Home Office

BUILDING A SAFE, JUST AND TOLERANT SOCIETY

A good practice guide for the implementation of redeployable CCTV

Martin Gill
Anthea Rose
Kate Collins

Home Office Online Report 16/05

The views expressed in this report are those of the authors, not necessarily those of the Home Office (nor do they reflect Government policy).

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Introduction

The initiative described in this report funded the purchase by local Drug Action Teams of RCCTV systems[1] to disrupt open drug markets and drug-related crime at three sites located in a London borough, in a predominantly rural area in the South West and in a mainly urban part of the North East of England.

RCCTV differs from static CCTV in that the cameras can be moved quickly from place to place (in theory at least), reacting to the identification of crime hotspots. Accompanied by signage it can be used overtly to scan areas, it can be used to target people and it can be used covertly (but the latter two require authorisation under the Regulation of Investigatory Powers Act 2000).

This guide aims to assist practitioners, particularly those employed in local government, who are buying and installing RCCTV for the first time. It is based on the transferable lessons from an evaluation of its implementation at the three sites. There is no intention here to provide an assessment of the effectiveness of RCCTV, but rather to help practitioners to avoid a range of implementation problems that might adversely affect the impact of the cameras or the prospects for measuring their efficacy

Many of these problems are similar to those encountered in the implementation and management of static CCTV schemes. The guide focuses particularly on the issues raised by RCCTV. Further advice and guidance on static CCTV can be found in the National Evaluation of CCTV Development and Practice Report (www.homeoffice.gov.uk/rds; see also. Gill *et al*, 2005; Smith *et al.,* 2003).

Methodology

The original design anticipated many more deployments, and assumed a measurable impact on drug-related crime. A combination of experimental design and realistic evaluation methods (Pawson and Tilley, 1997) were originally advocated, but since there was hardly any potential impact to evaluate, the approach changed. Data protection procedures prevented access to anything other than aggregate level data, which was not sensitive enough to identify any effects on crime, although no-one interviewed during the research supposed that the effect of RCCTV on crime rates was dramatic. Early discussion group findings suggested that the public were unable to distinguish between static and RCCTV, complicating measurement of public views.

The focus of the project was therefore very much on the process evaluation. The research team built up a good working rapport with staff in a variety of agencies at the three evaluation sites, and were involved in attending agency meetings, meetings of neighbourhood watch groups, and interviews with people who were knowledgeable about local drug markets or the potential impact of RCCTV. These were supplemented by three focus group discussions conducted in each area: one of local community representatives, the second of young people and the third of drug users. Time was also spent interviewing and observing police officers, especially during deployments. An assessment of the procedures and protocols was commissioned to provide insights into levels of compliance. Towards the end of the research, surveys were conducted to gather data on public perceptions of RCCTV in areas where cameras had been operating during the evaluation.

How to implement an RCCTV scheme

The flowchart on the next page (Figure 1) demonstrates the basic principles of implementing an RCCTV scheme. The issues in the chart are covered in greater detail in the rest of this report.

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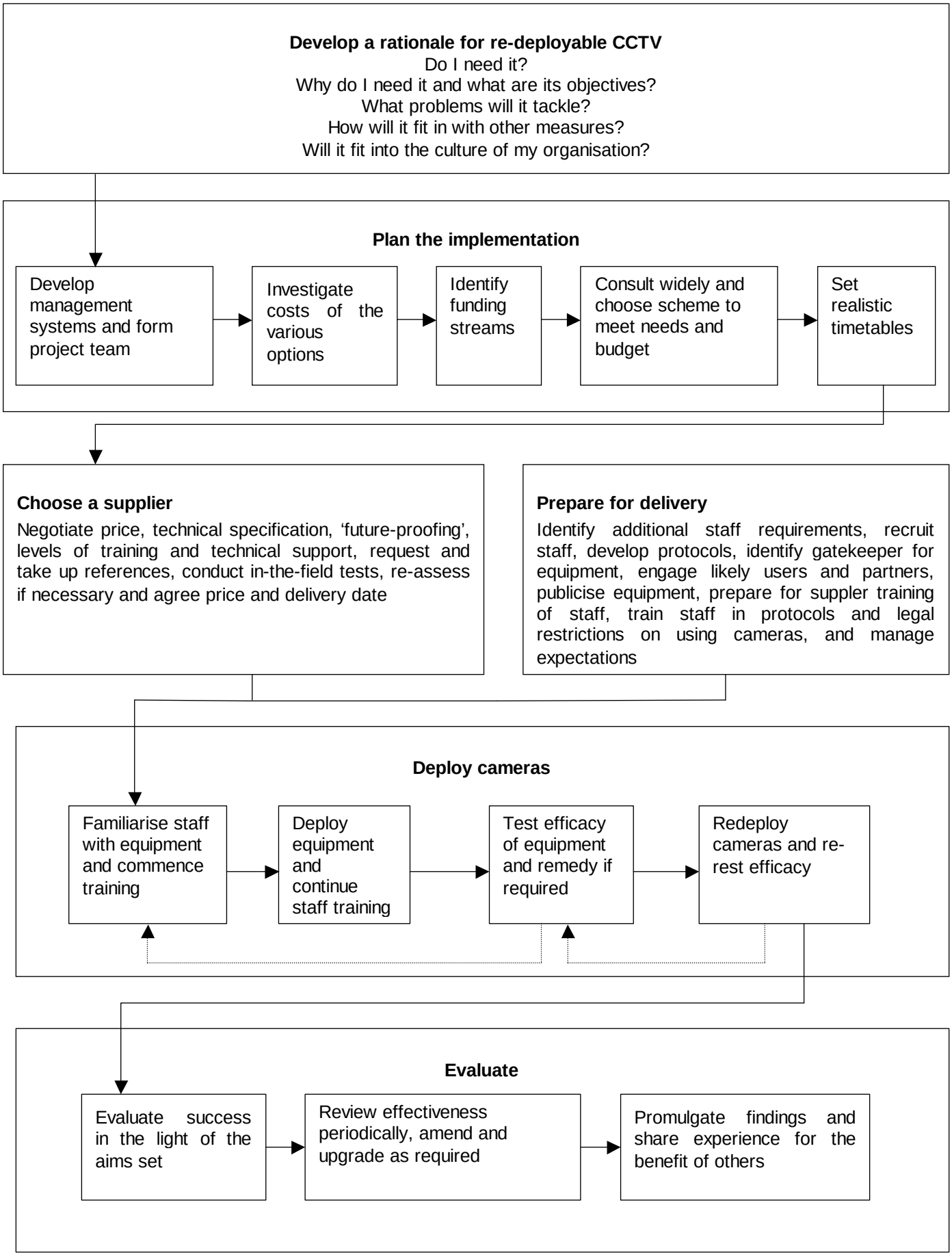
[1] 'Redeployable' is sometimes referred to as 'relocatable' or 'mobile' although the latter more commonly refers to CCTV-equipped vans.

