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Crime Prevention through Environmental Design

Professor Rachel Armitage and Dr. Tim Pascoe

Abstract

Crime Prevention through Environmental Design (CPTED) is a method of reducing crime through the design and manipulation of the built environment. Based upon the New Opportunity Theories of crime, CPTED focuses upon blocking opportunities for criminal behaviour through subtle techniques to maximise informal surveillance, territoriality and guardianship, to minimise through movement and to set standards of physical security that are proportionate to crime risk. This chapter will discuss the principles of CPTED and the theories from which it evolved, before exploring how CPTED is applied internationally in terms of policy, guidance and practice. Examples include Chile, Mexico, and Brazil, as well as countries with more established processes of implementing CPTED within the planning process (England and Wales, Netherlands and Australia). Evidence regarding effectiveness will be presented and consideration will be given to the extent to which principles, practice and procedure can be transferred to different countries and cultures.

Introduction

Crime Prevention through Environmental Design (CPTED) is a method of reducing crime through the design and manipulation of the built environment. Based upon the New Opportunity Theories of crime, CPTED focuses upon blocking opportunities for criminal behaviour through subtle techniques to maximise informal surveillance, territoriality and guardianship, to minimise through movement and to set standards of physical security that are proportionate to crime risk. The New Opportunity Theories (including Routine Activity Theory, Rational Choice Theory and Crime Pattern Theory) suggest that opportunities play a role in causing crime. Based upon this premise, the reduction of crime must focus upon the reduction of opportunities for crime to occur.

Routine Activity Theory (Cohen and Felson, 1979) considers how the structure of modern society and the routine activities of everyday life have created more opportunities for criminal activities. These opportunities include an increase in easily

accessible, lightweight and high value consumer products; the dispersal of individuals into more households - thus increasing the number of potential burglary targets; the increased use of motor vehicles - thus more targets for acquisitive crimes, and also more opportunities in the form of surplus time and energy as historically time-consuming tasks are aided or replaced by electronic goods and convenience products. Cohen and Felson (1979) suggest that the increase in crime in the United States since 1960 was not so much an indicator of social breakdown, as a '*by-product of the freedom and prosperity within the routine activities of our everyday lives*' (p.605). From the perspective of Routine Activity Theory, for a crime to be committed there must be a motivated offender, a suitable target and the absence of a capable guardian. A situation in which a motivated offender comes into contact with a suitable target, with the absence of a capable guardian is likely to lead to the committal of a crime. Therefore, an intervention which removes/de-motivates the offender, deems the target unsuitable, or introduces a capable guardian, is likely to prevent crime taking place.

Another perspective, grouped into the New Opportunity Theories is Rational Choice Theory (Cornish and Clarke, 1986). This perspective is influenced by economic thinking and assumes that offenders seek to maximise the benefits of offending and in doing so make rational choices or decisions based upon the information or cues available to them at the time of offending. Decision processes are likely to vary according to the different stages of criminal involvement, between offenders (based upon age, experience etc.) and between different offence categories. Preventive suggestions seek to influence an offender's decision or choice to commit a crime through 1) increasing what they perceive to be the risks involved in committing that offence (installing a burglar alarm, designing housing estates to maximise natural surveillance), as well as 2) reducing the rewards should that crime occur (property marking). The aim is to ensure that for the offender the perceived costs outweigh the perceived benefits of offending.

Crime Pattern Theory, developed by Brantingham and Brantingham (1981), draws upon key concepts from behavioural geography and suggests that crimes '*do not occur randomly or uniformly across neighbourhoods, or social groups, or during an individual's daily activities or during an individual's lifetime*' (Brantingham and Brantingham, 2008 p.79). Crime Pattern Theory argues that the design of a

neighbourhood, in terms of both the internal layout and its positioning in relation to other key facilities, will influence how likely potential offenders are to learn about potential targets for crime. According to this theory: '*Offenders go to jobs, visit friends, come home, stop at the store, and carry out other daily activities just like the rest of us*' (Taylor, 2002 p. 419), and the spaces in which they travel to reach these locations are known as their activity space. These potential offenders, like all individuals within society, will have an awareness space which is made up of the locations, and the spaces in between those locations, about which they are knowledgeable. An individual's awareness space is structured by their activity space which in turn has been structured by their daily activities.

The key principle of these theories is that offenders seek to minimise the risks involved in offending and therefore select targets which are perceived as suitable and lacking in the presence of capable guardians. Offenders will also make these selections based upon their knowledge of the areas which they frequent. According to these theories, crime can be reduced by designing residential areas to minimise the likelihood that opportunistic potential offenders will pass-by en route to their daily activities, and ensuring that, should offenders become aware of the area, the design and layout of surrounding properties the offenders' perceptions of the risk associated with selecting the area as a target for crime.

What is CPTED?

CPTED is an approach to crime reduction that aims to reduce crime through the design and manipulation of the built (and sometimes natural) environment. It focuses predominantly upon designing out opportunities for crime before they occur and, ideally, this should take place at the pre-planning or planning stage. However, some interventions are implemented post-development as a response to a crime problem which has emerged. Whilst designing out crime, as an approach to crime reduction, has been used to reduce crimes as varied as pickpocketing, theft from the person, vandalism, vehicle crime and bike theft (see Ekblom, 2014 for a full review), CPTED focuses upon the built environment. As such, the crime types typically targeted for reduction include residential burglary and vehicle crime associated with residential areas (see Armitage, 2013 for a full review). Typically, crimes taking place inside properties such as domestic abuse, cyber crime or child

abuse, have not been targeted by this approach.

A commonly used formal definition is that used by Tim Crowe who defines CPTED as: *'The proper design and effective use of the built environment, that can lead to a reduction in the fear or incidence of crime and an improvement in quality of life...The goal of CPTED is to reduce opportunities for crime that may be inherent in the design of structures or in the design of neighbourhoods'* (Crowe, 2000, p. 46). Ekblom (2011) proposes a redefinition and presents the following alternative, which introduces several points not included within Crowe's definition - including the balance between security and contextually appropriate design and the possibility of intervening at different stages between pre-planning and post construction. Ekblom states that CPTED is: *'Reducing the possibility, probability and harm from criminal and related events, and enhancing the quality of life through community safety; through the processes of planning and design of the environment; on a range of scales and types of place, from individual buildings and interiors to wider landscapes, neighbourhoods and cities; to produce designs that are 'fit for purpose', contextually appropriate in all other respects and not 'vulnerability led'; whilst achieving a balance between the efficiency of avoiding crime problems before construction and the adaptability of tackling them through subsequent management and maintenance'* (Ekblom, 2011, p. 4).

More recently, research within the field of CPTED has focused upon the *effectiveness* of both the individual and collectively applied principles of CPTED measures in reducing crime and the fear of crime (by authors such as Armitage, 2000; 2006; Cozens, 2008; Cozens *et al*, 2005; Hillier and Sahbaz, 2009; Pascoe, 1999), the *process* of applying CPTED principles within police and planning environments (by authors such as Monchuk, 2011), the development of CPTED based *risk assessment tools* to predict (and prevent) risk (by authors such as Armitage, 2006; Armitage *et al*, 2010; Van der Voordt and Van Wegen, 1990; Winchester and Jackson, 1982), and a wider approach to the potential benefits of such interventions including the impact upon environmental and social *sustainability* (by authors such as Armitage and Monchuk, 2009; Cozens, 2007; Dewberry, 2003).

Given a widening of the focus to include the process of application and

consideration of benefits beyond crime reduction, such as social and environmental sustainability, a more appropriate definition of CPTED might be: The design, manipulation and management of the built environment to reduce crime and the fear of crime and to enhance sustainability through the process and application of measures at the micro (individual building/structure) and macro (neighbourhood) level.

