Assessing the impact of CCTV: the Hawkeye Case Study

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1. Overview

London Underground Limited and the British Transport Police (BTP) received funding from the Crime Reduction Programme to install CCTV in all London Underground station car parks. The system consisted of 646 fixed static cameras across the 60 car parks providing almost 100 per cent coverage of the marked parking spaces, with images from each car park being sent to one of three control rooms. There were four main objectives:

- to provide 100 per cent coverage of the marked parking spaces across all car parks owned by London Underground Limited;
- to reduce the incidence of vehicle crime in the car parks by 55 per cent by March 2003;
- to improve the provision of intelligence on criminal behaviour;
- to improve personal safety for car park users.

The mechanisms by which the system was intended to work included:

- deterrence of potential offenders through the presence of cameras and signs warning of CCTV coverage;
- increasing detection of offences by providing evidence, leading to successful prosecutions and a higher rate of secondary prosecutions;
- increasing detection of offences by increased surveillance and immediate deployment of police to the scene of an offence;
- reassurance of the public through the presence of cameras and signs warning of CCTV coverage;
- reassurance of the public through the presence of call points.

Overall the system was designed reasonably effectively, ensuring 100 per cent camera coverage of 58 of the 60 car parks. High camera coverage and high numbers of brightly coloured signs detailing the presence of CCTV contributed to the significant reduction in vehicle crime. However, the design was slightly compromised by the speed of the implementation process and the desire to limit costs. For instance, lighting columns were used instead of camera poles, which meant that the cameras shook in the wind.

The reduction in vehicle crime was also brought about by the effective retrospective use of recorded footage as evidence. This was facilitated by a number of factors, including good tape management practices on the part of the control room operators and an effective working relationship between the control rooms and the British Transport Police Vehicle Crime Squad.

On the downside, the proactive detection of incidents was compromised by the system’s design and the communication channels between the control rooms and Management Information Central Control (MICC). High camera to operator ratios in each of the control rooms meant that just 16 per cent of the cameras could be displayed on wall monitors at any one time. In addition, the static nature of the cameras meant that the operators could not interact with them, as is possible with pan, tilt, and zoom cameras. Therefore, the operators placed less emphasis on the proactive detection of incidents as they occurred. On the few occasions when an incident was spotted, there were difficulties communicating with the local police Command and Control Unit, which meant that immediate police deployment was unlikely to occur. However, the entire underground car park system suffered an average of approximately two incidents per day before installation, and this decreased to less than one after the system was fully operational. Therefore, the ability to monitor the system live had little bearing on the system’s overall effectiveness.

This report summarises the Hawkeye system, including the process of designing, implementing and managing the system, and the impact these factors had upon achieving the project’s stated aims and objectives.
2. Involvement

The British Transport Police and London Underground Limited had primary responsibility for London Underground car parks, and collectively they perceived an opportunity to address vehicle crime. The former policed the car parks and housed three control rooms from which the cameras were monitored within their police stations. London Underground Limited was the owner of the car park assets, but contractors managed them on a day-to-day basis.
3. Intelligence

General context

The 60 car parks are attached to London Underground stations to the north of the River Thames. The car parks vary according to size and operator (also termed contractor). National Car Parks (NCP) operate 26 of the car parks, whereas Vinci operate the remaining 34. They are predominantly attached to tube stations on the Central, Metropolitan, Northern, and Piccadilly lines, and are located across a large number of local authority areas such as Barnet, Brent, Harrow, Redbridge, and Hounslow.

The car parks vary widely in terms of size: ten car parks contain more than 300 car parking spaces, and one had as many as 550; seventeen contain between 150 and 300 spaces, and the remaining 33 car parks contain less than 150 spaces with one containing as few as 16.

The crime and disorder problem

The original bid document stated that vehicle crime (in 1999) accounted for 9.4 per cent of all recorded crime on the London Underground, and that the aim of the CCTV project was to ‘reduce reported crime by 55 per cent by March 2003’.

However, the crime problem was not evenly distributed across car parks and in most of them the crime level was low. Only thirteen of the 58 for which crime data were available had a total of more than 50 vehicle crimes in the period January 2000 to September 2003.