Figure 1: Re-deployable CCTV process flowchart



Why do I need RCCTV?

As with any crime reduction measure it is important to establish a clear rationale for purchasing RCCTV at the outset. Managers should consider the following:

- What are the main objectives for RCCTV?
- Precisely how will the relocatable feature help to meet the objectives?
- Precisely what problems are to be tackled?
- What evidence is there to suggest that RCCTV is the appropriate intervention to tackle the issue in question?
- How will RCCTV fit with other measures already in place or are about to be introduced?
- How will it fit into the culture of the organisation?

Guidance on the pre-bidding process including assessing the mechanisms by which CCTV can work are contained in the National Evaluation of CCTV (www.homeoffice.gov.uk/rds). There is very little information specifically about RCCTV at present (but see, Gill *et al*, 2005) and it may be helpful to outline some of the ways it was used at the evaluation sites.

The main reasons for deployments at the evaluation sites were to:

- act as a visible deterrent;
- gain evidence on the movements of suspects as part of police operations; and
- reassure the public.

RCCTV was used to tackle the following problems

- Street drug crime.
- Street robberies.
- Vehicle crime.
- Dwelling burglaries.
- Prostitution.
- Antisocial behaviour.

RCCTV was installed in a variety of locations, including:

- railway stations;
- secondary shopping areas where static CCTV systems did not exist;
- gaps in existing town centre CCTV;
- outside night-clubs, pubs and bars;
- residential estates, both private and Council;
- out of town retail car parks;
- market towns and villages; and
- parks and woodlands.

The case studies below are illustrations of how RCCTV was used at the evaluated sites.

Case study 1

On several occasions RCCTV was used for evidence gathering at a retail car park. Young people involved in antisocial behaviour on a Sunday evening were suspected of using and dealing drugs from vehicles. Cameras were deployed overtly in and near the car park enabling police officers to observe the situation remotely and allowing them to gather evidence for stop and searches. As a result several arrests were made for possession of cannabis. The youngsters were cautioned and released.

Case study 2

RCCTV was used for public reassurance and as a visible deterrent in a residential area where prostitution and drug related offences were highly visible. The cameras were deployed overtly to target suspects as part of a high-profile policing initiative. After only three days, the deployment resulted in the 'targets' moving addresses. Camera remained in the vicinity for several months before being replaced by static CCTV cameras.[2]

Transferable lessons

- Ensure that RCCTV is the appropriate measure for tackling the problems identified. There may be alternatives that are less costly of capital and revenue resources.
- Establish a clear rationale for purchasing RCCTV at the outset. Are there specific problems to which redeployable cameras seem suited?
- Have a clear idea of how RCCTV will fit with other existing, or intended, measures.
- Be sure that RCCTV will fit into the culture of the organisation and particularly of those who will be using it. Are those who will deploy the cameras prepared for the learning curve they will have to negotiate to use the equipment effectively?

Project management

Many problems were encountered in deploying cameras effectively at the evaluation sites and these were caused mainly by a lack of proper preparation. The preparation process was complicated by a variety of agencies being involved in the decision to purchase and then in the use of the equipment. Many of the recommendations coming from the evaluation sites apply equally to static CCTV, for example, the need for:

- clear decision-making processes, taking into account the opinions and needs of all partner organisations;
- definition of areas of responsibility within and between partner organisations, both strategically and operationally; and
- each partner agency to identify its priorities for using CCTV, and for these to be effectively managed.

However there are issues that particularly affect RCCTV that merit consideration, including:

- the need to identify both capital and revenue funding streams.
- the need to identify a suitable 'gatekeeper' to control access to the equipment.

[2] Indeed, despite the original intention sometimes RCCTV was deployed as a *de facto* static camera.

- the need to resolve communication issues between agencies.
- timescale slippages caused by the need to manage complex and new technology.

Identify funding streams

Identification of appropriate funding streams to support both the set-up and ongoing costs of an RCCTV system is of key importance. As will be discussed later, there are a range of costs, some not immediately obvious, but these all need to be identified and funding streams found to meet them all.

