ASIS FOUNDATION

ASIS FOUNDATION™

CRISP REPORT

Connecting Research in Security to Practice

Situational Crime Prevention and Supply Chain Security

Theory for Best Practice

Harald Haelterman, PhD

ABOUT THE CRISP SERIES OF REPORTS

Connecting Research in Security to Practice (CRISP) reports provide insights into how different types of security issues can be effectively tackled. Drawing on research and evidence from around the world, each report summarizes the prevailing knowledge about a specific aspect of security, and then recommends proven approaches to counter the threat. Connecting scientific research with existing security actions helps form better practices.

Reports are written to appeal to security practitioners in different types of organizations and at different levels. Readers will inevitably adapt what is presented to meet their own requirements. They will also consider how they can integrate the recommended actions with existing or planned programs in their organizations.

This CRISP report by Dr Harald Haelterman focuses on applying one of the most important crime prevention frameworks, situational crime prevention, to yet another issue which merits more research and insight, supply chain security. Specifically this report provides guidance on how to tackle security issues faced by those charged with meeting a range of voluntary and statutory requirements. Although it has been written with a logistics and transportation environment in mind it has a much broader application. Indeed, a principal benefit of this report is that it helps readers understand how to use theoretical frameworks and models to guide practice.

CRISP reports are sister publications to those produced by Community Oriented Policing Services (COPS) of the U.S. Department of Justice, which can be accessed at *www.cops.usdoj.gov*. While that series focuses on policing, this one focuses on security.

Martin Gill
Chair
Research Council
ASIS Foundation

ISBN-978-1-934904-44-2

Printed in the United States of America

CRISP REPORT

Connecting Research in Security to Practice

An ASIS Foundation Research Council CRISP Report

Situational Crime Prevention and Supply Chain Security

Theory for Best Practice

Harald Haelterman, PhD

ASIS Foundation, Inc. : Alexandria, VA

Contents

Executive Summary

In recent years we have witnessed the introduction of a range of programs, some mandatory, others voluntary, to secure supply chains against acts of unlawful interference. The majority of these programs are quite prescriptive and detailed and most if not all impose the requirement for cargo operators to introduce a variety of situational measures.

When implementing these measures, end-users often face unexpected costs and implementation problems that may impact the overall success of the initiative. This CRISP Report provides guidance on how best to tackle these problems upfront, focusing to a great extent on the selection process of alternative measures that are available to mitigate identified and acknowledged risks.

In this Report it is argued that a structured approach is the best way forward when it comes to introducing situational controls in a business environment. The approach that is presented covers six consecutive stages:

- identification and definition of the problem and its stakeholders, which is defined as one of the most important although often underestimated stages in the process;
- careful and detailed analysis of the situational conditions that permit or facilitate the commission of the crimes under study;
- production of an inventory of potential countermeasures, whether the most appropriate or not;
- ex ante consideration of these measures;
- actual implementation of the most promising (set of) measures; and
- ex-post evaluation that allows establishing the effects of the intervention.

This approach has been illustrated in a transportation and logistics environment. It is, however, equally applicable in other industries, the public sector, and to virtually any type of criminal or disruptive behavior. In order to enable its application, however, there is a need for policy makers to allow practitioners a certain freedom of choice between alternative solutions or the freedom to come up with alternatives that are equivalent to those initially proposed.

Introduction

This CRISP report focuses on situational crime prevention in domestic and international supply chains, an area of interest selected based on the observation that over the past decade, and especially since the 9/11 attacks those involved in the international movement of goods have witnessed the introduction of a number of programs designed to secure supply chains against acts of unlawful interference. These programs impact all industry partners, ranging from transport and logistics operators[1] to individual shippers and manufacturers. Some programs are mandatory, other voluntary. Most are quite prescriptive and detailed and impose the requirement to introduce a variety of situational measures.

When implementing these measures, operators often face a number of unexpected costs and implementation problems that may affect the overall success of the initiative. This Report provides a reference guide on how best to approach the introduction of situational crime prevention in a business environment. It provides clear guidance to policy makers and security practitioners on what considerations to make at each particular stage of the crime prevention effort. Although the suggested methodology has been illustrated in a transportation and logistics environment, it is equally applicable in other industries, the public sector, and to virtually any type of criminal or disruptive behavior.

In order to set the scene, part one provides a brief overview of crime phenomena predominantly associated with supply chains. These phenomena range from a series of offenses where the supply chain is being used as a 'vehicle', to a number of unlawful acts where the supply chain itself is being targeted.

Part two provides detail on government and industry-driven initiatives introduced over the past years to secure supply chains.

In part three it is illustrated that most of these programs impose the requirement for industry partners to introduce a variety of situational crime prevention measures. This statement is based on the outcome of a Security Research Project that was conducted on behalf of the European Commission (see also Haelterman, 2009a).

One of the key deliverables identified in the above project was to comment on the effectiveness, efficiency and acceptability of existing countermeasures. As highlighted in part four, this exercise revealed a series of costs and implementation problems commonly faced by end-users (see also Haelterman, 2009b; 2011).

Crime Hitting Supply Chains

Following a brief introduction into the generic crime risk management process, the structure of part five follows the stages generally accepted as constituting the standard methodology applied for situational crime prevention projects. It identifies the need for a proper analysis and definition of the problem on hand; an analysis of the situational context in which preventive action is required or recommended; an inventory of potential countermeasures; an ex ante consideration of these measures; their actual implementation and an ex-post evaluation.

The majority of these stages are illustrated using elements of a case study into alternative measures to control unauthorized access to pick-up and delivery vans (see also Haelterman et al., 2012).

Recommendations for future programming as well as research needs are captured in parts six and seven, followed by a list of notes and references that can serve as a guide for further reading to those who want to dig deeper into the subject.

"For the U.S., the total estimated cargo related theft loss value in 2011 amounts to approximately $130,000,000."

In order to set the scene, this section provides details on criminal activities that are predominantly associated with supply chains. Quite often a distinction is made between acts committed by third parties and those committed by the operator's own or subcontracted staff (see e.g. Rovers & de Vries Robbé, 2005). Others distinguish between offenses where the supply chain is being used as a 'means' or 'vehicle' (e.g. for smuggling of illicit goods), and a number of unlawful activities where the supply chain itself is being targeted (e.g. acts of terrorism or sabotage).

According to Hintsa (2011), supply chain related crime types can be divided into three broad categories: economic crime including theft, human trafficking, customs law violations, parallel trade, environmental crime, etc.; facilitating crime, (e.g. crime committed to facilitate the commission of other types of crime); and other crime types including terrorism, sabotage, vandalism, etc.

Cargo theft has been identified as a major and rising concern to industry, with the declared value of the loss being only a small part of its total impact (Burges, 2012a). According to Burges (2012b), "the costs associated with replacing the load, loss of market share, increased insurance premiums and – in some industries – product recalls and loss of brand trust must all be factored in when analyzing how cargo theft impacts a company's bottom line". For the U.S., the total estimated cargo related theft loss value in 2011 amounts to approximately $130,000,000; with

prepared food and beverage, electronics, base metals, apparel and animals/animal products representing 59.4% of all commodity types reported stolen (CargoNet, 2012). According to the European Union, the theft of high value/high risk products moving in supply chains in Europe costs businesses in excess of € 8.2 billion a year (Transported Asset Protection Association, 2012).

Following the September 11 attacks in the United States, governments have mainly focused on preventing acts of terrorism. In a study on the impacts of possible legislation to improve transport security, over 200 terrorist intervention scenarios were identified (DNV Consulting, 2005). Intervention methods include arson, the use of explosives, poison attacks, biological/ biochemical/ chemical attacks, nuclear attacks, hijacking and cyber-attacks (see also Burnson, 2011). From this overview of intervention scenarios the researchers further deduced two broad categories of transport security risks: (1) infrastructure risks where the terrorist has the objective to damage or destroy transport elements in order to disrupt the supply chain; and (2) supply chain risks where the objective is to misuse the supply chain as a means to create damage or fatalities.

According to the same study the transport supply chain can either be misused as a means of transport (e.g. as a means to conceal and transport various explosives, incendiary devices or nuclear devices to a location where they are unloaded or detonated), or as a weapon (e.g. release or detonation of dangerous goods in preferably densely populated areas).

Other classifications and numerous statistics can be found in literature. What is most important here is that each of these crime types – including their subtypes - will require a tailored response, which makes crime risk management in the transportation and logistics industry a challenging but rewarding endeavour to both policy makers and security practitioners.

"According to the European Union, the theft of high value/high risk products moving in supply chains in Europe costs businesses in excess of € 8.2 billion a year."

Government and Industry Responses

In response to the attacks of September 11 in the United States, federal and state governments globally have introduced a variety of programs designed to protect the public in general, and the supply chain in particular, against acts of unlawful interference. The U.S. Government set the scene with the Aviation and Transportation Security Act[2], the Customs Trade Partnership against Terrorism[3] and the Container Security Initiative.[4] The European Union was soon to follow with the enforcement of a series of requirements covering all modes of transport. In order to combat terrorism, the European Union Heads of State called for 'the strengthening of all forms of transport systems, including the enhancement of the legal framework and the improvement of preventive mechanisms'.[5] A full implementation of measures to combat terrorism was declared to be "a matter of urgency". Some examples of existing government initiatives are listed in Appendix A. These include a number of global programs such as the International Ship and Port Facility Security Code, ICAO Annex 17 and the WCO Safe Framework of Standards, as well as some relevant U.S. and E.U. initiatives.

Over the past decade, most of these programs have been strengthened following further incidents and changing threat patterns that provoked government and industry intervention. To give an example, recent interceptions of improvised explosive devices originating from Yemen have triggered U.S. and E.U. governments to further enhance air cargo security regulations and introduce additional safeguards to protect civil aviation (Bentz, 2011). As a result of this interception the Presidency of the European Council and the European Commission set up a high level working group to look at ways to strengthen air cargo security.[6] This has led to revised legislation with regards to cargo and mail being carried into the European Union from third countries[7], and discussions on whether or not to make use of the Customs' system of advance information analysis on all cargo movements entering, transiting, and exiting the European Union.

The total of supply chain security measures introduced in government programs is further complemented by a range of measures that form part of international standards (e.g. the ISO 28000-series)[8], and various industry-driven security initiatives in which TAPA has taken the lead. TAPA[9] – the Transported Asset Protection Association – started off in the United States in 1997 and unites global manufacturers, freight carriers, law enforcement agencies, and other stakeholders with the common aim of reducing losses from international supply chains. The aim of the association is to provide a forum for responsible managers and to share professional information for mutual benefit. One of TAPA's key activities has been the development and introduction of its Freight Security Requirements (FSR). These requirements have been established by security professionals within the high-tech/high-value industry and specify the minimum acceptable security standards for assets travelling throughout the supply chain and the methods

Supply Chain Security and Situational Crime Prevention

to be used in maintaining those standards. Over the years the TAPA FSR has become a widely recognized security standard for the care and handling of freight, as have the TAPA TSR ('Truck Security Requirements').

Between 2006 and 2009, as part of a Security Research Project further referred to as the 'Counteract Project'[10], a series of targeted studies were conducted on behalf of the Directorate-General Transport and Energy of the European Commission, one of which focused on the effectiveness and potential spill-over effects of counter-terrorism measures in international supply chain security programs. As part of this targeted study, two of the programs highlighted in Appendix A were selected for further analysis: the E.U. Air Cargo Security Program, designed to protect European civil aviation against acts of unlawful (terrorist) interference; and the TAPA (2007) Freight Security Requirements, a certification program that was specifically designed for theft prevention.

In order to identify and classify the preventive measures listed in these programs, both were analyzed to the level of each constituent part. As illustrated in Table 1, all measures could be classified using the five-strategy (and 25-category) classification of opportunity-reducing techniques developed by Clarke and his colleagues (Clarke & Eck, 2009; Cornish & Clarke, 2003). The same exercise was consequently performed on other supply chain security programs, displaying a similar preference of policy makers for situational crime prevention.

Table 1: Examples of situational security measures

Situational strategy	Examples taken from the TAPA FSR and the EU 2005 Air Cargo Security Program
Increase the effort	- Arrange access control to premises and designated areas in order to ensure that air cargo is secured from unauthorized interference - Lock and seal vehicles - Provide a restricted-access, caged/vault area for assets remaining on site for more than two hours - Protect ground floor warehouse windows by anti-ram posts or other physical barriers - Utilize hard sided instead of soft sided trailers
Increase the risk	- Perform identity checks on persons delivering known freight - Arrange CCTV external coverage of shipping and receiving yard, including entry / exit points, to cover the movement of vehicles and individuals - Have motion detection alarms in place inside the warehouse and make sure these are activated when the entire facility is vacated - Request staff to report any irregularities immediately to management or to the authorities
Increase the effort / increase the risk	- Arrange for staff vetting / pre-employment screening - Screen consignments for prohibited articles - Provide security controlled access points (e.g. guards, card access or CCTV with intercom)
Increase the risk / remove excuses	- Provide (awareness) training to all relevant categories of staff - Provide robbery response training detailing safe and secure actions to be taken during the event a driver is threatened - Provide security awareness training to drivers on mitigating risks
Reduce rewards	- Avoid pre-loading or post-delivery storage of assets in trailers
Remove excuses	- Declare in writing that consignments of air cargo do not contain any prohibited articles unless properly declared - Allow no subcontracting without prior agreement in writing - Communicate Security policies to all employees

Note: Since 2005, the EU Air Cargo Security Program has been updated and strengthened on multiple occasions.

