border control (Article 17). The States Parties also agreed to the establishment of national and sub-regional electronic databases that could benefit from

technological advances, e.g. in the marking and registration of weapons (Kinshasa Convention, 2010). Within the so-called Sao-Tome Initiative, the United Nations Standing Advisory Committee on Security Questions in Central Africa (UNSAC) tasked UNREC to develop an implementation plan for the Kinshasa Convention. The plan, which was adopted at the 31st ministerial meeting of the Committee, highlights concrete measures that States Parties are encouraged to take in order to effectively implement the Convention. These are subdivided for each chapter of the Convention in institutional, regulatory and operational measures at the national and sub-regional levels. Although the implementation plan does not make any direct reference to specific technologies, it requests the States Parties and the Economic Community of Central African States (ECCAS) Secretariat take action in the harmonization of legislation and administrative procedures and the development and introduction of norms and standards for the proper management of civilian-owned weapons and ammunition stocks, as well as standards for conventional and security marking, physical security and stockpile management, storing, tracing, and other activities that contribute to the implementation of the convention (UNREC, 2011).

Both the ECOWAS Convention and the Kinshasa Convention provide for a dialogue with producers and suppliers to ensure that they contribute to the effective implementation of the Conventions, e.g. through memoranda of understanding or framework cooperation agreements and exchange of information. These provisions make room for further engagement on the issue of weapons security and potential standard setting, driven by security needs of African states rather than the interests of the producers.

Regional instruments in Africa, which are legally binding, open space for regional standard setting and the use of modern technology in arms control and the combating and prevention of illicit trade in SALW by setting very specific standards on weapons safety, PSSM, registration and tracing.

These instruments also indirectly invite producers to come up with technical solutions that can contribute to their implementation. It is therefore important that these technologies respond to the needs and requirements of the continent, taking into account the economic and developmental realities of African states including geography, infrastructure, and of course competing developmental priorities. 34 African states are still considered to be least devel-

oped countries, with limited infrastructure that will also affect the choice of weapons security technology (United Nations, 2013). Land-locked developing countries and small island developing states face unique developmental challenges that also inform their approaches to arms control, e.g. in the area of border security and the regulation and management of arms transfers, including trans-shipment (United Nations, 2013a; 2013b).

The recently adopted Arms Trade Treaty (ATT), which will enter into force after the ratification by 50 countries, will also require States Parties to adapt their legislation and administration for the management and control in the transfer of arms. New technology may provide solutions for States to meet their obligations under the Treaty. African States played an important role in the adoption of the Treaty, through sub-regional and Africa-wide initiatives (United Nations, 2013c). At the time of writing, 17 African countries have signed the ATT, one—Nigeria—has ratified it, and it may be expected that more ratifications will follow sooner rather than later (United Nations, 2013d).

Arms embargoes established by the UN Security Council under Chapter VII of the Charter are legally binding for Member States. These measures, which aim at giving the Council and the Member States concerned space and time to reach a peaceful solution to a conflict, are often violated, sometimes with the tacit or explicit knowledge of some governments. In practice, the prevention of diversion of arms to countries or groups on which a sanctions regime is applicable can be challenging for countries with limited resources, porous borders and competing development priorities (Wood and Danssaert, 2011). New weapons safety and control technologies may be used to help Member States in meeting their legal obligations under the Charter in the implementation of arms embargoes.

Expectations of smart gun technology

For smart gun technology to be effective in Africa, it must respond to the needs of African states and take into account the continent's specificities, which includes different levels of human and technological development, geographic challenges such as long distances, large territories, low concentration of population, and limited infrastructure, as well as the continent's political structure. One has to imagine that the technology needs to be usable in rural and border areas far from economic hubs or capitals, as well as in mega-cities. It must respond to the needs of

least developed countries as well as medium-income countries and be in conformity with different international legal instruments applicable for a relatively small market (P. Wezeman, S. Wezeman, and Beraud-Sudreay, 2011). First and foremost, however, it must contribute to a viable solution to the illicit trade in small arms and light weapons.

How 'smart' can the technology be?

Much of the modern military technology is unsuited for the tasks of the militaries and security forces in Africa. It is too expensive, specialized, sophisticated, and fragile (Marsh, 2012). For smart gun technology to effectively meet the needs of African Member States, it must be suited for the tasks of the military and the security forces in the region. Any technology that wants to contribute to a sustainable improvement of arms control and management in Africa must be reasonably priced, applicable to a wide range of conventional arms, easy to use and sturdy. It also needs to be adapted to the developmental realities of the region, where power cuts are frequent, distances are long, infrastructure is inadequate and human resources with the appropriate technical skills (African Economic Outlook, 2013) and job opportunities are often lacking.

To be effective, every new initiative must be piloted and then evaluated with a critical eye and the willingness to make radical changes to an initial concept, which at first sight may have appeared to be perfect, but is not sufficiently adapted to the realities on the ground. UNREC is no stranger to the experience. The Center had launched several technical projects, including a project on brokering in East Africa, to support Member States in the implementation of the PoA. The project was launched in six East African Member States and created an electronic register for arms brokers and brokering licensing as a control mechanism. Despite the fact that the electronic registers were installed in five countries and UNREC trained personnel in the usage of the software, their use has remained limited, as the legal and administrative frameworks, as well as the conditions on the ground, such as unreliable electricity supply, unstable Internet connection and difficult access to IT-support in remote areas, are not conducive to a wider use of these electronic tools (UNREC, 2011a).

The areas identified by Member States in their reports under the PoA could all benefit from smart gun technology. While the reports submitted between 2010 and 2012 mention the need to address issues of border

control and PSSM, the technology could also be used as a tool to prevent the diversion of arms from legal, government-owned stocks to the illicit market, or to strengthen end-user control systems.

The use of smart gun technology and electronic storage facilities can help importing or transit states to show exporters that they not only have effective end-user and use controls as well as adequate stockpiling procedures in place, but that they also have the physical capacity to manage and secure their stockpiles to prevent diversion at the different stages of the physical transfer process. Mobile communication technology could also be used as a tool following the shipment, transit, and transshipment of weapons and contribute to facilitating on-site inspections of transferred items, while at the same time reducing the costs for the importing and transit states.

Smart gun technology that could be used for stockpile management or border control scanning of goods could play a part in reducing the illicit trade in SALW. However, the necessary basic computer technology for these aspects is not available in the rural areas where a lack of human and material government resources facilitate the illicit trade in SALW.

Possible solutions already developed by the industry

The industry has already developed several solutions that could be piloted in the African context.

PSSM could be improved through biometric access control systems that can be used on gun lockers and storage containers to restrict access to guns as well as track when and by whom a weapon is used. According to industry sources, however, the retail price of the technology is nearly 100 times higher than the price of an automatic rifle in illegal markets in some parts of the continent which can be purchased for as little as US \$30 to \$120 apiece, depending on its state (Alpers and Wilson, 2013). When purchasing new weapons, governments could require that they be fitted with fingerprint recognition or radio-frequency identification (RFID) technology (Teret and Mernit, 2012). Again, the cost may be prohibitive, and it would be much more difficult to attach this technology to already existing stocks or refurbished weapons (Mearian, 2012).

Ideally, smart technology would build on systems that have already been introduced to society, such as mobile phone technology, which is widely used to conduct banking transactions in Africa. This technology would allow communication with the weapon,

either to activate, deactivate, or track it, through a mobile-phone communication system. As mobile phone communication is widely available, this technology could operate in remote parts of the region and also across national borders. Authorities could potentially notice any diversion of a weapon and intervene by using mobile phones or similar tracking systems that are, for example, used in motor vehicles. This technology would have to be used in a way that any attempt to remove the communication device would render the weapon useless. Currently, such technology exists but as a result of a lack of donor funds it remains outdated and has yet to be marketed (Stern, 2013; Mearian, 2012).

PSSM could be improved by focusing the attention beyond just the physical structure, which is cost intensive to build and to maintain especially for those states that have to ensure stockpiles across large territories. Electronic firearms safety devices could provide at least temporary solutions to prevent the diversion of a weapon until it is brought to the appropriate armory and stockpiled in accordance with international standards, such as the International Ammunition Technical Guidelines (IATG). Weapons with built-in safety devices can neither be loaded nor used if stolen, limiting the risk of diversion even in difficult security contexts such as post conflict environments or ongoing DDR programs. Available electronic technology can be retrofitted and used in different types of firearms, unlike mechanical devices that have to be custom-made. Since this technology is used in the individual firearm, it can also be used as a complementary security system, by law enforcement agencies, for instance, to improve the management of armories. However, the technology must ensure, as in RFID or SIM-card based technology, that any improper deactivation or removal of the device would render the weapon permanently unusable (Hefner and Giebel, 2013).

In addition to the cost of such technologies, some of which may be prohibitively high for most state governments, the main problem with this technology is that it requires a reliable flow of electricity. Limited battery power for mobile devices, however, is only one of the challenges. Many countries in Africa cannot provide a fully functioning, uninterrupted power supply, especially in remote areas that are often not connected to the continent-wide electricity grid. Mobile solar power generation, despite some remarkable advances, is not widely available and requires a high level of maintenance, thus it is not a practical replacement for normal, centralized power supplies (Damasen and Uhomobhi, 2012).

Another aspect that is unique to the African arms market is the production of craft weapons. Although mainly for hunting or self-defense purposes in remote areas (Stohl and Tuttle, 2009), these weapons can also find their way into illicit markets and contribute to conflicts and human rights violations (United Nations, 2011; 2011a). It is therefore important to ask the question whether smart weapon technology can be used in the production of craft and artisanal weapons in a way that it becomes an accessible and viable option for local small-scale manufacturers. This could be done by fitting simple, easy to use technology directly in the production process, or by making retrofitting technology widely available. Another option for giving this technology a chance, is to tailor it to small-scale artisanal producers so that they can meet the needs of local consumers. It is also important to involve local craftsmen and women in the development of weapons safety technology for the African market, as they best know the local challenges and needs in terms of gun control and security.