Identifying the 'gatekeeper'

The 'gatekeeper', that is the agency chiefly responsible for managing RCCTV, was either the Council or the police. Placing responsibility for the systems in the hands of the police can lead to quick and regular identification of deployment opportunities on the basis of analysis of crime statistics or because of local operational knowledge of where the hotspots are. However, designating the Council as the gatekeeper means that existing static CCTV expertise can be more easily drawn upon. To comply with current legislation the gatekeeper will need to register with the Information Commissioner (www.dataprotection.gov.uk). Managers need to weigh up the relative advantages of different organisations acting as gatekeepers, but it is important that this is agreed from the start.

Communication issues

Whoever is chosen as gatekeeper, it is important that the decision is communicated widely, and that there are clear policies and procedures governing the use of the cameras including who pays for deployments. In practice a range of groups may want to use the system, and having clearly understood procedures makes the equipment more accessible and its use more likely. In practice, the police were the main, and in some cases the only, users of the system.

It is always a challenge in partnership working to ensure that communication is effective. Factors to consider are:

- The differing priorities of each partner agency.
- Who will have priority use of the equipment?
- How deployment needs will be identified.
- How the cameras will be used with clear guidelines governing their use.
- How the public will perceive RCCTV.

During the evaluation three examples of communication issues came to light. First, at a site where the Council undertook responsibility for and monitoring of the cameras but the police were the main intended users, the two agencies failed to communicate properly and as a result there was limited use of the cameras at that site.

Second, deployments were sometimes delayed whilst waiting for other departments to carry out work (for example the lighting or maintenance department within the Council to survey or wire lampposts, or the contractor to arrive with a cherry picker to install cameras). Good communication here was found to aid the fast and frequent deployment of cameras.[3]

[3] This process can be improved further still. This may include, for example, the minimum requirements of a contractor deploying the cameras on the Council's behalf being granted approval to work on street lighting supplies from the local electricity board (usually a formal qualification obtained from the electricity board directly), and using their own MEWP (Mobile Elevated Work Platform – cherry picker).

Third, if there is a possibility that the cameras will be deployed in residential areas the public need to be informed as soon as possible. Residents need to know the cameras are present if they are to feel safer, while offenders need to know if they are to be deterred.

Timescale slippages

The management of project timescales is crucial to the effective implementation of RCCTV schemes. Experience from the evaluation sites showed that it can take from four to nine months for RCCTV to become operational and even then technical difficulties will persist. RCCTV is particularly susceptible to slippage because the technology is relatively immature. Managers need to factor potential problems into project plans and manage any slippages. In addition to technical problems, timescale slippage can occur due to:

- the slow release of funding;
- tendering processes, which are sometimes administratively complicated;
- delays in receiving equipment from the suppliers. This was sometimes due to small orders being given a low priority. On other occasions it took the supplier longer to manufacture specialised equipment than anticipated; and
- the slow acceptance of new technologies into an organisation's culture and working practices.

Transferable lessons

- Identify funding streams for capital and revenue costs.
- Establish responsibility and a system for managing RCCTV systems.
- Communicate this effectively within and between partner organisations.
- Communicate with the public to manage the installation and eventual removal of cameras (i.e. development of an exit strategy).
- RCCTV is a developing technology, which means there may be technical problems. For this and other reasons set realistic implementation timescales, allowing for slippages.

How do I know what kind of system I need?

Like static systems, RCCTV comes in different forms, which are described below. In order to select the most appropriate system there is no substitute for establishing clear operational requirements. This will need to take account of the following:

- What problem is RCCTV being used to tackle?
- In what kinds of areas will it be used?
- What are the strengths and weaknesses of different systems?

Finding experts on RCCTV may not be easy in all areas. Guidelines for operational requirements can be found on the Police Scientific Development Branch (PSDB) website at http://www.homeoffice.gov.uk/crimpol/police/scidev/publications.html
(see also, www.cctvusergroup.com). In addition, there are two other potentially good sources of information:

- Other users of RCCTV
- The supplier (and the manufacturer where this is different)

Other users of RCCTV

Visiting other users of RCCTV before purchase can be valuable. Because the technology can be affected by location it is wise to select areas that are geographically similar to those where the cameras will be deployed, and where they are being used to tackle similar problems. In addition, organisations may already operate covert RCCTV cameras, and this knowledge can be very helpful. Information should be sought on the following:

- The identity of suppliers of RCCTV equipment and the quality of service they provided, for example in terms of technical support and after-sales back-up.
- What, if any, technical and implementation problems were encountered and how these were resolved.
- The costs (which can be greatly increased by technical problems).
- The strengths and weaknesses of systems for particular purposes.
- Examples of how RCCTV was used, evidence of success and explanations for failings or problems.
- Notable failures of operations and how they were rectified.

The supplier (and the manufacturer where this is different)

Suppliers have a range of systems available and it is crucial to spend time choosing the right one. Moreover, technology is developing at a rapid pace and purchasers may need to be careful about being used as 'guinea pigs'. Asking suppliers for references from their clients and taking these up can be instructive. The best advice is to ask for a list of clients and then contact a sample yourself. Sometimes, the manufacturer may supply equipment themselves and sometimes not, but they offer another source of information. The following are key points to consider when thinking about suppliers.

- There are a range of companies that make and sell RCCTV equipment and it is advisable to shop around to get the best deal.
- Invite several companies to carry out equipment testing at the chosen locations. Transmission paths can go from good to bad in a few metres' distance because of the transmission wavelengths used. Also ask for a written report on their findings clearly outlining any difficulties that need to be managed.
- Having chosen potentially interesting suppliers, ask to speak to some of their existing clients and check the claims that the suppliers make.
- Enquire whether suppliers allow for a trial period of equipment use prior to purchase.
- Ensure the supplier is willing to make modifications after delivery if necessary, perhaps to meet in-field requirements that cannot be foreseen at the planning stage. Check whether and in what ways equipment can be upgraded as technology advances, and at what cost.
- Ensure that the supplier has a comprehensive technical back-up system in place and that it is easily accessible.