Situational Crime Prevention

Contrary to traditional criminological approaches that have mainly been concerned with explaining why certain individuals are more likely to engage in criminal behavior compared to others, situational crime prevention focuses not upon changing offenders, but on modifying the settings, with its opportunity structures, in which crime occurs (Clarke, 1997; Weisburd, 1997; Welsh & Farrington, 2010).

The concept of situational crime prevention was first introduced in the late 1970's by a team of scholars working in the UK Home Office (Clarke, 1992). Studies on institutional treatments for delinquents undertaken by the Home Office Research Unit provided a stimulus for the founding of its theoretical base, together with two independent but related strands of policy research in the United States: Oscar Newman's concept of 'defensible space' (1972), and Jeffery's concept of 'crime prevention through environmental design' (Clarke, 1992; Crowe, 2000; Cozens, 2008). The theoretical development of situational crime prevention was further strengthened by the development of routine activity and rational choice theory (Clarke, 1992; Newman, Clarke & Shoham, 1997).

According to rational choice theory, offenders make rational decisions when carrying out a criminal act. If the costs of exploiting a criminal opportunity are perceived as being too high, or if an opportunity is reduced or removed altogether, the offender will cease the activity or look for another and better opportunity (Hamilton-Smith, 2005; Hayes, Downs & Blackwood, 2012). Routine activity theory argues that offenders are but one element in a crime, and perhaps not even the most important element. The routine activity approach emphasizes how illegal activities feed on routine activities (Felson, 1998). According to Cohen and Felson (in Clarke, 1992), "crime occurs when a motivated offender and suitable target (or victim) converge in space and time in the absence of a capable guardian".

Routine activity, rational choice, and crime pattern theory, sometimes referred to as 'opportunity theories' or 'crime theories' (Newman, Clarke & Shoham, 1997; Clarke, 2005; Lilly, Cullen & Ball, 2007), all give an important role to situational factors in crime. Although somewhat different in focus, they provide a solid theoretical base for the concept of situational crime prevention: "routine activity theory as a 'macro' theory that seeks to explain how changes in society expand or contract opportunities for crime; crime pattern theory as a 'meso' theory that seeks to explain how offenders seek or stumble across opportunities for crime in the course of their everyday lives; and the rational choice perspective as a 'micro-level' theory that deals with the decision-making processes that result in an offender choosing to become involved in crime and selecting specific crimes to commit" (Clarke, 2005).

Situational Strategies and Techniques

Advocates of situational crime prevention have argued for years that the context of crime provides a promising alternative to traditional offender-based crime prevention policies (Weisburd, 1997). The set of situational crime prevention measures or techniques available to policy makers and security practitioners has evolved quite significantly. The original formulation of situational crime prevention included an eight-category classification of opportunity-reducing techniques of which some had proven to be useful while the remainder required modification (Clarke, 1992). In his first edition of 'Situational Crime Prevention', Clarke presents a revised classification of twelve techniques, adding new categories and re-labeling existing ones. These twelve have later been expanded by Clarke and Homel to sixteen, including a new category of 'removing excuses for crime'. Finally, in response to Wortley's remarks on controlling situational precipitators (Wortley, 1997; 2001), Cornish and Clarke expanded the techniques further to twenty five by including a category referred to as 'reducing provocations'. As such the classification of preventive techniques has grown in step with the expanded theoretical base of situational prevention (Clarke, 2005; Mayhew & Hough, 2012).

Appendix B provides a full overview of situational techniques, listed under five basic strategies. The first set of techniques (i.e. increasing the perceived effort to commit a crime) is quite common in transportation security and forms part of various supply chain security programs. Some examples taken from the European Air Cargo Security Regulations and the TAPA Freight and Trucking Security Requirements, include: (1) providing access control to premises and designated areas in order to ensure that air cargo is secured from unauthorized interference; (2) proper packaging and sealing of consignments of air cargo; (3) locking and sealing of vehicles; (4) providing parking areas for private vehicles separate from shipping, loading and cargo areas; (5) protecting warehouse windows or other openings in warehouse walls and roofs; (6) protecting ground floor warehouse windows by anti-ram posts or other physical barriers; (7) providing high value security cages for assets remaining on site; (8) utilizing hard sided instead of soft sided trailers; (9) using padlocks on trailer doors during transport; etc. (Haelterman, 2009a).

Increasing the perceived risk of being apprehended is also an often applied technique. Some typical examples include: (1) conducting identity checks on persons delivering cargo or entering a site; (2) requesting staff to report any irregularities immediately to management or to the authorities; (3) providing sufficient lighting inside and outside the facility; (4) challenging unidentified persons present on site; (5) installing CCTV to cover the movement of vehicles and individuals; (6) alarming warehouse doors and windows, truck, trailer and cabin doors;

End-User Perspectives on Effectiveness and Efficiency

(7) conducting random trash inspections in warehousing facilities; etc. (Haelterman, 2009a).

A typical example of reducing the anticipated rewards for the offender is the replacement of cash money transfers upon delivery of a consignment by electronic systems, avoiding cash money being transported, and as such, making pick-up and delivery vans a less desirable target for potential offenders.

Finally, removing excuses by means of rule setting, posting instructions, alerting conscience, etc. also form typical ingredients of many transportation and supply chain security policies and programs.

Although Clarke's classification of techniques comprises five different strategies, it is worth observing that the first two strategies (i.e. increasing the perceived effort and increasing the perceived risk) are extremely well represented in the programs that were analyzed as part of the Counteract study. This observation raises the question whether or not exploring the other strategies may widen the potential of situational crime prevention in the supply chain.

One of the other key deliverables identified in the Counteract study was to comment on the effectiveness, efficiency, and acceptability of existing countermeasures. To that end a self-completion questionnaire was sent to all Regulated Agents listed on the official site of the Dutch Government[11], to the four major Express Integrators, and – under a different scope - to a number of users of the TAPA FSR. Following a range of questions querying some general background details, respondents were encouraged to list all possible problems they encountered when implementing the programs, and to provide as much detail and examples as possible.

This survey revealed a series of costs and implementation problems in relation to the availability of certain measures that are required by policy makers; to their practicability and impact on core business processes; to the (financial and human) resources required to implement and maintain them; and to their negative impact on the (perceived) freedom of movement and privacy of staff. They further relate to the level of knowledge and expertise required for assessing, evaluating, prioritizing and tackling crime risks; to the level of (user) belief in their effectiveness; and to the level of awareness and commitment of end-users and other stakeholders (Haelterman, 2009a).

Table 2: Examples of implementation problems

Problem area	Examples of reported problems
Availability	- Limited ability to check previous employment or criminal history due to privacy legislation and lack of access to the necessary information sources - Limited ability to verify information across borders
Required level of knowledge, expertise and guidance	- Expertise required to check the identity of persons delivering known freight; to verify cargo documentation and to screen consignments for prohibited articles
Practicability	- Difficulties encountered with organizing security awareness training for all relevant categories of staff and with limiting the use of soft-sided trailers during peak season - Inability to seal multiple stop pick-up and delivery vehicles
Financial/economic cost	- Cost of screening equipment; staff vetting; providing full CCTV-coverage and protecting windows or other openings in warehouse walls and roofs
Ethical/social cost	- Privacy issues related to staff vetting, controlling access to facilities and conducting identity checks
Reverse effects	- Escalation of violence when using overt or covert escorts to secure transport movements
Stakeholder / user belief	- Limited belief in the effectiveness of certain documentation requirements

Table two provides examples of implementation problems reported by end-users. All of them had been reported well after the implementation of the respective measures. The second column outlines a process in which each of these potential problem areas are subject to an ex ante consideration that allows policy makers and practitioners to conduct a proper cost-benefit analysis of potential solutions and, as such, to make informed decisions.

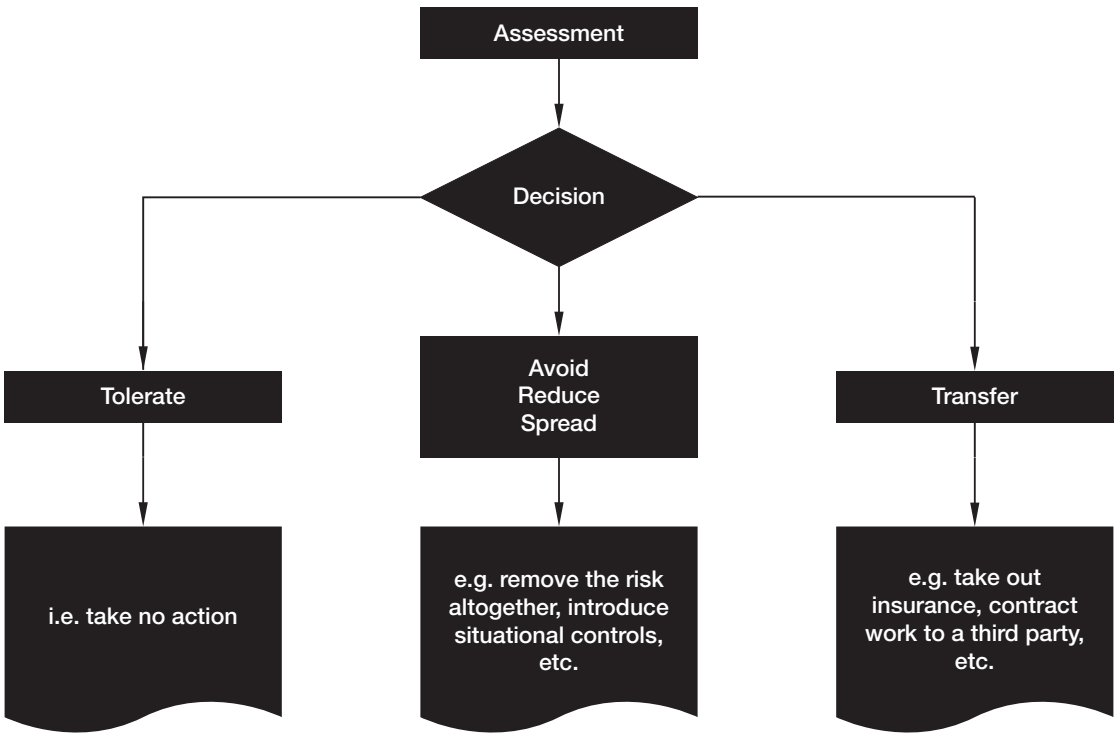
Theory for Best Practice

The Crime Risk Management Process

As Waring and Glendon (1998) argue, risk management is implicitly or explicitly a strategic component of any organization's survival and development. Within the scope of logistics and supply chain management, Norrman and Lindroth (cited in Ekwal, 2010) define supply chain risk management as "the collaboration with partners in a supply chain applying risk management process tools to deal with risks and uncertainties caused by, or impacting on, logistics related activities or resources".

In his introduction to the second volume of 'Crime at Work', Gill (1998) describes crime risk management as a process that starts with an assessment of the situation on the basis of which a decision is to be made whether to tolerate or transfer the risk (e.g. by taking out insurance), or to develop a more specific strategy to deal with it (see also figure 1).

Figure 1: The crime risk management process (source: Gill, 1998: 14-17)



As part of the latter strategy one can choose to avoid the risk, or to reduce or spread it (e.g. by means of introducing situational controls). To tolerate a risk basically means to not take any action at all. Transferring it could mean taking out insurance, or subcontract the work to another (third) party. The third option, i.e. to define a more specific strategy to tackle the risk, can include a variety of actions. One can avoid the risk by eliminating it altogether. As mentioned earlier, a typical example of the latter is to avoid the risk of someone attacking courier vans for the cash that is carried on board by replacing cash collections by electronic payment methods. Another strategy to tackle the risk is to introduce situational controls, which forms the topic of this Report.

Program Design Stages

In order to maximize effectiveness and efficiency, the introduction of situational controls requires a structured and well thought out approach.

Clarke (1997) describes the standard methodology that is applied for situational projects as "a version of the action research model in which researchers and practitioners work together to analyze and define the problem, to identify and try out possible solutions, to evaluate the result and, if necessary, to repeat the cycle until success is achieved".

According to Tilley (2005) "the commonsense problem-solving approach to crime issues suggests that we first scan the environment for existing and future problems, then subject them to careful analysis to figure out what might be done about them, and on the basis of this develop a strategy to address them, which is then systematically evaluated so that practice may be refined and failed approaches abandoned".