Explaining CPTED as a crime reduction approach requires some discussion regarding the principles upon which it is based. Conscious that these principles are often presented as a given, with little discussion regarding their origins, definition, relevance to different countries, climates and cultures or their individual impact on the reduction of crime, this section will attempt to tackle these oft omitted debates.

The encounter versus enclosure debate

Before presenting the key principles of CPTED, it should be highlighted that there are several principles – of particular note being ‘limiting access and through movement’ and ‘surveillance’, where there has been some disagreement regarding their impact on crime (see Armitage, 2006b for a full discussion). These two positions are sometimes referred to as ‘encounter’ versus ‘enclosure’ or ‘inclusive’ versus ‘exclusive’ approaches. The ‘encounter’ argument, based largely on Jacobs’ (1961) principle of eyes on the street, takes the view that increasing through movement within a neighbourhood will increase the number of users of that space, and therefore the number of people to act as informal guardians of that space. In practical terms, this approach would advocate higher levels of what is often referred to as permeability (or footpaths, walkways, connections) to maximise movement and use of space. The ‘enclosure’ argument would suggest that neighbourhoods should be designed with limited through movement. This position argues that increasing through movement and access to and from a development allows potential offenders to become aware of that space and the routines of its residents, it allows potential offenders to enter and escape with relative ease, and the increased footfall provides cover/anonymity for potential offenders. Proponents of this argument would suggest that the risks of increasing the ease with which offenders can access and move through an area, outweigh any benefits of enhanced surveillance from legitimate users

of the space. Whilst the authors acknowledge these different approaches, in reality the application of CPTED has evolved considerably over the past decade, with recognition within policy, practice and academic debate that the argument is not so simplistic. As is highlighted in Armitage *et al*, (2010, 2012), ‘good design’ should be flexible and tailored to the context and crime risk of a specific area. The historical argument of culs-de-sac versus through roads, which the authors would argue was often misrepresented, has evolved to acknowledge that cul-de-sacs can be safe, as can through roads, however, when poorly designed connecting footpaths are introduced, both designs will become vulnerable.

The principles of CPTED

The principles of CPTED have been presented by several authors, including, but not exclusively Poyner (1983) and Cozens *et al* (2005), Armitage (2013) and adapted across different countries to form the attributes of safe places/environments within planning policy and guidance. Poyner (1983) outlined the principles as surveillance, movement control, activity support and motivational reinforcement. Cozens *et al* (2005) extended this to include the seven principles of defensible space, access control, territoriality, surveillance, target hardening, image and activity support. Armitage (2013) offered yet another combination of physical security, surveillance, movement control, management and maintenance and defensible space. Ekblom *et al* (2012) amended these (to enhance transferability to the United Arab Emirates) to include: access and connectivity, structure and spatial layout, ownership, surveillance, activity, public image and adaptability. Montoya *et al* (2014) assess the impact of the six principles of territoriality, surveillance, access control, target hardening, image/maintenance and activity support on burglary offences. Finally, Hedayati and Abdullah (in press) propose four primary dimensions - surveillance, access control, territoriality and maintenance, and eight subdimensions – visibility, lighting, physical barrier, security system, markers, landscaping, front house maintenance and backlane maintenance. Anyone new to the subject would be forgiven for expressing confusion. As Hedayati and Abdullah (in press) summarise in their study of CPTED in Malaysia, the problem is that the terms used as CPTED components vary from study to study. However, as will be argued later in the chapter, perhaps these differences are not only to be expected, but should be positively applauded.

Defensible space and territoriality

The term defensible space was coined by Oscar Newman (1973) who suggested that the physical design of a neighbourhood can either increase or inhibit people's sense of control over the spaces in which they reside. Newman categorised space into public (for example, the road in front of a property), semi-public (for example, the front garden), semi-private (for example, the back garden) and private (inside the property). He argued that if space is defensible, it will be clear to the owner/user of that space, and to non-legitimate users, who should and who should not be in this space. CPTED interventions ensure that space is clearly demarcated, that it is clear who has control/ownership/rights over that space and that potential offenders have no excuse to be in that space. CPTED interventions would rarely achieve this through the installation of physical barriers (figure 1); rather interventions would include the more subtle measures such as a change in road colour and texture or a narrowing of the entrance to the development to mark the area as private (figures 2 and 3).



Figure 1: CPTED would not use physical barriers/gates



Figure 2: Creating a symbolic barrier through a change in road colour/texture



Figure 3: The semi-private space is clearly demarcated through a change in road colour and texture.

These environmental features are sometimes referred to as symbolic barriers as they do not physically keep people out – rather they aim to portray the message that the area is private, and anyone entering that space will be observed and

apprehended. Brown and Altman (1983) and Armitage (2006a) found that, compared with non-burgled houses, properties which had been burgled had fewer symbolic barriers, as well as actual barriers such as fences and locked gates. In their study of 851 properties in Enschede (The Netherlands) Montoya *et al* (2014) found that houses with a front garden had a burglary risk 0.46 times lower than those without.

Territoriality involves the human emotion/response to the space which they define as their own. Physical responses to territoriality might include a resident marking an area as their own through the installation of a house sign or gate. Emotional responses to territoriality would include a resident's feelings of intrusion or infringement should a person enter what they consider to be their space. Thus, territoriality refers to the human motivation to control the space which they believe is theirs, be that through the legal ownership of that space or through their adoption and management of that space. Brown and Bentley (1993) interviewed offenders, asking them to judge (from pictures) which properties would be more vulnerable to burglary. The results revealed that properties showing signs of territorial behavior (such as the installation of a gateway at the front of the property or a sign on the gate/door marking the area as private) were perceived by offenders to be less vulnerable to burglary. Montoya *et al* (2014) also found a significant relationship between signs of territorial responses and burglary risk, but only for daytime (as opposed to night time) burglary offences.

Limiting access and through movement

Access control refers to the design of buildings and space to actively keep people out. Whilst this principle has traditionally been referred to as access control, perhaps due to its routes in more traditional situational crime prevention measures to restrict entry into buildings and rooms within buildings, within CPTED the aim is much wider. What has been referred to as access control encompasses the aims: 1) To limit the likelihood that offenders will become aware of that area as a potential target; 2) To make it more difficult for offenders to navigate into, out of and within an area should they select it as a target; 3) To increase the *physical* difficulty of entering a building/space should offenders become aware of the area as a target; 4) To increase the difficulty *psychologically* for offenders to enter and move around an area without feeling conspicuous, and 5) to remove any excuse for potential offenders to be within

a private or semi-private space and maximise the legitimate users' confidence in challenging non-legitimate users of space. Given the wider aims of this principle, access control would appear too limited a definition. A more appropriate term might be the 'limitation of access, egress and through movement'. In terms of evidencing the impact of limiting access, egress and through movement on crime levels, the efficacy of this principle is less clear-cut and this is one of the reasons why the encounter versus enclosure debate (discussed above) emerged.

There are three mechanisms through which limiting movement might reduce crime (and these form the basis of the enclosure argument). Firstly, that limiting movement reduces the ease with which offenders can enter and exit an area, and increases their perceptions of the risk of moving in, out and through a space without being observed. Secondly, that areas with high levels of movement are more likely to be within an offender's awareness space. Therefore, reducing through-movement reduces the likelihood that an offender will become aware of a vulnerable target. Finally, that areas with high levels of through movement, and therefore more pedestrians and vehicles using the area, creates an enhanced anonymity for offenders. In turn, reducing those levels of movement creates an area where anyone who does not live or work within that space feels conspicuous and vulnerable to apprehension.