Transferable lessons

- Have clear operational requirements in order to minimise technical problems.
- Get advice from other users about their experiences.
- Choose the supplier carefully and invest time doing so, ensuring that the system meets technical and operational requirements, and can be adapted to meet any changes required.
- Check whether the supplier has a good technical support system, and if possible, check claims suppliers make about their equipment with existing users.

- Remember that each redeployment brings potential for errors, so RCCTV is more likely to be affected by user error than static systems.
- Ensure that supplier has authorisation and qualification to carry out deployment without the involvement of any third party (highway lighting etc.) to reduce the likelihood of delays caused by the lack of inter-agency communication.

What types of systems are available?

This section will guide prospective users through some of the key technical challenges of implementing RCCTV. It will provide some examples of how RCCTV was applied at the evaluation sites, the types of systems used and some of their advantages and disadvantages.

Matching technology with applications

There is a need for thoughtful planning in deciding how best to match the available technology to operational requirements. Clearly circumstances will vary, but Table 1 may be helpful in terms of guiding the choice to be made. The left-hand column lists a potential objective of RCCTV, and the right-hand side suggests an appropriate technology or technologies to consider.

Table 1: Applying RCCTV at the evaluation sites

Use proposed	**Solution**
Visible deterrent	Shoebox camera more appropriate because it is seen to follow suspects and potential victims.
Police surveillance	Dome camera to hide tracking and mobile receiver which is more directly accessible to police operational staff in the field.
Public reassurance	Shoebox camera, to maximise visible deterrence.
Continuous monitoring	Radio transmission of signals, although it should be noted that if the radio link being used is analogue it must be encrypted to avoid easy interception of pictures by third parties.
Retrospective reviewing of footage	On-board digital recorder or transmit back to a control room, bearing in mind that if the camera does not have an integral digital recorder and the transmission link fails, the camera will produce no images.
Lengthy transmission distances	GSM communication is less affected by obstacles, although as the bandwidth is very low, the picture resolution will be very low and the latency (time delay between the camera viewing an image and the remote operator seeing the same image) will be high making active control and monitoring virtually impossible.
Long-term deployments	Mains power and communication to the CCTV control room.
Short-term deployments	Battery powered / briefcase receiver.

A general guide such as this cannot unravel the many complex decisions that have to be made in choosing the appropriate system. Instead the discussion focuses on some of the main issues that need to be considered in the following areas:

- Type of camera.
- Transmission medium.
- Type of receiver.
- Power supply.
- Mounting of cameras.

Type of camera

The two types of cameras purchased for the evaluation sites were the 'shoebox' and the 'dome'. The shoebox camera is a traditional CCTV camera, rectangular in shape and used in most town centre static CCTV schemes (see Figure 2). It is usually mounted on the top of a column[4]. The dome camera is so called because it is housed in a dome-shaped casing and can be bolted onto the side of a lamppost, or other suitable structure, (see Figure 3).[5] Both cameras can have the ability to pan, tilt and zoom. This means the camera lens can view panoramically, vertically and take close-ups of subjects. However, there is an issue with the shoebox camera's ability to see the bottom of the pole on which it is mounted and suppliers should be questioned on this. Some of the main advantages and disadvantages detailed in Table 2 highlight the key differences between the two types of cameras (although these may change as the technology develops). The type that should be purchased will depend on its intended use[6] and also the structure to which it will be mounted.

[4] It is important to check claims that these units can be street light or 'telegraph' pole mounted as they are typically too heavy for such installations.
[5] At the time of writing telegraph poles are not suitable because of concerns about Health and Safety.
[6] There is a big difference between using RCCTV as a quick response to a problem - and to be moved soon after the problem has gone away - to using the RCCTV as if it were a static camera by leaving it in situ for long periods.

Figure 2: Shoebox camera

Figure 3: Dome camera

Table 2: Advantages and disadvantages of the Shoebox and the Dome cameras

	Shoebox	**Dome**
Advantages	Suitable for deterrence and public reassurance as: The direction the camera is pointing is visible from the street. Large / obvious	Suitable for evidence gathering as: The direction in which the camera is pointing cannot be ascertained from the street, especially if the dome is made of opaque material Small / discrete It is light (approx. 7kg) and so can be deployed on a range of structures.
Disadvantages	It is heavy (approx. 25kg), so unsuitable for mounting on some structures. May not be suitable for evidence gathering because the direction in which the camera is pointing is visible from the street.	The quality of the picture can be impaired as: Some designs are susceptible to rain and snow because the convex shape of the camera housing does not allow a wiper to be fitted, although some versions have overcome these issues. The convex shape of the dome casing can sometimes distort the quality of the picture, although some versions have overcome these issues. Condensation can occasionally build up in the dome housing.[7]

Transmission

The signal transmission methods used at the evaluation sites were Global Systems for Mobile Communication (GSM) and analogue radio. GSM involves the transmission of digitised video, as data via a mobile phone network. Radio transmission allows data to be sent via several licence-exempt radio frequencies such as 2.4GHz, 5.8GHz (Bands A and B) and 1.394GHz, or via (only with permission) police-only licensed L and S bands.