Based on pre-intervention crime figures from January 2000 to November 2001, it was possible to classify the car parks into one of three categories: high, medium or low risk of crime. Nineteen car parks were classed as high risk, whereby they suffered between 0.24 and 1.48 offences per space over a one year period; seventeen were classed as medium risk, whereby they suffered between 0.8 and 0.23 offences per space; and 21 were classed as low risk, whereby they suffered between 0 and 0.7 offences per space. This classification will be used during the analysis of impact in section 6.

Whilst all crime recorded by the British Transport Police in the London Underground area increased by 27 per cent between 2001/02 and 2002/03, motor vehicle and cycle offences decreased by 45 per cent. This is against a backdrop of an increase of 6 per cent for all British Transport Police recorded crime in England for the same period, whilst vehicle crimes decreased by 10 per cent. Nevertheless 340,000 vehicles are stolen each year.

The need for CCTV in a strategic context

CCTV was identified as a viable tool for reducing crime and reassuring customers primarily because of the capital funding opportunity provided by the Home Office; it would otherwise have been viewed as too expensive. The project also acted as a catalyst for London Underground Limited to insist that companies contracted to manage the car parks (NCP and Vinci) sought Secured Car Park status.

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1. 14,278 to 18,141 offences: British Transport Police Annual Report 2002-3
2. 1,013 to 560 offences: op cit
3. 54,035 to 57,414 offences: op cit
4. 12,590 to 11,335 offences: op cit
4. Implementation

The Hawkeye project was large scale and in most respects it was well implemented. It benefitted from a dedicated contract manager who had strong management skills and controlled each part of the process, co-ordinating all parties. However, there were a couple of minor issues, which compromised its effectiveness.

There was a strong view that its quality was compromised by the need to submit the bid to the Home Office within tight deadlines. Unfortunately, the primacy of application success was a common foe of planning in these circumstances:

   It was all done at the last minute – it landed on my desk and I had about three weeks to sort all of this out. (British Transport police officer)

   What happened four years ago really governed where we are now, which was governed by time constraints. (Senior engineer, contractor)

The availability of funding was a significant ‘carrot’ for London Underground Limited, and the financial opportunity was also considerable for those employed by the contractor in commission-based sales positions, as alluded to by a senior engineering representative:

   Sales people have a lot (of commission) to gain and this is definitely a big job to have on the books

The contractors wished to please the potential client by keeping their tender low. This meant that project designers did not identify and address a range of significant design issues.

The first and the most significant issue concerned power supply. Those involved in writing and submitting the bid assumed that a usable power supply would be available in each of the car parks. Unfortunately this was the case for only one third of the car parks, the remainder requiring either a new supply from the local distribution company or power taken from the nearby London Underground station. Where the latter was needed, engineers had to overcome a rather bureaucratic process in order to enter the power rooms. A brief training course was necessary even where access was required for short periods of time, and the access needed to be authorised by the station manager to comply with health and safety regulations. This inevitably added to the time taken to install cameras. Because of this problem the contractors also became embroiled in the bureaucracy of the Infracos. A senior engineer complained of their inefficiency:

   Interfacing with the Infraco was a nightmare…I hadn’t heard of any of them before the project. They didn’t have a clue of what they wanted between them, and even within each Infraco there were mixed messages. A five-minute job to get into a switch room can take paper work of five days, unless you had an informal arrangement with the station supervisor…If you do it by the book, you have to wait 28 days

There was an alternative. In May 2001, the Infracos offered to install power for a £350,000 fee. Whilst all parties would have welcomed a more efficient implementation process, London Underground Limited considered this prohibitively expensive.

A second issue which had concerned the project manager from the outset was the divided contractual responsibility between the company responsible for the equipment (such as cameras, multiplexers and video recorders) and the telecommunications company. The project manager feared a fault occurring in the system where neither party would admit responsibility. This became reality when many of the recorded images were found to suffer from ‘white-out’, a considerable lightening of the whole image. This problem stalled implementation by approximately three months. A technical

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6 These are the infrastructure companies, of which there are three that own leases for various parts of the Underground railway line and the land either side of the track. At the time of the project, the three Infracos were relatively new to their roles although they had been ‘shadow running’ since 1999 whilst preparing for the planned PPP (public private partnership). It was necessary for the contractors to gain permission from them in order to carry out certain works.
inspection proved inconclusive, but later an independent expert identified a problem with a multiplexer, and further investigation revealed a fault that had developed at the time of manufacture.