"Problem-oriented policing', first introduced by Herman Goldstein in 1979 (Braga, 2002) and captured in the four-stage 'SARA' model (i.e. Scanning, Analysis, Response and Assessment), reflects the same action research paradigm underpinning situational crime prevention. The SARA model was originally developed by Eck and Spelman as a simple problem-solving tool that can help in addressing any crime or

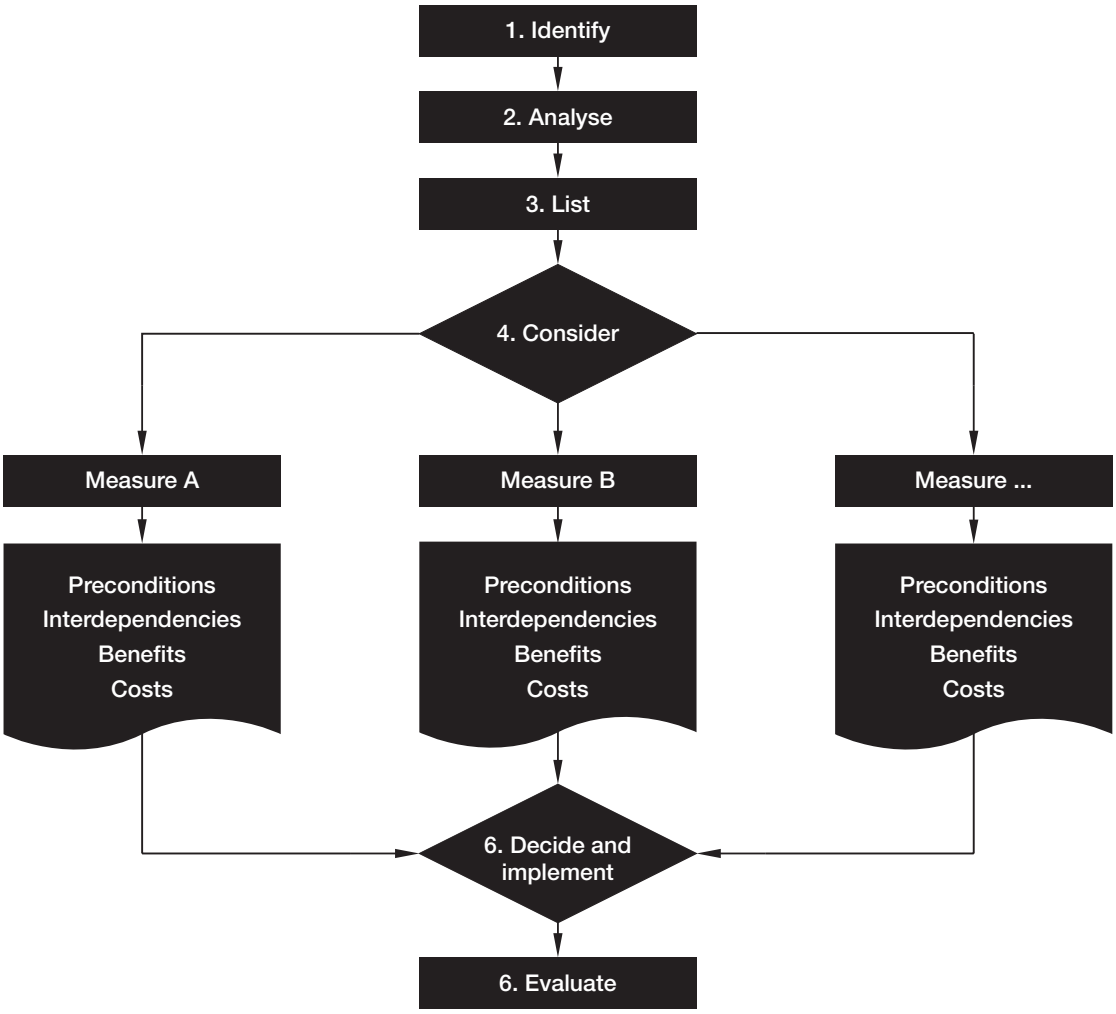
disorder problem (Morgan & Cornish, 2006a). By dividing an overall project into separate stages, SARA helps to ensure that the necessary steps are undertaken in proper sequence (Clarke & Eck, 2009).

More recently Ekblom (cited in Clarke and Eck, 2009) developed the SARA-acronym further into what he refers to as 'the 5 I's': (1) intelligence (i.e. "gathering and analyzing information on crime problems and their consequences, and diagnosing their causes"); (2) intervention (i.e. "considering the full range of possible interventions that could be applied to block, disrupt or weaken those causes and manipulate the risk and protective factors"); (3) implementation (i.e. "converting potential interventions into practical methods, putting them into effect in ways that are appropriate for the local context, and monitoring the actions undertaken"); (4) involvement (i.e. "mobilizing other agencies, companies and individuals to play their part in implementing the intervention"); and (5) impact and process evaluation (i.e. "assessment, feedback and adjustment").

If we incorporate the outcome of more recent studies, we end up with a dynamic approach that covers six 'consecutive'[12] stages (see also figure 2):

- an identification and definition of the problem and its relevant stakeholders;
- an analysis of the situational conditions that permit or facilitate the commission of the crime(s) under study;
- an inventory of potential countermeasures that are thought of to be effective to mitigate the problem;
- an ex ante consideration of these measures;
- their actual implementation and
- an ex-post evaluation.

Figure 2: Program design stages (revised)



The following sub-chapters describe each of the above stages in more detail. The majority are illustrated using elements of a case study into alternative measures to control unauthorized access to pick-up and delivery vans, a requirement that forms part of various anti-theft and anti-terrorism supply chain security programs. As part of this case study – further referred to as the 'ACPD-study'[13] - two focus group meetings and two surveys were conducted in a local branch of an international express carrier.

Stage 1: Problem Analysis and Definition

Those responsible for managing security need to continuously assess the type of criminal risks their business is exposed to. For each individual risk they will need to decide whether to accept, avoid, transfer, or reduce it. As resources are often limited, they will further need to prioritize what risks (or problems) deserve most attention at a particular point in time.

Defining and analyzing problems that need tackling is by far one of the most important although often underestimated stages in the process. As Laycock (2005) argues, if the problem definition is wrong to start with or important information is overlooked, then the whole crime reduction process can be compromised. It is important therefore to collect as much data as possible on the nature of the (crime) risk or problem, its causes and extent, and its (potential) impact. Ekblom (cited in Gilling, 1996) identifies this stage as "obtaining data on crime problems". Berry and Carter refer to the need for "a clear understanding of the problem being addressed" (in: Gilling, 1996).

"if the problem definition is wrong to start with or important information is overlooked, then the whole crime reduction process can be compromised."

As Gilling (1996) argues, "misdiagnoses of crime problems can result from the failure to research the characteristics of crimes in sufficient depth, although this is not always possible given the limitations of data collection in the crime field". In practice, data on crime problems are often hard to access, partial and inaccurate; and identifying patterns and underlying problems requires substantial understanding and skills (Tilley, 2005). As Tilley continues, "the initially 'obvious' can be quite mistaken and ill-thought through but well intentioned responses are capable of producing perverse and damaging effects" (see infra).

Crucial to implementing situational crime prevention is the requirement to be very crime specific (see also Clarke & Eck, 2009). As indicated by Clarke (1997), situational measures must be "tailored to highly specific categories of crime, which means that distinctions must be made, not between broad categories such as burglary and robbery, but rather between the different kinds of offences falling under each of these categories". 'Cargo theft', to give just one example, would be too broad a problem definition to start from. More accurate examples would be 'pilferage in warehousing facilities', 'round-the-corner deliveries' or 'bogus collections', to name but a few.

ACPD Case Study

In the ACPD-study, the crime problem under consideration relates to the risk of individuals gaining unauthorized access to (the loading compartments of) pick-up and delivery vans when operated on the public road. The main reason for controlling access, as identified by the focus group members, is theft prevention. In this context, theft can relate to the theft of the actual vehicle; the consignments on board of that vehicle; the cargo documentation; and/or cash retrieved from cash deliveries. Other objectives are to prevent the introduction of any illegal items or substances in the supply chain (e.g. improvised explosive devices or narcotics); to limit insurance premiums; to ensure the safety and security of drivers; to reduce reputational risks to the company; and – last but not least – to achieve and maintain regulatory compliance (e.g. compliance with air cargo security regulations). Identified stakeholders include shareholders, customers, employees and society as a whole.

Stage 2: Analysis of Situational Context

Once the problem has been identified and defined, it is essential to analyze the situational conditions that permit or facilitate the commission of the crimes under study as effective responses can only be developed if all factors contributing to the problem are known (Mayhew, Clarke, Sturman & Hough, 1976; Hirschfield, 2005; Morgan & Cornish, 2006). In this stage of the process the situational contexts and 'communities' in which different types of crime are committed and preventive action is required, need to be analyzed thoroughly and separately (Mayhew, Clarke, Sturman & Hough, 1976; Hirschfield, 2005). As indicated in the *2011 FreightWatch International Global Threat Assessment Report*, the prevention of cargo theft on a global scale requires intimate knowledge of incident trends on a regional basis as security programs and -measures don't always transfer successfully from region to region.

Looking at the standard process of the organization in which the ACPD-study was conducted, vans were mainly operated on week days between 9:00 AM and 5:00 PM. During that period, drivers used to make a range of scheduled stops to either pick-up or deliver consignments. On average, each driver serviced 47 collection and/or delivery addresses per day, resulting in, on average, a total of 2115 scheduled stops daily for the entire research population. The location of collection and delivery addresses varied from shopping malls in city centers (of which some were considered 'hot spots') to rural areas outside of the main cities, with each location and each route to and from it having its specific features to take into account. Apart from the scheduled stops, drivers evidently have to make a number of additional comfort stops, e.g. to take their lunch break, or forced stops in case of illness or technical problems encountered with the vehicle. Although the historic number of unscheduled stops was extremely limited, it could not be overlooked when assessing the situational context in which preventive action would be required. The same applies for the number and type of recorded incidents in the pick-up and delivery area, both by the company itself as by federal and local law enforcement agencies.

Stage 3: Inventory of Potential Countermeasures

As part of stage three an inventory of potential countermeasures (whether the most appropriate or not) is to be produced. In doing so there are a number of important considerations to take into account:

- As stated before, each problem requires a tailor-made solution. This however does not mean that a certain measure has no potential to help mitigate more than one problem or risk. As we will see later on, diffusion of benefits is a phenomenon that is to be included in any cost-benefit analysis that is being conducted when assessing alternative measures prior to their implementation.
- Also it is worth noting that often a combination of measures will prove most effective in reducing the risk or crime problem. According to Clarke (2008), "a situational project is more effective when it adopts a package of measures, each of which is directed to a particular point of the process to committing the crime".

In the ACPD-study, a list was compiled of potential measures that could be introduced to mitigate the risk of individuals gaining unauthorized access to the loading compartments of pick-up and delivery vans while on the public road (thus not when parked on company or customer premises). For each of these measures it was indicated whether or not it was perceived effective to reduce the risk of theft of a loaded vehicle (or to increase the chances of recovering it after a theft would occur); to reduce the risk of theft of the content of that vehicle; and to reduce the risk of someone introducing illegal or prohibited items in the supply chain. The measures that scored positive on all three objectives were selected as measures for further consideration. After having verified whether the proposed measures were available to the operator, the final list contained nine different measures:

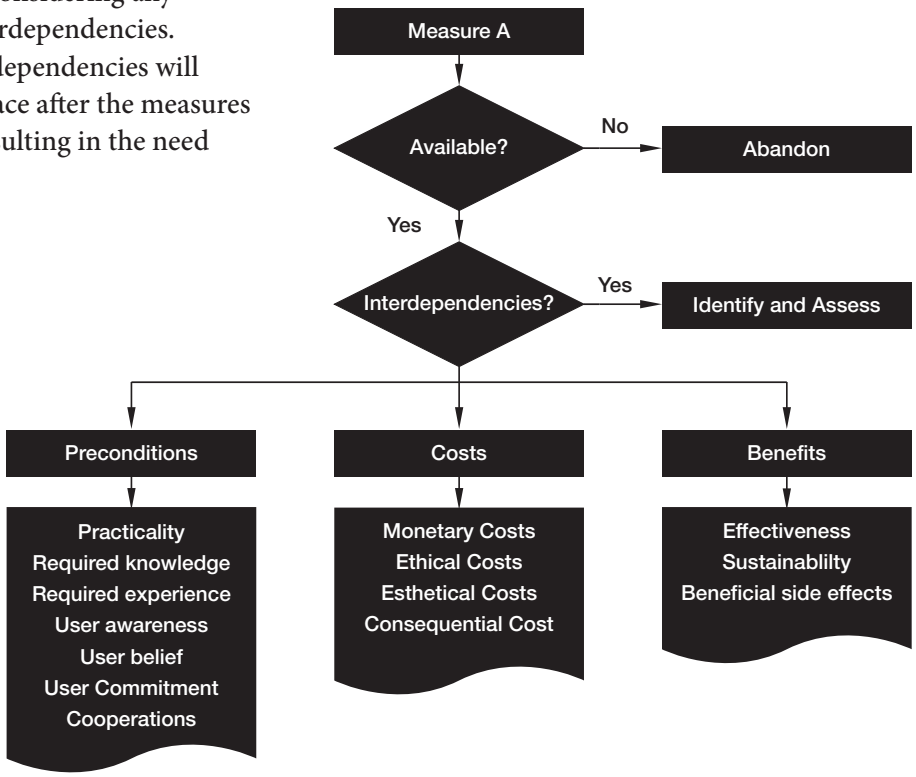
- installation of locking devices on all vans, enabling the doors to automatically lock when the driver – holding a key card – approaches or moves away from the vehicle;
- installation of audible intrusion alarms, attracting attention when doors or windows are forced open;
- installation of silent intrusion alarms with GPS monitoring, allowing remote intervention upon receipt of an alarm;
- dissemination of formal instructions to drivers (e.g. to always lock their vehicles when left unattended), combined with random compliance checks and an internal sanctioning system;
- provision of security awareness training to drivers (e.g. on vehicle security, secure parking, offender's modus operandi, etc.);
- provision of two drivers for each vehicle, with one person staying in or nearby the van at all times;
- provision of overt security escorts;
- removal of company logos from vehicles in order to conceal the target; and
- provision of specific notifications on vehicles alerting the fact that no valuables are carried inside, or the fact that the vehicle is alarmed and monitored at all times.