Other wireless systems exist including digital[8], laser, Ethernet[9] and Internet and the technology is still developing at a very fast rate. A combination of wireless and hardwired transmission methods can be used to extend signal range.[10] Table 3 shows the advantages and disadvantages of GSM and radio transmission methods. The main finding from the evaluation sites was that radio transmission was viewed as the best option when line of sight can be achieved, but in practice this is often a problem and the advantages of GSM are more apparent. If GSM fulfils operational requirements, and its disadvantages and limitations are fully understood, there is no reason not to purchase this system.

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[7] If this happens, it reflects a fault with the system.
[8] Following a House of Lords Select Committee report in 1998, use of digital images in court is increasing. Managers should ensure local courts possess the facilities to display digital images at trial.
[9] Likely to be used for fixed CCTV systems rather than redeployable ones, although WI-FI technology enables computer networks to be utilised for RCCTV.
[10] For example, a fixed microwave link can be installed from a control room to what is termed a 'hub' or a 'node'. Cameras can then transmit to this by wireless methods such as radio. However, this can be costly, time-consuming and requires detailed forward planning.

Table 3: Advantages and disadvantages of Radio and GSM transmission

	Radio	**GSM**
Advantages	Licence exempt radio frequencies have no transmission costs. Enables proactive real-time monitoring. Good image quality. Suitable for evidential purposes.	No line of sight required Unlimited transmission range. No antennae required, which can be costly and difficult to position.
Disadvantages	Transmission range is limited due to Home Office restrictions in power output. Usually only one camera is also permitted to transmit on the more powerful 1.394GHz frequency per hotspot but this may be multiplexed with other cameras transmitting on the lower power allowed at 2.4gHz Line of sight between transmitter and receiver is needed. Maximum transmission distance varies from 1km to 4 km depending upon line of sight and geographical conditions. Potential obstructions that can limit transmission range and strength include trees, especially when wet, and metal and stone buildings. Licence exempt frequencies, especially 2.4GHz, have an increasing number of users and these may interfere with camera transmission. Each camera requires a separate antenna. Several strengths are available and suitability will vary from deployment to deployment depending on the above factors. If not encrypted, images can easily be intercepted possibly causing data protection concerns. It should also be noted that easy interception also means that false images can be fed to a remote operator in place of the genuine video images giving the operator the impression that he/she has lost control of the camera whereas they have actually been duped.	Costly to download video via a mobile phone network if used over a long period of time (approximately 20p per minute). Real-time monitoring is not possible due to slow data transfer rate of 1 frame per second or less. GSM systems display four small pictures on-screen. However, images are small because of the low resolution available over GSM and when expanded to full screen they appear very pixelated. Due to the slow transfer of video any movement on or of the camera causes an unacceptable degradation of images. This is mainly because of conditional refresh (updating the parts that change). Due to all the above, images received from GSM transmission will invariably not be of evidential quality.

Types of receivers

At the evaluation sites pictures from RCCTV were transmitted to:

- an existing static CCTV control room when using radio transmission;
- a recording and monitoring facility in a portable briefcase when using radio transmission;
- a stand-alone PC or laptop when using GSM.

Each type of receiver was found to have advantages and disadvantages and these are detailed in Table 4.

Table 4: Advantages and disadvantages of receivers

	Briefcase	**PC**	**Existing CCTV control room**
Advantages	Flexibility – allows in field monitoring and recording. Portable – can be used anywhere, reception permitting. Particularly suitable for use during police operations. When complemented by a built in digital recorder it negates the need for a continuous radio link.	No infrastructure is needed except a standard PC and appropriate software. Providing the PC is in an existing control room there is no issue of security. Providing the PC is housed as above, existing control room protocols may be used.	Can be monitored by existing trained CCTV staff. Allows data to be recorded and stored on existing CCTV system. Can use existing protocols and codes of practice.
Disadvantages	A secure place to store the case and data, within the specified range of the transmission method, needs to be found. If staff have no previous experience of using CCTV they will need to be trained to use the equipment and on protocols and legislation. Relatively short recording periods.	Downloading to record onto a PC can be costly over a long period of time. Onboard hard drives are available, which can either be removed to view large amounts of recorded data or downloaded to a laptop on site (although the costs may be high). A secure place to house the PC needs to be found, e.g. a CCTV control room. If the PC is not housed in an existing control room, staff will need to be trained on the use of the equipment and on protocols and legislation.	Installing the infrastructure prior to use can be costly, time-consuming and requires careful forward planning. One of the obvious transmission paths available to most local authorities is their existing LAN/WAN but gaining cooperation from the Council's own IT department can be very difficult.

Power supply

Cameras can be plugged into a mains supply, or a battery can be mounted with or placed nearby the camera. Using the mains supply from lampposts is the most reliable way to power cameras, but battery power is more suitable to the rapid deployable nature of RCCTV. Table 5 details the advantages and disadvantages of these two types of power supply.

Table 5: Advantages and disadvantages of power supplies

	Mains	**Battery**
Advantages	Provides a constant power supply. Once permission is granted by the Council, wired lampposts can be re-used for future deployments. Costs can be reduced if the Council does not monopolise the right to wire the cameras. This can usually be overcome by the contractor gaining the required qualification and authorisation to work on street lighting supplies from their owner, usually be the local electricity board.[11]	Suitable for rapid deployment as wired lampposts are not needed. Cameras can be deployed on any suitable structure, e.g. telegraph poles.
Disadvantages	Permission needs to be obtained from the local authority (and the local electricity board if it is one of their supplies) to use a lamppost's mains supply. Permission may be refused. Cameras need to be wired into the lampposts and often this will need to be done by the relevant Council department. This can cause delays and be costly.	Duration of deployment is limited to battery life. The cost of replacing the battery during a deployment needs to be factored into revenue costs. Batteries need to be charged in advance. If a well designed battery charger is not used then it may be possible to damage batteries by overcharging them. Permission to use structures will need to be obtained prior to deployment.