There are many research studies that support the first mechanism – that offenders prefer areas with high levels of through movement due to the ease of entry, through movement and escape. These include Murray *et al* (1980), Taylor and Gottfredson (1987), and Poyner and Webb (1991). Several studies have also shown that physical changes to the internal layout of residential areas - through the closure of streets, has resulted in reduced levels of crime (Matthews, 1992; Atlas and LeBlanc, 1994; Newman, 1995, 1996; Donnelly and Kimble, 1997; Wagner, 1997; Lasley, 1998; Zavoski *et al*, 1999; Eck, 2002; Farrington and Welsh, 2009).

The second explanation for higher crime within permeable neighbourhoods suggests that offenders have to be aware of a property's existence before they can select it as a target for crime. As offenders spend much of their time travelling between home, work, school or leisure activities, the properties that they become aware of are likely to be along the travel paths that they frequent. Wiles and

Costello (2000) used interviews with offenders, police recorded crime data and forensic science data from the police DNA database as a means of investigating the distance which offenders will travel to offend. Their findings suggest that burglars are largely opportunistic, with the selection of a particular target taking place as they pass properties and notice their suitability. The dominant reason given by offenders for selecting a target was chance – with 63% of offenders giving this response.

Additional research findings which support the premise that offenders select properties as they take part in day to day activities include Letkemann (1973) who found that burglars interviewed in British Columbia stated that they generally kept their eyes open for targets all of the time. Rengert and Wasilchick (2000) found that convicted Philadelphia area burglars usually picked their targets within a limited distance of their normal travel paths, primarily along the axis of their usual home-to-work travel path. Feeney (1986) and Gabor (1987) found that individual choice of robbery locations was oriented or directed towards personally well known locations. Poyner and Webb (1991) also suggest that through routes allow offenders to search for potential targets.

The final rationale, that offenders prefer targets located within areas of high pedestrian movement due to the anonymity which this movement provides, is supported by Angel (1968), Suttles (1968), Brantingham and Brantingham (1975), Taylor and Gottfredson (1987) and Poyner and Webb (1991).

There are many additional studies that have found higher levels of crime in areas with high levels of through movement. Bevis and Nutter (1977) studied the relationship between road layout and burglary within Minneapolis, USA and found a strong association between road network complexity and crime. The study revealed that residences on grid streets experienced the highest rates of burglary, with properties located on *culs-de-sac* and dead end streets experiencing the lowest rates of burglary.

White (1990) examined the relationship between risk of burglary and levels of through movement in 86 neighbourhoods in Richmond, Virginia, USA. The measure of permeability was the number of roads in each area directly connected to a

major traffic artery. White (1990) found that the index of permeability explained a significant amount of variation in area-level burglary rates, and after controlling for socio-economic variables, the study concluded that higher levels of permeability were associated with higher levels of burglary. Nubani and Wineman (2005) used Space Syntaxⁱ measures of accessibility to examine the geographical patterns of four types of offence – breaking and entering, larceny, vehicle theft and robbery – in Michigan, USA. This study found both high local integrationⁱ and high connectivity to be positively associatedⁱⁱ with crime. Street spaces with low integration were safer as were areas with low connectivity. Beavon *et al* (1994) examined the relationship between permeability and crime in Ridge Meadows, Canada – the index of permeability used being the number of roads directly connected to each street segment analysed. The results revealed a positive association between connectivity and crime levels.

In their study of the impact of permeability/through movement on burglary risk in Merseyside, England, Johnson and Bowers (2010) test the three hypotheses: 1) Risk of burglary will be greater on major roads and those intended to be used more frequently: 2) Risk of burglary will be higher on street segments that are connected to other segments, particularly where those to which they are connected have higher intended usage, and 3) risk of burglary will be lower in *culs-de-sac*, particularly those that are non-linear and not integrated into the wider network of roads. Their sample included 118,161 homes and used both GIS and manual identification to establish road networksⁱⁱⁱ and police recorded crime data to measure burglary levels. The results, which controlled for socio-economic influences, revealed that if a street segment is part of a major road^{iv}, all other things being equal, compared to a local road^v there is an expected increase in the volume of residential burglaries on that segment of 22%. In contrast, for street segments classed as private roads^{vi}, compared to a local road, there would be a 43% decrease in burglary. In terms of road network, the study suggested that for each additional link to other roads, the predicted burglary count would increase by a factor of 3%. If a street segment had five more connections than another, there would be an expected increase in burglaries at that segment of 16%. In terms of connectivity, the results revealed that being linked to one

ⁱ Space Syntax is a mathematical approach which takes account of the street network and how each street segment connects to other streets at the local and wider area level.

other major road increases the expected count of burglary by 8%. In contrast, being linked to a private road decreases the estimated burglary levels by 8%. The study concludes that *culs-de-sac* are safer than through roads and that sinuous^{vii} *culs-de-sac* are safer still. It should be highlighted that although *culs-de-sac* were manually identified, this study did not distinguish between ‘true’^{viii} and ‘leaky’^{ix} *culs-de-sac*, therefore all were analysed using the same category. Based upon previous studies, this would suggest that the positive conclusions relating to *culs-de-sac* present a less positive picture than would have been revealed had ‘leaky’ *culs-de-sac* been excluded from the analysis. Rengert and Hakim (1998), Hakim *et al* (2001) Yang (2006) also found that areas with higher pedestrian and vehicular flow experienced higher crime, with *culs-de-sac* experiencing the lowest levels of crime.

A research project which took place in England (Armitage *et al*, 2010) analysed the design features of over 6,000 properties on 44 developments within the three police forces of Greater Manchester, Kent and West Midlands. Individual properties, their boundaries and the layout of the development on which they were located were meticulously and manually analysed and compared with prior victimisation (at property and development level). The results revealed that, compared to the true *cul-de-sac* (the safest), through roads experienced 93% more crime and leaky *culs-de-sac* 110% more crime. The analysis also identified that crime risk was generally lower on sinuous compared to linear *culs-de-sac* (replicating Johnson and Bowers, 2010). This study concluded that the most vulnerable developments were those connected by poorly designed footpaths (see figures 4 and 5). Where footpaths are included within a development they should be well-lit, straight and wide (avoiding hiding places) and they should not run at the rear of properties.



Figure 4: A poorly designed footpath provides hiding places for offenders



Figure 5: Footpaths that run at the rear of properties should be avoided

Several studies have also highlighted through-movement as a criminogenic feature in their production of crime risk-assessment mechanisms. Armitage's (2006a) Burgess Checklist (derived from Simon's Burgess Points System, 1971) allows the user to predict a property's crime risk based upon its design features. The Burgess score is derived from the difference between the mean rate of crime suffered generally (by the whole sample) and the rate of crime suffered by houses with a particular design feature. Armitage identified through movement as a key factor associated with both burglary and crime-prone homes. Six of the 13 environmental factors which were associated with risk of burglary (at a statistically significant level), and eight of the 17 factors which were associated with total crime (at a statistically significant level) were related to permeability and through-movement. In their Delft Checklist, Van der Voordt and Van (1990) also identified several factors relating to access and through movement which increased a property's vulnerability to crime, these were: Number of entrances and escape routes, the ease of access to entrance and escape routes, the physical accessibility of entrance and escape routes and the absence of symbolic barriers.

