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Considering local context when evaluating a closed circuit television system in public spaces

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Foreword | *Closed circuit television's (CCTV) popularity as a solution to local crime problems continues to gain traction. Its broad community support and visibility as a tangible response to crime problems suggests that the demand for CCTV is unlikely to abate. However, many agencies have difficulty locating information on the practical considerations for implementing a CCTV system and only become aware of the real cost of CCTV after installing the system. Therefore, measures need to be taken to ensure knowledge of good practice in CCTV implementation is shared. In addition, agencies need to be aware of the different factors that can influence CCTV delivery. Such information could add further value by being considered when developing evaluations of CCTV. In this paper, a description is provided of the lessons learned by local agencies when implementing a CCTV system that was administered through a grants program. Such experiences, if adequately disseminated, can assist agencies to implement CCTV systems and assist in the development of evaluation strategies.*

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The use of CCTV as a tool to prevent crime in public spaces continues to expand, in particular among local governments (Iris Research Ltd 2005). Indeed, its popularity and use is not restricted solely to preventing crime. CCTV has been implemented for a range of purposes that includes use as an access control measure, as a method to reduce fear of crime and improve perceptions of community safety, to potentially detect crime and also to be an evidentiary tool (Allard, Wortley & Stewart 2006). Technological advances have also meant that its application has also been explored more broadly in other areas by using new methods such as video analytics. As a result, CCTV has been used for road and traffic management activities such as tracking people and cars (Edelman & Bijhold 2010), automatic numberplate recognition systems (Clancey 2009) and pre-empting possible criminal events through behavioural analysis (ACBPS nd).

Despite this, research suggests that the effectiveness of CCTV as a crime prevention measure remains modest at best (see eg Gill & Spriggs 2005; Wells, Allard & Wilson 2006; Welsh & Farrington 2009, 2008, 2002), with limited evidence of its impact on fear of crime and feelings of safety for users of the space under surveillance (Gill, Bryan & Adam 2007; Taylor 2010a; Zurawski 2010). When shown to be effective, it is often dependent upon the context in which it has been applied. For example, while CCTV has been observed to be effective in car parks and similar locations, it has met with mixed success in city centres, public housing and public transportation systems (Welsh & Farrington 2009). In particular, the success of CCTV schemes in car parks has been limited to a reduction in vehicle crimes, coinciding with other strategies such as improved lighting and signage alerting the public to the presence of CCTV (Welsh & Farrington 2009).

An Australian study of prison misbehaviour also identified that planned offences were not as likely to be captured by CCTV as 'spur of the moment' offences, suggesting an individual's motivation to commit an offence might influence the deterrent effect of CCTV

Table 1 Factors to consider when conducting a CCTV evaluation

In addition to assessing changes in the levels of crime in the intervention and comparable control areas before and after the installation of CCTV systems, consideration should be given to:

- crime patterns in surrounding areas in order to measure displacement/diffusion of benefit effects;
- perceptions among both business traders and the general public of CCTV, fear of crime and feelings of safety in both intervention and control areas before and after CCTV installation;
- mapping other crime reduction initiatives operating within the intervention and control areas that may impact on any outcomes;
- technical specifications and key features of the design of the CCTV systems, such as the number of cameras and coverage area;
- the process of implementing and installing the CCTV systems, including any issues that are encountered over the course of the project;
- activities aimed at increasing general awareness of the presence of CCTV, such as signage and media releases;
- control room operations, including a log of monitoring schedules, details regarding incidents identified by the cameras, calls to police and/or security patrols in relation to incidents that have been identified, and requests from police for access to footage for evidentiary purposes;
- relationships with key external agencies such as police, including any protocols and procedural guidelines or memoranda of understanding that are developed; and
- costs attributed to installation, maintenance and monitoring.

Source: Gill & Spriggs 2005; Welsh & Farrington 2009, 2008; Wilson & Sutton 2003).

(Allard, Wortley & Stewart 2008). Further, factors such as the long-term ongoing funding of CCTV schemes (Gerrard et al. 2007) and the way control rooms are operated (Roe & Read 2007; Wells, Allard & Wilson 2006) can have an impact CCTV delivery. This suggests that if CCTV is to be an effective crime prevention tool, then it must be carefully planned and integrated with other measures. Comprehensive Australian studies of CCTV effectiveness in crime prevention in Australia are limited, though there are exceptions. Wells, Allard and Wilson (2006) studied the use and effectiveness of CCTV as a crime prevention tool in Gold Coast public spaces and on the Queensland Rail City Train network. They found that CCTV had an effect when detecting violent offending, but not *deterring* any crime type in the areas covered by the cameras. Whereas many businesses, residents and rail commuters supported the CCTV installation, they questioned whether the cameras were being actively monitored and whether the system could improve police response times to incidents as they occurred (Wells, Allard & Wilson 2006).