Mounting of RCCTV cameras

Whichever system is chosen there are several issues that need to be considered when deciding where to mount RCCTV cameras.

- Lampposts vary in height. A short lamppost has at least two disadvantages: it can make it difficult to identify a line of sight, and it can render the camera susceptible to vandalism or theft. Some lampposts are too tall and sway in high winds, which can affect the image quality.
- Lampposts vary in width. It is important to check that brackets supplied by manufacturers fit around the pole.
- A cherry picker is required to mount RCCTV cameras.[12] This is a hydraulic device commonly used for the maintenance of street lighting, which can be hired, usually from

[11] It is important to note that these variations vary across the country.
[12] Although variations are coming on to the market which may ease this process.

the Council,[13] or purchased. If hired, good communication with the relevant department is needed to facilitate the rapid deployment of cameras.

- To protect cameras, anti-vandalism measures, such anti-climbing rings with spikes should be considered.
- The dome camera lens is usually supplied with a plastic cover. This can be susceptible to scratching during installation, which then diminishes the quality of the image. Fabric covers, termed 'fluffy hats' can be an effective way of protecting the lens. Some of the latest designs may overcome these issues.

Technical problems

The sites experienced numerous technical problems, which highlighted the need for a comprehensive fault reporting procedure and reliable and expert technical backup from the supplier. Table 6 summarises the technical faults that occurred.

Table 6: Technical faults that can occur

Affecting	Fault
Cameras	• Condensation in the dome camera housing affected the quality of the image received. • Impaired image quality of the dome cameras due to rain or snow on the camera lens and the inability to fit a screen wiper in some cases. • Cameras failed to work, for a variety of reasons.
Radio transmission	Interference with transmission signal from other users. Difficulty in establishing line of sight due to obstructions. Weak transmission signal due to the geographical make-up of an area. Inability to transmit over even the shortest of distances. Antennae were not always powerful enough.
GSM	Inability to connect to mobile phone network.
Receiver	Control panel failure. Problems with the batteries. Power supply. Battery failure due to incorrect charging and use.

Transferable lessons

- Have realistic expectations of what the technology can achieve.
- Test the RCCTV system in the areas of intended use prior to purchase to minimise potential technical problems.
- Ensure compliance with Home Office power output regulations for radio transmission.
- Consider the issue of security for briefcase receivers.

[13] If the minimum requirements of any contractor include ownership of their own MEWP then the council will not have to carry out any of the practical work, hence cutting down the number of opportunities for poor communication.

- Establish a clear rationale of intended use as this will impact on the type of system purchased.
- Do not opt for GSM if continued, long-term monitoring is required.
- Always contact the relevant authorities (usually the Council and often the local electricity board too) to obtain permission to mount cameras on, and wire cameras into, lampposts or other structures, before ordering the equipment. This will affect which power supply is chosen.
- Ensure line of sight is viable if radio transmission is intended.
- Always fully charge batteries and switch off the camera when not in use.
- Ensure fault reporting procedures are in place prior to going operational.

How much does RCCTV cost?

The issue of cost is rarely considered in publications, but it is of course a major consideration in all preventive options. It is instructive to consider some of the costs incurred at the evaluated sites. Funding is required for both capital costs (purchasing the equipment) and ongoing revenue costs for running camera deployments. Tables 7 to 11 show the capital costs for RCCTV at each site.[14]

Site A purchased a radio transmission system consisting of seven RCCTV cameras, five for transmission back to an existing control room, and two with a briefcase receiver. Table 7 summaries the cost and type of equipment purchased at site A.

Table 7: Site A items purchased and their cost

Item	**Cost**
2 dome cameras with on-board digital recorders Batteries Long range antennae 2 briefcase receivers Installations and connection	£24,000
5 dome cameras with on-board digital recorders Long range antennae	£37,500 (£7,500 per camera)
Wiring into a control room included: • A 16-way recorder as existing recorder was at full capacity • A Matrix • Cabling (cost will depend on distance and number of cameras) • Software to run RCCTV cameras with existing static CCTV cameras	£9,700
Total cost	**£71,200 plus labour** (Estimated at £400 per day for installing one to two cameras)

Site B purchased a radio transmission system consisting of two RCCTV cameras with one briefcase receiver and four lithium batteries. Table 8 summaries the cost and type of equipment purchased at site B.

[14] The equipment was mostly purchased in 2002-3. Clearly, there may have been changes since then.

Table 8: Site B items purchased and their cost

Item	**Cost**
2 dome cameras with on-board digital recorders 1 briefcase receiver 2 lithium batteries 2 chargers 2 whip antennae 2 tripods	£21,450
2 pairs of anti-climb spikes	£260
2 lithium battery tubes	£2,400
VCR	£750
3-year maintenance contract	£5,500
Total cost	**£30,360**

Site C purchased a GSM system consisting of two shoebox cameras with relevant PC software and hardware. Table 9 is a summary of the cost and type of equipment purchased at site C.

Table 9: Site C items purchased and their cost

Item	**Cost**
2 Shoebox cameras	£13,738
Software for each camera	£2,618
PC	£1,604
2 mobile telephones	£160
2 SIM cards	£47
Printer	£389
GSM monitoring software for the PC	£981
3 removable digital recorders	£881
Total cost	**£20,418**

The sites found that additional capital items were needed over and above the initial order. These items, and their costs, are listed in Table 10.