The industry that is currently developing the smart weapon technology will also have to address challenges that are directly related to the level of development in a country or a sub-region. Middle-income and emerging countries may be in a position to introduce smart weapon technology without too many difficulties. Some of these countries already have production facilities (P. Wezeman, S. Wezeman and Béraud-Sudreau, 2011). These could be used as a platform for introducing new technologies to improve arms control and prevent the illicit trade in SALW. For many post-conflict countries, however, this would probably require international support, e.g. through a larger initiative that addresses arms control, PSSM, marking and tracing within the framework of the implementation of the PoA, and sub-regional instruments.

Conclusion

Although smart weapon technology appears to be responding more to the needs of the European and North American markets, with their specific challenges faced by gun violence (Schönbohm, 2013; Teret and Mernit, 2012), there is room to use smart technology as a tool to address some of the problems Africa is facing with regard to peace and security, including the illicit trade in SALW.

As the trafficking and proliferation of SALW remains a threat to fragile countries and continues to exacerbate conflict, civil unrest and criminal activities

in the region, it is all the more important to not only make smart technology a viable option but to ensure that the technology responds to the specific needs of African states. It is clear that the political will to combat the proliferation of SALW exists and is demonstrated in reports to the PoA by African states as well as other sub-regional legally binding instruments that African states are party to.

As mentioned above, there are various technologies to restrict access to guns and track when and by whom a weapon is used, such as biometric access control systems, mobile phone technology, radio-frequency identification and firearm safety devices. This technology can undoubtedly advance African states' ability to combat the proliferation of SALW and improve their capacity for PSSM. The next step will be to determine which smart gun technology can be used most efficiently to suit the tasks of the military and security forces in Africa.

Legal and policy instruments are available to governments, civil society, and the defense industry to engage in a dialogue to assess the needs of African states, conduct pilot projects and identify potential local manufacturers. These instruments, which are some of the most advanced in the combat against the illicit trade in SALW, can also form the basis for a regional standard setting that would create a demand-driven market for modern, yet affordable arms safety technology.

The Berlin Conference was an important first step in globalizing the discussion on smart weapon technology, bringing governments, international organizations, national SALW commissions, civil society organizations, the media, academia, and the industry together. This discussion needs to continue at the global and regional level, through further meetings of practitioners and policymakers, researchers, public-private partnerships, and broad-based involvement of the population.

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How to address problems of diversion and illegal transfers of arms?

Examples of diversion and illegal arms transfers are not hard to find but for the topic of smart weapons, I intend to cite an example from my own recent experience as the Arms Expert on the UN Security Council's Panel of Experts on the Sudan. This is because the example is topical but also because the solution, which a colleague and I recommended fits neatly with the concept explored here of using 'smart technology' as an aid in the prevention of diversion.

Export of high-tech weapons systems

Sukhoi 25 ground attack aircraft were exported from Belarus to the Sudan together with their associated air-to-ground rockets systems (including thermobaric warheads¹) after the receipt of a binding undertaking from the recipient government that the equipment would not be used in the Darfur conflict. This solemn undertaking was, alas, repeatedly breached. To counter this, at least insofar as future arms exports to that locality are concerned, my then colleague General Al-Omari from Jordan and I proposed to the Security Council that in future 'major assets' such as these aircraft should have electronic tracing devices installed during manufacture and in any event before delivery and that expendable assets—in this case the rockets—should be subjected to an enhanced verification regime.

Perhaps I should observe here also that my reason for leading with this example is that, in terms of the implementation of any legal requirement to apply smart technology to arms sales, there would be a clear advantage in going down the 'sanctions path' since resolutions of the UN Security Council are, in theory at least, automatically binding on Member States. There is, of course, also a downside to this in that it is often difficult in practice to successfully negotiate sufficiently robust language into a Security Council resolution. Indeed, one is sometimes reminded of the famous surrender broadcast of the late Japanese Emperor Hirohito who told his people, after the attacks on Hiroshima and Nagasaki, that the war "had proceeded in a manner not entirely to the advantage of the Japanese nation" and one should read the reports of Expert Panels to the Security Council in much the same spirit.

Nevertheless, we recommended that the Security Council

Require that states exporting military aircraft to the government of the Sudan incorporate an elec-

¹ These warheads were later used in the conflict for the first time.



tronic tracking system in the platforms to ensure that they are not used in violation of Resolution 1591(2005). Furthermore, such exporting states must report any such violations to the (Sanctions) Committee. They should also cease, after violation, to provide any technical support for those platforms and to provide new platforms to the government of the Sudan. (United Nations, 2013, paragraph 195 (b)).

We then went on to address measures to better control ammunition supply, including the thermobaric rockets mentioned earlier by recommending that the Security Council

Consider whether there is a need for an additional layer of verification to be imposed upon exporting states, given that the arms embargo is limited to the five states of Darfur and that there are numerous examples of cases in which the government of the Sudan has assured arms-exporting states that the equipment in question would not be used subsequently in Darfur. The Panel is of the view that there is such a need. Accordingly, the Panel further recommends that exporting states also be required to undertake physical verification of the presence of those assets on random dates thereafter. (ibid. paragraph 195 (c)).

The "additional layer of verification" which I was contemplating certainly involved the use of smart technology. If it is possible for international courier companies to be able to track shipments electronically all the way from consignor to consignee, then it is certainly possible for governments to do the same—it becomes, as ever, a matter of will.

Application of smart technology

In a purely passive system, one would microchip the asset, or a container of such, in much the same quick, cheap and efficient way that a family pet is

chipped. Subsequently, anyone equipped with the appropriate 'reader' could immediately ascertain the identity and history of the asset concerned and thus establish its status. Allied to the ability to track the items concerned throughout previous journeys by any mode of transport then, this is a comprehensive identification. Crucially, it offers the potential for real-time verification of items stored in a stockpile in a manner much superior to any other system currently in use and is far superior to any existing manual method of counting and inspection.

It is a matter of record that, in this particular example, international 'will' to thus bolster the arms embargo on Darfur did not actually exist. Nevertheless, undaunted, I suggest that both options above, which one might term the 'active' and the 'passive', since one involves the continuous electronic monitoring of a major weapons platform whilst the other involves the random verification of an object's presence, are potential solutions to the problem of arms diversion and I am also enthused by the prospects offered by smart technology in more traditional SALW control settings.

The potential clearly exists to use smart technology in the SALW setting, perhaps not only to mitigate civilian deaths by misuse but also in the military and security sectors. In the security sector, there are clear and valid concerns regarding control of individual weapons which will need to be addressed and one way forward would be to establish a pilot scheme where perhaps local police and security forces were equipped with smart weapons in a clearly defined region and the outcomes of this experiment were closely monitored. This is perhaps beyond the scope of this paper. Clearly the concept of smart weapons itself however, is not. At the time of writing, the debate continues in Europe and elsewhere regarding the merits and demerits of arming insurgents in Syria. The obvious point to make here is that the lifetime of a weapon is much greater than the lifetime of any single conflict. As an anecdote, I recall that in 2006 in Bunia in Eastern Democratic Republic of the Congo, the UN peacekeeping forces were able to confiscate rifles manufactured by F.N. Herstal in Belgium in the early 1950s and which were still perfectly serviceable. More recently, colleagues and I have devoted considerable time and resources to tracing weapons from the vast armories of the late Colonel Ghaddafi in Libya, which are now scattered in a great swathe across the Maghreb and elsewhere.

The corollary of this reality is that, if it were to prove possible to remotely control weapons, to only arm them upon arrival at an authorized destination, to allow their use only by someone approved of by the provider and to be able to turn them off when that approved use had ceased, then the case for supplying lethal assistance to the opponents of repressive regimes would be greatly strengthened. In this, discrete and specialized, context then I am struck by the prospects offered by radio-frequency identification (RFID) technology. Whilst I am aware of other approaches, the use of RFID seems to me to be the only smart weapon system which is currently available and which could be deployed tomorrow—if, that is, a weapons manufacturer could be induced to do so and a user or users could be identified. In this context, my previous comment about the need for some courageous organization to organize a defined field trial comes again to mind.

What has been termed smart gun technology has manifested itself in a variety of concepts including magnetic-based triggers, biometrics, pressure grips and active transmitters. All have as their aim to prevent the accidental or unauthorized discharge of a firearm. Usually, some sort of an identification device disengages a physical safety mechanism within the weapon and thus allows it to operate normally. User acceptability of these diverse systems has been a continuing problem. Radio transmitters require batteries which—it is said—may expire at just the wrong time whilst biometric-based systems allegedly take too long to activate. In contrast, RFID works in real-time, is proven and inexpensive as evidenced by its use in applications as diverse as passports and library tickets.

Radio-frequency identification systems

By using readily available RFID systems, it is possible to undertake detailed checks on a weapon and its ammunition throughout the journey from manufacturer to final authorized user. It is also possible for the originator of the export to closely control the use of the individual weapon. Weapons can be activated by remote control and also, likewise, deactivated. Leaving aside the morality or otherwise of arming any insurgents anywhere, this approach at least should mitigate the worst excesses that have been associated with recent previous attempts, such as the arming of Libyan rebels by the French and the current arming of diverse groups inside Syria by various Middle Eastern governments.

It is also true to observe that circumstances in which it might be desirable to retain ultimate control over a weapon are also those circumstances where the normal check and balances of a state are either fragile or, perhaps, entirely lacking. Perhaps one might use as an example the new State of South Sudan, which has had, in effect, to build itself from scratch. There is no shortage of SALW in South Sudan—indeed, even the government's fire-fighters are an armed force—but there remains a great deal of work to be done by way of stockpile management and control of individual weapons allocation.

In circumstances such as those one could, indeed, visualize a situation in which obsolete and obsolescent weapons would be recovered and destroyed and a much smaller number of newer weapons, properly accounted for, would be substituted. This would clearly provide an opportunity to use smart technology to advantage.