Robust evaluations of CCTV implementation are critical for understanding the effectiveness of CCTV and assisting to determine if investment in CCTV is worthwhile. Indeed, improving the methodological rigour of CCTV evaluations was a specific recommendation from a systematic review of CCTV studies undertaken by Welsh and Farrington (2009).

A well-designed and thorough evaluation of CCTV effectiveness should take into account local contextual issues, such as resource availability, the local environment and any other events that may influence overall success. Table 1 outlines some of the key considerations that should be incorporated into an evaluation plan. It highlights how an agency's understanding of the factors that can influence CCTV implementation and operation is central to deciding how best to apply CCTV, as well as the execution of a rigorous evaluation that improves the sector's knowledge of the effectiveness of CCTV. In reality, many agencies can struggle to identify what issues might influence the implementation and effectiveness of CCTV (Anderson & McAtamney 2010).

This paper is primarily designed to assist those who are implementing CCTV systems and/or evaluators to identify various contextual factors and conditions that can influence the effectiveness of CCTV implementation and affect the interpretation of evaluation findings. Some of the key CCTV experiences of various agencies that have received funding from the Australian Government Safer Suburbs grants program are drawn upon to highlight the factors affecting CCTV implementation. These experiences also provide insight into the limitations and obstacles faced by agencies in the practical delivery of their Safer Suburbs CCTV projects. These examples are not exhaustive, as each locality experienced CCTV implementation differently, but these implementation experiences are particularly relevant for agencies conducting a process evaluation of their CCTV systems, as well as informing those conducting outcome (impact) evaluations.

The research

During 2009, the Australian Institute of Criminology (AIC) conducted consultations with a cross-section of seven of the 24 sites involved in the Australian Government's Safer Suburbs grants program; a program administered by the Australian Government Attorney-General's Department (AGD). The grants aimed to support communities to implement infrastructure, such as CCTV, to help address local crime and antisocial behaviour problems (AGD nd).

Case study site selection was based on accessibility, costs and variation on the types of CCTV projects implemented. This cross-section allowed the researchers to review projects that were:

- at the consultation stage;
- run by a newly amalgamated council;
- conducted by a Chamber of Commerce;
- already at the implementation stage; and
- examples from three Australian jurisdictions.

Geographically, consultations were conducted with seven sites across three Australian states. Stakeholder consultations commenced in May 2009 and were finalised in September 2009. This study involved interviewing the key project contact and/or any other representative whom the project officer(s) invited to the meeting. Between one and three people participated in each consultation. These were conducted in a semi-structured interview format to allow the researchers to explore key factors specific to their local context. There were 10 consultations in total (3 additional

consultations at 3 sites were conducted for follow-up purposes). However, this was not possible for the other four target sites, as available resources precluded additional travel to these locations.

The key project contact details were supplied by AGD and the majority (8 out of 10 consultations) were from local government authorities, as they comprised most of the Safer Suburbs grants recipients. The exceptions were a local business representative from a site's Chamber of Commerce and a site's local police liaison officer for the CCTV system, whose details were provided by the site's project contact officer.

The purpose of the consultations was to document the experiences and progress of grants recipients when implementing a CCTV system and to identify contextual factors that influenced the effectiveness of CCTV implementation. Those interviewed described their own experience of the processes involved in developing and implementing a CCTV system and how they planned to evaluate the effectiveness of their system. The consultations also provided insight into their experience of implementing CCTV within a grants program framework that specified deadlines and introduced various accountability processes. This was important because the AIC has previously found that this consideration can influence decisions on CCTV implementation and add another dimension of program implementation complexity that otherwise may not exist (Homel et al. 2007).

In addition to the consultations, the AIC trialled the use of an invitation-only CCTV online discussion forum to provide a broader online community where councils, agencies and government agencies involved in implementing CCTV for their Safer Suburbs projects could engage with each other on CCTV-related issues (for more detailed information on the online community trial see Anderson forthcoming). These agencies were recruited via related AGD-administered grants programs and through word of mouth referral by other users. As most agencies were in the early stages of implementation, the majority had yet to develop their evaluation strategies. Therefore, the forum was a vehicle to inform their CCTV strategies and approaches. Five synchronous (ie real-time) discussions were hosted by the AIC and guest hosts from industry or agencies related to CCTV, with active participation ranging from zero to six participants for each one. This did not include the number of participants logged on but not contributing either questions or comments.