Table 10: Additional capital items and their cost

Item	Cost
Dome camera, battery and recorder *without* the briefcase	£6,500
Additional lithium battery	£1,200
VCR	£750
De-gausser	£1,142
Antennae for achieving greater transmission distances: Satellite Antennae Directional Panel Antennae	 £550 £90
1 A4 sign indicating CCTV is operating	£50 per camera site
Removable digital recorder	£800
1 pair of anti-climb spikes	£250

Revenue costs

The following are examples of some of the main revenue costs that need to be considered. There may well be other revenue costs to be taken into account, which do not appear here, but the following are some of the main ones identified at the sites that were evaluated.

Table 11: Revenue costs

Item	Approximate cost
Surveying and wiring of lampposts	£50 per lamppost (wiring can be done in-house)
Installation of a new lamppost	£600
Hydraulic platform (Cherry picker): To hire To purchase	 £150 per day (site B) £250 per day (site C) £25,000
Transmission costs to a mobile phone network	20p per minute
Transmission costs for analogue or digital radio transmission	£0.00
Single videotape	From £2
Plastic Dome camera housing	£65
3-year maintenance contract including parts (excluding 3rd party / malicious / accidental damage).	10% of the total cost of the equipment
Training	£587 (Site C) but costs will vary.
Staffing	£26.70 per hour (At site B. Figures used to determine a police officer's input when on overtime. Clearly costs will vary depending on the type of deployment, and the agency using the equipment.

Transferable lessons

- Conduct a cost analysis of, and obtain funding to support, both capital and revenue costs. Remember that deployments that require a high level of staffing can be costly.
- Consider carefully how frequently the system will be used. This will impact on revenue costs. Cherry pickers need to be used with each deployment to deploy and take down cameras.
- Start with a small system that is not too complex, it can always be augmented at a later date.
- Ensure systems can be up-dated and added to as technology improves.

Protocols and legislation

All protocols and procedures for the use of RCCTV need to comply with legislation and must be in place before the equipment is deployed. The following are needed:

- *Code of practice* - This can be incorporated into any existing CCTV Code of Practice or developed specifically for the use of RCCTV (see Appendix A for an example).
- *Protocols on the use, procedures and responsibilities for the equipment* - For example, who is the data controller, will the equipment be stored securely, how will issues of privacy be dealt with, and how are deployment needs to be identified?
- *Standard authorisation forms for each deployment* – This needs to include reasons for the deployment, objectives and expected and actual outcomes, and tape logging procedures (see Appendix B for an example).
- *Evaluation forms* – This will help the user to evaluate the success of deployments (see Appendix C for an example). For information on how to evaluate measures such as RCCTV see the 'Passport to Evaluation' guide published by the Home Office (2002, www.crimereduction.gov.uk/evaluation).
- *Compliance with the Regulation of Investigatory Powers Act 2000 (RIPA)* will be required if RCCTV is used for targeted surveillance (www.homeoffice.gov.uk).
- *Signage* - If the system is to be used overtly, signage must accompany every deployment in order to comply with legislation (www.dataprotection.gov.uk). Signage should be in the immediate vicinity of the CCTV; clearly visible and legible to the public, A4 or A3 in size (for pedestrian or vehicular traffic respectively); and should state that CCTV is in operation, identify a responsible person and carry a contact number.
- *Fault reporting* - Simple forms are required to report and track faults and to ensure they are rectified as soon as possible.
- *Image management protocols* - This should include details of where tapes will be stored and relevant logging and recording procedures. These are necessary in order to comply with data protection and other standards or legislation associated with the use of CCTV images as evidence. Some of the key issues involved are detailed in the next section.

For additional guidance on protocols and legislation see the crime reduction website www.crimereduction.gov.uk. See also the CCTV user group's website www.cctvusergroup.com for examples of many of the above forms.

Transferable lessons

- Ensure all necessary protocols are in place to comply with current legislation prior to the use of systems.
- Arrangements that already exist for static CCTV may be a helpful starting point. Advice is available from a range of officially sanctioned websites.
- Make use of what exists already when constructing forms and codes of practice.

- Ensuring forms are easy to follow and complete will aid the rapid deployment of cameras. Officers using RCCTV particularly liked the fact that forms were quick and simple to fill in and the lack of 'red tape' involved with the process of requesting and using the cameras.
- Designating a named individual to receive all forms and deal with fault reporting will assist with the above.
- If cameras are to be used to target people (or covertly) then authorisation is required due to the Regulation of Investigatory Powers Act (2000).
- Ensure legally compliant signage is used for all overt deployments.

Are the images good enough for evidential purposes?

Issues that affect the use of images for evidential purposes apply to both static and RCCTV. There are two that merit specific attention; those relevant to meeting the Rotakin standard, and effective tape management.

Rotakin standard

The courts will decide whether CCTV evidence is accepted. In so doing they may refer to the PSDB guidelines regarding image height (the size on the screen), known as the Rotakin standard (Aldridge, 1989).
http://www.homeoffice.gov.uk/crimpol/police/scidev/publications.html.).

Tape management issues

Five important aspects of tape management emerged during the evaluation:

- Tapes should be de-gaussed (magnetically cleaned) of all previous images before they can be reused for recording. If this is not done, or not done properly, it can result in the court refusing to accept the evidence obtained on that tape.
- Each time a tape is used the image degrades, so tapes should be discarded according to manufacturers advice, usually after about 12 uses.
- Tapes need to be securely stored. Images used as evidence resulting in a conviction are required by law to be kept for the duration of the sentence, which could be more than 20 years.
- Tapes are susceptible to damp, dust and sunlight.
- A full paper trail must be in place to ensure accountability and continuity of evidence. Tape usage, storage arrangements and any incidents recorded need to be documented.