Conclusion

There is little doubt that, by embracing smart technology, the potential exists to ameliorate further the abuses caused by the diversion to unauthorized parties of otherwise legal arms exports. The problem perhaps is to induce an official organization—either governmental or international—to take a positive lead in such a process.

Certainly the technology already exists—while I admit to a preference to RFID systems, much the same principles hold for the other alternatives. But where to begin?

My preferred solution would be twofold; first, if the various Sanctions Committees of the UN Security Council could be assured of the value of smart technology as a new tool for use in UN sanctions regimes, then the process could be introduced simply by Security Council resolution, thus obviating the need for any renegotiation of international instruments such as the Arms Trade Treaty (ATT). This state of affairs could best be attained by a sustained attempt at outreach to the various Panels of Experts who report to, advise and inform their respective Sanctions Committees.

A practical demonstration of the efficacy of such technology as an antidote to diversion and the illegal transfer of arms would also be a useful—if not crucial—adjunct to this process. The new state of South Sudan would seem in principle to provide fertile ground for such an initiative, since the government of that state has abundant good intentions but a sadly lacking infrastructure to accomplish them. The use of smart technology as part of an ongoing process of assisting that government could only be seen, therefore, as a positive step.

Reference

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4

Political and legislative dimensions of smart weapon technology



Opportunities, concerns and the need for parliamentary action

Introduction

Smart weapon technology (SWT) is new to the field of small arms and light weapons (SALW). As with every new technology, perspectives and opinions diverge, sometimes more, sometimes less. For fruitful discussions and progress on the issue, it is of utmost importance that representatives from academia, practice, policy making, civil society, and industry stand in close dialogue and exchange ideas and concerns. While input from all these fields is important to move the agenda on smart weapon technology further, I would like to stress one particular perspective on the issue, namely the one of parliamentarians as policy shapers and legislators.

As any political issue, SWT underlies the logic of implementation. Only if it is subject to severe legislative efforts, its benefits and advantages can start to have an impact on the matter we are all most concerned with in regard to SALW—deadly violence. As David Atwood and An Vranckx point out in their chapters in this *brief*, armed violence causes more than 526,000 deaths per year (Geneva Declaration, 2011). An estimated 42 to 60 percent of these killings are committed with firearms (Small Arms Survey, 2013), signaling that SALW represent a major challenge towards the prevention and reduction of armed violence. Apart from its direct and lethal impact, SALW-related violence indirectly affects the socio-economic infrastructure of countries all over the world, severely harming human development, and representing a serious obstacle to the achievement of the Millennium Development Goals.

As a parliamentarian, active in the field of small arms-related violence, its prevention and reduction, I am primarily concerned with finding ways to stop deadly violence. When introduced to a new field such as SWT, my colleagues and I see the chance to contribute to a more peaceful world. We listen to experts, discuss with practitioners and review findings and recommendations with the ultimate aim of translating these into legislation. In short: We try to assess whether the suggestion at hand can reach its goals within the political reality of the world. Hence, with this article, I would like to contribute to the discussion on SWT by taking a parliamentary perspective on the issue and by investigating this new technology with regard to legislative opportunities and obstacles. What can be done on the legislative level to advance the smart technology agenda? What problems might arise when smart technology is analyzed through the eye of a parliamentarian? If we eventually deem it useful,



what will need to be done to ensure its successful implementation—both on the national and international level?

Throughout this paper, I will try to provide answers to these questions and I would like to do so by stressing three major points which I consider to be particularly important when discussing SWT through the eyes of legislators. First—obvious but often neglected—without parliamentary action on SALW and SWT no significant progress can be made, neither in terms of national nor international implementation. Second, while parliamentarians and their work are necessary to advance the SWT agenda, there are some concerns that have to be raised when taking a parliamentarian perspective on the usefulness, desirability, and political reality of SWT. Third, if we deem SWT to be a useful tool to prevent and reduce SALW-related violence despite all potential concerns, then parliamentary action on the issue has to be of a particular nature to be successful, namely characterized by national and international cooperation and dialogue across party-lines, political ideologies and country borders.

Why do we need parliamentary action on smart weapon technology?

The discussion on SWT is embedded in the broader context of disarmament and SALW control, where parliaments and individual parliamentarians have a traditional and central role to play. Three characteristics of parliamentary action are hereby particularly important, as they define the very nature of our work and hence set the frame in which we are able to operate and consequently make an impact. While this refers to the broader issue of SALW, it is subsequently also relevant for smart technologies.

First and foremost, as legislators, we have the mandate to introduce new laws and review existing ones, ensuring that they adequately regulate

emerging practices. This refers to the national and the international level. While it is obvious that we decide whether laws are implemented or not in our respective parliaments, we also ratify international treaties and thus have an impact on the international SALW agenda. Reducing access to firearms through legislation to control their purchase and use has shown to be successful in reducing armed violence. Empirical evidence from different countries worldwide indicates that countries that have more restrictive firearm policies and lower firearm ownership also tend to experience less armed violence (Bellis et al., 2010).

However, while legislation is at the core of our work, our mandate is much broader. To tackle SALW-related issues, a complex set of interventions is needed that goes far beyond technical work on legislation. Hence, a second major characteristic of parliamentary action is that we operate as awareness raisers. We interact with the public and translate contemporary concerns into policies. By doing so, we play an important role in stimulating public debate and putting important issues on the political agenda in our parliaments. We can make our colleagues and governments aware of pressing issues, and we can lobby and advertise for them. In this regard, we play a unique role in shaping policy. Thus, with regard to the reduction and prevention of SALW related violence, we hope to not only contribute by developing and maintaining adequate legislation, but also by stimulating cultural and behavioral changes towards the possessions of small arms, their legitimacy and, eventually, their use. This refers to the international context, too, where we can initiate discussion with fellow colleagues in other countries, and hence greatly contribute to the formation of international norms on SALW. And finally, a third defining characteristic refers to our responsibilities in allocating budgets. This is particularly important to the issue of SALW and smart weapon technology, as we have to decide whether taxpayers' money is allocated adequately, and whether programs, initiatives and technologies are suitable for reducing and preventing armed violence in a given context. With regard to smart weapon technology, this holds true for all fields it could be used in, from marking and tracing in order to control legal and illegal arms trade, to stockpile management in OECD countries and post-war societies, to civilian protection and, finally, to the prevention of unintended incidents, be it within the police, the military, or among civilians.

To sum up: It is the parliamentarians who have to keep an eye on the political reality, on legislative concerns, societal norms and values as well as on financial restric-

tions. We have to make the decisions whether new technologies are worth funding, and whether they have a chance of surviving within the reality of our country and the international community. We have to make these decisions, and consequently we have to account for them. This gives us great opportunities to make an impact, but also great responsibilities. With regard to SWT, this means that we can advance the agenda via our role as legislators, awareness-raisers, and budget allocators, but at the same time it means that we have to reflect critically on the issue to do justice to our role as parliamentarians.

SWT through the eyes of a parliamentarian: A critical review

Since parliamentarians and legislators are no experts on smart weapon technology, the detailed discussion on the issue is best left to academic and technical experts. What is more interesting from the viewpoint of a parliamentarian are concerns related to political realities and consequently the question whether SWT—if implemented—could actually attain what it aims for, namely reducing armed violence globally. In this context, it should be remembered that in general, SWT is only a *tool* for the *control* of small arms. It is true that the availability and misuse of arms significantly contributes to violence and makes the outcome more likely to be lethal, but it does not *cause* it in the first place. Small arms are a violence multiplier, but not the main reason why individuals or groups resort to it. Merely having the means, e.g. resources or structural opportunities, to acquire a weapon does not necessarily mean that motivations to do so are present, and that the weapon is ultimately used. And, in contrast, while motivations might exist, the means to acquire a weapon might not, reducing the chance that an individual or group resorts to SALW-related violence. Hence, any discussion on the usefulness of SWT needs to take into consideration that merely addressing the supply side of armed violence in terms of controlling and containing SALW availability is not sufficient to prevent and reduce it. Tackling the demand side is of absolute necessity and includes the targeting of a wide range of potential motivations such as the actual or perceived need for security or desire for economic and social stability.

With that said, I would like to highlight some concerns that are particularly important when discussing this kind of technology with regard to implementation and legislation and which have to be kept in mind when making any efforts on the issue. As parliamentarians, our decisions have not only a direct impact

on national legislation and implementation, but also on international legislation influenced by our domestic decisions. Hence, any discussion on SWT has to distinguish between the contexts we are referring to. Are we assessing the usefulness and reality of such a technology within the industrialized world? Or are we talking about more fragile, instable setting such as conflict zones, post-war societies or countries characterized by economic and political instability? From a parliamentary perspective, I argue that while the technology is promising in theory, smart weapons come along with some concerns on the practical side of the coin.

Let us look at the main issues smart weapon technology aims to address. While the detailed discussion is best left to the experts, some basic facts are worth mentioning here. In the context of Organisation of Economic Co-operation and Development (OECD) countries, SWT are primarily intended to make small arms—whether they be owned by civilians or state authorities—safer and prevent their mis- and unauthorized use. They particularly address issues such as school shootings, suicides and unintentional killings. In addition, SWT used for marking and tracing weapons destined for export will provide a good basis for controlling that these weapons actually arrive at the authorized end-user and are not diverted. While all these measures are promising with regard to the reduction of the lethal impact of SALW by making the export and possession of arms safer, from a parliamentary perspective the possibility of some unintended effects needs to be considered. My concern as a policy shaper working towards the reduction of armed violence is that the use of SWT might be detrimental to our aim of shaping norms and values that de-legitimize the civilian possession and use of SALW. If weapons were perceived as less dangerous, would not more people try to acquire one? Making weapons safer might send a paradoxical political signal. We do not want to fuel the arms industry, to the contrary, we want to have fewer arms in circulation independent of whether these are secured by SWT or not. While making guns safer in terms of their functionality and restriction of use is a desirable outcome, SWT does not make arms less dangerous *per se*—they still are a lethal weapon.