In a review of the evidence relating to the impact of permeability on crime, Taylor (2002) concludes that: "*Neighbourhood permeability is ... one of the community level design features most reliably linked to crime rates, and the connections operate consistently in the same direction across studies: more permeability, more crime*" (Taylor, 2002 p. 419). This assertion is not entirely true, as there is an argument amongst some (the encounter debate) that increasing, as opposed to decreasing, through movement will create more activity and therefore more users of that space to provide what Jane Jacobs (1961) refers to as eyes on the street. Studies that support this argument are largely conducted using Space Syntax techniques (Jones and Fanek, 1997; Hillier and Shu, 1998; Hillier and Shu, 2000 and Shu and Huang, 2003; Hillier, 2004), and it has been suggested (Armitage *et al*, 2010) that these differences could relate to the way in which through movement is measured. Without doubt, it is the view of the authors, that the majority of evidence supports the notion that, limiting through movement reduces crime risk.

Although the link is less explicit, property type (is the house detached, semi-detached and terraced) and the location of a property within a development (is

the property located on a corner allowing more access) can also be included under the principles of limiting access and through movement. As a means of determining the relationship between design features and crime risk, Winchester and Jackson (1982) produced a risk index based upon 14 different variables which were found to be particularly effective in discriminating between houses which had experienced burglary and those which had not. Houses with a score of zero had a one in 1,845 chance of being burgled during the course of one year; those possessing nine or more features had an average of one in 13 chance of being burgled. The median score on the Environmental Index of Risk for victims' houses was five, compared to a median score of two for houses lived in by the general household sample. Multiple victims (those who had been burgled on more than one occasion during the period that the present household had lived there) had a median score of seven on the index. In terms of house design, Winchester and Jackson (1982) identified two factors which they found to increase a property's vulnerability to burglary. They found that where there is access at both sides of a property from the front and the back, the likelihood of burglary victimisation is increased. This suggests that detached houses are more vulnerable to burglary than those which are attached. Armitage *et al's* (2010) study also found that, although not statistically significant, burglary rates were higher in detached homes compared to other property types.

Hillier and Sahbaz (2009) used Space Syntax to analyse five years' of police recorded crime data for a London Borough consisting of 101,849 dwellings. Hillier and Sahbaz found that flats had the lowest risk of burglary and that detached properties had the highest risk of burglary. The study presents the mean burglary rate for 13 property types ranging from very tall blocks to large detached properties. The findings revealed that, in general, the higher the number of sides on which the dwelling is exposed (high rise flats not at all and detached on all four sides), the more vulnerable a property is to burglary.

In terms of a property's position within a development, many studies have found that corner plot property experience significantly higher levels of burglary than those located elsewhere within a development. Groff and La Vigne (2001) suggested that properties located on corner plots were more vulnerable to burglary than those which were not. Armitage *et al* (2010) also found that being located on a corner plot

increases a property's risk of crime by 18% (as compared to properties not positioned on a corner plot). These findings are confirmed by several studies which ask burglars to identify properties which they consider to be at risk of burglary. In a survey of residential burglars in Ireland, Taylor and Nee (1988) used simulated environment (photographs) to establish which environmental cues may have an impact upon target choice for burglars. One of the findings of the study was that burglars expressed a consistent preference for corner houses – as opposed to those located further into a development. Cromwell and Olson (1991) used staged activity analysis (interviews and ride-alongs) with a sample of 30 active burglars as a means of establishing which (if any) environmental cues influenced target selection. One of the factors considered to influence target selection was whether or not a property was located on a corner plot – with corner plots being considered to be more vulnerable than properties located further into a development.

Surveillance

Surveillance refers to the way that an area is designed to maximise the ability of formal (security guards, police, employees) or informal (residents, passers-by, shoppers) users of the space to observe suspicious behaviour. These formal and informal users are referred to in Routine Activity Theory as Capable Guardians. Within Situational Crime Prevention more generally, surveillance may include the installation of CCTV or the use of formal security guards. Within CPTED, surveillance rarely relates to formal measures but refers more to the informal surveillance created through measures such as ensuring that dwelling entrances face the street, that rooms facing the street are active (such as the kitchen or living room) and that sightlines are not obstructed by shrubbery or high walls. Linked with territoriality, the principle of surveillance requires users of that space to recognise that an individual is behaving in a suspicious manner (be that through their behaviour or simply their presence within a private/semi-private area) and to have the confidence to challenge them or intervene. Therefore, the term surveillance includes the operational tasks of active (formal) and passive (informal) surveillance, the surveillability (Ekblom, 2011) of that space and the creation of the perception amongst offenders that they are being observed.

Research suggests that surveillance and visibility play a major part in offenders' decision-making processes when selecting properties to offend against. Offenders prefer to avoid confrontation and, where possible, select targets which are unoccupied. Reppetto (1974) interviewed 97 convicted burglars and found that the most common reason for avoiding a target was that there were too many people around. Offenders stated that the possibility of neighbours watching them deterred them from selecting a property and that they would select targets where they felt less conspicuous and where there was less visual access to neighbouring properties. In interviews with a sample of 30 active burglars, Cromwell and Olson (1991) found that properties considered to be the most attractive targets were those which were located within close proximity to a stop sign, traffic lights, commercial business establishment, park, church or four-lane street – these properties being within the activity and awareness space of offenders. This research also revealed that over ninety per cent of the sample stated that they would never enter a residence which they suspected to be occupied.

Brown and Bentley (1973) asked 72 incarcerated burglars to assess, from photographs, whether or not properties had been burgled. Across all ten homes, the houses judged to be occupied were perceived by the burglars as being those which had not been burgled.

Nee and Meenaghan (2006) interviewed fifty residential burglars in the UK, asking questions relating to decision to offend, target selection, search behaviour inside the property and disposal of stolen goods. The findings confirm those presented above, that offenders prefer to select unoccupied properties, and properties with little or no surveillance from neighbouring houses. Nee and Meenaghan found that the most commonly referred to feature of attractive targets was the degree of cover (47 respondents). Three-quarters (38) of the sample preferred a property to be unoccupied, with two-thirds of that number checking this by knocking on the door or ringing the bell. Ten accepted a target in which residents were present, as long as they were judged to be asleep at the time of the offence.

When assessing the design characteristics of victimised properties, several studies identified a lack of surveillance or poor levels of visibility as key features of

crime-prone homes. Armitage (2006a) found that there was a complex relationship between surveillance and crime risk. Surveillance from neighbouring properties appeared to reduce crime risk, yet surveillance from a nearby road or footpath enhanced a property's risk of crime. The latter can be explained by Brantingham and Brantingham (1984) and later Beavon *et al*'s (1994) suggestion that properties within the awareness space of potential offenders are more likely to be selected as targets. Where a property is located within viewing distance of an offender's daily travel path, that property is more likely to be noticed as part of their day-to-day activities. Armitage's research found that being overlooked at the front by neighbouring properties produced a Burgess risk score of -0.6 (suggesting a less than average crime risk). Not being overlooked at the front produced a Burgess risk score of +5.7 (an above average crime risk). This is clearly related to the benefit of informal surveillance from neighbours who are able, and likely, to act as capable guardians. In contrast, a property being visible from a nearby footpath experienced an increased risk of crime, with a Burgess score of +6.3. As Brantingham and Brantingham suggest, this design feature is likely to enhance crime risk due to the position of the property within viewing distance of a footpath, and therefore, placing the property within the awareness space of potential offenders. Similarly, a property situated within viewing distance of traffic lights, according to Armitage (2006a), has a Burgess risk score of +46.6, the second highest score (second to property having a gate leading into the garden from a rear footpath, which scored +51.9).

Research conducted across three police forces in the UK revealed findings to support those presented above. Armitage *et al* (2010) found that properties overlooked by between three and five other properties experienced 38% less crime than those not overlooked. However, there did not appear to be any additional benefits for those properties overlooked by five properties or more – these dwellings experiencing thirty-four per cent less crime than properties not overlooked. Interestingly, the research found that the surveillance related design features 'property faces the street on which it is located', 'windows offer good surveillance' and 'property boundary blocks view of neighbouring properties' had no statistically significant association with crime risk.