Stage 4: Ex Ante Consideration of Alternative Measures

As Shapland (2000) rightly states, the weakness of having a full palette of measures to choose from is the difficulty of making the choice. The introduction of any measure "brings some benefits and imposes some costs, such as the material resources required to implement it, the degree of inconvenience it creates, and its possible deleterious impact on such interests as freedom, autonomy or privacy" (Duff & Marshall, 2000). All too often countermeasures that are thought of to be effective are identified and implemented without considering any potential side effects or interdependencies. These side effects and interdependencies will eventually come to the surface after the measures have been implemented, resulting in the need for abandoning initial approaches, the need for adjustments or 'damage repair' or, even worse, resulting in the conclusion that measures are totally ineffective and time, efforts and resources have been completely wasted.

Assessing alternative measures incorporates an assessment of the costs and benefits of each individual measure, as well as an assessment of a range of preconditions and of any interdependencies that may have been identified (see figure 3).

Figure 3: Assessing individual measures



Interdependencies

After having confirmed the availability of a measure, the first thing to do is to identify any potential interdependencies, as the level of effectiveness or efficiency of a measure often depends on the presence (or absence) of other measures. For example, it is of little or no use to install an electronic access control system in a warehousing facility with no access control procedures in place. Clarke (1997) provides another example of security guards that rarely monitor CCTV systems as closely as designers would expect them to do.

Prior to deciding on what measures to implement, it is essential to recognize what interdependencies are obvious, and to verify how to overcome them. If any interdependent measures have been identified, these should be assessed on an individual basis, i.e. focusing on preconditions, costs and benefits; and the outcome of this assessment should be taken into account in the overall selection process.

"For example, it is of little or no use to install an electronic access control system in a warehousing facility with no access control procedures in place."

Preconditions

Certain preconditions need to be in place in order for any intervention to be effective. This is the case for the practicability and availability of a measure to end-users, as well as for the knowledge and expertise required to evaluate and implement. If a measure is unavailable (e.g. because local law does not permit its use or implementation), it simply cannot be introduced. If a measure is available to the end-user but its introduction would impact core business processes to an extent that their execution becomes extremely difficult or impossible, there is little guarantee for success.

As Beck and Willis (1994a) argue, there is a delicate balance to be struck between meeting security imperatives and maximizing business opportunities. The same applies when the implementation of a certain measure requires a level of knowledge or expertise that is unavailable to (or hard to obtain for) the end-user. A poor understanding of available techniques to analyze the crime problem or to implement security measures and evaluate their effectiveness and efficiency may render all preventive efforts useless. As Knutsson and Clarke (2006) put it, "seemingly simple measures can be rather difficult to implement for a variety of technical, managerial and social reasons".

Other preconditions include the need for end-users to be aware of the problem that is being dealt with, believe in the effectiveness of the proposed solution and to be committed to solve the problem and to cooperate with other

stakeholders to reach the desired outcome. Those who need to initiate action need to be aware of their responsibility to do so. They need to be committed to act, and to achieve the necessary coordination among all parties concerned.

Especially the latter can prove to be quite challenging. Effective crime prevention is often about partnerships, in that "each of the players has a role which complements and must be coordinated with the others in a system of mutual co-operation" (Hardie & Hobbs, 2005). As illustrated by Newman and Clarke (2003) in a case study of the reduction of credit card fraud, there are numerous cases where situational crime prevention has succeeded through forging partnerships among the crucial players; and the fact that a lack of commitment or co-operation causes preventive action not to reach its full potential is clearly illustrated in a study on ram raiding where it was discovered that police recording practices and a lack of commitment of some retailers made it difficult to collect useful data to tackle the problem (Jacques, 1994). As Tilley (2005) points out, "competing demands on the organizations and individuals belonging to them; differences in philosophy, culture and organizational style; a lack of dedicated resources; differences over leadership; a historic lack of trust; an apparent indifference or apathy amongst some; and so on; all conspire to create obstacles to the operation of effective formal partnerships".

In the ACPD-study, specific attention was paid to the level of awareness amongst drivers; to their commitment to contribute to mitigate the risk; to the perceived practicability of the proposed measures; and to the extent to which they believe them to be effective.

- In order to assess the level of awareness of the problem on hand, drivers were asked to agree or disagree on a number of predefined statements. Because of the abstract character of the awareness concept, it was decided to establish an awareness scale that consisted of various items rather than to ask the drivers directly to what extent they were aware or unaware of the problem. Each item was scored on a one to five point Likert scale.[14] It was found that the scores were unevenly distributed in the advantage of the higher scores as the respondents mostly agreed or fully agreed with the awareness statements. As such it could be concluded that the respondents showed a fair level of awareness.
- The same methodology was applied to assess the level of commitment amongst drivers to (help) mitigate the risk of individuals gaining unauthorized access to cargo. Again, the outcome showed a predominance of the higher scores, indicating a high level of commitment

amongst the group of respondents to help mitigate the problem. Nearly all of the respondents agreed or fully agreed that the driver is best placed to protect the vehicle against unauthorized interference; and the majority of them were willing to assist in mitigating the risk.

- As to assess to what extent the drivers believed in the effectiveness of the proposed measures, they were asked to comment on a range of predefined statements for each individual measure. The measures that came out most positive, included the installation of automatic locking devices on all vans (for example: 87% of the respondents agreed or fully agreed with the statement that the introduction of this measure would make it more difficult for an offender to gain access to the vehicle) and the installation of audible intrusion alarms (for example: 82.6% agreed or fully agreed with the statement that an alarm would deter potential offenders). The measures perceived as being the least effective, were the removal of company logos and the provision of specific notifications on vehicles.
- The same methodology was applied to compare the measures on their perceived practicability. A practicability-scale was established for each individual measure, comprising four items, meaning that individual (total) scores could range from 'four' (minimum score) to '20' (maximum score). The installation of automated locking devices came out as the most practical measure as perceived by the drivers. 87% of the respondents believed that this measure would even facilitate their job compared to the existing situation. Other measures that were perceived favorable are the installation of audible alarms and the installation of silent alarms combined with off-site monitoring. The measures perceived as being the least practicable, were the provision of double drivers for each vehicle and the provision of overt security escorts.

Financial costs

A review conducted into the monetary costs and benefits of 13 situational crime prevention projects reported on between 1977 and 1999, focused on a range of cost items such as management and overhead costs, personnel costs, capital expenditures, cost of (security) equipment and services, maintenance costs, etc. (Welsh & Farrington, 1999). Often the implementation of security controls in a business environment has an impact on certain core processes (e.g. the introduction of X-ray screening, which delays the normal operating procedure and therefore adds additional costs to the import or export process). The cost resulting from that impact needs to be taken into account in the total (monetary) cost calculation (see also Bichou, 2008).

As Laycock (2005) rightly states, some ideal responses may be far too expensive to be acceptable in financial terms. It is important therefore that proposals are realistic and not over-ambitious or over-expensive. Furthermore, being expensive in financial terms does not qualify as a guarantee for success. As Gill (1994) argues, the most effective crime prevention measures are often cheap or even free. It has long been established, for example, that signs of occupancy are the factor most likely to deter potential burglars of a domestic dwelling, making the encouragement not to leave a note of absence on the front door, or not to let the newspapers build up in the letter-box, an effective and cost-efficient preventive measure. Vice versa, measures that may initially be thought of as being less expensive than alternative options, may actually prove to be the contrary, as illustrated in a study on the cost of electronic article surveillance in retail stores, where it was found that the cost of tagging goods eventually proved to be the equivalent of employing a full-time member of staff for 52 weeks (Bamfield, 1994). The monetary cost of introducing a certain measure should therefore carefully be measured and balanced against the cost of alternative solutions.

In the ACPD-study, the total investment cost (in equipment, research, development, etc.) and the running costs per year were assessed for all identified measures. For some measures the monetary cost was found negligible or extremely limited. This was the case for the removal of company logos or the provision of notification boards or -stickers. The provision of a second person accompanying the driver and the provision of overt security escorts solely resulted in additional (though substantial) personnel costs or costs of outsourcing a service to an external contractor (i.e. a guarding company). The financial cost linked to the introduction of the other measures resulted from a combination of equipment, installation and maintenance costs; personnel costs; management and overhead costs; the cost of external service providers; etc.

- Conducting random checks to verify compliance with formal instructions imposed on drivers, resulted in an operational cost of 8.320 Euros per year, based on one weekly check to be conducted by a qualified representative of the security department. Taking into account the number of pick-up and delivery vehicles (n= 45), the investment that resulted from purchasing and installing automated locking devices on all vehicles totaled around 33.000 Euros. The equipment was deemed subject to a three year depreciation period. Maintenance costs were estimated by the operator's facility department at 15% of the equipment cost per year, which brought the yearly running cost for this option to 16.000 Euros.
- Installing audible intruder alarms was assessed to amount up to an investment of 456 Euros per vehicle, totaling 20.547 Euros for the entire fleet. Again, the equipment was deemed subject to a three year depreciation period and the yearly maintenance cost was estimated at 15%. The yearly running cost totaled 9.931 Euros.
- The estimated cost of installing silent alarms with remote monitoring on the entire fleet resulted from an investment in the purchase and installation of the electronic devices, the maintenance cost (15%), the cost for external monitoring of alarms and consequent interventions, and communication costs. The cost of having the alarms monitored by an external monitoring room equaled an amount of 5.994 Euros per year (for the entire fleet). The total running cost for this option amounted up to 21.258 Euros yearly, the cost of interventions not taken into consideration.
- The 'human factor' approach (i.e. providing staff with recurrent awareness training) presented a yearly investment for developing and upgrading the training package - estimated by the operator's training department at 3.750 Euros - and a yearly running cost for delivering the training to the drivers. The latter included the cost of providing trainers and training facilities; as well as the recurrent cost of replacing drivers who are participating in the training (i.e. 250 Euros per driver). The average cost of providing a security awareness session was estimated at 125 Euros per driver per year (taking into account an average of six participants per session), replacement costs not included. Taking into account an average staff turnover of 18 drivers yearly and the fact that recurrent training would be required every year, the yearly (running) cost of training the full population of van drivers amounted up to 27.375 Euros.

Ethical Costs

Solutions to prevent crime may be effective and cost-efficient, but that does not automatically make them acceptable without further consideration. When applied without reflection, or by their very nature, preventive measures can easily backfire and lower the quality of life in our society. Certain members of society may become labeled, feelings of intolerance and distrust may be stimulated, social conduct may be hindered and human rights violated (Vettenburg, et al., 2003; Newburn, 2007).

Translated into a workplace environment, staff members may feel labeled and discriminated, or hindered in their freedom of movement, alienating them from their colleagues and from their employer. As Duff and Marshall (2000) put it, "if an employer decides to introduce exit searches on employees as they leave work, not only the cost-effectiveness of this measure, but also the attitude it displays towards the employees should be questioned, as well as the conception it implies of their role in the enterprise in which they are engaged".

While the ethical and social cost of situational crime prevention is obvious in some cases, not every measure is likely to be susceptible to the critical concerns raised above, and "people are willing to surrender some freedoms or endure some inconvenience in specific contexts if they gain protection from crime" (Clarke, 2005). A good example of the latter is the general acceptance of the need for additional precautions when checking-in on a passenger aircraft.

"When applied without reflection, or by their very nature, preventive measures can easily backfire and lower the quality of life in our society."

As to assess the ethical/social cost of the measures proposed in the ACPD-study, drivers were asked to comment on a range of predefined statements for each individual measure.[15] These statements related to (1) the perceived impact on the driver's feeling of privacy; (2) their perceived feeling of trust or distrust towards their employer; (3) the perceived impact on their freedom of movement; and (4) on their feeling of being treated equally.

- Issuing formal instructions to drivers combined with random compliance checks and a sanctioning system was perceived as the measure with the highest ethical cost. Other measures that appeared in the top-four were the provision of security escorts, the provision of double drivers and the installation of silent alarms combined with remote (GPS) monitoring. The installation of automatic locking devices and the installation of audible alarms were perceived as the most favorable from an ethical perspective.
- The measures perceived as having the biggest (negative) impact on the driver's feeling of privacy, were the roll-out and monitoring of formal instructions, the provision of overt security escorts and the provision of two drivers for each vehicle. With regard to the perceived impact on the feeling of being (dis)trusted by their employer, the provision of formal instructions, the provision of awareness training and the provision of two drivers or security escorts scored least favorable. The provision of overt security escorts, the roll-out of formal instructions, the provision of two drivers per vehicle and the installation of silent intruder alarms with remote (GPS) monitoring constituted the top-four of the measures that were perceived as having the most negative impact on the driver's freedom of movement and feeling of equal treatment. For all four items that were measured, the installation of automatic locking devices and the installation of audible alarms were perceived as posing the lowest ethical cost.