Furthermore, whenever discussing SWT, we should take into consideration the specific context we are talking about. While SWT might be an effective way of preventing school shootings and suicides committed with the help of guns, its impacts in regions characterized by armed conflict, fragility and poverty might be

restricted. In countries where infrastructure is embryonic or arms represent a cultural object symbolizing power and masculinity, complex technologies might be more difficult to implement and to advertise for. While every saved life through SWT is a success on its own, we need to keep in mind that SWT is no wonder button that, once pressed, will solve the multiple problems associated with armed violence. And on a final note, as people's representatives, parliamentarians have to take the whole spectrum of opinions and attitudes towards small arms into consideration. Introducing a technology that particular segments of society could perceive as restricting their personal rights and freedom might have the unintended effect of pushing them more to the extreme end of the spectrum, rather than finding compromise that allows progress.

With regard to international consequences and as a member of the only global parliamentary network related to the specific matter of small arms control and violence reduction, the Parliamentary Forum on Small Arms and Light Weapons, I am not only concerned with domestic issues regarding SWT. I am also concerned whether this type of arms control mechanism is a reliable and suitable one for my colleagues in those parts of the world that are affected the most by the proliferation of SALW, such as Africa, Central and Latin America and the Caribbean. In contexts characterized by armed conflict, state fragility, political and economical instability, or severe crime, SWT could be a useful tool for stockpile management, tracing and marking and thus ultimately for preventing legally traded weapons to disappear on the black market. Yet, as parliamentarians, we have some legitimate questions to pose in that regard. We have an important role in approving budgets and will have to make the decision on whether developing this technology is worth its while. Armed violence reduction and prevention needs to be addressed from many angles. We need to assess whether time and resources that could be spent on SWT might be better spent on other violence prevention measures to reduce the actual use of weapons. There are proven, inexpensive methods concerning the terms of legitimate use of force, such as accurate training of personnel. In terms of civilian disarmament, these might contribute more significantly to the general weapons culture than relying on advanced technology. The remaining question is whether SWT is financially worth its while, and whether it is actually suitable for the realities of those regions in the world that are plagued the most by SALW-related violence.

Finally, and to end the discussion on concerns, independent from the context we are talking about, and with a stronger focus on the legislative side, it should be remembered that SWT are an *ex-post* mechanism to reduce armed violence. If we discuss the effectiveness of SWT that make the unauthorized use of small arms more difficult *after* they were acquired, we will have to take a step back and ask ourselves what can—legislatively—be done *ex-ante*, i.e. *before* they reach civilian hands. Without any doubt, sovereign states have the right to self-defense, making legal arms trade necessary. However, we must acknowledge that legal arms trade as it is regulated now and the illegal circulation of weapons fuel conflict and non-conflict related armed violence all over the world. This reminds us that efforts towards a better-regulated arms trade are of outmost importance for the prevention of SALW-related violence. The total proliferation of arms is far beyond the legitimate need and the major issue here might not be the question of how to handle weapons once they are in possession, but how to address the issue that there are simply too many of them in the first place. The world came one step closer to tackling that problem in April this year when over 150 states voted in favor of the Arms Trade Treaty (ATT). The question that remains is: How do we proceed?

Parliamentary action on SWT: A matter of national and international cooperation and dialogue

If we deem SWT useful and desirable, despite all potential risks and concerns, we then have to ask what can be done from a parliamentarian perspective to advance the agenda further? First and foremost, parliamentary and legislative action has to be of a particular nature: It has to be built upon two absolutely necessary conditions—*cooperation* and *dialogue*. While this is important for the national implementation of SWT, it also applies to the international context.

In terms of national legislation and implementation, it is of utmost importance to acknowledge that efforts on SWT can only be successful if parliamentarians in their respective parliaments join forces and work together. Let me demonstrate that with an example taken from my experience within my home parliament in Sweden. For a number of years, I have been leading a parliamentary association on SALW. The most important feature of this association is that it includes members from all eight parties represented in the Swedish parliament. It provides us, parliamen-

tarians concerned with the issue of armed violence and SALW control, with a forum to discuss and debate issues on SALW, to write joint and cross-party motions as well as to organize seminars and awareness-raising activities within parliament. Additionally, my work with the Parliamentary Forum on Small Arms and Light Weapons has led me to understand that there is a wide political interest that cuts across party political lines, opening opportunities for dialogue and consensus-building between representatives from otherwise opposing sides. Compared to the disarmament of nuclear weapons, where political support traditionally came from the center to the left, control of SALW gauges an interest in parliamentarians from the entire political spectrum—left, right, and center. This cross-party engagement based upon dialogue and cooperation between the different political segments has proved to be very fruitful for legislative action on SALW, and it is absolutely necessary if we want to advance the agenda on SWT.

However, the very nature of SWT demands that national cooperation, dialogue and action be complemented by efforts taken on the international level. In this regard, it needs to be remembered that it is not only important to work across lines within one's own parliament, but also to join forces internationally and become engaged in global networks and organizations. Only if parliamentarians stand in close international dialogue, can we learn from each other, build our capacities and take the reality in other regions into account when discussing the issue of SWT in our home parliaments. This is particularly relevant, since we play a central role in bridging the gap between agreements on the national level and international policies. Every international treaty that touches upon SALW—and in the future also on SWT—needs to be ratified by national parliaments. A strong and well-functioning legislation on SWT that aims at reducing armed violence worldwide needs the special attention of parliamentarians and their cooperation. Additionally, I would like to note that any legislation on smart technologies will only have a significant impact if implemented by all arms producing and importing countries. Only if we make sure that such technology is binding for all actors involved at all levels can we ensure that it will work and that it will have an impact on the core issue we are discussing here—the reduction and prevention of armed violence that is responsible for human suffering and deaths all over the world. With that, I do not mean that we should not push forward to make guns safer and hence reduce the risk of lethal outcomes. Such actions should be initiated by states in the OECD, so as to provide an

example and pave the way for global action. But I want to stress that we will be most effective if we join forces and work together.

Conclusion

Taking a parliamentary perspective on SWT in relation to SALW reveals that although there are many opportunities to prevent and reduce armed violence, these must be balanced with a number of concerns. As actors with a threefold responsibility—legislation, awareness-raising, and budget allocation—parliamentarians have to take a critical perspective on the issue to do justice to our role as people's representatives. At the same time, these three characteristics of parliamentary work give us great possibilities to push the agenda a step forward. This, however, can only be done when parliamentarians cooperate and stand in close dialogue, both in their national parliaments and within international fora, platforms and organizations. Similarly, only if we make SWT binding for all actors involved—no matter whether we talk about the marking and tracing of firearms, stockpile management or civilian protection—can it have a significant impact on the reduction of SALW-related violence. In short, cooperation, dialogue and legislation are the key words here.

Before outlining what particular outlook this offers for parliamentary action, I want to highlight three aspects of a more general nature:

First, as the discussion of concerns with regard to SWT above has shown, armed violence is a very broad and complex phenomenon that plagues a variety of different regions and countries. Until now, the discussion on SWT as a control mechanism has not taken different contexts sufficiently into account. Future debates on the issue should hence be characterized by greater context-specific analyses to make sure that we adequately discuss the issue and hence find suitable solutions for the variety of contexts, countries, and regions we talk about. I consider this *brief*, in which two specific national contexts are discussed, a good start, but more analysis and discussion is needed.

Second, an important issue is the financial aspect of SWT. Just like the wide range of potential mechanisms falling under that category—everything from electronic devices to GPS, radio-frequency, and biometrics—there is a wide range of financial implications, some of them more expensive, others probably less. Here, we need the qualified assessment of technical and academic experts to make a qualified judgment ourselves.

Third and finally, we should assess the usefulness of SWT for other types of weapons, such as explosive devices and landmines, which usually are dangerous legacies of wars. Many newer weapons contain electronic components, so that fitting SWT should not be too problematic.

What does that mean for the future of SWT? How should we proceed from here? And what implications does this have for parliamentarians? I would like to suggest three steps that have to be taken before SWT can become an implemented reality.

First, smart technology needs to be brought onto the political agenda within national parliaments and has to become a subject of thorough debate. Until now, this issue has received very little attention from policy-makers, and its embryonic status has prevented any action so far.

Second, we need to investigate financial aspects more. How expensive is smart weapon technology, and is it worth investing in it? Here, we need to cooperate with experts and make careful and wise decisions.

Finally, if we deal with these issues successfully, we will have to make sure that both national and international legislation on SWT, is strong and without any loopholes. If we follow these steps, I see a good chance to contribute to the reduction of deathly violence; in my home country Sweden, in Europe, and in the whole world.

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Incorporating SWT into international frameworks and standards

Introduction

The preceding chapters have set out in some detail the nature of 'smart' weapon technology (SWT) as it exists today and the contributions that such technology could make to strengthening small arms and light weapons (SALW) control in different contexts. The overarching objectives of SALW control are reducing the illicit trade, uncontrolled proliferation, and misuse of SALW and thus contributing to reducing the global burden of armed violence.

The reality is, however, that while such smart technologies promise much in the way of improved SALW control—including the protection of civilians, more efficient management of stockpiles and more effective import and export controls—they are currently delivering very little in concrete terms and have not made their presence felt beyond a number of industrialized countries. The technologies most widely used in today's world to control SALW—the stamping or engraving of numbers and symbols into steel, the writing of records onto paper by hand, the physical inspection of weapons stockpiles—are primitive compared to the technologies that have been described in preceding chapters and that are available—or will soon be available—to be applied to these tasks. Technologies such as radio-frequency identification (RFID), biometric recognition, two-dimensional data matrices and sophisticated electronic databases doubtless have potential. But the barriers to adopting them are high and can take different forms, including higher cost, the need for advanced training in their use, skepticism on the part of the end-user—be it military, police or civilian—regarding the need for and reliability of new technologies and, perhaps most significantly, a lack of incentives for the arms industry to adopt these new, smart technologies.