Winchester and Jackson (1982) found that, of the 14 design variables linked to heightened risk of burglary, nine relate to a lack of surveillance from neighbouring properties, or being within the awareness space of potential offenders. In terms of surveillance from neighbouring properties, those variables include: property is isolated, property is set in a location with less than five other houses in sight, property is set at a distance from the road on which it stands, property is not overlooked at the front by other houses, property is not overlooked on either side by other houses, the majority of the sides of the house are not visible from a public area, the property is set at a distance from the nearest house and the property frontage is obscured from roadside view. In terms of being located within the awareness space of potential offenders, Winchester and Jackson found that properties located on the nearest main road experienced an increased risk of crime.

Brown and Altman (1983) studied 306 burgled and non-burgled properties and found that burgled houses showed fewer indications of the probable presence of residents than non-burgled properties. These signs or traces included toys strewn across the yard or sprinklers operating in the garden. Brown and Altman also found that burgled properties had less visual access to neighbouring properties.

In their risk-assessment tool, Groff and La Vigne (2001) also identified several key factors which increased a property's vulnerability to burglary. Properties located within a two-block radius (1,000 feet) of major roads were considered to be at more risk than others, as were properties within dark (as opposed to illuminated) areas.

As was referred to above, Van der Voordt and Van Wegen (1990) also developed a checklist for measuring the risk of crime – the Delft Checklist. Of the factors which they identified as helpful in predicting levels of crime, several related to surveillance and visibility. These were: visual contact between buildings, amenities and outside spaces, sightlines between buildings and adequate levels of lighting.

Authors such as Jane Jacobs (1961) highlight the importance of informal surveillance from those living and working within an area (the encounter debate), and

from those users of the space who are simply passing by. Jacobs refers to this as ‘eyes on the street’, commenting:

‘...there must be eyes on the street, eyes belonging to those we might call the natural proprietors of the street...the sidewalk must have users on it fairly continuously, both to add to the number of effective eyes on the street and to induce a sufficient number of people in buildings along the street to watch the sidewalks’ (Jacobs, 1961, p.35).

Of course this argument has many weaknesses, the most notable being that, whilst a street may be surveyed by many people, those people do not always notice crimes taking place (Gelfand *et al*, 1973; Mayhew *et al*, 1979) and if they do, they do not always intervene (Rosenthal, 1964; Latane and Darley, 1970). This concept of self policing, which may apply in busy cities (which were the focus of Jacobs’ work) is also weakened when transferred to suburban residential developments which are less densely populated. As Cozens (2011) highlights, many social as well as design factors make this concept less likely to apply within residential settings. In many cultures, it is common for both adults within a household work full-time and developments have few or no community facilities, making surveillance from those living, working and passing through the area, less likely to take place.

Recognising the difference between predicted or potential surveillance and that which actually takes place, Reynald (2009) conducted an excellent study which measured the relationship between guardianship intensity and surveillance opportunities – is actual guardianship bolstered by opportunities for surveillance; and between guardianship intensity and actual crimes experienced on a sample of 814 residential properties in The Hague. Reynald measured guardianship intensity using a four-stage model which moves from stage one – invisible guardian stage (no evidence that the property is occupied), to stage two – available guardian stage (evidence that the property is occupied), to stage three – the capable guardian stage (fieldworkers are observed by residents), to stage four – intervening guardian stage (fieldworkers are challenged by residents). Surveillance opportunities were measured by observing the extent to which the view of a property’s windows was obstructed by physical features

such as trees and walls. The results revealed a positive statistically significant correlation between surveillance opportunities and guardianship intensity (0.45), suggesting that guardianship intensity increases as opportunities for surveillance increase. When assessing the relationship between crime and guardianship intensity the results were positive and statistically significant. The analysis revealed that crime decreases consistently at each stage of the four-stage model. Crime drops significantly between the invisible and available guardian stages, decreasing even more at the capable guardian stage and slightly more at the intervening stage.

Physical security

Target hardening is often referred to as physical security and includes the initial design, or retrofit upgrade, of doors, windows, fences and other physical structures to increase the difficulty for offenders in entering a building or space. Research on security measures as a means of preventing burglary suggests that, all other factors being equal, burglars prefer to offend against properties with lower levels of physical security (Cromwell and Olson, 1991). Budd's (2001) analysis of the British Crime Survey found that security devices are extremely effective in reducing the risk of burglary victimization. Budd found that, in England and Wales in 1997, 15% of households without security measures were burgled, compared to just 4% of households with basic measures in place and 3% with higher levels of security.

Vollaard and Ours (2010) report the findings of an extensive assessment of built-in security in the Netherlands. This study utilises the introduction of regulatory changes in building regulations introduced in 1999 which saw all new-build homes required all windows and doors (for new build properties) to be made from material certified and approved by the European ENV 1627:1994 Class 2 standard, or the Dutch NEN 5096, Class 2 standard. Using data from four waves of the annual National Victimization Survey (VMR), the results reveal that the regulatory change resulted in a reduction in burglary (within the sample) from 1.1 to 0.8 per cent annually – a reduction of 26 per cent. The results also reveal that the enhancement in security within new homes resulted in increased protection for older, less-protected homes within close proximity of the new homes – thus suggesting a diffusion of benefits whereby offenders are unable to distinguish between homes protected and those which are not. The analysis also suggests that burglary offences are not being

displaced to other property crimes such as bicycle or vehicle theft. It should be noted that these regulations are different to the Dutch equivalent of the Secured by Design Scheme (Police Secure Housing label – discussed in more detail below) which includes measures related to the wider built environment as well as physical security requirements. To ensure that the effect being measured was independent of the benefits of the Police Secure Label Housing Scheme, these properties were excluded from the sample. Montoya, Junger and Ongena (2014) also examined the impact of physical security on the burglary levels experienced by a sample of 851 properties in the Netherlands. The research found that new houses (built after the launching of the national Police Label Secure Housing scheme) have a lower risk of burglary and whether houses with increased security measures have lower risk. Findings support the research conducted by Vollaard and van Ours (2010) that properties with higher levels of physical security experience lower levels of burglary. Their research found that, in particular, window screening was associated with lower night and daytime burglary.

Tseloni *et al* (2014) conducted an in-depth analysis of the relationship between physical security measures and burglary risk in England and Wales. Using data from four sweeps of the Crime Survey for England and Wales (CSEW) - formerly the British Crime Survey, they presented the crime reduction benefits of individual and combined security features reported to be present by those taking part in the survey. The research found that certain combinations of security features confer a crime reduction advantage, but that the protection conferred against burglary does not consistently increase with the number of devices installed. The analysis suggested that if only one security device was to be installed, the most effective device would be external lights on a sensor. If one further device was to be added, the most effective pair of security devices would be window locks and external lights. The ultimate choice for balancing out the number of devices and protection against burglary was window and door locks together with either external lights or a security chain. The study concluded that individual security devices confer up to three times greater protection against burglary than no security and that combinations of security devices in general afford up to fifty times more protection than no security.