The findings from the consultations and online discussion forum were assessed together through five key themes. These themes were structured around the '5 I's', a theoretical framework that has been developed to improve knowledge transfer and project documentation for crime prevention projects (see Ekblom 2007). The themes were:

- the purpose of the CCTV system;
- deciding 'what to do and how to do it';
- the reality of implementation;
- managing stakeholders and community expectations; and
- measuring effectiveness.

Each theme included sub-themes on the experiences and issues of sites in their application of the Safer Suburbs grants. It is recognised that the processes undertaken to implement CCTV, whether for the Safer Suburbs grant or another funding scheme, are not linear. Factors such as local context, available resources, existing infrastructure, existing stakeholder relationships, staffing and time constraints can influence when and how each step in the implementation process is conducted. In addition, the themes provided are not mutually exclusive categories, because many of the actions and processes of the sites are interconnected and do not sit comfortably under a single theme.

The term *agencies* is only used to mean the case study sites (ie local government agencies, police and Chamber of Commerce representatives) interviewed as part of this review. Findings from the online community were integrated with the findings from the consultations, as only representatives from the case study sites actively participated in the discussions (ie posted or answered a post, rather than solely passively viewing the discussion). As such, the findings only refer to the information obtained from a small sample of seven case study sites and as a result, should not be considered to be representative of CCTV implementation more broadly.

The findings

Agencies interviewed generally reported needing guidance on identifying and measuring the information required to implement and evaluate a CCTV project; however, the nature and extent of support required varied depending on the type of agency and local context.

This need for guidance was interesting because since the late 1990s, there have been numerous guidelines for the use of CCTV systems produced in Australia, primarily by state governments (Wilson & Sutton 2003). In 2006, the Council of Australian Governments released a national code of practice for CCTV systems, specifically tailored for CCTV use in the mass passenger transport sector for counter-terrorism purposes (see COAG 2006). Standards Australia also released guidelines in 2007 on Security Surveillance Standards. In addition, there have been numerous publications documenting CCTV effectiveness (eg Welsh & Farrington 2009, 2008, 2002). However, most agencies in the AIC's review indicated that finding and using available CCTV resources, particularly on how to evaluate a CCTV initiative, was difficult.

In truth, the process of choosing the most appropriate methodology for an evaluation is not an easy or simple task. The most methodologically rigorous form of evaluation is considered to be randomised controlled experiments and these have been regarded as the preferred approach for determining a project's effectiveness (Sherman et al. 2002; Welsh & Farrington 2009). Such an experimental design for testing CCTV effectiveness on a crime problem would require the random assignment of CCTV initiatives into test and control groups, while also controlling for any extraneous variables that might otherwise influence the CCTV's effectiveness in the area.

Realistically, it is difficult to meet the standards for this form of evaluation and it is relatively rare. For instance, many local government agencies and businesses do not have access to the expertise or financial resources required to conduct such evaluations. Furthermore, often the conditions required for randomised control experiments are not achievable, particularly for CCTV evaluations (Taylor 2010a).

As Taylor (2010a) points out, controlling for extraneous variables and the impact of other crime prevention initiatives is usually not practical in public areas such as central business districts and shopping centres, which usually see a multitude of activities and initiatives occurring concurrently. Moreover, isolating the impact of a CCTV intervention and the contribution of other interventions to any changes in the crime problem(s) being targeted often relies on subjective assessments of each initiative's overall impact (Taylor 2010a).

Due to these complexities and the skills required for conducting randomised controlled experiments, it is unsurprising that none of the case study sites included in this review were proposing an evaluation of this scale. Indeed, there is currently no evidence of a randomised controlled experiment being conducted on CCTV's effect on crime either in Australia or overseas (Welsh & Farrington 2008). Where agencies consulted for this review had developed evaluation strategies, the methods were often limited to pre- and post-test measures of crime data and/or community surveys, and did not include control or comparison (ie 'no treatment') groups. Therefore, the proposed evaluations did not exceed level 2 on the Scientific Methods Scale, which for many researchers is considered too low to make any substantial conclusions on CCTV effectiveness (Sherman et al. 2002; Welsh & Farrington 2009, 2002).

However, there is an school of thought gaining increasing advocacy among researchers that argues that evaluations with a sole focus on whether CCTV had an effect on the crime problem(s) and in showing causality—as promoted in randomised controlled experiments—can often overshadow the need to also consider the influences of local context for each intervention evaluated (eg Ekblom 2010; Pawson & Tilley 1997; Taylor 2010a). Therefore, in the absence of more rigorous experimental evaluations, agencies can still contribute to the CCTV knowledge base by reporting on their experiences in a framework designed to capture this information.