Ethical Costs

Apart from their financial and social cost, certain measures may have a negative impact on (the esthetics of) the environment and, as such, pose an additional cost compared to those that are equally effective but blend in with their surroundings. Examples of esthetical costs derived from literature include the installation of floor-to-ceiling turnstile railings in subway stations, creating a prison-like, 'draconian' environment (Clarke, 1997); gating-off pay phones in public spaces to prevent shoulder surfing (Bichler & Clarke, 1997); or the installation of bollards or shutters outside listed buildings or in older market towns (Jacques, 1994).

In the ACPD-study, no significant esthetical costs were identified, apart maybe from having overt security escorts following each single vehicle every day of the week, which has a potential to invoke negative feelings to the general public living in the collection and distribution area.

Consequential Costs

Finally there has been extensive publishing on various reverse effects that may result from the implementation of situational crime prevention.[16] As Grabosky (1996) argues, the ways in which crime prevention programs may become derailed are numerous and diverse.

The most common side effects that are referred to in literature are effects of displacement (Eck & Weisburd, 1995; Clarke, 1997; Bowers & Johnson, 2003; Tilley, 2005; Newburn, 2007; Guerette, 2009; Ekwall, 2009). This is the phenomenon where the introduction of preventive measures results in crime being displaced elsewhere (i.e. 'geographical' or 'spatial displacement'), to some other time or target (i.e. 'temporal' or 'target displacement'), being committed in another way (i.e. 'tactical displacement'), or being substituted for some other kind of offense (i.e.'crime type', 'functional' or 'offence displacement') (Clarke, 1992a; Bowers & Johnson, 2003; Guerette & Bowers, 2009).

Furthermore, one may actually produce crime and do more harm than good in the course of combating it. As Marx argues, "the frustration that results from blocked criminal opportunities may lead to excessive violence or to an instrumental reliance on more forceful means of goal attainment" (Grabosky, 1996).

Some initiatives or measures may inspire adaptive behavior on the part of the offenders that can entail more inventive, devious or violent activity (Grabosky, 1996; Clarke, 2005).

Finally, by dramatizing certain aspects of unwanted behavior, one may actually advertise that behavior, either by bringing it to the attention of those who would otherwise be oblivious or only vaguely aware, or by enticing the potentially rebellious.

It is essential therefore to identify the possibility and likelihood of displacement and other reverse effects as part of the design phase of a project, be it to try and manage the occurrence upfront, or to provide input for the monitoring- and evaluation plan. According to Guerette (2009), the fact whether or not displacement is likely to occur, will largely be determined by offender motivation, offender familiarity and crime opportunity. To effectively manage displacement at the outset of a program, one needs to identify what criminal opportunities are left unattended once a measure has been introduced, and try to anticipate how the offender might attempt to circumvent or counter that measure. As Guerette puts it, "understanding the local displacement (and diffusion) potential requires a thorough analysis of the characteristics of targeted offenders, locations and victims".

Benefits

The main benefit resulting from the implementation of preventive measures should obviously be the reduction of the risk (or resolution of the problem) that was identified and to what purpose the measures were selected and introduced.

Apart from fulfilling this main purpose of (sustainable) effectiveness, the introduction of situational measures can further result in a range of beneficial side effects that go beyond mitigating predefined risks or problems. As argued by Hamilton-Smith (2002), immediate crime reduction gains can 'spill out' beyond the property or people that have been targeted by the project. This phenomenon is commonly referred to as 'diffusion of benefits'. These benefits can also spill over to other time periods, other places and other types of crime (e.g. anti-terrorism measures resulting in reduced opportunities for cargo theft).

Furthermore, introducing preventive measures can also result in improvements in other key business processes. Improved customer loyalty and employee commitment, higher supply chain visibility and improved efficiency are just some examples of beneficial side effects (or 'collateral benefits') that are frequently referred to in literature as resulting from the introduction of (anti-terrorism) supply chain security measures (Tyska & Fennelly, 2001; Rice & Spayd, 2005; Peleg-Gillai, Bhat & Sept, 2006). According to Ritter et al. (2007), an investment

in security should be focused on value creation, and "firms that implement security initiatives which are quantifiable more effective and more comprehensive than those of their competitors should expect to be rewarded accordingly by the marketplace".

Stage 5: The Implementation Stage

The actual implementation stage kicks in once all potential measures have been identified and considered and a detailed implementation plan allowing for constant monitoring and an 'ex post' impact and process evaluation has been agreed upon with all stakeholders and program partners. This 'ex post' evaluation usually takes place once the program has been implemented and settled for a certain period of time. It is important, however, to receive the feedback required for fine-tuning and, if necessary, more encompassing adjustments as soon as possible. A built-in monitoring system provides for these functions and can further be used for purposes of program evaluation (Gilling, 1996).

Stage 6: Monitoring and Ex-Post Evaluation

The general purpose of evaluation is to provide feedback that will generate corrections to and refinements in crime prevention theory, policy and practice (Tilley, 2002). Scientific evaluations are necessary in order to measure and establish the effects of a program. Their major strength is that rules of science provide a consistent and reasonably objective way to draw conclusions about cause and effect (Sherman et. al., 1998). Scientific evaluations are said to be part of the remedy for exaggeration and overgeneralization of a program's efficacy (Eck, 2002).

According to the National Crime Prevention Institute, "a thorough evaluation can help to (1) measure the degree of progress toward the general goal of reducing crime, (2) identify weak and strong points of program operations and suggest changes, (3) compare efficiency and effectiveness of existing program activities with other possible program activities, (4) challenge underlying program assumptions and improve the quality of program objectives, (5) suggest new procedures and approaches, (6) provide for timely recognition of negative program effects, (7) help establish priorities for resource allocation, (8) increase public support for successful approaches and reduce emphasis on unsuccessful approaches, (9) provide standards against which to measure achievement and (10) develop a critical attitude among (program) staff and advisory personnel, and increase communication and coordination among them" (NCPI, 2001).

Recommendations for Future Programming

Four basic elements must be considered in all evaluations: interventions (i.e. the package of actions whose effectiveness the evaluation is supposed to determine), outcomes (i.e. the changes in target crimes or disorders), cases (i.e. the people or areas involved with crime) and settings (Eck, 2005). As argued by Welsh (2007), "just as it is crucial to use the highest quality evaluation designs to investigate the effects of crime prevention programs, it is equally important to use the most rigorous methods to assess the available research evidence".

"Allowing scope for choice between alternative measures may widen the potential of situational crime prevention in the supply chain and increase the number of professionals occupied with developing, implementing, and evaluating new techniques, leading to innovative approaches and a continuous refinement of existing ones."

In order to enable operators in the supply chain to select the most promising measures that best fit the setting in which they are to be introduced, they must be allowed a certain freedom of choice between a number of alternative solutions; or the freedom to come up with alternatives that are equivalent to those proposed by policy makers. This is currently the case in some but not all programs.

Allowing scope for choice between alternative measures may widen the potential of situational crime prevention in the supply chain and increase the number of professionals occupied with developing, implementing, and evaluating new techniques, leading to innovative approaches and a continuous refinement of existing ones. Although Clarke's classification of techniques comprises five different strategies, there currently appears to be an over-representation of only two particular ones (i.e. increasing the perceived effort and increasing the perceived risk).

Having sufficient freedom to make a choice between alternative solutions is also key to situational crime prevention as a concept. Every specific environment in which a measure is to be introduced will have its own features that need to be considered when deciding on the way forward. As such, defining one particular measure as being the best option for implementation in a global environment encompassing thousands of business settings may appear to be a bit overambitious.

Future Research Needs

This suggested shift to a more lenient and partnership approach does not come without a challenge. From this Report it should become clear that (situational) crime prevention is a very complex endeavor, requiring specific theoretical understanding and skills, and the availability of accurate data. End-users will need to have sufficient knowledge and expertise to select the most efficient solution from a range of alternatives, and those tasked with verifying compliance to the program (i.e. government officials or commercial certification bodies) will need to be capable of assessing whether the controls obtained for or by a particular user meet the objectives of the program.

For a number of key program stages, academia already provides a toolset to aid practitioners. To give a few examples, various tools are available to support the data gathering and analysis process, e.g. impact analyses, vulnerability scans, crime-centered analyses[17], crime-environment analyses[18], crime script analyses[19], etc.

Management science can also be of much assistance in enabling practitioners in industry to conduct a proper cost analysis and come to an informed decision on what particular measure(s) best to implement. As argued by Moore and Weatherford (2001), models can be used to abstract the problematic aspects of a management situation, often involving conflicting or competing alternatives, into a quantitative model that represents the essence of the situation.

The assessment of ethical and esthetical costs presents a challenge and requires a somewhat different approach. To a certain extent it remains a normative discussion, but, notwithstanding that, criminology and management science can provide tools that allow for incorporating the assessment into the decision making process on what measures best to implement.

In the academic debate on the cost of crime, several methods have been proposed to estimate intangible or non-monetary costs such as those invoked by pain and suffering (Cohen, 2005). These include methodologies such as contingent valuation, which involves probing potential victims on how much they would be willing to pay in order to avoid the pain and suffering associated with a crime (Dolan, et al., 2005) and the methodology applied by von Hirsch and Jareborg (1991) in an effort to categorize the harms of crime. The latter methodology focuses on assessing the impact of a crime on the victim's standard of living, identifying four generic-interest dimensions upon which crime intrudes: physical integrity, material support and amenity, freedom from humiliation, and privacy or autonomy. Where these methods prove to be effective in assessing the social cost of crime, they can obviously be adjusted and applied to assess the social (ethical) or esthetical cost of crime prevention.

The relative importance that stakeholders (e.g. management, unions or staff members) attribute to ethical and esthetical cost components can be determined by means of stated preference research (Zamparini & Reggiani, 2007). Although this research has been criticized as depicting behavior which is hypothetical and not observed in reality (Zamparini et al., 2010), it allows for estimating attributes on which revealed preference data is not (yet) available.

An ex ante consideration of (the impact of) potential reverse effects is even more challenging as these effects will only present themselves after the measures have been in place for a certain period of time. To give just one example, offenders confronted with vehicle alarms may turn their attention to other, unsecured vehicles (target displacement), or try to gain access to the load in another way (tactical displacement), perhaps by means of excessive violence (escalating effects).

As Hamilton-Smith (2002) argues, "measuring displacement […] is particularly difficult because attributing the occurrence or non-occurrence of one crime to the prevention of another is ostensibly a somewhat speculative pastime". This is not to say that displacement and other reverse effects are completely unpredictable. Analyzing all available information on (potential) offenders, victims and offense locations at the very outset of a project may provide useful input for modeling patterns of offending and for considering how they might be affected by the introduction of a given crime reduction measure (Hamilton-Smith, 2002). One needs to identify what criminal opportunities are left unattended once a measure has been introduced, and try to anticipate how the offender might attempt to circumvent or counter that measure. Although it may be impossible to predict every possible permutation in offender behavior, one should at least attempt to identify potential temporal, spatial, target, tactical and offence changes.

Finally, apart from trying to predict (the impact of) unintended consequences of the introduction of crime prevention measures during the design phase of the program, it is also extremely important to be vigilant for their manifestation once the program is in place. Even if crime reduction measures do not lead to any reverse effects in the short term, the monitoring of crime patterns and trends may reveal more long term adaptations by offenders to blocked opportunities or illuminate the exploitation of new opportunities (Hamilton-Smith, 2002). For that reason a built-in monitoring system is essential to the long term success of any program, and long-term follow-ups are crucial to assess benefits and costs that may only become apparent years after the intervention (Welsh & Farrington, 2010).

Notes

As all of these activities require a certain level of expertise that may not be readily available to date, it is recommended that government, industry (associations) and academia offer additional guidance and support, e.g. by familiarizing practitioners with key concepts and techniques, by funding or conducting additional research (especially evaluation studies), by means of collecting and disseminating relevant (incident) data and research findings, and by facilitating best practice sharing.

1. E.g. importers, exporters, brokers, freight forwarders, carriers, distribution centers, (air) ports, integrators, warehouse- and terminal operators, etc.
2. Public Law 107-071 passed by the 107th Congress on November 19, 2001.
3. The Customs Trade Partnership against Terrorism (C-TPAT) is a voluntary government-business initiative to build cooperative relationships that strengthen and improve overall international supply chain and U.S. border security. More info: *www.cbp.gov*.
4. The Container Security Initiative (CSI) was launched in 2002 by the U.S. Bureau of Customs and Border Protection in order to increase security for container cargo shipped to the United States.
5. Council of the European Union, *Declaration on combating terrorism*, Brussels, 25 March 2004.
6. Council of the European Union (2010) *High Level Working Group Report on Strengthening Air Cargo Security*, 16271/10, 30 November 2010.
7. *Commission Implementing Regulation (EU) No 859/2011 of 25 August 2011 on amending Regulation (EU) No 185/2010 laying down detailed measures for the implementation of the common basic standards on aviation security in respect of air cargo and mail*, Official Journal of the European Union, L 220/9, 26 August 2011.