This chapter will offer some preliminary reflections on the challenges and possible benefits of incorporating smart weapon technology into international frameworks and standards related to SALW control, with a view to encouraging their wider application and use. It will focus in particular on two global agreements to which all UN Member States have committed themselves—the UN Programme of Action to Prevent,



Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All its Aspects (henceforth the UN Programme of Action - PoA) and the International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons (henceforth the International Tracing Instrument - ITI). In addition to these two global agreements, the chapter will also consider the role that the International Small Arms Control Standards (ISACS)—which provide practical guidance on the implementation of these agreements—can play in promoting the use of smart weapon technology to better control SALW.

Technological 'leapfrogging'

At the outset, it is important to address a common misconception that advanced, smart technologies of relevance to SALW control are only relevant to rich countries that have the necessary human and financial resources to acquire, use and maintain them. This is not necessarily the case, as is attested by the spread of other smart technologies throughout the world. Consider, for example, mobile telephony. In the last five years, Africa's mobile phone market has expanded to become larger than that of either the European Union or the United States, with some 650 million subscribers. During the same period, Africa's Internet bandwidth has grown twentyfold. This rapid spread and deep penetration of mobile communications technology is transforming the way many African communities engage in agriculture and climate change adaptation or consume financial, health, market and educational services (Yonazi et al., 2012).

The mobile phone example demonstrates two things. First, that advanced, smart technologies can be applied directly in developing countries, without the need to pass through intermediate technology stages (e.g. saturation by telephone landlines)—a phenomenon known as "leapfrogging" (Steinmueller, 2001)—

¹ The author would like to acknowledge with thanks: the German Federal Foreign Office for convening a conference on "Smart Technology in SALW Control" at which a first outline of this paper was presented; the Bonn International Center for Conversion (BICC) and the Conventional Arms Branch of the United Nations Office for Disarmament Affairs (UNODA) for reviewing earlier drafts of this paper; and Mr. Joseph Elton for providing research support. Any remaining errors or omissions are the responsibility of the author.

and, second, that smart technologies can have transformative effects, even, or especially, in developing countries. Two caveats are also needed in this context however. First, the right conditions have to exist for smart technologies to take hold and become ubiquitous (i.e. incentive structures must be sound) and, second, the infrastructure to support the technology must be in place or, at the very least, must be capable of being built cost-effectively.

Barriers to adopting smart technology

A number of barriers exist to adopting smart weapon technologies on a broad scale that could significantly improve and strengthen SALW control. Primary among these can be the cost of the technology itself—both in terms of hardware and software, but also in terms of the training required to enable the effective use of this technology. Another barrier can be the absence of sufficient infrastructure upon which the technology can rest (a smart technology that relies on sustained Internet connectivity, for example, will not work well at a remote border post outside of the range of mobile networks and without electricity). Inertia (i.e. unwillingness to change the way things are normally done) and concerns about the reliability of a new technology can also be barriers to adopting new technologies. Finally, the lack of appropriate incentives to develop, spread, and use new, smart technology is a fundamental barrier to their adoption. Such incentives, to be effective, should ideally be directed at innovators, entrepreneurs, and industry both from the side of the consumer and from the side of government.

Prerequisites for incorporating SWT into global frameworks and standards

For a specific piece of smart weapon technology to overcome such barriers and, furthermore, to gain broad enough recognition, acceptance and trust at the international level to consider incorporating it into global frameworks on SALW control, three main conditions would have to be met.

- The technology would have to consistently achieve the outcome it is designed to achieve—i.e. it should be **reliable**.
- The outcome achieved by means of the technology would have to provide significant advantages over how things were done before—i.e. it should be **transformative**.
- The cost of the technology (in terms of equipment, software, training, etc.) would have to be within the reach of all states (albeit with the need for

international cooperation and assistance in some cases)—i.e. it should be **affordable**.

Challenges to incorporating SWT into international frameworks

Even if all such prerequisites were to be met by a particular smart weapon technology, it would not automatically follow that they would find themselves recommended, or even referenced, in global agreements related to SALW control—e.g. the UN PoA or the ITI. There are two main reasons for this—the 'outcome-based' approach of both instruments and the fact that States have preferred not to revise their texts since adopting them in 2001 and 2005, respectively.

Outcome-based approach

These global agreements—which set out a broad range of undertakings to which all UN Member States have committed themselves—focus on achieving specific outcomes and do not, generally speaking, specify the technologies that should be employed in order to achieve them. For example, the UN PoA commits all UN Member States to putting in place "adequate and detailed standards and procedures relating to the management and security of their stocks" (United Nations. General Assembly, 2001). The UN PoA does not elaborate on what "adequate and detailed" standards are or on how (i.e. by means of which technologies) they should be achieved.

Likewise, the UN PoA encourages States to "consider international cooperation and assistance to examine technologies that would improve the tracing and detection of illicit trade in small arms and light weapons, as well as measures to facilitate the transfer of such technologies" (ibid.), a provision that is repeated in the ITI (United Nations. General Assembly, 2005). Although the UN PoA makes specific reference in this instance to the use of technology to strengthen SALW control, it does not make reference to any specific type of technology, but rather leaves this up to States to consider.

The ITI is even more pointed in this regard. For example, on the method (or technology) to be employed in applying markings to weapons, the instrument states that "(t)he choice of methods for marking small arms and light weapons is a national prerogative" (ibid.). As such, the Instrument explicitly eschews mentioning or recommending one marking technology or another. Like the UN PoA, the ITI focuses on the outcome to

be achieved—e.g. specifying the marks to be applied (name of manufacturer, country of manufacture, serial number, etc.); where they should be applied (frame/receiver, barrel, slide/ cylinder, etc.) and their general nature (conspicuous, readable, durable, etc.).

This 'outcome-based approach' is, generally speaking, the nature of multilateral instruments on SALW control. The Instrument indicates (often vaguely) *what* should be achieved (the outcome) but largely remains silent on *how* it should be achieved. This approach has the advantage of enabling multilateral instruments to remain relevant over time, even when new technologies come on stream. Were an instrument to specify or require, for example, that a specific, named technology should be used to achieve a particular outcome, it would risk losing relevance once a new and better technology was developed to achieve the same outcome.

In sum, the outcome-based approach of the UN PoA and the ITI make it highly unlikely that specific reference to smart weapon technology will be incorporated into these instruments.

Unchanging texts

Since UN Member States adopted the UN PoA and the ITI (in 2001 and 2005, respectively), they have not modified the texts of these Instruments, even though two Review Conferences (in 2006 and 2012) provided, at least in theory, opportunities to do so. It is likely that this practice will continue in the foreseeable future, meaning that it remains unlikely that direct reference to SWT will be incorporated into the texts of these instruments.

Opportunities for incorporating SWT into international frameworks

The outcome-based approach of the UN PoA and the ITI, combined with the fact that their texts are unlikely to be changed in the foreseeable future, make it unlikely that direct reference to SWT will be incorporated into these global instruments any time soon. There are, however, some indirect ways by which SWT could be referenced in and incorporated into the international *aquis* that surrounds these Instruments, assuming the technologies fulfil the prerequisites of being reliable, transformative, and affordable.

Inclusion in outcome documents of UN Inter-sessional Meetings and Review Conferences

Rather than seeking to strengthen global instruments on SALW control by revising their texts, UN Member States have instead chosen to elaborate upon and strengthen the respective normative content of the UN PoA and the ITI through substantive outcome documents generated by biennial meetings of States (BMS), sexennial review conferences (RevCon), and meetings of governmental experts (MGE). To date, four such substantive outcome documents have been generated by inter-sessional meetings and review conferences in the context of the UN PoA and the ITI: The Outcome Documents of the 3rd and 4th Biennial Meetings of States (in 2008 and 2010, respectively); the 1st Meeting of Governmental Experts (in 2011) and the 2nd Review Conference (in 2012). A brief analysis of how these documents relate to the issue of technology is instructive.

The Outcome Document of the 3rd Biennial Meeting of States contains a number of provisions relating to the dissemination and use of technology designed to strengthen SALW control. For example, it

- notes that "assistance and cooperation include technical (...) support, [and] the provision of (...) technology;
- calls on States and international and regional organizations to render "technical (...) assistance, [and] measures to facilitate technology transfer;"
- emphasizes the importance of expending resources for the purpose of "procuring information technology and equipment required for inventory management;"
- notes that "(a) number of States were seeking assistance in the acquisition of hardware and software to improve national record-keeping capacity;"
- encourages States to examine "technologies that would improve the tracing and detection of illicit small arms and light weapons, as well as measures to facilitate the transfer of such technologies" (United Nations. General Assembly. 2008).

The Outcome Document of the 4th Biennial Meeting of States likewise contains a number of provisions of relevance to the issue of smart weapon technology. For example, the document

- encourages States to "facilitate the transfer of technology for the detection and tracing of the trafficking in small arms and light weapons;"
- highlights the importance of "enhanced technical capacity to mark all small arms and light weapons and recover obliterated markings;"

- notes “the value of technology in creating a comprehensive system of records;” and
- calls upon States to support “the distribution of marking machines to enable States to mark existing State inventories of small arms and light weapons, in addition to newly seized or newly imported or manufactured small arms and light weapons” (United Nations. General Assembly. 2010).

The procedural report of the 1st Meeting of Governmental Experts on the implementation of the UN Programme of Action (United Nations. General Assembly, 2011) refers to “the marking, record-keeping and tracing of ammunition for small arms and light weapons” (ibid.) and “the transfer of relevant technologies to developing States in a non-discriminatory manner” (ibid.).

Finally, the Outcome Document of the 2nd Conference to Review Implementation of the UN Programme of Action and the International Tracing Instrument

- notes “the important role of industry in the Programme of Action process, including in ensuring that the process is fully informed by relevant technical developments;”
- undertakes to facilitate “the transfer of relevant technology;”
- suggests that topics for future inter-sessional meetings (biennial meetings and meetings of governmental experts) could include
 - o “physical security measures of small arms and light weapons and capacity-building (including provision of equipment, technology and training);”
 - o “the implications of recent developments in small arms and light weapons manufacturing, technology and design for effective marking, record-keeping and tracing; and
 - o “relevant practices in relation to international assistance and capacity- building, including ways to support the transfer, uptake and effective utilization of relevant tools and technologies;
- commits States in a position to do so to provide “adequate technical and financial assistance, relevant technologies, equipment, in particular marking machines, and training in order to improve national marking, record-keeping and tracing capacities;” and
- commits States to “utilize the national reports to share information (...) on the provision of technical, financial and other assistance, including the provision of relevant equipment (...) and technology” (United Nations. General Assembly, 2012).