One such an approach is known as Realistic Evaluation. In a realistic evaluation framework, an understanding of the context of an intervention (eg the extent and nature of problem, location, time, resources, staff availability and skills etc) is considered essential in understanding how a project works, why it works and in what context (Pawson & Tilley 1997). Instead of assessing a project as a whole as 'effective' or 'ineffective', realistic evaluation approaches are more interested in identifying the different parts of a project that work well and others that may not be effective. Acknowledging the environmental context for projects as part of an evaluation can produce a more useful understanding among practitioners of what works in crime prevention strategies (Ekblom 2010). Understanding the context and mechanisms of how and when CCTV works to trigger the desired outcome is useful on its own, but can also complement other quantitative research methods that may be undertaken.

Findings from the research suggest that this approach could be considered a viable approach to CCTV evaluations. This is because the Safer Suburb agencies implementing CCTV not only wanted to find evidence of 'what works', but to identify practical lessons for the process of CCTV implementation. For example, during the development phase for the hosted CCTV online discussion forums, it emerged that the majority of agency participants wanted to engage with other councils or organisations to learn from their experiences of actual CCTV implementation, rather than with researchers. Therefore, encouraging agencies to report and subsequently share their experiences of CCTV implementation in evaluations that are designed to capture both process and outcome information may provide a useful method for sharing better practice approaches to CCTV implementation.

Factors that influence CCTV implementation

Many factors influence the ability of an agency to implement CCTV effectively. The outcomes of the online discussion forum and the AIC's consultations confirmed much of what was already known. For example, in 2003, Wilson and Sutton (2003) documented the operational issues involved in CCTV implementation in Australia. They found that most areas installed CCTV to address antisocial behaviour, with implementation driven and funded primarily by local councils. Concerns about the implementation of CCTV included a fear of being 'locked in' to ongoing maintenance, the high cost of monitoring systems, the complex and ongoing administration and accountability responsibilities, and concerns as to how to maintain adequate public awareness of CCTV systems (Wilson & Sutton 2003).

Most agencies interviewed in 2009 raised concerns similar to those identified by Wilson and Sutton (2003). Agencies saw CCTV systems as a means of tackling antisocial behaviour, property damage and/or community perceptions of safety, as well as providing evidentiary support for police. Where possible, agencies tried applying good practice principles when selecting CCTV locations. This was achieved via a combination of reviewing the available literature, gathering crime statistics to identify areas of concern, consulting with key stakeholders (eg police) and selecting CCTV technology that best fitted with their costs and aims.

Clear, consistent aims for the CCTV system were reported as being essential to gaining community support and to limiting resistance to CCTV implementation. Agencies also recognised the importance of clearly identifying who would use the system and for what purpose it would be used. This could reduce the risk of problems, such as installing the wrong sort of cameras and associated equipment; for example,

cameras more suited to daytime use when the crime problem usually occurred at night, or installing Pan, Tilt and Zoom (ie movable) cameras when static cameras would be more appropriate as the footage was not intended to be monitored in real-time. Other potential problems include choosing inappropriate locations to mount surveillance; for example, planning to place cameras on private businesses prior to gaining consent from the owners, installing cameras that were positioned in a way that could look into homes and therefore invade people's privacy, or placing cameras in areas that did not have a high crime rate for the targeted problem(s).

None of the agencies interviewed viewed CCTV as a panacea for local crime problems. Many implemented CCTV in conjunction with other crime prevention initiatives as part of a multifaceted, concerted crime prevention effort. While the majority indicated a preference for '24/7' active CCTV monitoring, they recognised the limitations in achieving this within current local capacity. Therefore, most agencies aimed to install systems that could be upgraded as needs and resources changed.

The majority of agencies involved in the review were either developing, or had recently commenced implementing, their CCTV project. For most agencies implementing CCTV at this stage, the overall good practice and measurable impact of their CCTV system appeared to be a secondary issue to other more immediate and practical factors such as purchasing equipment that was capable of being upgraded, satisfying community demand and meeting budgetary and timeframe specifications. Considering contextual factors specific to each agency's location (such as local topography, technological capacity, nature of the crime problem being targeted and addressing community concerns) was a key strategy in each agency's processes for selecting a CCTV system. This also included trying to capitalise on what was already in existence (eg integrating grant-funded cameras with existing camera systems or other crime prevention strategies currently being implemented locally) in order to maximise CCTV overall cost savings of installing a CCTV system. These factors also directly influenced the quality and effectiveness of the planned CCTV systems.