This could have been avoided. There had been discussions in the early stages about the possibility of the equipment contractor managing the telecommunications installation and thereby taking responsibility for all aspects including the whiting-out issue. However, their fee of £250,000 was again rejected as too expensive by London Underground Limited. Moreover, the impact of the problem could have been lessened by effective laboratory testing of the equipment, but the tight time constraints prohibited this.
5. Intervention

Design of the system

Having described the context in which the Hawkeye system came into being, the system itself will now be described. It consisted of the installation of 646 fixed and static cameras covering 9,283 car parking spaces across the 60 car parks. Fixed and static cameras were used to maximise the scope of camera coverage, helping to ensure that all activity in the car parks would be recorded. This was unlike the more commonplace PTZ (pan, tilt and zoom) cameras, which cover part of the space they are capable of surveying at any one time (unless used in a fixed position). Whilst PTZ cameras can move and zoom to cover a space in detail, fixed cameras allow constant uniform coverage and they therefore have to be positioned correctly.

The CCTV system was required to provide coverage of each marked parking space in all of the car parks at an identification level of ten per cent Rotakin. This is measured by using a standard test target of a standing man with a height of 1.6 metres. When the image fills the screen vertically the image height is said to be 100 per cent Rotakin. In the performance guidelines of the Police Scientific Development Branch, different Rotakin levels are classified into groups depending on the likely evidential quality of the pictures. An image not less than 10 per cent Rotakin is classified as capable of providing detection where this means that, ‘following an alert, an observer can, after a search, ascertain with a high degree of certainty whether or not a person is visible in the pictures displayed to him’. In each car park, a camera was placed at the entrance/exit point to capture the registration plate of each vehicle. For detection purposes, a standard saloon car should not fill less than 50 per cent of the picture height.

The cameras were all boxed design and were accompanied by distinctive signage, making them clearly visible to both offenders and members of the public in order to deter the former and reassure the latter.

Whilst the project was predominantly concerned with reducing vehicle crime, call points were also installed with the aim of improving personal safety for car park users. Whilst assaults were not common occurrences in the car parks, there were a small number of recorded instances by the British Transport Police. When a call point was pressed within monitoring hours (currently 0700-2200), the relevant control room was contacted and the customer could speak to a control room operator via an intercom. If pressed outside the monitoring hours, the customer was directed to Management Information Central Control (MICC) after hearing a recorded message.

How effectively the design met system objectives

The required level of coverage was achieved in all but two of the car parks. In the first there were trees between parking rows, which made it impossible to cover all marked spaces without using an unacceptably high number of cameras. In the second, the contractor failed to install two cameras by mistake, the error only coming to light around a year after the project was handed over to the client. This compromised the level of coverage. The British Transport Police found that the camera shots of some spaces dipped as low as four per cent Rotakin, although the contractor disputed this.

Limitations of design

The Hawkeye partnership bid for the CCTV funding in a manner that minimised the capital cost:

What you’ve got here is a CCTV system on the cheap…using existing power supply and poles instead of using new ones. (Technical consultant)

Even though the project received considerable capital funding (approximately £3 million), this was to pay for just the cameras, cabling, ten new CCTV poles and limited funding for civil engineering works. The contractor was given the option of using lighting columns and existing catenary routes where they were considered ‘fit for purpose’. In order to keep the cost of the tender down (to maximise its chances of success) and save time, the contractor chose to use the existing materials without undertaking costly surveys to check its suitability fully.

The consequences of the cost-cutting exercise for operational effectiveness are detailed below:

- The lighting columns supporting cameras were prone to sway in windy conditions, which in turn made the images from these cameras move on screen.

- The cable and telecommunications cabinets were easy to access. By targeting the telecommunications cabinet, the whole system in the respective car park could be brought down by someone interested in compromising the CCTV system. However, at the time of writing, no deliberate vandalism to Hawkeye cameras had been reported.

Besides this there were a few limitations of the equipment and design, which potentially reduced the effectiveness of the system.

- A further cause of discussion at project meetings was the limited protection of the camera lens provided by the housing. As a consequence, water droplets covered camera lenses in wind and rain. An experiment using sunshades to help protect the lenses was not deemed effective and the only other proposed solution involved the use of a lens treatment to encourage the water to run away. The effect of the rain was considerable, with the worst affected car parks situated on more exposed areas of ground.