8. For more info: *www.iso.org*.
9. For more info: *www.tapaemea.com*.
10. COUNTERACT - Cluster of User Networks in Transport and Energy Relating to Anti-terrorist Activities, 2006–2009. The main objectives of the project were to assess current practices in the fight against terrorism and to recommend feasible and cost-effective solutions for the improvement of security in key sectors of transport and energy. The Counteract project was funded within the European Union 6th RTD Framework Programme, started off in June 2006 and was to be terminated after 36 months.
11. *www.kmarcargoregister.nl*.
12. As Clarke and Eck (2009) argue, these stages shouldn't necessarily follow one another in a strictly linear fashion. An unfolding analysis can result in refocusing of the project, and questions about possible responses can lead to the need for fresh analyses. The longer and more complicated the project, the more iterations of this kind are likely to occur.
13. See also Haelterman, H., Callens, M. and Vander Beken, T. (2012).
14. The one-dimensional character of the scale was confirmed with principal axis factoring (a single own value greater than one). This scale tested good on internal consistency with an acceptable Cronbach's Alfa value.
15. Again, responses have been plotted on a (five-point) Likert scale, tested by means of an exploratory factor analysis, and verified for internal consistency.
16. As argued by Bowers and Johnson (2003), research indicates that crime displacement is not a necessary outcome of crime prevention activity, and it is also possible that crime reduction schemes may have a diffusion of benefits. Furthermore, it has been argued that even where displacement occurs, there may be some benefit to this (e.g. offenders choosing to commit less serious types of crimes than those prevented). A systematic review of 102 evaluations of situational crime prevention initiatives by Guerette and Bowers (2009) further supports the view that crime does not necessarily relocate in the aftermath of situational interventions.
17. Crime-centred analysis uses a range of measurements and statistical techniques to identify the manifestation of crime and how it is changing over time, and includes analyses of its spatial distribution, its temporal patterns and how crime within one area compares with that elsewhere (Hirschfield, 2005).
18. Crime-environment analysis examines the relationship between crime and aspects of the physical and social environment. It includes exploring links between crime and community-level characteristics (e.g. disadvantage, community cohesion) and between crime and other factors such as land use, transport routes, the distribution of crime generators, crime attractors and, if available, crime prevention measures (Hirschfield, 2005).

References

19. Crime scripts describe the ways in which an offence unfolds and attempt to make explicit the series of decision points through which the would-be offender passes in the process of crime commission. They treat crimes as stories involving a cast of characters, props and locations that unfold in a purposeful sequence of stages, scenes and actions (Cornish, 1994; Morgan & Cornish, 2006). As Laycock (2005) argues, crime scripts can be useful in the response development process since they offer a mechanism for systematically working through the decision process, thus exposing a range of potential intervention points.

Bamfield, J. (1994). Electronic Article Surveillance: management learning in curbing theft. In Gill, M. (ed.). *Crime at Work*. Leicester: Perpetuity Press, 156-174.

Beck, A. & Willis, A. (1994). Customer and staff perceptions of the role of closed circuit television in retail security. In Gill, M. (ed.). *Crime at Work*. Leicester: Perpetuity Press, 186-202.

Bentz, B. et al. (2011). Learning from recent threats to cargo security. Retrieved November 5, 2012, from Accenture website: *http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture_Learning_From_Recent_Threats.pdf*.

Bichler, G. & Clarke, R.V. (1997). Eliminating Pay Phone Toll Fraud at the Port Authority Bus Terminal in Manhattan. In Clarke, R.V. (ed.). *Situational Crime Prevention*. Successful case studies (2nd edition). New York: Harrow and Heston, 98-112.

Bichou, K. (2008). Security and Risk-Based Models in Shipping and Ports: Review and Critical Analysis. London, UK: Centre for Transport Studies. Retrieved November 5, 2012, from: *http://www.internationaltransportforum.org/jtrc/discussionpapers/DP200820.pdf*.

Bowers, K.J. & Johnson, S.D. (2003). Measuring the Geographical Displacement and Diffusion of Benefit Effects of Crime Prevention Activity. *Journal of Quantitative Criminology*, 19 (3), 275-301.

Braga, A.A. (2008). *Problem-Oriented Policing and Crime Prevention (2nd edition)*. Monsey, NY: Criminal Justice Press, 242.

Burges, D. (2012a). *Cargo Theft, Loss Prevention, and Supply Chain Security*. Elsevier, 392.

Burges, D. (2012b). Hidden costs. *Cargo Security International*, October/November 2012, 46-48.

Burnson, P. (2011). Supply chains remain vulnerable to cyber crime and cyber terrorism. Retrieved August 6, 2012, from: *http://www.scmr.com/article/supply_chains_remain_vulnerable_to_cyber_crime_and_cyber_terrorism/*.

CargoNet (2012). 2011 United States Cargo Theft Report. Retrieved August 7, 2012, from: http://*www.cargonet.com/cargo_theft_reports/2011.pdf.*

Clarke, R.V. (ed.) (1992a). *Situational Crime Prevention – Successful Case Studie*s. NY: Harrow and Heston, 286.

Clarke, R.V. (ed.) (1997). *Situational Crime Prevention – Successful Case Studies (2nd edition)*. NY: Harrow and Heston, 357.

Clarke, R.V. (2005). Seven misconceptions of situational crime prevention. In Tilley, N. (ed.). *Handbook of Crime Prevention and Community Safety*. Cullompton, UK: Willan Publishing, 39-70.

Clarke, R.V. (2008). Situational crime prevention. In Wortley, R. & Mazerolle, L. (eds.). *Environmental Criminology and Crime Analysis*. Cullompton, UK: Willan Publishing, 183.

Clarke, R.V. & Eck, J.E. (2009). *Crime analysis for problem solvers in 60 small steps*. Washington, DC: U.S. Department of Justice, Office of Community Oriented Policing Services.

Cohen, M.A. (2005). *The Costs of Crime and Justice*. London - New York: Routledge.

Cornish, D. (1994). The procedural analysis of offending and its relevance for situational prevention. In Clarke, R.V. (ed.). *Crime Prevention Studies Volume 3*, 151-196.

Cornish & Clarke (2003), cited in Clarke, R.V. (2005). Seven misconceptions of situational crime prevention. In Tilley, N. (ed.). *Handbook of Crime Prevention and Community Safety*. Cullompton, UK: Willan Publishing, 39-70.

Cozens, P. (2008). Crime prevention through environmental design. In Wortley, R. & Mazerolle, L. (eds.). *Environmental Criminology and Crime Analysis*. Cullompton, UK: Willan Publishing, 153-177.

Crowe, T. (2000). *Crime Prevention Through Environmental Design (2nd edition)*. National Crime Prevention Institute, Boston: Butterworth-Heinemann, 333.

Dolan, P., Loomes, G., Peasgood, T. & Tsuchiya, A. (2005). Estimating the Intangible Victim Costs of Violent Crime. *British Journal of Criminology*, 47 (1), 121-132.

DNV Consulting (2005). *Study on the impacts of possible European legislation to improve transport security*. Final report no. 40008032-6-2 (public version).

Duff, R.A. & Marshall, S.E. (2000). Benefits, Burdens and Responsibilities: some Ethical Dimensions of Situational Crime Prevention. In von Hirsch, A., Garland, D. & Wakefield, A. (eds.). *Ethical and Social Perspectives on Situational Crime Prevention*. Oxford and Portland: Hart Publishing, 17-35.

Eck, J. (2002). Learning from experience in problem-oriented policing and situational prevention. In Tilley, N. (ed.). *Crime Prevention Studies Volume 14: Evaluation for Crime Prevention*. Monsey, NY: Criminal Justice Press, 93-117.

Eck, J.E. (2005). Evaluation for lesson learning. In Tilley, N. (ed.). *Handbook of Crime Prevention and Community Safety*. Cullompton, UK: Willan Publishing, 699-733.

Eck, J. & Weisburd, D. (1995). Crime Places in Crime Theory. In Eck, J. and Weisburd, D. (eds.). *Crime Prevention Studies Volume 4: Crime and Place*. Monsey, NY: Criminal Justice Press, 1-33.

Ekwall, D. (2009). The displacement effect in cargo theft. *International Journal of Physical Distribution & Logistics Management*, 39 (1), 47-62.

Ekwall, D. (2010). On analysing the official statistics for antagonistic threats against transports in EU: a supply chain risk perspective. *Journal of Transportation Security*, 3 (4), 213 – 230.

Felson, M. (1998). *Crime and Everyday Life (2nd edition)*. London: Pine Forge Press, 223.

FreightWatch International Global Threat Assessment 2011. Retrieved October 25, 2012, from: *http://www.cargosecurityinternational.com*.

Gill, M. (1994). Introducing Crime at Work. In Gill, M. (ed.). *Crime at Work*. Leicester: Perpetuity Press, 1-10.

Gill, M. (ed.)(1998). *Crime at Work Volume 2*: Increasing the Risk for Offenders. Leicester: Perpetuity Press, 217.

Gilling, D. (1996). Problems with the Problem-Oriented Approach. In Homel, R. (ed.). *Crime Prevention Studies Volume 4: The Politics and Practice of Situational Crime Prevention*. Monsey, NY: Criminal Justice Press, 9-23.

Grabosky, P.N. (1996). Unintended Consequences of Crime Prevention. In Homel, R. (ed.). *Crime Prevention Studies Volume 4: The Politics and Practice of Situational Crime Prevention*. Monsey, NY: Criminal Justice Press, 25-56.

Guerette, R.T. (2009). *Analyzing Crime Displacement and Diffusion*. Center for Problem Oriented Policing Tool Guide No. 10., Washington, DC: U.S. Department of Justice, Office of Community Oriented Policing Services.

Guerette, R.T. & Bowers, K.J. (2009). Assessing the Extent of Crime Displacement and Diffusion of Benefits: a Review of Situational Crime Prevention Evaluations. Criminology, 47 (4), 1331-1368.

Haelterman, H. (2009a). *Effectiveness and Potential Spill-over Effects of Counterterrorism Measures defined in International Supply Chain Security Programs*. Counteract Report FT4/A, EC Contract Number SSP4/2005/TREN/05/FP6/S07.48891 (not published).

Haelterman, H. (2009b). Situational Crime Prevention and Supply Chain Security: An Ex Ante Consideration of Preventive Measures. *Journal of Applied Security Research*, 4, 483-500.

Haelterman, H. (2011). Re-thinking the Cost of Supply Chain Security. *Crime, Law and Social Change*, 56 (4), 389-405.

Haelterman, H., Callens, M. and Vander Beken, T. (2012). Controlling Access to Pick-up and Delivery Vans: the Cost of Alternative Measures. *European Journal on Criminal Policy and Research*, 18 (2).

Hamilton-Smith, N. (2002). Anticipated consequences: developing a strategy for the targeted measurement of displacement and diffusion of benefits. In Tilley, N. (ed.). *Crime Prevention Studies Volume 14: Evaluation for Crime Prevention*. Monsey, NY: Criminal Justice Press-Cullompton, UK: Willan Publishing, 11-52.

Hardie, J. & Hobbs, B. (2005). Partners against Crime: The Role of the Corporate Sector in Tackling Crime. In Clarke, R.V. & Newman, G.R. (eds.). *Crime Prevention Studies Volume 18. Designing out Crime from Products and Systems*. Monsey, NY: Criminal Justice Press / Cullompton, UK: Willan Publishing, 85-140.

Hayes, R., Downs, D. & Blackwood, R. (2012). Anti-theft procedures and fixtures: a randomized controlled trial of two situational crime prevention measures. *Journal of Experimental Criminology*, 8 (1), 1-15.

Hintsa, J. (2011). *Post-2001 Supply Chain Security-impacts on the private sector*. Thèse présentée à la Faculté des HEC de l'Université de Lausanne, 169 (not published).

Hirschfield, A. (2005). Analysis for intervention. In Tilley, N. (ed.). *Handbook of Crime Prevention and Community Safety*. Cullompton, UK: Willan Publishing, 629-673.

Jacques, C. (1994). Ram raiding: the history, incidence and scope for prevention. In Gill, M. (ed.). *Crime at Work*. Leicester: Perpetuity Press, 42-55.

Knutsson, J. & Clarke, R.V. (2006). Introduction. In Knutsson, J. & Clarke, R.V. (eds.). *Crime Prevention Studies Volume 20. Putting Theory to Work. Implementing Situational Prevention and Problem-oriented Policing*. Monsey, NY: Criminal Justice Press / Cullompton, UK: Willan Publishing, 1-8.

Laycock, G. (2005). Deciding what to do. In Tilley, N. (ed.). *Handbook of Crime Prevention and Community Safety*. Cullompton, UK: Willan Publishing, 674-698.

Lilly, J.R., Cullen, F.T. & Ball, R.A. (2007). *Criminological Theory. Context and Consequences (4th Edition)*. Thousand Oaks: Sage Publications, 266.

Mayhew, P. & Hough, M. (2012). Situational Crime Prevention. The Home Office origins. In Tilley, N. & Farrell, G. (eds.). *The Reasoning Criminologist: Essays in honour of Ronald V. Clarke*. New York: Routledge, 15-29.

Mayhew, P., Clarke, R.V.G, Sturman, A. and Hough, J.M. (1976). *Crime as opportunity. Home Office Research Study n° 34*, London: Her Majesty's Stationery Office, 29.