Implementation capacity

No two local areas have the same needs and the capacity to implement the most appropriate and evidence-informed CCTV system can be affected by a range of factors that impact differently across areas. These include administration and time considerations, local topography, access to expertise, staff availability and even the type of agency that will be responsible for implementing the CCTV system. Lack of awareness of these issues can lead to increased (current and future) running costs and poorly performing systems. In the following sections, the impact of these factors is discussed in more detail.

Administration and time considerations

It is inevitable that during the CCTV implementation process, projects will encounter the need to negotiate a 'trade-off', where implementing agencies have to balance one factor with another. One area where this can occur is within the administration requirements for an agency. Administration requirements attached to CCTV implementation can be time consuming and complex. CCTV systems implemented as part of a grants program will often have additional accountability and reporting requirements. In the opinion of some agencies that were surveyed, this process had the potential to hinder their ability to implement a CCTV system that was the most appropriate for their local area. For example, in order to meet milestone deadlines, one agency indicated they forfeited their preference to have optic fibres installed, instead opting for a less reliable wireless CCTV network to stay within a strict timeframe. Timeline constraints were also identified as an influence on an agency's ability to conduct broad stakeholder consultations.

Capacity affected by location

The topography of an area can influence the types of CCTV technology able to be installed. Coastal towns may require equipment that is corrosion-resistant due to exposure to air-borne salt and mountainous or hilly areas may make it difficult to relay wireless CCTV signals. One agency noticed that rural area CCTV needs were often seasonal and event driven, suggesting a preference for a mobile system, something that may not be as relevant in an urban setting.

Staff availability

The staff time and resources dedicated to the implementation of CCTV can be underestimated. While many agencies budgeted for a dedicated project officer to lead the CCTV implementation, there were often difficulties in recruiting suitable staff, something that caused program delays. Further, project staff could be involved in a variety of activities such as attending consultations, preparing tenders and investigating technology—where the scope of the position(s) and their workload had not been fully recognised.

Type of agency

The capacity to undertake CCTV implementation and to manage resourcing needs can also vary depending on the type of agency installing CCTV. For example, a Chamber of Commerce may have different purposes for the implementation of a CCTV system than a local government (such as a greater focus on protecting property/businesses), as well as not having access to the same level of services and expertise available to a local council. Therefore, there are likely to be different methods used in determining CCTV sites, the capacity to erect cameras in certain areas and how the broader community is consulted. This could have implications for how well the CCTV system is implemented and ultimately its effectiveness, including how this effectiveness is evaluated. It also suggests that funding agencies may need to consider the support needs of different agencies implementing CCTV systems.

Consulting stakeholders and the local community

Identifying key stakeholders and balancing their needs and any competing objectives for the use of the cameras can influence

camera placement, timing of implementation, costs and overall acceptance of a CCTV system. Key stakeholders often included police, local council members, various council employees (eg Rangers, IT departments, building and infrastructure personnel etc) and representatives from local businesses and the community. Documenting decision-making processes and techniques for managing issues, including stakeholder expectations, was important for providing a justification for the choices made when implementing CCTV, especially if the decisions taken were contrary to what other evidence may suggest as being a more effective option. Disseminating the rationale for decision-making could also allow access for other agencies who are considering using CCTV systems to access innovative solutions that could assist in addressing similar expectations in their area.

For example, one agency created a matrix system to address competing aims from local councillors, business owners and residents. The matrix system rated each location based on an analysis of crime statistics, the number of cameras required at each proposed location, type of usage (eg deter or detect crime, footage to be used as evidence, need for an immediate response to an identified problem etc), the hours of proposed use, together with an administration rating of each suggestion (ie rating of whether the suggestion was congruent with council guidelines). This allowed the agency to put forward a proposal that could demonstrate to the community that a transparent and systematic assessment of all suggestions received from interested stakeholders had been undertaken and had informed the decisions on where to place CCTV cameras (see Clancey 2009 for a more detailed description of the matrix system). Another agency consulted local youth—the main group affected by the proposed cameras—by interviewing them to determine their specific concerns and needs. SMS alerts were then used to keep the young people informed as the project developed.

Choosing the appropriate technology

Interviewees recognised that CCTV technology was constantly changing, making it difficult to keep abreast of all technological advances. Agencies therefore often relied on consultants or IT specialists to guide the process of choosing the appropriate technology. Some noted that to provide an effective assessment, consultants needed to be knowledgeable about community and environmental crime prevention principles, as well as being familiar with CCTV technology. Further, various agencies warned about being 'locked in' to a specific system, as some brands of equipment may not be compatible with others. Therefore, upgrading equipment might be dictated by the requirements of the installed system and not by the most cost-effective or best technological option. In addition, if new systems were being installed alongside existing CCTV, compatibility between the systems was another consideration.