The same study looked at the protection afforded by burglar alarms on

properties covered by multiple sweeps of the CSEW. The results (published in Tilley *et al*, in press) revealed that for the majority of CSEW sweeps, burglar alarms were associated with either no change or, more often, a substantial increase in the risk of burglary with entry. The results also suggested that the presence of a burglar alarm seems to be diminishing as a protective factor with earlier sweeps showing a positive impact on burglary with entry. This is despite the technical advances in the quality of burglar alarms systems. These findings confirm those suggested by Vollard and Ours that: “To the best of our knowledge, no study has shown burglar alarms to have an independent, negative effect on victimisation of burglary, with most studies showing a positive correlation between burglary risk and the presence of a burglar alarm” (p.3). Tilley *et al* (in press) propose seven possible hypotheses to explain this counterintuitive finding. These include: i) dodgy data, ii) respondent error - that the respondent has reported that the alarm was installed at the time of the burglary when in actual fact it was installed as a consequence of the burglary (and therefore post-victimisation), iii) latent repeat victims – that the alarm was installed as a response to a previous burglary and it is that burglary that boosts the likelihood of repeat victimization, iv) adaptive offenders, v) flags for target vulnerability – that the presence of an alarm suggests rich pickings, vi) dilution/discredit/drowned out – that the mass availability of alarms has meant that their deterrent effect is diluted, vii) heterogeneity in systems and effects – that the CSEW only measures the presence of an alarm, not the standard or quality of each device.

Image/management and maintenance

Cozens *et al* (2005) use the term ‘image’, while others have used ‘management and maintenance’ to cover the principle of creating buildings/spaces which are physically free from litter, graffiti, vandalism and damage but are also areas without stigma or a poor social reputation. It is difficult to allocate a specific label to these concepts as image refers to a state and management and maintenance to the activities that create that state.

Several studies have suggested that if low-level disorder such as vandalism and litter are not addressed, they can act as a catalyst for more serious crimes. Skogan (1990) refers to this as the contagion theory, suggesting that the “*presence of vandalism stimulates more vandalism*” (p.39). Wilson and Kelling

(1982) refer to this contagious effect as the “*broken windows theory*” (p.16). This suggests that an area with existing deterioration such as graffiti and vandalism conveys the impression that a) nobody cares so apprehension is less likely and b) the area is already untidy so one more act will go unnoticed. This is supported by Taylor and Gottfredson (1987) who found that physical incivilities indirectly influence offenders’ perception of risk in that they portray a resident’s level of care or concern for the area in which they live, thus acting as an indicator for the likelihood that they will intervene if they detect an offence taking place.

In her study of the link between environmental design features and crime within West Yorkshire, Armitage (2006a) found evidence of brief and long-term desertion to be statistically significantly associated with prior burglary in a sample of 1058 properties. 41.7% of the properties which showed signs of brief desertion had been burgled at least once; this was compared to just 15.8% of properties which did not show signs of brief desertion. Additionally, 45.5% of the properties which showed signs of lengthy desertion had been burgled at least once. This was compared to a figure of just 15.8% for houses without signs of lengthy desertion.

In a series of papers, Cozens *et al* (2001, 2002a and 2002b) revealed photographs of two contrasting versions, one being well maintained, the other poorly maintained, of five housing designs – detached, semi-detached, terraced, low-rise flats and high rise flats. Participants were asked to judge each property’s vulnerability to burglary. The results revealed that elderly residents, convicted burglars, planning professionals, police and young adults consistently selected the ‘well maintained’ option as the safest for all five design types.

Activity support

Activity support relates to the creation of an environment which increases the likelihood that legitimate users will make use of space and subsequently act as additional surveillance. Although activity support is included by many as a distinct principle of CPTED, the ultimate aim is to enhance surveillance and so, the authors would argue, that the two principles can be combined.

Transferring the principles of CPTED

Several authors have discussed the dangers of presuming that CPTED principles can simply be transferred to different countries without consideration for the local culture, climate and context (Reynald, 2009; Ekblom *et al*, 2012; Armitage, 2013; Cozens and Melenhorst, 2014). To do so would be to ignore the different ways in which people utilise public and private space, design requirements and solutions to meet the climate and culture of a region and the specific crime risks associated with a particular location. We would never presume that residents would use their space in the same way in England, Abu Dhabi, Brazil, Australia, Holland and Sweden, therefore, why should we presume that what works to reduce crime and improve quality of life through the design and management of the environment would transfer seamlessly between these areas?

Crime prevention solutions cannot simply be bolted on or imposed without consideration for local context. Because these mechanisms work through motivating and directing the action of residents, passers-by, offenders, they have to take into account the way that people use their surroundings. As Ekblom *et al*, 2012 highlight: “*Crime prevention designs for the built environment can rarely be mass-produced but must be customised to local conditions*” (Ekblom *et al*, 2012, p. 92).

Ekblom *et al* (2012) explore the extent to which the ‘traditional’ principles of CPTED can be transferred to the region of Abu Dhabi within the United Arab Emirates. The research used the seven attributes of Safer Places (as defined England and Wales’s planning guidance - Safer Places, ODPM/Home Office, 2004) as a starting point, with the aim of identifying any tensions/conflicts between those principles and the culture and climate of Abu Dhabi. The seven attributes were access and movement, surveillance, structure, ownership, physical protection, activity and management and maintenance. The main tensions identified within the research related to access and movement, structure, ownership, surveillance and management and maintenance. The aim of limiting access and through-movement and of ensuring that pathways are wide, well-lit and free of hiding places proved difficult to impose within this culture and climate. Traditional Emirati neighbourhoods are designed to include *Sikkak* (pedestrian passageways) that are positioned to maximize shade through vegetation and high boundary walls. In this instance, pathways designed according to the principles utilized in England and Wales would not meet the needs of

users of that space. The principle of structure – which relates to road layout and the positioning and orientation of buildings and space also revealed tensions. The principles of CPTED promote the need for properties to face the street, with front facing rooms designed to maximize natural surveillance of the street. Where the need for shade takes priority, it is unlikely that these principles will be followed. Conflicts were also identified in relation to territoriality and guardianship, one reason being the Emirati tradition of gifting plots at birth. This can mean that, whilst a plot of land is owned, it could remain undeveloped for years/decades, leaving developed buildings surrounding by undeveloped plots of land. Where this is the case it is difficult for residents to establish who should and who should not be within a given area. Finally, cultural preferences for privacy, facilitated by high boundary walls, also limit the extent to which design can maximize natural surveillance between public and semi-public space.

Cozens and Melenhorst (2014) explore the extent to which traditional CPTED principles can be applied within a non-Western setting – specifically the city of Gaborone in Botswana. Highlighting the limitations of imposing Western criminological theory upon other regions, Cozens and Melenhorst (2014) discuss the extent to which Western “CPTED ingredients” (p. 70) are appropriate within this setting. Taking the six principles of territoriality, surveillance, image/maintenance, access control, activity support and target hardening (which as has been discussed has its own methodological limitations), Botswana explores the extent to which these are present within the case study setting, and the extent to which users of the space feel safe in the area in the daytime and after dark. Using 24 factors, based upon the six principles, Cozens and Melenhorst (2014) found that only six of the 24 were present, awarding a “CPTED score” (page 78) of just 25%. Given that 100% (n = 50) of respondents felt safe in the daytime and 82% (n=41) after dark, one might question the extent to which the absence of traditional CPTED features (as measured by the CPTED score) is actually impacting upon feelings of safety.

Hedayati and Abdullah (in press) also question the absence of research to explore the impact of environmental factors on victimisation within non-Western cultures. Their research focuses upon the impact of, what they refer to as the four fundamental principles of CPTED – surveillance, access control, territoriality and

maintenance, on crimes experienced by a sample of 456 households in two neighbourhoods in Malaysia. Whilst the findings conclude that these four principles are negatively associated with burglary risk, the need to explore context is emphasized.

It is worth noting that even where countries or regions may appear to have the same climate and culture, there are still contextual differences that can impact upon the success or otherwise of CPTED interventions. Montoya *et al* (2014) explored the extent to which design features of households and surrounding areas impacted upon levels of burglary. Whilst their findings supported research conducted on neighbourhoods in England (Armitage, 2006a) they found that the distinction between leaky and non-leaky culs-de-sac, found in research conducted in England, did not apply in Holland, their explanation being the high level of bicycle use which is not always limited to formal pathways.