- The control room operators maintained that better camera angles could have been arranged in some of the car parks.

- There were also several problems with the call points installed in each car park, which considerably compromised their effectiveness:

  - Only one call point was installed in each car park regardless of size. Generally, the bigger the car park the more difficult it was to find the call point. This problem was exacerbated by poor signage. Even when there was knowledge of the presence of a call point they were not always easy to find. As there were no other means of alerting customers, many were unaware of their existence. This accounted for the very low rate of usage by customers.

  - There were no instructions as to the appropriate use of the call points. Thus, rather than being used in situations where a person was being physically threatened (as focused on in project meetings), the call points were more likely to be used for minor administrative matters, such as asking the control room for directions.

  - Outside of standard monitoring hours (07.00 – 23.00), the call point was routed through to the central police Command and Control (MICC). As will be seen in the following section, however, there were difficulties in communication between MICC and the Hawkeye system, so that those using the help point would be unlikely to obtain a response to their request for assistance.

  - Call points could potentially be used by customers or station staff to alert Hawkeye to a vehicle crime. This occurred just once during 108 hours of observation in the Hawkeye control rooms. The most common use of the call points was by contractors undertaking maintenance work in the car parks.

**Control room**

There were three control rooms (WH, WP and FP) using personnel provided by a recruitment consultant specialising in security staff. Whilst the operators were paid by the British Transport Police, ultimately the funding for their positions came from London Underground Limited, and was made available until the end of the 2007/08 financial year.
There were essentially two areas of core activity for each of the control rooms: monitoring the cameras; and operating the video-editing suite where compilations of recorded footage from multiple cameras could be made. There was more sophisticated software at the WH site, and the operators were keen to help sustain Hawkeye beyond its London Underground Limited-funding lifespan, which lasts until 2008.

Each control room was monitored for up to sixteen hours a day, suggesting that one of the main mechanisms by which CCTV was designed to have an impact was the proactive detection of criminal incidents. However, in practice, this was not found to be its main use. In control room studies⁸, the operators detected very few live incidents. In total, across the three control rooms and 108 hours of observation, seventeen incidents⁹ were noted. At WH, the busiest control room, there were five criminal incidents during the study period, none of which were captured live. Indeed between August 2003 and March 2004 there were only two criminal incidents captured live in the WH control room. This was for several reasons.

- A proactive monitoring function was precluded with the Hawkeye system by the limited number of cameras that could be displayed on the monitors at any one time (around sixteen at each site) compared to the total number of cameras (WH: 221, WP: 271, FP: 121).

- Operators reported only being able to survey one screen in detail at any one time. However, a more common technique used at Hawkeye was for operators to set up the screens with the operators’ preferred images (chosen on the basis of car park usage, recent criminal activity and the extent of coverage provided by the camera) and to use their own peripheral vision to detect movement. Typically, this was their method of monitoring such a large system.

- The number of multiplexers at each site limited the number of cameras that could be monitored simultaneously from the car parks. Each multiplexer processed the images from nine cameras, so that only three images from a car park with 27 cameras could be presented in the control room at any one time.

- The operators could provide continuous surveillance of the screens for only a limited length of time. All operators interviewed stated that frequent breaks from the screens were required to prevent them from ‘going wappy’. In addition, the cameras were static so operators could not interact with the system in order to maintain their interest.

A further weakness for proactive monitoring of the system was the link between the control rooms and Management Information Central Control (MICC), which co-ordinated a response to all live incidents in British Transport Police Area 8, including the London Underground. Although all control rooms had direct landline links to MICC, these were answered tardily or not at all, and operators complained that MICC had not heard of the Hawkeye project. The following example is typical of the complaints of operators.

Two young men entered a car park and were acting suspiciously. The operator knew the British Transport Police motorbike patrols were close and wanted to direct them to the scene. Soon the suspects were...‘screwing a car’. Forbidden from using the British Transport Police radio, he had to call MICC via use of a landline, but there was no response, and the police missed the offenders. Five to ten minutes later the offenders reappeared, this time at a different car park. The operator was on his own in the control room and recorded the events in real time. This time he dialled 999, but was on automatic divert to the MICC at Broadway, and once again there was no reply. By this time, the operator was exasperated: “I was so frustrated and annoyed – I could see them but could not contact anyone. We even knew who he was (one of the offenders) – he’s responsible for about ten crimes.” The patrol officers were no less frustrated.