Responsibility for project management and implementation

Monitoring strategies of camera operators have been identified as a key influence in CCTV effectiveness (Wells, Allard & Wilson 2006). It was usually found that no single project officer or council section was responsible for overall CCTV project management over the life of a project. In some cases, once a CCTV system was installed, responsibility for the system shifted from a project officer to a different area in council specialising in information technology for ongoing maintenance. In addition, the officer or section monitoring the system could change and frequently, an external contractor or the local police took over this role. This has consequences for project evaluators, with difficulties likely to arise in accessing information and relevant records needed for the evaluation from other internal council sections or external agencies. Such problems were identified as likely to occur even in cases where the evaluation was managed by the initial project officer assigned to the CCTV system implementation, as it is not necessarily the case that the officer would have automatic permission access to information held elsewhere in the council or by other agencies. If access could not be negotiated, the nature of information available for the evaluation would be affected.

Using CCTV systems for purposes beyond crime reduction and prevention

CCTV systems may be implemented to fulfil a crime prevention purpose, but they may also be incorporated into broader agency functions. For example, one council that was interviewed was integrating the new CCTV system into a whole-of-council approach to internal security, with the system being linked to other council functions that included monitoring staff and public access to offices and rooms within council buildings, such as the library. As such, this would make it difficult to accurately measure the net cost associated with cameras that were implemented as part of the grants program.

The possibility of CCTV images being requested to help find lost property, requested in a subpoena or exposing an agency to a liability case all illustrate the potential for the CCTV system to be used beyond the initially stated objectives. This not only has resource implications, as recognised by some of the agencies and experts consulted, but may also affect an agency's ability to assure the community that their safety is a priority and that their privacy is being protected. To reduce the potential for images to be misused and to keep within stated objectives, most agencies developed standard operating procedures to govern CCTV systems and also restricted access to the footage. This was considered particularly important when cameras were located in sensitive locations such as facing public swimming areas. Overall, these issues highlight the need to document in CCTV evaluations what prompted decisions taken regarding camera operations, as these may affect CCTV coverage and potentially its overall effectiveness.

Internal council processes and accessing support

Councils typically have specific financial acquittal and other internal accountability processes they need to follow. These can include council-preferred vendors, specific tender requirements and council approval processes. These processes may be in conflict with grant requirements from a funding agency and can affect which CCTV systems can be installed and by whom. As such, reconciling grant requirements with agency protocols and processes can be difficult. Further, a grant requirement to tender for the supply of the system can be quite costly and may create implementation delays. For example, in some small towns, there may be only one provider in the area, yet the grant process might require quotes from more than one provider. As one council pointed out, these can be difficult to obtain because providers may not want to travel (sometimes distances of over 100km) to provide a quote that they know will most likely not be as competitive as the local provider and is primarily being sought just to fulfil a grant requirement. Some councils also reported having a limited choice of providers and had already identified a preferred vendor, yet were still required to go to tender.

The sources of advice available to implementing agencies and their access to professionals with experience in establishing CCTV systems could also impact on the type of system implemented. Stakeholders or other agency staff, such as the IT department and Council Rangers, may be more knowledgeable about CCTV than those directly in charge of setting up a CCTV project.

Liaising with other sections within agencies was reported to provide crucial sources of information. The knowledge and expertise accessed included advice on the types of cameras to purchase, whether planned CCTV cameras were compatible with other existing council infrastructure and if current IT capabilities could accommodate and support the proposed CCTV system. Such liaison could also ensure a CCTV system was integrated with other existing or planned crime prevention initiatives. This expertise was considered an asset by some respondents because it could enhance system design and reduce the time taken on the implementation process.

It was often the case that other councils were a source of support, knowledge and/or assistance for councils implementing CCTV. This advice appeared particularly invaluable when agencies were inexperienced in CCTV implementation and did not feel as though they could rely on external consultants.

When advice from other councils was not readily available, agencies often sought advice from specialist consultants. This pattern of seeking advice from other local authorities and consultants was also identified in previous Australian research (Wilson & Sutton 2003). It is unclear if a similar support network existed for non-council agencies.

Management, sustainability and maintenance of installed systems

Management, sustainability and maintenance of an installed CCTV system were all raised as ongoing considerations. Factors that were considered included who monitors the cameras, where data storage should be located, how to maintain ongoing stakeholder relationships and when and how to update ageing CCTV systems. Of particular note was determining who should monitor the effectiveness of the systems—whether it should be the primary users of the system (such as police), or if it was the responsibility of the grant recipient (in this case local councils). Determining who had the capacity and expertise to do repairs was also identified as an issue. For example, maintenance of a camera located on existing power poles may be more costly and more difficult to repair than cameras in more accessible locations, because they can require specialist electricians to do the work. Therefore, agencies considering placing CCTV cameras on power poles would need to gain permission from the power company for cameras to be mounted on existing poles and also to provide the relevant assistance with maintenance. However, this could incur additional costs of camera maintenance and create delays for camera repairs if a qualified professional was not available.