As the Designing out Crime Association for England and Wales (DOCA) states *context is everything*. Context in the case of CPTED is crucial, but as is highlighted by Ekblom *et al* (2012), it may be a key consideration, but it cannot be *everything* otherwise we would be without any core CPTED principles – however vague they may be.

Applying CPTED – policy and practice

Whilst CPTED is founded on an agreed set of theories and assumptions, the way that CPTED is applied varies across, and even within different countries. It is beyond the scope of this chapter to cover the different international approaches to implementing CPTED. Therefore the focus is to focus firstly upon a selection of three countries identified as delivering good practice in incorporating CPTED into the planning system (England/Wales, Australia and the Netherlands), before discussing the delivery within Latin American countries for example Chile

Across England and Wales there are 43 police forces and within each of these there is at least one individual whose role involves reviewing the planning applications which are submitted to the local planning authority (within the local council), and offering CPTED advice to mitigate any potential crime risks associated

with the proposed development. This role is referred to as Architectural Liaison Officer (ALO), Crime Prevention Design Advisor (CPDA) or Designing out Crime Officer (DOCO). Even within England and Wales (which share a government and associated laws and policies), the role of ALO/CPDA/DOCO varies between police forces, with some ALO/CPDA/DOCOs dedicated entirely to this role whilst others have numerous additional roles. Unfortunately, austerity measures following the Comprehensive Spending Review (2010) have led to dramatic cuts in the number of ALO/CPDA/DOCOs (as well as other police roles) from 347 in January 2009, to just 125 in November 2014.

The delivery of CPTED within the 43 police forces also varies in terms of process, with some local planning authorities *requiring* pre-planning consultation (for example, the local authorities within Greater Manchester), whilst other forces have a more reactive response, with the consideration for crime prevention being entirely dependent upon the ALO/CPDA/DOCO seeking out current planning applications and contacting the planning office to offer CPTED advice. The planning system in England and Wales is guided by national policy - at the time of writing the National Planning Policy Framework. This policy states that local planning policies and decisions should aim to create developments which are (amongst other considerations) safe and where crime, disorder and the fear of crime do not undermine quality of life. England and Wales also has planning guidance which directs local planning authorities, and those working within the built environment profession, as to how to develop safe neighbourhoods. Historically, this guidance had been *Safer Places – The Planning System and Crime Prevention*, however, this was cancelled as part of the Taylor Review of Planning Guidance (2012). In 2014, this was replaced by the National Planning Practice website. Although this is not specific to crime prevention, it does include references to the importance of considering safety, crime prevention and security measures.

At the time of writing, the planning system within England and Wales has been going through a period of major change as a response to the Government's Housing Standards Review. There is a strong likelihood that, for the first time, security will be a requirement within building regulations. This is likely to come into

force in early 2015 and is a major step forward in terms of ensuring the physical security element of CPTED is built into all new housing.

In addition to policy, guidance and allocation of police resources, England and Wales also implement an award scheme to encourage developers to design out crime at the planning, or pre-planning stage. The Secured by Design (SBD) scheme is managed by the Association of Chief Police Officers Crime Prevention Initiatives (ACPO CPI) and run on a day-to-day basis by local police ALOs, CPDAs or DPCOs whose role is to ensure that developments are designed and built to certain specifications. SBD is based upon the key principles of CPTED and the standards and guidance follow those principles of physical security, surveillance, access/egress, territoriality and management and maintenance. There have been five published evaluations of the effectiveness of the SBD scheme (see Armitage and Monchuk, 2011 for a review) each concluding that SBD confers a crime reduction advantage.

In countries such as Australia, delivery varies dramatically from state to state. The state of New South Wales is selected as an example for this chapter because of the model of delivery which includes a legislative requirement for a Crime Risk Assessment to be conducted for developments considered by the local council to pose a crime risk. Whilst this legislation shows a clear commitment to the importance of CPTED, the process of embedding this within the planning and policing system differs greatly to England and Wales. In New South Wales there is no equivalent of the ALO/CPDA/DOCO role and the closest position to this is the Crime Prevention Officer. In a similar vein to the Crime Reduction/Prevention Officer role in England and Wales, the post includes a variety of roles and responsibilities. Within New South Wales, this post also has the additional burden of covering a large geographical area. This means that in practice, the Crime Prevention Officer cannot systematically assess all planning applications from a crime prevention perspective. Therefore, the role of conducting the required Crime Risk Assessment and recommending alterations based upon crime risk is conducted either by private crime prevention consultants, planning companies or the developers themselves. Clancey *et al* (2011) conducted a review of 33 Crime Risk Assessments submitted between January 2007 and October 2010 and found that these were conducted by 24 companies – 11 of which were planning firms, eight were social planning firms, seven were development companies, five were

private crime prevention consultants and two were engineering firms, with no Assessments conducted by police. Clancey *et al* (2011) question the extent to which these reports are written by independent organisations with no vested interest in the outcome.

The Netherlands has one of the most comprehensive approaches to embedding CPTED within the planning process, and this applies to regulation, award schemes and the process of delivery. In terms of regulation all new-built homes in the Netherlands have to comply with specific security regulations for windows and doors and from the 1st January 1999, planning permission could only be obtained if the application met the legal requirements for built-in security. The Netherlands also has an award scheme (similar to the UK's SBD scheme) entitled Police Label Secure Housing. Unlike the SBD scheme, this award (which was originally owned and managed by the police) is managed by the Dutch government who adopted the police label into their planning policy guidelines and (since 2004) every new estate or dwelling must be built in accordance with the police label or an equivalent label. Although the award was modelled on SBD, there are several distinctions which mark the two schemes apart. The first is that the label is split into three different certificates – Secured Dwelling, Secured Building and Secured Neighbourhood. These can be issued separately but together they form the Police Label Secure Housing award. The label is also less prescriptive than SBD with more flexibility for developers aiming to achieve a secure development. The list of requirements are set out under five categories (urban planning and design, public areas, layout, building, dwelling) and these include performance requirements (what) and specifications which indicate the way in which those requirements will be met (how). As a means of encouraging creativity and avoiding the risk of developers 'designing down' to specific requirements, where a developer offers a solution which differs from that set out in the 'how', but can still demonstrate the same preventative effect, then this will be considered. The scheme also differs in that it is valid for ten years only and after this period, a re-assessment is required. In terms of the delivery of the scheme, the system is very similar to that within England and Wales. Until 2009, each police region had a number of Building Plan Advisors (Bouwplanadviseur) whose role was very similar to the ALO/CPDA/DOCO role. As a response to budget cuts, the role has been

civilianised and is run by the municipalities either through the employment of external consultants or civilian Building Plan Advisors located in-house.

CPTED in Latin America

The drive to adopt the approach in Latin America was led initially by countries such as Chile and regional CPTED ‘champions’ such as Macarena Rau who formed the South American Chapter of International CPTED Association in the year 2000. Since then CPTED has been adopted by many Latin American countries such as Chile, Brazil, El Salvador and Honduras (Moser et al., 2005). In Chile the focus was on incorporating and empowering the local community in the diagnosis, strategy design and subsequent evaluation of a CPTED project. Two districts of Santiago (Chile’s capital city) were chosen as pilots and specialists undertook CPTED surveys of the areas and also involved the community, police and architects in helping identify problems and solutions. Recommendations and improvements were made to the physical environment, transport routes and community vigilance. The results showed a significant reduction in crime and fear of crime (Rau *et al*, 2003).