The above brief review demonstrates that the outcome documents of biennial meetings, meetings of governmental experts and review conferences of the UN PoA and the ITI delve into considerably more detail on matters pertaining to technology than do the global instruments to which they relate. This notwithstanding, it is also clear that references to technology that appear in these outcome documents are not so specific as to recommend, or even mention by name, a particular technology (e.g. RFID, 2D matrix marking, etc.).

There are grounds to expect, however, that references to technology—including to smart weapon technology—may be included in a more pointed way in such outcome documents in the future. In preparation of the 5th Biennial Meeting of States to consider implementation of the ITI, scheduled to be held in June 2014, States have requested the UN Secretary-General, for the first time, to submit a technical report on “the implications of recent developments in small arms and light weapons manufacturing, technology and design for effective marking, record-keeping and tracing,” as well as “practical steps to ensure the continued and enhanced effectiveness of national marking, record-keeping and tracing systems in the light of such developments” (United Nations. General Assembly, 2012). The Secretary-General’s report, which will be informed by written contributions from Member States, will be an opportunity to present and explain the utility of new smart weapon technologies—such as those set out in this *brief*—and could provide States with material that they could refer to and use in future outcome documents of biennial meetings, meetings of governmental experts and review conferences. Opportunities to do so will present themselves at biennial meetings of States in 2014 and 2016, at a meeting of governmental experts in 2015, and at the 3rd Review Conference in 2018 (ibid., 2012).

Inclusion of references to and recommendations regarding smart weapon technology in the outcome documents of these future meetings would integrate such technologies into agreed implementation measures within the international framework on SALW control.

Inclusion in international small arms control standards

A second possibility also exists to integrate smart weapon technology into international frameworks on SALW control—their inclusion in International Small Arms Control Standards (ISACS). ISACS are being developed by the United Nations to provide practical guidance on the implementation of commitments that States have made in, *inter alia*, the UN PoA and the ITI². The standards take the global norms set out in these instruments as their starting point, but then delve into some detail on how a State could go about achieving such norms in practical terms. As mentioned above, the 'outcome-based' approach of the global instruments mean that they focus on specifying the outcome to be achieved without necessarily providing guidance on how it should be achieved. ISACS seek to fill this gap by providing practical guidance on how to achieve the outcomes set out in these instruments. As such, the standards have some scope to refer to or recommend technologies that can facilitate the achievement of such outcomes.

Yet, ISACS also have some constraints in this regard. In setting standards, ISACS seek to strike a balance between the 'effectiveness' of the standards being set, on the one hand, and their 'achievability' by all UN Member States, on the other—bearing in mind that some States may require international cooperation and assistance in order to be in compliance with the standards. The need to strike this balance—for international standards on SALW control to be both effective and achievable—means that the standards set by ISACS are not necessarily 'best practices' in the strict sense of the term.

An example should serve to illustrate this point. On controlling access to SALW stockpiles, ISACS could recommend that biometric technology (e.g. fingerprint or retina scanning) be employed. This would be highly effective in achieving the outcome desired—allowing only authorized personnel to have access to SALW stocks. However, this solution would not be achievable by all UN Member States, given the cost of the technology and the infrastructure and training required to run and maintain it. Such a solution—although it may be 'best practice'—would not strike the balance that is sought by ISACS. Thus, although ISACS does have the scope to refer to and even recommend certain technologies, the standards are also constrained by the need to balance effectiveness with achievability.

² Further information on the ISACS project is available at <www.smallarmsstandards.org>.

The United Nations launched the first set of ISACS modules at the 2nd Review Conference of the UN PoA in August 2012. While the modules provide much practical guidance, they do not, generally speaking, make specific recommendations regarding the use of technology, except when they set out and recommend the use of existing resources made available by international organizations such as the International Criminal Police Organization (INTERPOL) and the World Customs Organization. An example of this is the recommendation by ISACS 05.31 (*Tracing illicit small arms and light weapons*) of the use of integrated ballistic identification system (IBIS) technology in the forensic analysis and matching of fired cartridge cases and bullets, based on its adoption and use by INTERPOL at the global level in the INTERPOL Ballistic Information Network.

Provision has been made for the continuous updating and revision of ISACS modules. Such revisions are foreseen when major policy developments take place (e.g. the adoption of new global agreements—such as the ATT) or when new technology comes on line that fulfils the prerequisites of being reliable, transformative, affordable, and, consequently, strikes the required balance between being effective in achieving the desired outcome and being achievable by all UN Member States.

Conclusion

The technologies most widely used today to control SALW are primitive compared to the smart technologies that are available (or soon will be) to be applied in this area. The barriers to adopting smart weapon technologies are many and varied but primarily relate to costs, available infrastructure, concerns about reliability and inertia in the face of changing the way things are done. For a smart weapon technology to gain enough traction to have a chance of being integrated into international frameworks and standards on SALW control, it must prove itself to be reliable, transformative, and affordable.

Since both the UN PoA and the ITI focus primarily on outcomes to be achieved (and not on the methods or technologies to be used to achieve them), the most promising avenue for integrating smart weapon technology into international frameworks lies in their inclusion in the outcome documents of biennial meetings of States, meetings of governmental experts and review conferences on the implantation of these instruments, opportunities for which will arise in 2014, 2015, 2016 and 2018. The report of the UN Secretary-

General on the implications of recent developments in small arms and light weapons manufacturing, technology, and design for effective marking, record-keeping, and tracing, foreseen for 2014, may provide a key catalyst in this regard.

The possibility also exists to integrate smart weapon technology into the International Small Arms Control Standards—which provide practical guidance on the implementation of global SALW control commitments—provided that the technology in question strikes the right balance between effectiveness, on the one hand, and achievability by all UN Member States, on the other, helped along by international cooperation and assistance.

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Afterwords

SmartCon (formally the International Conference on Smart Technology in Small Arms and Light Weapons Control: Civilian Protection, the United Nations Programme of Action, and Transfer Control), held in June 2013 at the Foreign Office in Berlin, was the first major interdisciplinary and international conference on the topic of smart weapon technology. The technology, nicknamed smart guns is really a collection of related, but separable technologies: IT solutions for stockpiling, protection of civilians, gun theft and misuse, and cross-border arms trade. Crucial, we believe, is the recognition that we are at the beginning of a process in which smart weapon guns—despite our dislike for the term—or smart weapon technology will contribute to SALW control, physical security and stockpile management (PSSM), civilian security and protection. At the moment, the field is chaotic, and incorporates a number of issues, which, upon further examination, will prove to be separable and specialized. This *brief* incorporates many of the papers presented at the conference aggregated into four major themes: the imperative to use smart weapon technology, technology and its potential, its use in less developed and post-conflict countries (where the SALW problem is present in its most acute and variable forms), and the political/ legislative dimension.

In ten years time, we expect that much of this discussion will be obsolete. Technological development being what it is, within a decade we would expect to find the technology radiating into a variety of specialized niches. The field of smart weapon technology will likely mature, branch out, and specialize into many niches, as any healthy technological economic market should. At the moment, the market for smart guns is embryonic: We can barely see what it *might* and *perhaps* should become with time, as specialized niches become occupied by manufacturers, specialized demand by user sectors grows, and more understanding is garnered about the technology, its uses and its limitations.

One issue that overshadows the entire topic, and which is reflected in the papers presented in this *brief*, is the usual problem often found in discussions of technological innovations: While the technology is already here, waiting to be used, the social understanding, and social institutions to deal with the technology are yet to come to maturity. Significantly, the papers in this *brief* address the issue not only from the perspective of developed economies in Europe, but also of developing and post-conflict countries in Africa and elsewhere. One common finding among the authors is



that a stable legal framework and functioning institutions are preconditions for the use of the technology. On the other hand, some of the most egregious problems are in developing and post-conflict states, where stable institutions are often not present, and where funds may be nonexistent. Most of the papers seem to accept, as did the participants at the SmartCon, that it is important to adapt technology to the environment and needs of developing countries, where most gains are to be made. This in turn implies that the technology must be simple and robust, cheap, offer immediate advantages to the user, and build upon successes in governance and the economy.

A second fundamental issue that emerges from these papers is that smart gun technology is not a silver bullet. It is an additional instrument—likely a powerful and important one—in the array of tools we need to ensure safety from firearms abuses. Some of the smart weapon technologies discussed are more controversial than others. There is little opposition to improving tracing technology, for example, by adding a chip that is non-removable, readable from the distance, cheap and able to store quantities of data. Such an apparently small step could help to improve stockpile management, export control monitoring, retrospective tracing. This type of 'lead technology', offering as it does immediate and tangible benefits in terms of savings and security, could pave the way for the introduction of other smart weapon technologies.

On the whole, we find that manufacturers, NGOs, and diplomatic and political actors are all aligned behind the technology, rather than being opposed to one another. This is encouraging, because it means that from the start there is general buy-in, and from the start, there will be knowledgeable people able to encourage, guide, and if necessary critique, the path of development. This is not to say there is total agreement to this technology. There is powerful, sometimes reasoned opposition to the application and distribu-

tion of 'smart gun' technology. This opposition often comes from developed countries, where SALW problems, and solutions, differ markedly from those nations where SALW are a clear and present danger to daily life, notably less-developed and post-conflict countries. The major challenge we face is to convert those opponents into supporters. This will come about once we have two things in hand. The first is strong empirical evidence of the utility of the technology and its concept. Second, as the industry matures, as new technologies within the field emerge, we will find that different segments of what we now think of (or talk about) as a single technological idea—smart guns or smart weapon technology—will appeal to different consumer types. These consumers will also be found among those currently opposed, for their own reasons (often political ones), to smart guns, as the variety and versatility of different aspects of 'smart guns' become apparent.