A recommendation from Hawkeye operators was that staff from “MICC need to come here and find out who we are, (and) our calls should flash up as “Hawkeye” on their screens”. At WH a new agreement meant that British Transport Police officers and the control room staff could bypass the

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⁹ Where an ‘incident’ was defined as any action which attracted the notice of the operators and led to some action by them, usually in the form of viewing tapes retrospectively.
official procedure in urgent cases by using the officers’ mobile phone numbers. Since the control room study, operators competent at using the British Transport Police radio were given permission to use it in emergency situations.

However, the Hawkeye system was more useful to the British Transport Police as a reactive system. The video-editing suite at each control room had equipment for viewing tapes containing multiplexed images. Composite tapes containing images from multiple cameras could also be made, although this was much quicker at the WH site where there was access to an extra software package (Media 100). The editing suite services were contracted out to other organisations including Customs and Excise, and the Metropolitan Police, and in the ten months between the beginning of May 2003 and the end of February 2004, there were 655 recorded uses of the three editing suites, just over two per day. One hundred and forty-three of these were recorded as incidents occurring in station car parks, and thus relate to Hawkeye. The majority (78%) of the tapes viewed were ‘foreign’, i.e. not from the car parks involved in the Hawkeye scheme. The most common offence committed in the car parks in this period was theft from a motor vehicle, constituting 77 (54%) of the 143 incidents. There were 21 (15% of total) incidents of criminal damage, nine of which were carried out on a vehicle. Ten tapes (7%) were viewed for incidents involving the theft of a motor vehicle. Other tapes were viewed for attempted thefts, road traffic accidents and a sexual assault.

On 105 (73%) of the 143 occasions when tapes were viewed, still images were produced from the system, suggesting that there was material of some worth to an investigation. Tapes were removed on 89 (62%) occasions and composites on 26 (18%) occasions.

The effectiveness of this facility on the Hawkeye system was assisted by the good relationship between the British Transport Police and all Hawkeye control rooms. The British Transport Police’s Vehicle Squad was based in the same building as the WH control room leading to frequent exchange of information, and the Vehicle Squad visited all Hawkeye control rooms as a matter of course.

For recorded evidence to be accessible and usable in court, good records were kept of tape storage. In all three control rooms, operators were extremely professional and meticulous in their record-keeping. The system was virtually impossible to monitor ‘live’, so tape changes and reviews formed the bulk of operators’ duties and they spent large amounts of time carrying these out. Operators recognised the chief purpose of the control rooms was providing retrospective evidence to a range of agencies and therefore linked job satisfaction to any duties relating to these.

An important feature of the project was the use of fixed static cameras. Unlike a PTZ system, all incidents in each car park were recorded (barring technical problems or vandalism). The evidential quality of the footage varied depending on where the incident took place in relation to the position of the cameras at that moment, but there was some footage where an incident took place on or near a marked parking space, unless there was a physical obstacle. Because of the Rotakin testing during the implementation stage, a minimum standard of 10 per cent R was applied to the vast majority of car park coverage.

A weakness in terms of the reactive usage of the Hawkeye system was the short duration for which tapes were stored before being degaussed: just fourteen days. If an offence came to the attention of the British Transport Police more than two weeks after it was committed, any recorded information would have been deleted. This was not a common occurrence, but was more likely when an offence was reported to a regular police force, rather than the British Transport Police, as there were sometimes delays in passing the information on:

(If) they get a British Transport Police crime, they don’t know what to do with it and so it just gets chucked in the tray until someone eventually gets round to dealing with it (British Transport Police officer).

A number of improvements were made to the car parks in the period after the system handover (from contractor to client) in May 2003, although these were mainly undertaken by just one of the two contractors. In May 2004, 34 car parks managed by this contractor were awarded Secure Car Park status.

10 When the system was officially ‘handed over’ by the contractor to LU/British Transport Police.
CCTV was, quite reasonably, seen as a key part in gaining Secure Car Park status, supporting Smith et al’s (2002) study on secure car parks, which identified the introduction of CCTV as one of the most common approaches to obtaining the award. Making the achievement of the award a condition of their contract was a good incentive for car park operators to undertake further appropriate work in the car parks. CCTV was also beneficial for London Underground Limited to demonstrate that they were taking customer safety seriously.