The success of the pilots was recognised by the Chilean government, who in the year 2000, recognised the role of CPTED and implemented a policy stating that it should be used in the urban reform of the country. Recognising the need to adapt existing guidance to reflect the Latin-American social and cultural context (as most examples of CPTED were from North America and Europe), the Ministry of Housing produced the manual “Espacios Urbanos Seguros” (Safe Urban Spaces) which set out how CPTED should be used (Gutiérrez and Muñoz 2004) in all major new build and regeneration. This includes specific reference to how planning guidance should take into account CPTED principles and how communities and local stakeholders should be consulted in any CPTED projects.

In other Latin American countries, CPTED was introduced by enabling local professionals and stakeholders to take a more informed approach. For example in Brazil CPTED was applied as part of a technical assistance project, funded by the World Bank, to the Municipality of Olinda and Recife. This consisted of training local staff, including architects, police and urban planners. A similar approach was taken in

2005 in Honduras and El Salvador. The intention was to embed the knowledge as best practice rather than making it a legal requirement.

The early work on CPTED in Latin American was also recognised in June 2003 with the World Social Forum on Democracy, Human rights, Wars and Drug-Trafficking - which took place in Cartagena de Indias, Colombia, and included representatives from twenty Latin American Countries (LAC). The forum proposed the launching of a Safer Cities programme in the LAC Region and the organization of a Seminar in Guarulhos (Brazil) to present, disseminate and discuss good practices in crime prevention through environmental design (Higuera , 2005).

The Latin American CPTED approach has a much greater emphasis on a multi disciplinary approach, often being led by the architects rather than, for example, the police (as in the United Kingdom). It also places a greater emphasis on community participation, and because of the strong community participation, the CPTED principles and working materials have to reach users of different socio-cultural and technical levels, and ages. This approach taken in Latin America is referred to by some (see Fisher, 2014) as Second Generation CPTED. First generation CPTED deals with principles such as natural surveillance, access control, territorial reinforcement and space management. However, it has been criticised (Saville, 1998) for its lack of focus on the social environment and the way in which communities utilise their space.

The following section outlines some examples of CPTED projects implemented in Latin America. The first is a CPTED project in Puente Alto and Vilia El Caleuche (Chile), the second is in Tapachula and San Luis de Potosi (Mexico). Both illustrate the emphasis on community participation.

Puente Alto and Vilia El Caleuche (Chile)

Puente Alto is a neighbourhood located in the South-West periphery of the Santiago Metropolitan Region. In 2001, the crime and fear of crime levels were high (Ruprah, 2008). The local government commissioned CPTED specialists to apply the Espacios Urbanos Seguros, the Chilean CPTED policy model, which takes a second generation CPTED approach, to identify solutions to reduce the crime rates

and increase the confidence of the people. A multi disciplinary approach was taken by forming a partnership of local stakeholders who would oversee the project. Relevant stakeholders included the police, sports associations, neighbourhood council representatives, and firefighters. The first step of the CPTED process was to identify where the crime was actually taking place. Analysis of the Chilean Police Force (Carabineros de Chile) crime data identified and mapped the main crime hotspots. The analysis showed that mugging and theft hot spots were located at the urban and commercial centre of Puente Alto, as well as high concentrations of theft in a residential neighbourhood called Villa El Caleuche.

The urban centre in Puente Alto was surveyed by CPTED consultants who advised improvements in line with the CPTED principles of defensible space, movement control, surveillance, physical security and management and maintenance. The business area was then rebuilt in the following three years following those CPTED parameters. Further analysis of data after the build has shown a reduction in crime and fear of crime in the area and there has been an increase in commercial business (Rau and Stephens 2003).

The residential area – Villa El Caleuche – was a social housing neighbourhood and it was here that the second generation CPTED approach was used - with extensive consultation with residents. This project was called ‘Hermoseando tu Barrio’ and was a follow on/second stage of the Puenete Alto project. The residents were involved in helping to diagnose the problems and choosing solutions from those offered by the CPTED team. This revealed that the main issues were the lack of territoriality/ownership felt by the community for their public space. These were resolved by improving the natural surveillance of the squares and using local community street art to increase the community ownership of the space. Those solutions were then implemented. A follow-up survey of 1200 residents revealed that crime victimisation levels and fear of crime levels had significantly reduced and the community was using the public space far more frequently (Rau and Stephens, 2003).

Tapachula and San Luis de Potosí, Terremoto (Mexico)

The second example includes two Mexican CPTED projects undertaken in 2011 in the cities of Tapachula and San Luis de Potosí.

The CPTED process undertaken consisted of three phases. The first consisted of training Local Government employees of both cities in the principles of CPTED. The second stage consisted of CPTED consultants surveying the problem neighbourhoods and consulting the local community. The third stage was the development of a baseline for impact assessment and the suggestion of CPTED solutions by these consultants.

The most successful CPTED intervention was in the Terremoto neighbourhood which is part of San Luis de Potosí, where consultants worked with the community via participative design workshops to redesign public space. This included enhancing territoriality and defensible space, improving natural surveillance through landscaping and lighting and physical changes to pavements and pedestrian routes to reducing through movement and permeability. The Mexican government started to deliver the new pedestrian designs of the streets in September 2011 in the project area. A survey of 178 residents was undertaken in 2012 to measure the impact. Ninety-one per cent of the residents sampled saw the CPTED project as a positive improvement leading to a 30% reduction in their fear of crime (Rau, 2012).

Conclusion

CPTED is a crime reduction approach that aims to consider, and therefore 'design out' crime problems before they emerge. Ideally, this is done at the pre-planning stage in close consultation with local communities (who understand the context) and local police (who understand the local crime risks). Several authors have demonstrated what they consider to be the principles or components of CPTED. These vary, with some proposing four, others many more. The extent to which these vary is, in the view of the authors, of little concern, and in fact, something to be expected and applauded. Variation will be dependent upon factors such as climate, culture and many more local considerations. The authors would argue that principles should be considered fluid, evolving as offenders evolve, with changes affected by factors such as patterns of drug use and modus operandi. There do appear to be five core principles that are supported by the majority of authors and where evidence

exists to support a positive impact upon crime reduction. These are defensible space, movement control, surveillance, physical security and management and maintenance.

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ⁱ Integration being an indicator of how easily you can reach a specific line – the average number of spaces needed to pass through to reach of specific line for all axial lines in a system.

ⁱⁱ Statistically significant at 1% level.

ⁱⁱⁱ A distinction was not made between true and leaky culs-de-sac.

^{iv} Major roads connect cities, towns and the larger areas between them (Johnson and Bowers, 2010)

^v Local roads form the urban backcloth on which residential estates are built, and they facilitate easy travel between one local road to another. They are unlikely to be used for vehicular travel for anything other than local trips, but do connect neighbourhoods and allow travel within and between them (Johnson and Bowers, 2010).

^{vi} Private roads are intended for use by residents alone and not for connecting places. Some of these will be culs-de-sac, some will be through roads (Johnson and Bowers, 2010).

^{vii} A sinuous cul-de-Sac is defined as: Property is located on a road which leads to a dead-end AND is non-linear in geometry so that there is little visibility down the road from the road to which it is connected OR the road is linear in geometry BUT the road to which you turn off to access the cul-de-sac is NOT a through road. A linear cul-de-sac can be defined as: Property is located on a road which leads to a dead-end AND is linear in geometry so that there is visibility to the end of the cul-de-sac from the road to which you access the cul-de-sac AND the street is one turn off a through road.

^{viii} A true cul-de-sac has no means of pedestrian access/exit. It has no footpaths/pathways allowing pedestrian access or egress.

^{ix} A leaky cul-de-sac contains pedestrian access/egress via footpaths/pathways.