Smart weapon technology must be discussed further. This *brief* and the discussions that preceded it identified a wide gap between what is technologically feasible and what is politically and legally possible or marketable. Critically, what has been left undone for the large part is to identify the incentives, the regulations and the laws that may be necessary to make the technology relevant and workable. We are happy for any initiative that will help ensure that the ideas generated in this *brief* will not be lost but be developed further—particularly within UN frameworks, among the community of policymakers, and within the research community.

Smart weapon technology melded with firearms will not save the world from armed violence. Not all technologies will work in all situations. Nevertheless, some technologies hold promise of being useful in specific situations. But, with half a million victims every year, even small percentage reductions translate into large numbers of victims saved.

Acronyms and abbreviations

ATT	Arms Trade Treaty
AUC	Autodefensas Unidas de Colombia
CAVIM	Compania Anónima Venezolano de Industrias Militares
CPU	Central processing unit
DDR	Disarmament, demobilization, and reintegration
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EU	European Union
EUC	End-user certificate
FARC	Fuerzas Armadas Revolucionarias Ejercito del Pueblo
FN	Fabrique Nationale
GBAV	Global Burden of Armed Violence
GD	Geneva Declaration on Armed Violence and Development
GPS	Global positioning system
HDI	Human Development Index
IATG	International Ammunition Technical Guidelines
INDUMIL	Industria militar
INTERPOL	International Criminal Police Organization
ISACS	International Small Arms Control Standards
IT	Information technology
ITI	International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons (International Tracing Instrument)
MANPADS	Man-portable air defense systems
MPEG	Moving Picture Experts Group
NGO	Non-governmental organization
NRA	National Rifle Association
NSAG	Non-state armed groups
OAS	Organization of American States
OECD	Organisation of Economic Co-operation and Development
OSCE	Organization for Security and Co-operation in Europe
PSSM	Physical security and stockpile management
RevCon	Review Conference
RFID	Radio-frequency identification
SADC	Southern African Development Community
SALW	Small arms and light weapons
SSR	Security sector reform
SWT	Smart weapon technology
UN	United Nations
UNGA	United Nations General Assembly
UN-PoA	United Nations Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All its Aspects (UN Programme of Action)
UNREC	United Nations Regional Centre for Peace and Disarmament in Africa
UNSAC	United Nations Standing Advisory Committee on Security Questions in Central Africa
US	United States
WHO	World Health Organization

Contributors and editors

Michael Ashkenazi

Michael Ashkenazi is currently the Program Leader for SALW Control at the Bonn International Center for Conversion (BICC), a German applied research center focusing on security and development. Dr. Ashkenazi has conducted research in Afghanistan, China, Guinea Bissau, Japan, Korea, Liberia, Nepal, South Sudan, Timor Leste, and Uganda. His current research interests range from traditional security providers through arms and ammunition storage, DDR, SSR, to the effects of SALW on societies and development. His research has been disseminated through numerous publications, including the TRESA (Training and Education on Small Arms) publications, and numerous courses across the world including in Columbia, Germany, Ghana, Mozambique, South Sudan and UN Headquarters. Audiences range from police and military officers through NGO members to parliamentarians. Previous to working for BICC Dr. Ashkenazi taught graduate and undergraduate students at universities in Canada, Israel, and the United Kingdom. He has also served as infantryman, platoon and company commander, and in staff positions. He was educated in Israel, Japan, and the United States.

David Atwood

David Atwood currently works part-time at the Small Arms Survey, where he remains closely associated with the Geneva Declaration on Armed Violence and Development. He is also a Visiting Fellow at the Geneva Centre for Security Policy. From 2004 to 2011, he was Director of the Quaker UN Office in Geneva, and led QUNO's disarmament and peace program from 1995 to 2011. He has worked on a wide range of international peace and security issues concentrating mainly on enabling processes on international peace and security policy with UN missions, international agencies, and NGOs. He is a co-founder of the Geneva Forum, the joint Geneva-based peace and security initiative undertaken by QUNO with the UNIDIR and the Centre on Conflict, Development and Peacebuilding of the Graduate Institute of International and Development Studies. He has been closely associated with small arms-related policy and research for many years. He led QUNO's work in developing the civil society relationship with the Geneva Declaration on Armed Violence and Development, building the early foundations for the newly formed Global Alliance on Armed Violence. He holds a PhD in Political Science from the University of North Carolina.

Patrick McCarthy

Patrick McCarthy heads the United Nations Inter-Agency Support Unit tasked with developing and supporting the use of International Small Arms Control Standards (ISACS). ISACS provide comprehensive, practical guidance on putting in place and maintaining effective controls over the full life-cycle of small arms and light weapons (SALW). He is an employee of the United Nations Development Programme (UNDP), is based in the UN Office for Disarmament Affairs (UNODA) in New York, and works for the 23 UN agencies that make up the United Nations Coordinating Action on Small Arms (CASA) mechanism. Before joining the United Nations in 2008, he spent eight years coordinating the Geneva Forum—a joint UN/academic/ civil society initiative to support multilateral disarmament and arms control processes—and three years working in the area of conflict prevention and post-conflict peace-building with the Organization for Security and Co-operation in Europe (OSCE), the World Economic Forum, and the International Peace Bureau.

Owen Greene

Dr. Owen Greene is at the University of Bradford, where he has held a series of responsibilities including Research Director of the Department of Peace Studies (1994–2009), Director/ Chair of the Centre for International Co-operation and Security (CICS) (2002–) and Faculty Coordinator of Politics and International Studies Research (1996–2009). He is an international expert on conflict prevention and post-conflict recovery; arms proliferation; small arms and light weapons (SALW) and armed violence; security sector reform (SSR), disarmament, demobilization and reintegration (DDR), conventional arms (inc SALW) reduction and control, and inter-relationships between conflict, security and development in fragile and conflict affected countries. He is co-founder or Chair of the Board of several relevant NGOs, including Saferworld. Since the early 1990s, he has played a prominent international role in the development of international and regional actions on SALW, SSR, DDR, CSBMs and the Arms Trade Treaty (ATT), including several years as UN Consultant on SALW and advisor or assistant to the chair of several negotiations and policy processes in the UN, OSCE, EU, OECD, and regional organizations in Sub-Saharan Africa and Asia. In this context, Owen played a prominent role in initiatives to enable international tracing on illicit or diverted SALW since the late 1990s; and continues to be actively engaged with this issue.

Contributors and editors

Elvan Isikozlu

Elvan Isikozlu (M.A.) is a Researcher at BICC working primarily on small arms and light weapons (SALW) related issues. Between 2008 and 2010, she led a research study on wartime rape with field research in El Salvador and Bosnia & Herzegovina, and co-authored BICC *brief 43 Toward a Typology of Wartime Rape*. Prior to this study, Ms. Isikozlu led the coordination and delivery of six civil society workshops on small arms control in various villages in South Sudan, as part of BICC's early capacity-building work in the now Republic of South Sudan. She has also developed training material on small arms control through BICC's Training and Education on Small Arms (TRESA) project, and modified this material for use in South Sudan, Ghana and the West African region. Ms. Isikozlu recently returned to BICC from maternity leave.

Marco Kalbusch

Marco Kalbusch is the Director of the United Nations Regional Centre for Peace and Disarmament in Africa (UNREC), based in Lomé, Togo. He holds a German and a Belgian law degree from the University of Passau and the Catholic University of Louvain, as well as a degree in canon law. He has been awarded a doctoral degree in law from the Martin Luther University of Halle-Wittenberg. Mr. Kalbusch is a permanent staff member of the United Nations Secretariat. Before being appointed to UNREC, he served with the Office of the High Commissioner for Human Rights (OHCHR) as a Human Rights Officer in different positions in Burundi, Somalia and as Deputy Regional Representative for Southern Africa, with the Department for Disarmament Affairs at United Nations Headquarters in New York and in UN peace operations in East Timor and the Democratic Republic of the Congo. He has expertise in the areas of disarmament, mine action, security sector reform, human rights, international humanitarian law and transitional justice. Dr. Kalbusch has been the legal advisor to the UN Commission of Inquiry on serious human rights violations in Côte d'Ivoire and part of the Southern African Development Community (SADC) legal team to support the implementation of the Madagascar roadmap.

Marc Kösling

Marc Kösling (Dipl.-Soz.-Wiss.) works in the area of small arms and light weapons (SALW) control at the Bonn International Center for Conversion (BICC). He studied at the University of Duisburg-Essen with Political Science as major and a minor in Psychology. Marc Kösling co-authored the extensive BICC *brief* on man-portable-air-defense-systems (MANPADS) and their threat to civilian aviation and was the project manager of the international conference "Smart Technology in SALW Control: Civilian Protection, the UN-POA, and Transfer Control" (SmartCon). Other research interests include physical security and stockpile management (PSSM), international regimes, and regional cooperation.

Brian Johnson-Thomas

Brian Johnson-Thomas was Arms Expert on the UN Security Council's Panel of Experts on the Sudan from 2010 to 2013. In recent times, he has also worked on the UN Security Council's Panel on the Democratic Republic of the Congo and as Team Leader of an EU Expert Mission to Africa and Latin America charged with identifying SALW projects suitable for funding under the Instrument for Stability. His first published research—in February 1992—on the illicit trade in SALW referred to Mogadishu in Somalia.

An Vranckx

Since obtaining her PhD from the University of Brussels in 1999, An Vranckx has been working as an analyst and project coordinator on a wide array of international security themes, most prominently (small) arms transfers. While affiliated with the International Peace Information Service, United Nations University and the University of Ghent Conflict Research Group, her empirical research covers amongst other things European-made SALW that have leaked into the hands of illegal non-state actors in Colombia—as reported in the first of a series of 'black books' on European arms exports that she began editing in 2010. Additionally, Dr. Vranckx has guest lectured at a number of universities.