Moore, J.H. & Weatherford, L.R. (2001). *Decision Modeling with Microsoft Excel – sixth edition*. Upper Saddle River, NJ: Prentice-Hall, 693.

Morgan, R. & Cornish, D. (2006a). Understanding local transport crime problems. In Smith, M.J. & Cornish, D.B. (eds.). *Secure and Tranquil Travel: Preventing Crime and Disorder on Public Transport*. London: UCL Jill Dando Institute of Crime Science, 29-42.

NCPI - National Crime Prevention Institute (2001). *Understanding Crime Prevention*. Boston: Butterworth-Heinemann, 212.

Newburn, T. (2007). *Criminology*. Cullompton, UK: Willan Publishing, 1019.

Newman, G.R. & Clarke, R.V. (2003). *Superhighway Robbery. Preventing E-commerce Crime*. Cullompton, UK: Willan Publishing, 224.

Newman, G., Clarke, R.V. & Shoham, S.G. (eds.) (1997). *Rational Choice and Situational Crime Prevention. Theoretical Foundations*. Aldershot: Ashgate Dartmouth, 260.

Peleg-Gillai, B., Bhat, G. & Sept, L. (2006). *Innovators in Supply Chain Security: Better Security Drives Business Value*. The Manufacturing Innovation Series, Washington: Stanford University – The Manufacturing Institute, 35.

Rice, J.B. & Spayd, P.W. (2005). Investing in Supply Chain Security: Collateral Benefits. Special Report Series, IBM Center for the Business of Government. Retrieved October 16, 2008, from: *http://www.businessofgovernment.org/pdfs/Rice_Report.pdf*.

Ritter, L., Barrett, J.M. & Wilson, R. (2007). *Securing Global Transportation Networks. A Total Security Management Approach*. New York: McGraw-Hill, 276.

Rovers, G.B. & de Vries Robbé, E. (2005). *Interne criminaliteit in de logistieke sector*. WODC-rapport nr. 235, Meppel: Boom Juridische Uitgevers, 227.

Shapland, J. (2000). Situational Prevention: Social Values and Social Viewpoints. In von Hirsch, A., Garland, D. & Wakefield, A. (eds.). *Ethical and Social Perspectives on Situational Crime Prevention*. Oxford and Portland: Hart Publishing, 113-123.

Sherman, L.W., Gottfredson, D.C., MacKenzie, D.L., Eck, J., Reuter, P. & Bushway, S.D. (1998). Preventing Crime: What Works, What Doesn't, What's Promising. *National Institute of Justice Research in Brief*. Washington DC: U.S. Department of Justice Office of Justice Programs, 19.

Tilley, N. (ed.) (2002). *Crime Prevention Studies Volume 14: Evaluation for Crime Prevention*, Monsey. NY: Criminal Justice Press.

Tilley, N. (2005). Introduction: thinking realistically about crime prevention'. In Tilley, N. (ed.). *Handbook of Crime Prevention and Community Safety*. Cullompton, UK: Willan Publishing, 3-13.

Tyska, L.A. & Fennelly, L.J. (2001). *Cargo Theft Prevention. A Handbook for Logistics Security*. Alexandria, VA: American Society for Industrial Security, 421.

Transported Asset Protection Association. Retrieved August 7, 2012, from: *http://www.tapaemea.com*.

Vettenburg, N., Burssens, D., Goris, P., Melis, B., Van Gils, J., Verdonck, D. & Walgrave, L. (2003). *Preventie Gespiegeld. Visie en instrumenten voor wenselijke preventie*. Heverlee: Lannoo Campus, 120.

von Hirsch, A. & Jareborg, N. (1991). Gauging Criminal Harms: A Living Standard Analysis. *Oxford Journal of Legal Studies*, 11 (1): 1-38.

Waring, A.E. & Glendon, A.I. (1998). *Managing Risk*. Critical issues for survival and success into the 21st century. London: Thomson Learning, 493.

Weisburd, D. (1997). Reorienting Crime Prevention Research and Policy: From the Causes of Criminality to the Context of Crime. *National Institute of Justice Research Report*. Washington DC: U.S. Department of Justice Office of Justice Programs, 28.

Welsh, B.C. (2007). Evidence-Based Crime Prevention: Scientific Basis, Trends, Results and Implications for Canada. Ottawa, Ontario: National Crime Prevention Centre (NCPC), 53.

Welsh, B.C. & Farrington, D.P. (1999). Value for money? A review of the costs and benefits of situational crime prevention. *British Journal of Criminology*, 39 (3): 345-368.

Welsh, B.D. & Farrington, D.P. (2010). The Future of Crime Prevention: Developmental and Situational Strategies. Paper prepared for the National Institute of Justice, 65.

Wortley, R. (1997). Reconsidering the Role of Opportunity in Situational Crime Prevention. In Newman, G., Clarke, R.V. & Shoham, S.G. (eds.). *Rational Choice and Situational Crime Prevention*. Theoretical Foundations. Aldershot: Ashgate Dartmouth, 65-81.

Wortley, R. (2001). A Classification of Techniques for Controlling Situational Precipitators of Crime. *Security Journal*, 14(4): 63-82.

Zamparini, L. & Reggiani, A. (2007). The Value of Travel Time in Passenger and Freight Transport: An Overview. In van Geenhuizen M., Reggiani A. and Rietveld, P. (eds.). *Policy Analysis of Transport Networks*. Aldershot: Ashgate, 145-162.

Zamparini, L., Layaa, J. & Dullaert, W. (2010). Monetary Values of Freight Transport Quality Attributes: A Sample of Tanzanian Firms. *Journal of Transport Geography*, 19: 1222-1234.

Appendix A: Examples of Supply Chain Security Programs

Program:	Brief description:
ISPS – International Ship and Port Facility Security (Code)	- United Nations International Maritime Organization (IMO) - Adopted in December 2002 as an amendment to the SOLAS ('Safety of Life at Sea') Convention - Describes minimum requirements for security of ships and ports - Provides a standardized framework for evaluating risk, enabling governments to offset changes in threat with changes in vulnerability for ships and port facilities through determination of appropriate security levels and corresponding security measures - Incorporated into European legislation in 2004 - More info: *www.imo.org*
ICAO – Annex 17	- United Nations International Civil Aviation Organization (ICAO) - Main document: Annex 17 to the Chicago Convention (1974) - Aims to prevent and suppress all acts of unlawful interference against civil aviation throughout the world - Ninth edition applicable on 1 July 2011 - More info: *www.icao.int*
WCO – Safe Framework of Standards	- United Nations World Customs Organization (WCO) - Adopted in 2005 - Sets forth principles and standards for Member Customs administrations to use in developing their cargo and supply chain security policies and programs - Introduces AEO ('Authorized Economic Operator') concept - Recently amended (2011) - More info: *www.wcoomd.org*
ATSA – U.S. Aviation and Transportation Security Act	- United States Department of Transportation - Enacted by the U.S. Congress as a result of the September 11, 2001 attacks (November 2001) - Creation of the Transportation Security Administration (TSA) to strengthen the security of the nation's transportation systems - Sets standard for excellence in transportation security - More info: *www.tsa.gov*

C-TPAT – U.S. Customs Trade Partnership against Terrorism	- United States Department of Homeland Security – Customs and Border Protection (CBP) - Voluntary government-business initiative to build cooperative relationships that strengthen international supply chain and U.S. border security - Certifies companies that agree to adopt and integrate the program's security guidelines into their supply chains - More info: *www.cbp.gov*
CSI – U.S. Container Security Initiative	- United States Department of Homeland Security – Customs and Border Protection (CBP) - Launched in 2002 - Addresses the threat to border security and global trade posed by the potential for terrorist use of a maritime container to deliver a weapon - Proposes a security regime to ensure all containers that pose a potential risk for terrorism are identified and inspected at foreign ports before they are placed on vessels destined for the United States. - More info: *www.cbp.gov*
EU Air Cargo Security Program	- European Commission DG MOVE - In effect since 19 January 2003 (EC Regulation 2320/2002) and revised several times in order to seek further simplification, harmonization and clarification of the existing rules, as well as improvement of the various levels of security - Based on standards contained in ICAO Annex 17, recommendations of ECAC ('European Civil Aviation Conference') and Commission proposals - Introduction of Regulated Agent, Known Consignor, Account Consignor and ACC3 status in European legislation
EU Authorized Economic Operator Program	- European Commission DG TAXUD - Security Amendments to the Community Customs Code published in May 2005 - Amendments cover a number of measures to tighten security around goods crossing international borders, the requirement for traders to provide customs authorities with information on goods prior to import to or export from the European Union, the provision to introduce the Authorized Economic Operator (AEO) concept, and the introduction of a mechanism for setting uniform Community risk-selection criteria for controls

ISO 28000 – series	- International Organization for Standardization (ISO) - ISO 28000:2007 specifies the requirements for a security management system, including those aspects critical to security assurance of the supply chain - The set of standards is applicable to all sizes of organizations, from small to multinational, in manufacturing, service, storage or transportation - More info: *www.iso.org*
TAPA FSR – Freight Security Requirements	- TAPA – Transported Asset Protection Association - Industry organization established in the United States in 1997 with the aim to provide a forum for responsible managers and to share information for mutual benefit - The TAPA FSR (Freight Security Requirements) specify the minimum acceptable security standards for assets travelling throughout the supply chain - More info: *www.tapaonline.org* / *www.tapaemea.com* / *www.tapa-asia.org*
TAPA TSR – Truck Security Requirements	- TAPA – Transported Asset Protection Association - Industry organization established in the United States in 1997 with the aim to provide a forum for responsible managers and to share information for mutual benefit - The TAPA TSR (Truck Security Requirements) specify the processes and specifications for Service Providers to attain TAPA certification for their truck operations - More info: *www.tapaonline.org* / *www.tapaemea.com* / *www.tapa-asia.org*

Appendix B: Situational Crime Prevention Techniques

Increase the effort	Increase the risk	Reduce the rewards	Reduce provocations	Remove excuses
1. Harden targets (e.g. immobilizers in cars, the use of hard-sided trailers, the provision of high value cages, etc.)	6. Extend guardianship (e.g. introduce neighborhood watch, alarm systems, etc.)	11. Conceal targets (e.g. gender-neutral phone directories, off-street parking, use of unmarked transportation units for transporting high value freight, etc.)	16. Reduce frustration and stress (e.g. efficient queuing, soothing lighting, etc.)	21. Set rules (e.g. rental agreements, hotel registration, etc.)
2. Control access to facilities (e.g. entry phones, electronic access to parking garages, etc.)	7. Assist natural surveillance (e.g. improved street lighting, trimming bushes to enhance visibility of premises, etc.)	12. Remove targets (e.g. removable car radios, pre-paid public phone cards, replace cash money transfers by electronic systems, etc.)	17. Avoid disputes (e.g. fixed cab fares, reduce crowding in pubs, segregate rival fans in soccer stadiums, etc.)	22. Post instructions (e.g. 'no parking' signs, 'private property' signs, etc.)
3. Screen exits (e.g. electronic tags for libraries, border controls, etc.)	8. Reduce anonymity (e.g. taxi driver ID's, name tags for staff members, etc.)	13. Identify property (e.g. property marking, vehicle licensing, etc.)	18. Reduce emotional arousal (e.g. controls on violent porn, prohibit pedophiles working with children, etc.)	23. Alert conscience (e.g. roadside speed display signs, 'shoplifting is stealing' signs, etc.)
4. Deflect offenders (e.g. street closures in red light district, separate toilets for women, only allow authorized personnel in shipping areas, etc.)	9. Utilize place managers (e.g. train employees to prevent crime, support whistle blowers, etc.)	14. Disrupt markets (e.g. checks on pawn brokers, licensed street vendors, tell the public how to report shops or individuals that sell or unblock stolen phones, etc.)	19. Neutralize peer pressure (e.g. 'idiots drink and drive', 'it's ok to say no', introduce good role models, etc.)	24. Assist compliance (e.g. litter bins, public lavatories to avoid urinating in the streets, etc.)
5. Control tools / weapons (e.g. toughened beer glasses or plastic mugs, put restrictions on the sale of spray-cans to juveniles, etc.)	10. Strengthen formal surveillance (e.g. speed cameras, CCTV in town centers, security guards, police bike controls, etc.)	15. Deny benefits (e.g. ink merchandise tags, graffiti cleaning, installation of road humps to deny the benefits of speeding, etc.)	20. Discourage imitation (e.g. rapid vandalism repair, V-chips in TV's, persuade media not to publish details of crime incidents and techniques used, etc.)	25. Control drugs / alcohol (e.g. breathalyzers in pubs, alcohol-free events, etc.)

References:

Clarke, R.V. (2005). Seven misconceptions of situational crime prevention. In Tilley, N. (ed.). *Handbook of Crime Prevention and Community Safety*. Cullompton, UK: Willan Publishing, 46-47.