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6. Impact

This report aimed to determine whether CCTV in Hawkeye was effective, through evaluating all the separate elements that made up the system. This section will address each objective of the system, determining whether the system effectively achieved it, whilst drawing together all the evidence discussed throughout the report.

Objectives of the system

To recap, the objectives of the system were:

- to provide 100 per cent coverage of the marked parking spaces across all car parks owned by London Underground Limited at a level of 10% Rotakin.
- to reduce the incidence of vehicle crime in the car parks by 55% by March 2003.
- to improve the level of detections and the provision of intelligence on criminal behaviour.
- to improve personal safety for car park users.

To provide 100 per cent coverage of the marked parking spaces across all car parks owned by London Underground Limited at a level of 10 per cent Rotakin

In 58 of the 60 car parks, this level of coverage was achieved, meaning that a minimum standard level of coverage was attained for the vast majority of the car parks. Each entrance or exit was covered in order to obtain a clear view of the car registration number, and this was attained in all car parks after adjustments had been made to the angle of some cameras.

To reduce the incidence of vehicle crime in the car parks by 55 per cent by March 2003

Table 6.1 shows the change in crime levels following the installation of CCTV. It compares crime levels for a period preceding the installation of the system to a period following, which includes the target date of March 2003 (January – December 2003). This allows one to assess whether the complete CCTV system has led to a decrease in crime by this date, whilst taking into account the variability of crime levels over time. It shows that, across the 58 car parks for which data were available, vehicle crime levels showed a statistically significant reduction following the installation of CCTV.

<table>
<thead>
<tr>
<th>Objective: to reduce...</th>
<th>Target absolute change</th>
<th>Target change (%)</th>
<th>Control absolute change</th>
<th>Control change (%)</th>
<th>Is this significant?</th>
<th>Relative effect size</th>
<th>Confidence intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle crime</td>
<td>794 – 214</td>
<td>-73</td>
<td>12,590 – 11,335</td>
<td>-10</td>
<td>Yes</td>
<td>3.34</td>
<td>2.86 – 3.91</td>
</tr>
</tbody>
</table>

Crime levels for a period of one year after installation (January–December 2003) were 73 per cent less than crime levels for a period of one year before full implementation of the system. This reduction in fact contributed to a 45 per cent reduction in vehicle crime in the whole London Underground Area reported by the 2002/03 British Transport Police Annual Statistics Report. British Transport Police recorded vehicle crime outside the scheme stayed constant at approximately 450 crimes per year. In the absence of a suitable control for the Hawkeye system, the changes in vehicle crime were compared with the changes in British Transport Police-recorded vehicle crime for England and Wales as a whole, and these showed a statistically significant decrease in vehicle crime.

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12 Based on comparison of moving averages.
13 Full implementation was achieved in December 2002.
14 (Dec 00-Nov 01) representing a period before cameras were installed in any car parks.
15 http://www.btp.police.uk/documents/AnnualStatistics02-03.pdf
The car parks became live\textsuperscript{16} on a rolling basis between December 2001 and December 2002. Figure 6.1 shows the level of crime mapped against the number of car parks that were live at any one time; the left hand axis shows the number of offences, while the right hand axis shows the number of car parks that were operational. It shows a steady decrease in crime as more car parks became live, suggesting that the reduction in vehicle crime could be attributed to the installation of CCTV. Furthermore, it shows that most of this reduction was achieved by March 2003.

\textit{Figure 6.1: Changes in vehicle crime levels against the number of car parks with CCTV}

These reductions can be attributable to the CCTV systems rather than potential confounding factors such as resurfacing, fencing and lighting upgrades as the latter were generally implemented after the system went live, and when the general crime level was already low.

Breaking down vehicle crime into its separate offence types, criminal damage to vehicles experienced the greatest reduction (82\%) followed by theft from motor vehicles (72\%) and theft of motor vehicles (67\%). Numbers for the ‘taking without consent’ category were negligible (less than ten for the whole after-period).

As mentioned above, there were large discrepancies in the size of the crime problems across the 58 car parks. It is of interest to see whether the system proved effective even where there were low levels of crime prior to CCTV installation. Table 6.2 shows the change in vehicle crime levels in high, medium and low risk car parks, as defined earlier in the report.