Most agencies expressed concerns about difficulties in managing community expectations of CCTV systems. For example, some agencies reported community members lobbying to have CCTV cameras directed at their business/street/park. Further, once a camera was in place, there appeared to be a community expectation that a camera would be functioning at all times, even though numerous factors, such as routine maintenance, may mean they could be unavailable at different times. Careful planning meant that the cost of critical spare parts could be budgeted for, reducing the risk of downtime occurring. Concerns also existed around the perceived rise in the use of 'dummy' or fake cameras and whether this could affect the deterrent aspect of cameras if offenders believed this was happening. Finally, agencies also raised concerns about determining who would be responsible for footage retrieval in the long term and the possible financial costs associated with this process.

The cost of CCTV implementation

Fundamental to all these issues is cost. Knowing the cost of a system is essential to accurately estimate whether CCTV is affordable and able to be adequately maintained over time, and to evaluating its cost-benefit value as a crime prevention option. Capital works (eg digging up footpaths to lay conduit, erecting poles for cameras etc) was cited as one of the most costly yet often overlooked area when considering CCTV.

Quantifying operational staff time was also found to be difficult, particularly across departments. Tasks to be considered when quantifying staff time include the time required to prepare tenders, monitoring and retrieving footage, acting on images retrieved, organising stakeholder consultations, maintenance works, administration work and evaluation. Table 2 summarises some of the key cost considerations that agencies should take into account when assessing the viability of implementing CCTV as a crime prevention measure and also for estimating the net cost of CCTV implementation in an evaluation.

Table 2 Cost considerations of implementing a public space CCTV system

Preparatory work considerations	Analysis of crime data
	Preparatory research
	Internal briefings
	Stakeholder meetings
	Consultant fees
Installation considerations	Cabling costs
	Cameras (purchase and installation)
	Erecting new poles
	Signage
	Lighting
	Removal of impediments to camera view
Monitoring considerations	Control room establishment
	Data storage
	Monitoring staff costs
Maintenance considerations	Cleaning of camera domes
	Pruning trees
	Replacing light globes
	Replacing damaged signage
	Regular system maintenance
	Replacing damaged cameras
	System upgrades
Governance considerations	Development of Standard Operating Procedures (SOPs)
	Audit/evaluation costs
	Oversight Committee expenses
	Legal fees
	Staff costs
	Insurance premiums

Source: Clancey 2009

Implications for measuring CCTV effectiveness

Agencies implementing CCTV are faced with a multitude of complex and multifaceted situations. The experiences of CCTV implementation illustrated in this paper offer only a few examples of the kinds of conditions that can influence the overall success of CCTV and as a result, have a direct influence on evaluating CCTV effectiveness.

Delays in initial project development, technology costing more than anticipated, underestimating the amount of capital works that need to be undertaken in order to lay conduit and being unable to find a suitable project manager or technology consultant are some of the factors that can ultimately have a negative flow-on effect to the delivery of a CCTV project within the proposed timeline and affect the scope of the CCTV system that can be achieved. Conversely, one or two key factors, such as having an experienced service provider offering expert advice and assistance in CCTV project development and/or being able to utilise existing infrastructure on which to mount cameras, can make implementation of the CCTV system easier and more successful.

These experiences and how the agencies manage the various situations locally are important lessons that should be documented through an evaluation. In improving what is known about what affects CCTV implementation, agencies are not only able to increase the efficiency of their own CCTV systems, but can also inform the wider sector about the circumstances that influence CCTV effectiveness.

Review of grant recipients in 2009 revealed that agencies appeared to be aware of employing evidence-informed decisions when choosing CCTV technology and camera locations, and appeared realistic in what CCTV could achieve. These are positive steps and can only assist in improving the effectiveness of CCTV and in providing better evaluations. Whether this apparent increased awareness would be present with an organisation implementing CCTV outside a grants program, where a high level of accountability is required, is uncertain. However, it may illustrate the importance of emphasising good practice principles in CCTV implementation in a grants process and the need to encourage further documentation on what works in CCTV.