Appendix C: User Checklist

Stages:	Relevant questions:
Problem analysis and definition	- What specific crime problem do I face? - What are its characteristics? - What sequence of steps / actions are involved for an offender to commit this particular type of crime? - What particular benefit is the offender seeking? - How big is the problem currently and how big of a problem can it potentially become? - What is the current and potential impact on my organization? - What stakeholders are (potentially) affected (e.g. customers, shareholders, employees, etc.)?
Analysis of situational context	- What are the characteristics of the environment in which preventive action is required? - What situational conditions permit or facilitate the commission of the particular crime type under study? - What factors contribute to the problem? - What crime generators can be identified? - What crime attractors can be identified? - What crime enablers can be identified? - What crime facilitators can be identified? • Physical facilitators that augment offenders' capabilities or help to overcome preventive measures? • Social facilitators that stimulate crime or disorder? • Chemical facilitators (e.g. alcohol or drugs)? - What controls are already in place? - What controls are missing?
Potential countermeasures	- Based on the identified sequence of steps / actions required to complete the crime: • What measures may be suitable to counter or disrupt these actions? • Do these potential measures target the specific type of crime that is under consideration?

Ex-ante consideration (for each of the identified countermeasures)	- Is this measure available should I want to implement it? - Does the implementation of this measure require the implementation of other (interdependent) measures in order to reach effectiveness? - Are the necessary preconditions in place for this measure to be effective and efficient, i.e.: • Is it feasible to introduce the measure from a practical point of view, i.e. without impeding core business processes? • Is the necessary knowledge and expertise available in my organization to introduce this measure? • Are end-users aware of the crime problem that is being dealt with? • Are they committed to help solve the problem? • Do end-users belief in the effectiveness of this particular measure? • Are they willing to co-operate with other stakeholders to help solve the problem? - What is the financial cost involved in introducing this measure (i.e. management and overhead costs, personnel costs, capital expenditures, maintenance costs, etc.)? - Does the introduction of this measure pose any potential ethical costs? • Would this measure have an impact on the feeling of liberty or privacy of individuals? • Would staff members feel labeled or discriminated if this measure would be introduced? • Would the introduction make them feel hindered in their freedom of movement or alienated from their colleagues or employer? • Would it make them feel distrusted? - Would the introduction of this measure have a negative impact on the esthetics of the environment?

	- What is the likelihood for the introduction of this measure to result in the following reverse effects:
	  • Geographical displacement?
	  • Temporal displacement?
	  • Target displacement?
	  • Tactical displacement?
	  • Offense displacement?
	  • Escalating effects (e.g. excessive use of violence)?
	  • Adaptive behavior?
	  • Enticement effects?
	  • What criminal opportunities are left unattended once this measure would be introduced?
	- How might an offender try to circumvent or counter this measure?
	- To what extent do I expect the introduction of this measure to mitigate the problem?
	- Would the introduction result in any beneficial side effects?
	- Would the introduction result in any diffusion effects (i.e. would it also mitigate any other crime problems that have been identified)?

Implementation	- What measure(s) will I implement (based on the outcome of the above exercise)? - Does the implementation plan cover all necessary actions? - Does it identify all process partners including their respective responsibilities? - Does the implementation plan include a built in monitoring plan?
Ex-post evaluation	- Was the intervention put into place as planned (based on a process evaluation)? - Was the response effective at reducing the problem (based on an impact evaluation)? - Have any beneficial side-effects / unexpected benefits been identified following the intervention? - Have any negative / reverse effects been identified? - Is there a need for adjustments or fine-tuning?

Author Biography

Dr. Harald Haelterman (°1972) holds a Master's Degree and a PhD in Criminology (Ghent University, Belgium), a Master of Science Degree in Security & Crime Risk Management (University of Leicester, UK) and a Certificate of Higher Education in Philosophy (Catholic University of Leuven, Belgium). He further specialized at the Free University of Brussels and the University of Antwerp.

He is a former research fellow at the Interdisciplinary Centre for Law and Information Technology (University of Leuven) and a former guest lecturer at the Free University of Brussels and the University of Antwerp Management School. From 2006 till 2012 he was an Academic Advisor at the Department of Criminal Law and Criminology of Ghent University, where he's currently a Postdoctoral Researcher at the Institute for International Research on Criminal Policy.

He started his professional career in 1997 as a Corporate Investigator and Crime Risk Management Consultant, completing assignments for a variety of multinationals and industry sectors. In 2002 he joined TNT Express where he held a number of senior security functions. Currently he's the Head of Security for Northern Europe and North America.

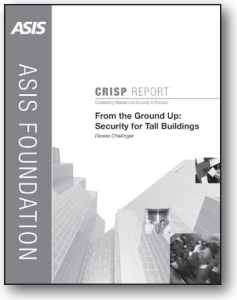
Dr. Haelterman is a Council Member of the European Corporate Security Association (ECSA) and a long standing member (and former Chairman) of the European Express Association Security Committee (EEA), representing the express cargo industry - including the four major international express carriers DHL, FEDEX, TNT and UPS - in stakeholder meetings and working groups with European Institutions and a range of international Regulatory Bodies.

He's the author of various publications on supply chain security, crime prevention, computer crime and corporate investigations; and has been participating in a wide range of (international) studies, projects and expert groups.

Contact details: *harald.haelterman@Ugent.be*

Additional CRISP Reports

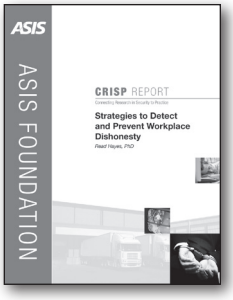
From the Ground Up: Security for Tall Buildings



Dennis Challinger

This report focuses on security challenges facing tall commercial and residential buildings. Challinger examines security threats, building vulnerabilities, and a variety of current responses. He also reports on research relating to the physical design of—and crime in—such buildings. His analyses lead to numerous research-justified recommendations.

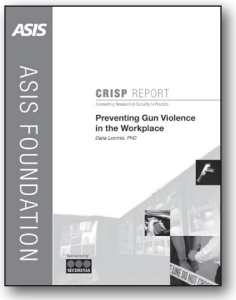
Strategies to Detect and Prevent Workplace Dishonesty



Read Hayes, PhD

Employee theft may account for 40-50 percent of all business losses. How can employers promote a culture of honesty? This report provides practical strategies to reduce workplace theft and fraud. Hayes examines the factors that lead to these behaviors; analyzes select prevention techniques, policies, and technologies; and offers research-based solutions.

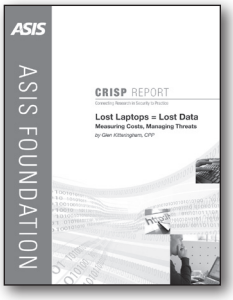
Preventing Gun Violence in the Workplace



Dana Loomis, PhD

New legislation may complicate your company's "no-weapons" policies. And there are many more potential perpetrators than just the usual suspects, from disgruntled former employees to domestic disturbances gone toxic. This report examines gun violence in the workplace and offers recommended approaches to prevent problems and minimize potential threats.

Lost Laptops=Lost Data: Measuring Costs, Managing Threats



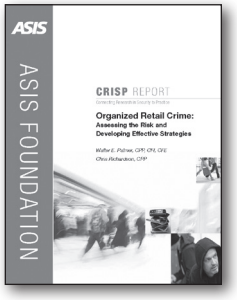
Glen Kitteringham, CPP

Replacing stolen laptops is just the start: lost productivity, damaged credibility, frayed customer relations, and heavy legal consequences can cripple your organization. This report reveals seven steps to protect laptops—and data—at the office, on the road, or at home. You get practical checklists and classification schemes to help determine adequate levels of data protection. Plus physical, electronic, and security measures you can immediately implement.

These reports are available on the ASIS Foundation website, *www.asisfoundation.org*.

Additional CRISP Reports

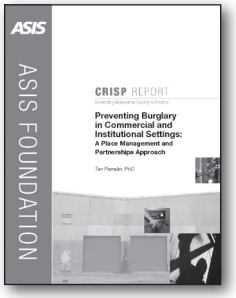
Organized Retail Crime: Assessing the Risk and Developing Effective Strategies



Walter E. Palmer, CPP, CFI, CFE
Chris Richardson, CPP

This CRISP report invites retailers to take a critical look at their handling of Organized Retail Crime (ORC). Chris Richardson and Walter Palmer combine their extensive experience of advising retailers on how to manage security risks with a very helpful summary of previous research, to stimulate thinking on how best to respond to ORC. Their starting point is that retailers and any others involved need to be clear about the type of ORC problem they are facing and its drivers, as well as the types of measures that are already in place that can be marshalled as part of an overall approach to making a response effective. They unpick the merits and limits of different types of security and offer a number of frameworks to guide practitioners. In so doing it is likely that this paper will become one of the essential reference points for those who need to tackle the ORC threat.

Preventing Burglary in Commercial and Institutional Settings: A Place Management and Partnerships Approach



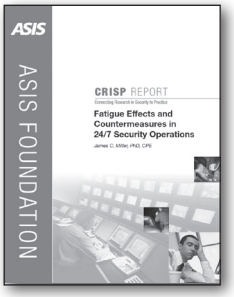
Tim Prenzler, PhD

In this report Tim Prenzler, PhD, looks at how to assess, manage, and respond to burglaries that occur at commercial and industrial sites. While there is a considerable amount written about domestic burglary, research is less in evidence when the locale is non-residential. His report looks at the context in which burglaries occur, and includes a consideration of the burglar's approach. He examines a range of solutions, which aim to make it more difficult for would be offenders particularly in the workplace, and he shows where security managers can have an impact. Drawing together a range of data, he looks at approaches from different levels, from the police, the government, and from those closer to the offence, the "place managers." Those charged with preventing burglary at commercial and institutional settings now have a source of information, which connects research to practice to guide them in their prevention strategies.

These reports are available on the ASIS Foundation website, *www.asisfoundation.org*.

Additional CRISP Reports

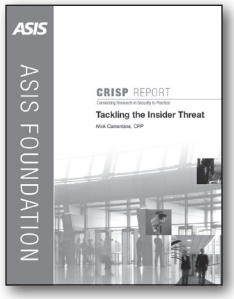
Fatigue Effects and Countermeasures in 24/7 Security Operations



James C. Miller PhD, CPE

Humans are not biologically wired to work at night. Speed and accuracy on the job are only above average between 7:00 a.m. and 7:00 p.m. Come nightfall, efficiency and productivity decrease and safety risks rise. In Fatigue Effects and Countermeasures in 24/7 Security Operations, author James C. Miller PhD, CPE, explores the effects of fatigue and night work on human cognitive performance and offers countermeasures that may be used to combat these effects. Miller's research draws from both experimental and field studies conducted with police and others who work evening and rotating shifts, as well as fatigue research conducted by the Department of Defense. The report provides relevant information for security personnel and police in general, especially those who work at night.

Tackling the Insider Threat



Nick Catrantzos, CPP

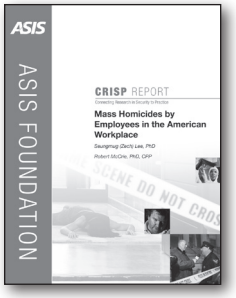
While malicious insider incidents remain statistically rare, they are potentially devastating to any institution with critical assets to defend. In Tackling Insider Threats, author Nick Catrantzos, CPP, combines a review of the insider threat literature with findings of a Delphi study to arrive at a new approach to defeating the kind of trust betrayer intent on carrying out catastrophic attack to the organization. His insights align with those who advocate the importance of a positive security culture, as he supports a greater role for engaging staff meaningfully in the protection of the organization. His approach, termed 'no dark corners' draws upon a range of others from security practice, and his findings will invite many to critically assess whether they are doing all they can in the best way, to manage different types of insider threat.

These reports are available on the ASIS Foundation website, *www.asisfoundation.org*.

Additional CRISP Reports

Mass Homicides by Employees in the American Workplace

Seungmug (Zech) Lee, PhD
Robert McCrie, PhD, CPP



This CRISP report focuses on a rare type of high impact threat, mass homicide by employees. The authors Seungmug (Zech) Lee, PhD, and Robert McCrie, PhD, CPP, report on new research about an area that has hitherto received relatively little scholarly focus. They highlight the importance of managing workplace problems with and between employees (and departing employees) carefully and highlight the close link between good management practices and effective security in reducing risks.

ASIS International (ASIS) is the preeminent organization for security professionals, with more than 38,000 members worldwide. Founded in 1955, ASIS is dedicated to increasing the effectiveness and productivity of security professionals by developing educational programs and materials that address broad security interests, such as the ASIS Annual Seminar and Exhibits, as well as specific security topics. ASIS also advocates the role and value of the security management profession to business, the media, government entities, and the public. By providing members and the security community with access to a full range of programs and services, and by publishing the industry's number one magazine—*Security Management*— ASIS leads the way for advanced and improved security performance. For more information, visit *www.asisonline.org*.

ASIS Foundation

The ASIS Foundation, a 501(c)(3) nonprofit organization, advances the security profession worldwide by enabling leading-edge research, education, and training. Foundation awards and scholarships ensure those pursuing a security management career are able to realize their academic and professional goals. Support for the Foundation is achieved through financial contributions from individuals, chapters, and companies with an interest in the security industry. For details, visit *www.asisfoundation.org*.

1625 Prince Street
Alexandria, VA 22314-2818
USA
+1.703.519.6200
Fax: +1.703.519.6299
www.asisonline.org

PLEASE PLACE BARCODE HERE
FOR ISBN #978-1-934904-44-2