\textit{Table 6.2: Changes in vehicle crime in high, medium and low risk car parks}

<table>
<thead>
<tr>
<th>Type of car park</th>
<th>Target absolute change</th>
<th>Target change (%)</th>
<th>Control absolute change</th>
<th>Control change (%)</th>
<th>Is this significant?</th>
<th>Relative effect size</th>
<th>Confidence intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>High risk</td>
<td>555-111</td>
<td>-80</td>
<td>12,590 – 11,335</td>
<td>-10</td>
<td>Yes</td>
<td>4.5</td>
<td>3.65-5.55</td>
</tr>
<tr>
<td>Medium risk</td>
<td>190-72</td>
<td>-62</td>
<td>12,590 – 11,335</td>
<td>-10</td>
<td>Yes</td>
<td>2.38</td>
<td>1.8-3.14</td>
</tr>
<tr>
<td>Low risk</td>
<td>49-31</td>
<td>-37</td>
<td>12,590 – 11,335</td>
<td>-10</td>
<td>No</td>
<td>1.42</td>
<td>0.9- 2.25</td>
</tr>
</tbody>
</table>

\textsuperscript{16} Where the live date is the date when the cameras are connected to the control room and are monitored.
The reduction in vehicle crime was greater (80%) for those car parks that had the highest ratio of crimes per parking space before the cameras were installed, and this was statistically significant. These tended to be the larger car parks, which suffered greater absolute levels of crime.

Medium and low risk car parks showed smaller, but nevertheless marked decreases (62% and 37% respectively). However, in low risk car parks this was not statistically significant. Low risk car parks tended to consist of fewer spaces and suffered small absolute levels of crime prior to installation. Hence a 37 per cent reduction in crime represents a decrease from just 49 to 31 offences in a year across all 21 low risk car parks.

Figures 6.2 to 6.4 show the changes in crime levels in each type of car park matched against the number of car parks that are operational.

**Figure 6.2: Change in crime levels in high risk car parks relative to the number of car parks that are operational**

![High risk car parks graph]

**Figure 6.3: Change in crime levels in medium risk car parks relative to the number of car parks that are operational**

![Medium risk car parks graph]
Figure 6.4: Change in crime levels in low risk car parks relative to the number of car parks that are operational

The above Figures show that crime patterns in the high and medium risk car parks match those across all car parks, in that there is a noticeable decrease in crime levels as the car parks become live. However, no such relationship is shown in the low risk car parks: crime levels are low and extremely variable both before and after the CCTV cameras were installed. This suggests that the CCTV systems are less effective where the crime levels are already low.

Overall, the data suggest that CCTV effectively reduced the incidence of vehicle crime, especially criminal damage to vehicles. The system must have worked through deterrence for a number of reasons.

- Steps were taken to ensure that awareness of the system was high amongst users of the car parks. Brightly coloured signs indicated the presence of CCTV, and leaflet drops (attached to windscreens) were conducted in the majority of car parks, detailing the presence of CCTV and making customers aware of the need to take security precautions.
- The control room was predominantly reactive; therefore, little proactive monitoring of the cameras was conducted. This meant that few incidents were passed to the British Transport Police for the immediate deployment and prevention of offences.
- Problems with communication links between the control room and the MICC meant that, of the few incidents that were detected, there was a reduced opportunity to pass this information to the BTP for immediate deployment.

To improve the level of detections and the provision of intelligence on criminal behaviour

The Hawkeye system has improved the level of detections and helped to focus resources. Table 6.3 reveals the target and actual detection rates in Area 8 (the London Underground Area) over the first three years of the system’s operation. In a control room observation, one offender known to be connected to a number of offences in London Underground Limited car parks was identified and images were recorded. Whilst they were unable to prevent thefts of and from vehicles, the CCTV footage with details of time and date, car registration number and *modus operandi* were crucial. According to the Vehicle Crime Squad based at WH, this type of information allows multiple offences to be attributed to one offender that was not possible prior to the introduction of CCTV. Ironically, however, the CCTV system has increased the workload of the Vehicle Crime Squad. Before the

17 BTP crime figures provided by the BTP Crime Vehicle Squad.
18 *Modus operandi* is the method by which the offender carried out the offence.
CCTV system was installed, intelligence existed for only some crimes, whereas since its introduction, intelligence is available for all offences, not least because virtually all car parks have 100 per cent coverage. The police are placed under an obligation to pursue each piece of evidence and to act upon it.