Conclusion

The review was conducted with a small sample of agencies implementing CCTV; therefore, the findings should not be interpreted as having generalisability across all agencies implementing CCTV systems in a public space. Nor was it the intention to offer such generalised conclusions. Rather, the findings are intended to illustrate the different CCTV implementation experiences agencies can have due to local contextual factors. In addition, the findings can help inform potential areas of need for agencies implementing CCTV as part of a grants program.

During the consultations, most agencies indicated that they would like more CCTV evaluation resources. Access to clear, comprehensive resources is needed for agencies to make well-informed decisions on choosing the best interventions to address safety and crime problems in an area and in deciding whether CCTV implementation in their local area is necessary, sustainable and appropriate for their needs. Information on key CCTV evaluation approaches and CCTV implementation already exists (see Table 1; see also Wilson & Sutton 2003), although many agencies were unaware of these resources.

Lack of awareness of previously published standards and guidelines may indicate that available resources are not easily accessible and/or easily followed. If they are not readily available, or agencies are unaware of these publications, funding bodies may benefit from collating the relevant information and making agencies aware of what CCTV resources are currently available as part of the grants process. If the problem lies in the perceived useability or applicability of the available resources, funding bodies may need to invest in developing resources that address the needs of the agencies, or invest in training for grant recipients.

Agencies showed a preference for obtaining more information describing the real-life (in situ) experiences of similar agencies to inform their decisions. This paper is a start to addressing this need, but clearly, more comprehensive examples are needed.

The *Considerations for Establishing a Public Space CCTV Network Manual* (Clancey 2009), developed as part of the AIC project, attempts to address this gap by expanding on the available research and drawing on the experiences of the Safer Suburbs case study sites. The manual outlines the basic stages in CCTV implementation and the factors an agency needs to consider at each stage. The manual can also be used to help identify the key considerations when developing a CCTV evaluation strategy.

As previously suggested, there is a continued need to stress the importance of well-developed and methodologically sound evaluations of CCTV effectiveness in preventing crime (eg Welsh & Farrington 2009). However, it is unlikely that most local agencies will have the capacity to undertake extensive and rigorous experimental evaluations into the effectiveness of their CCTV systems. Therefore, agencies should be encouraged and supported with practical resources to record and share their experiences, including the contextual considerations that affected their CCTV implementation.

Further, a realistic evaluation approach could provide a framework for presenting this information. However, this approach does not dismiss the importance of rigour in the evaluation design. Agencies would still need to make sure that the evaluation addresses key concerns, such as linking objectives to outcomes, using appropriate measures for each indicator of effectiveness for CCTV and whether the system has had an impact on the targeted crime type by using available crime statistics and where possible, comparing with other sites. Yet promotion of realistic evaluation approaches would allow a greater qualitative narrative around why and how these findings should be interpreted.

An example of how to apply a realist framework to CCTV evaluations was conducted by Tilley (1993) from the UK's Safer Cities Programme and CCTVs effectiveness in preventing crime in car parks. This research would be a useful resource for agencies or evaluators wanting to apply the framework in their own evaluations and to illustrate specific examples of how CCTV is meant to work and in what context. This example is also revisited in a subsequent publication (see Pawson & Tilley 1997).

Finally, any evaluation of CCTV effectiveness should also assess the ongoing cost-benefits of CCTV and whether other crime prevention strategies might be more practical and effective. As is illustrated in Table 2, the costs can be varied and include installation and ongoing maintenance costs, research and consultant fees, and staffing considerations. In addition, Taylor (2010b) also urged that CCTV evaluations should take into account the impact of CCTV technology beyond crime control, such as its impact on privacy and trust among the community.

Overall, it is important to recognise that although project managers may understand the need for evaluation and the various steps it involves, it does not necessarily mean that they have the capacity to conduct thorough and comprehensive evaluations. As such, funding bodies should be realistic about what agencies can provide in an evaluation, particularly if they do not have a trained evaluator. Another limitation not explored in this paper that warrants more detailed consideration is that even if evaluations and practical implementation lessons are well documented, there are currently limited means by which agencies can share these resources among other practitioners. Therefore, there needs to be an emphasis on having an appropriate forum to exchange knowledge with other practitioners.

It should be noted that the resource needs and limitations faced by CCTV managers mirror those of crime prevention practitioners in general. Lack of crime prevention knowledge and skills has been emphasised as a key hindrance to overall crime prevention effectiveness (Homel 2010). To address this, the AIC proposed the development of a *Crime Prevention Technical Assistance Program* (Homel 2010). This would be a national program that would, among other things, focus on the active dissemination of crime prevention knowledge and provide online resources to help improve the skill and capacity of practitioners. The program is currently being explored by the AIC and could be an appropriate forum for the collection and dissemination of practical CCTV resources in the future.

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