Contributors and editors

Christer Winbäck

Christer Winbäck has been a Swedish Member of Parliament since 2002. He is a long-term member, and currently Vice President, of the Parliamentary Forum on Small Arms and Light Weapons, a global network of parliamentarians related to the specific matters of arms control and violence prevention. In his home parliament, he is a member of the Committee on Foreign Affairs and is deeply engaged in issues concerning Latin America. He is both the chairperson of the parliamentary associations for Latin America and small arms and light weapons.

Annex : Conference Program

Smart Technology in SALW Control:
Civilian Protection, the UN-PoA,
and Transfer Control (SmartCon)
(Berlin, 17–18 June 2013)

Monday, 17 June 2013

- 09.00-10.00 **Registration**
- 10.00-10.30 **Welcome**
Ambassador Rolf Nikel (Foreign Office, Federal Commissioner for Arms Control)
Prof. Dr. Conrad Schetter (BICC Director for Research)
- 10.30-12.00 **Panel 1: The Context of Armed Violence**
The discussion on Smart Weapon Technology is embedded in the global realities of insecurity and the proliferation of small arms and light weapons (SALW). To introduce the topic, provide a common ground on the issue at hand, and introduce basic statistics, two experts will give presentations on the key context factors: armed violence and global arms proliferation.
- Presenters:
David Atwood (Small Arms Survey)
An Vranckx (Saferworld)
Moderator: **Marc Kösling** (BICC)
- 12.00-13.30 **Lunch Break**
- 13.30-15.30 **Panel 2: Smart Weapon Technology**
The term 'Smart Weapon Technology' subsumes a variety of concepts— including personalized weapons, digital stockpile management systems, and locking systems for individual weapons— which in turn have been implemented in different ways by the industry. This panel gives an introductory overview of the topic from several perspectives, including that of academia and industry representatives. Core contents of this Panel include
- Defining Smart Weapon Technology
 - Possibilities and limits
 - Practical experiences and lessons learned
 - Typology and semantics of available systems
 - Range of applicability
 - Potentials for the integration of smart technology into the manufacture of weapons and MANPADS
 - Why is smart technology in SALW-control not more widely used?
- Panelists:
Maximilian Hefner (Armatix)
Jonas McCord (Biomac/Sandy Hook Promise)
Michael Ashkenazi (BICC)
Moderator: **Benjamin Sutherland** (The Economist)
- 15.30-16.00 **Coffee Break**

Annex : Conference Program

- 16.00-17.30 **Panel 3: Security I—The context of developing and post-conflict countries—
Fight against diversion, improving PSSM**
Electronic solutions to secure SALW have been developed in industrialized Western countries where stockpile management is established and civilian possession of firearms is rather well regulated. This panel discusses how and under which conditions Smart Weapons Technology can be effective against diversion and improve PSSM in the context of developing countries. Contents include:
- Physical Security and Stockpile Management (PSSM) and the prevention of diversion in LDC context
 - Civilian protection (e.g. cattle rustling)
 - Preventing licit weapons from becoming illicit
- Panelists:
Anzian Kouadja (SALW Commission Cote d'Ivoire)
Abdulmonem Aliwan (Libyan Mine Action Center)
Klaus-Dieter Tietz (Police Expert South Sudan/ Bosnia)
Marco Kalbusch (UNREC)
Moderator: **Christof Kögler** (BICC)
- 19.00-21.30 **Evening Reception**
Löwenbräu am Gendarmenmarkt GmbH
Leipziger Straße 65
10117 Berlin

Tuesday, 18 June 2013

- 9.00-10.30 **Panel 4: Security II—Enhancing Export Control and Tracing of SALW**
Most illicit weapons originate from licit state stockpiles or the diversion of state-to-state deliveries. This panel looks at the potential contributions of Smart Weapon Technology to shipment and post-shipment tracing. Contents include:
- Smart Technology in export control
 - Tracing SALW
- Panelists:
François Remue (WCO)
Anika Leidinger (BAFA)
Owen Greene (University of Bradford, UK)
Brian Johnson-Thomas (UN Consultant)
Moderator: **Wolfgang Bindseil** (Federal Foreign Office)
- 10.30-11.00 **Coffee Break**

Annex : Conference Program

- 11.00-12.30 **Panel 5: Panel Discussion on Safety and Civilian Protection in EU/ OECD Countries**
Civilian arms control has been a contested topic in many countries. In Germany, for example, the issue was debated following several school shootings in the past 15 years. This panel debates the question whether and how Smart Weapon Technology can play a role in increasing the safety and security of civilian firearms in the format of a Pro-Con discussion. The following questions will form the starting point for the discussion:
- Can the use of Smart Weapon Technology reduce gun violence in the civilian sector, and if so, under which preconditions?
 - What are the legal and human rights objections to Smart Weapon Technology?
- Panelists:
Joachim Streitberger (ESFAM)
Jonas McCord (Biomac/Sandy Hook Promise)
Owen Greene (University of Bradford, UK)
Andrea Böhm (Die Zeit)
Moderator: **Michael Ashkenazi** (BICC)
- 12.30-13.30 **Lunch Break**
- 13.30-15.30 **Panel 6: Legal Frames—The UN Programme of Action and other National and International Legislations**
If Smart Weapon Technology proves effective in reducing armed violence it will need to be integrated in national regulations and taken up in relevant regional and international mechanisms and standards (e.g. the Wassenaar Arrangement, UN Programme of Action including its International Tracing Instrument, UN Firearms Protocol, and International Small Arms Control Standards (ISACS)). This panel investigates the requirements and potentials of such integration and includes:
- Legal implementations and requirements for Smart Weapon Technology on the international level
 - The role of smart technology for the future of the UN Programme of Action
 - Legal implementations and requirements on the national level
 - Can Smart Weapon Technology be worked into legal export mechanisms?
- Panelists:
Patrick McCarthy (UN-CASA)
Gillian Goh (UNODA)
Christer Winbäck (MP Sweden / Vice President Parliamentary Forum on SALW)
Stephen Teret (Johns Hopkins University)
Moderator: **Detlev Wolter** (Federal Foreign Office)
- 15.30-15.45 **Coffee Break**
- 15.45-16.30 **Summary and Next Steps**
- Legal issues at national level
 - Legal issues at the international level
 - Next steps with regard to technology
 - How to encourage and develop use in post-conflict and less developed states

Photo credits

- p. 4: Marc Kösling/ Thomas Ecke, BICC
Michael Ashkenazi/ Thomas Ecke, BICC
- p. 8: Slide showing gun markings from
An Vranckx' presentation at SmartCon/
Thomas Ecke, BICC
- p. 9: David Atwood/ Thomas Ecke, BICC
- p. 18: An Vranckx/ Thomas Ecke, BICC
- p. 25: Gun on the left/ Radetec
Gun with RFID watch/ Armatix
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Ashkenazi/ BICC
- Title: Audience at SmartCon/ Thomas Ecke, BICC
Assault rifle/ Radetec
Slide showing gun markings from An
Vranckx' presentation at SmartCon/ Thomas
Ecke, BICC
Gun with RFID watch/ Armatix
SmartCon Title/ Thomas Ecke, BICC
Assault rifle with RFID wristband/
Triggersmart

Conversion research for a more peaceful world

As an independent, non-profit organization, BICC (Internationales Konversionszentrum Bonn—Bonn International Center for Conversion) deals with a wide range of global topics in the field of peace and conflict research centering on conversion studies. With its vision of a more peaceful world, BICC analyzes the problems caused by organized violence and seeks ways to overcome these conflicts.

The main foci of BICC's work

BICC examines the dynamics of organized violence at three levels:

- *Concepts* (changes in the perception of war and its concomitant processes).
- *Means* (research on the material dimension of organized violence: i.a. conversion of military sites, global arms expenditures and exports, small arms control, new arms technologies).
- *Practices* (all processes of visible changes in organized violence: i.a. military regimes in transition, privatization of security).

Natural resources as well as migration constitute further key areas of BICC's work. Organized violence also manifests itself in these highly relevant societal topics.

BICC's empirical and applied research is critical, problem-oriented, and policy relevant. Its interdisciplinary topic areas generate diverse synergies regarding content and methods and also influence the fields of advisory services and capacity development.

BICC's work

BICC's portfolio includes:

- *Applied research* (research reports, background and evaluation studies, impact evaluations, development of indicators, data collection and analysis, as well as feasibility studies to support program implementation).
- *Research-based policy advice* (background analyses, feasibility and evaluation studies, training and expert workshops as well as the allocation of long- and short-term experts).
- *Capacity development* (preparation of concepts and modules for the further education and training of stakeholders in peace processes).
- *Public relations work* (publications, conferences and events, exhibitions).

Organization and mission

BICC was founded as a non-profit limited company in 1994 with the support of the State of North Rhine-Westphalia (NRW). The Center is headed by a Director for Research and a Director for Administration. Shareholders are the States of NRW and Brandenburg. BICC's governing bodies are the Supervisory Board, the Board of Trustees, and the International Board.

BICC's mission is to conduct critical, problem-oriented, policy relevant conversion research in response to the problems that occur as a result of organized violence. To do so, BICC engages in active exchanges with scholars, politicians and stakeholders in everyday practice and civil society. As a think tank, it seeks to engage in a dialogue with NGOs, governments, private organizations, research institutes and universities well as with interested individuals. BICC's public relations work sets out to raise public awareness of its central topics.

Partners, donors and clients

BICC receives institutional funding from the State of North Rhine-Westphalia (NRW). The position of Director for Research is combined with a professorship for Peace and Conflict Research at Bonn University.

BICC cooperates with international and German research institutes, international and German foundations, UN and other organizations, German federal ministries such as the Federal Foreign Office (AA) and the Federal Ministry for Economic Cooperation and Development (BMZ) as well as with institutions such as the German Federal Agency for Civic Education (bpb), German and international NGOs, and international and bilateral organizations working in the field of development cooperation. BICC is co-editor of the annual "Peace Report" (*Friedensgutachten*).

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