Table 6.3: Target and actual detection rates, Area 8, BTP

<table>
<thead>
<tr>
<th></th>
<th>2001-02</th>
<th>2002-03</th>
<th>2003-04</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target crime level (Per month)</strong></td>
<td>98</td>
<td>79</td>
<td>40 or fewer</td>
</tr>
<tr>
<td><strong>Target detection rate (crimes per month)</strong></td>
<td>3 (4%)</td>
<td>9 (12%)</td>
<td>13 (33.3%)</td>
</tr>
<tr>
<td><strong>Actual detection Rte (annual)</strong></td>
<td>83 (9%) [6.9 per month]</td>
<td>126 (25.8%) [10.5 per month]</td>
<td>94 (27.4%) [7.8 per month]</td>
</tr>
</tbody>
</table>

However, there was virtually no proactive use of the system; operators were unlikely to spot an incident live for the following reasons:

- across the entire car park system there was an average of only two incidents logged per day;
- there was a high camera to operator ratio, which meant that operators could view only a few cameras at any one time;
- the cameras were static, which were difficult for an operator to monitor for sustained periods of time;
- there were communication difficulties between the MICC and the control room operators, so there was no immediate police response to incidents.

**To improve personal safety for car park users**

Two aspects of car park design were intended to increase feelings of personal safety: clear signage and the installation of help points. For methodological reasons there was no direct measure of changes in fear of crime. The signage was clear and very noticeable. However, it is unlikely that the call points increased feelings of safety. One call point was installed in each of the car parks, but these were installed in the centre of the car parks and were less accessible in the larger car parks. Operators stated that members of the public rarely used them. The control room study revealed that the most frequent users of the call points were the maintenance engineers working on the cameras or the car parks. There was just one call relating to a car crime during the control room study period, initiated by a station manager.
7. Conclusion

The CCTV system has broadly achieved its main objective of reducing vehicle crime within the car parks; the crime rate has decreased by 73 per cent during the evaluation period and this was largely achieved by March 2003. This may have been brought about partly by detection; within nine months of the evaluation period the police seized evidence on 143 incidents, leading to a number of successful arrests.

This high level of detection was achieved through a number of factors. The use of static cameras meant that 100 per cent coverage of the car parks was obtained, so that at least some evidence was available for each reported incident. Up to date, Media 100 software made it easier to extract relevant evidence from recordings. The close links between the British Transport Police’s Vehicle Squad and the control room ensured that evidence was likely to be passed on. This evidence also provided the police with intelligence to address patterns of offending proactively, for instance where a car park has been victimised on a number of occasions. The police could be present at the car park at the appropriate times in contrast to the previous method of time-consuming stakeouts.

However, detection could feasibly account for only a proportion of the total reduction, as these 143 incidents represented only a small proportion of the total number of offences committed in this period, and also a successful detection and arrest does not necessarily prevent reoffending. The largest reduction could be caused by deterrence brought about by the high number of cameras and the clearly visible signs at the entrance to each car park.

Although the system was broadly successful, its effectiveness could have been increased. Some evidence was lost because of the short retention time of tapes for only 14 days; although no exact figures are available, operators cited several incidents where police had requested evidence after this short period was exceeded. Furthermore, a number of design shortcomings led to the reduced quality of evidence in adverse weather conditions. Car parks were not lit uniformly, so that on occasions night-time evidence was poor. The cameras were installed on lampposts, which were prone to shake in the wind. There was no facility for clearing rainwater off the static cameras.

In addition, the system was run uneconomically. There were three control rooms, each of which was staffed for sixteen hours a day. This high level of coverage suggests that the CCTV system was designed to address crime and fear of crime as it occurred, but this is extremely unlikely because of both the nature of crime in the car parks and the design of the system. In reality, across the whole system, an average of only one to two offences per day were likely to occur. The operators were unlikely to spot these incidents because they could display images from only 6 per cent of their cameras at any one time, and they could concentrate on monitoring for only a short period of time, as they could not interact with the static cameras. On the rare occasions when live incidents were spotted, a police response was prevented by difficulties in communication with the main British Transport Police control room.
References


British Transport Police Annual Report 2002-03: 
http://www.btp.police.uk/documents/AnnualStatistics02-03.pdf