Transferable lessons

- Ensure the images obtained using RCCTV are correctly managed to comply with legislation and guidance on their use as evidence.
- It is recommended that tapes used to record images must be de-gaussed before they are reused. Failure to do so can lead to questions concerning the suitability of the images as evidence.
- Ensure tapes are stored securely.
- Storing tapes in the correct way will help avoid unnecessary damage to recorded images.
- Limiting access to where the tapes are stored reduces the chances of mistakes being made such as tapes going missing.

Staffing and training

Staff will be required to monitor RCCTV cameras although, where images are transmitted to an existing control room, existing staff may be used depending upon their workload. In some types of deployments additional staff, for example police officers, may be required for on-the-ground support.

Staff using RCCTV need to be trained in a range of topics, including:

- Technology – how to work the cameras and to use them to best effect.
- Data Protection Act 1998 and Information Commissioner's Code of Practice for CCTV.
- Human Rights Act 1998.
- How to manage tape images so that they are suitable for evidential purposes.
- Paperwork and protocols, which are detailed in the previous section.
- Regulation of Investigatory Powers Act 2000 (RIPA).

Buyers of RCCTV systems need to consider whether the staff who will be expected to use the technology are willing and able to assimilate the requisite level of knowledge.

Transferable lessons

- Assess if additional staff need to be recruited.
- Train staff in the use of7 the technology, protocols and legislation.

Summary

Implementing and using RCCTV systems can be problematic. Based on users' experiences it is clear that RCCTV can take far longer to become operational than originally anticipated and once operational the user may still face many ongoing technical difficulties. Whilst an RCCTV system allows flexibility and is relatively cheap to purchase, this must be weighed against the fact that it is difficult to use and very sensitive to misuse at present. However, if the technological problems are dealt with, redeployable cameras, like static cameras can potentially be a valuable tool, especially when used in conjunction with other initiatives (see, Gill *et al*, 2005).

This guide has presented some of the key issues that need to be addressed when implementing an RCCTV scheme. Effective implementation requires a clear rationale for purchase, the identification of funding streams to support capital and ongoing revenue costs, realistic timescales and communication between and within partners. The system chosen needs to fit with the intended use and the geography of the area. Managers of RCCTV systems should have clear operational requirements and realistic expectations of what the technology can achieve. Technical problems can be minimised by the testing of systems prior to purchase although it must be noted that as with any wireless transmission system, such tests will not prove exhaustive. Prior to using the system a gatekeeper for the cameras, additional staff, clear protocols to comply with legislation and training programmes need to be in place.

The key transferable lessons learnt as a result of the experiences of the evaluation sites are as follows:

- Establish a clear rationale for purchasing RCCTV at the outset. Be aware of what the technology can realistically achieve and how it can be used to tackle particular problems.
- Identify funding streams to cover all revenue as well as capital costs.
- Ensure that departments such as lighting, maintenance etc. are aware of and accept the levels and type of assistance that might be required from them.

- Choose the right system to match needs and budget. Be aware that there are various types of RCCTV systems available, each with their own advantages and disadvantages.
- Test the RCCTV system in the areas of intended use prior to purchase to establish that it functions in the contexts where it will be used.
- Negotiate after-sales assistance and training contracts from suppliers of the equipment if possible.
- Ask for and take up references from suppliers before ordering.
- Identify the most appropriate lead agency, or gatekeeper, to be responsible for the system.
- Ensure a good communication system so that partner organisations are kept up-to-date with deployment opportunities, but at the same time manage expectations of what the technology can achieve.
- Set realistic implementation timescales. Because the technology is new there may well be technical problems and time needs to be allowed to deal with these.
- Establish clear operational requirements that are easy to follow.
- Ensure all necessary protocols are in place to comply with current legislation.
- Assess whether additional staff need to be recruited to operate the system or whether current employees (for example, maintenance staff) need to be involved.
- Ensure that all relevant staff are properly trained on the use of the technology, protocols and legislation.
- Ensure the images obtained using RCCTV, and which will be used evidentially, are correctly managed to comply with legislation.

Where can I get more information about RCCTV?

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- Crime reduction website - www.crimereduction.gov.uk
- *National evaluation of CCTV: Early findings on scheme implementation – effective practice guide,* London, Research, Development and Statistics Directorate, Home Office. www.homeoffice.gov.uk/rds
- CCTV User Group - www.cctvusergroup.com
- Information Commissioner - www.dataprotection.gov.uk
- PSDB publications - www.homeoffice.gov.uk/crimpol/police/scidev/publications.html

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Glossary

Briefcase – a portable case in which the camera controls and receiver are housed.

Cherry picker – a hydraulic vehicle used to repair and maintain lampposts and install redeployable cameras. Also known as MEWP (Mobile Elevated Work Platform)

Closed drugs market – access to a drug dealer is, 'limited to known and trusted

participants' (Lupton *et al.*, 2002).

Communities Against Drugs (CAD) – a source of funding directed towards Crime and Disorder Reduction Partnerships to tackle drug misuse at the local level.

Control room – a permanent location for the monitoring of CCTV cameras.

Dome cameras – a pan tilt zoom camera housed in a dome shaped casing.

GSM - Global System for Mobile Communications. A method of data transmission using a digital mobile phone.

Hotspot – concentrated areas of known street drug dealing and crime.

Line of sight – when the transmitter and the receiver can see each other without obstructions.

Onboard hard-drive – standard computer storage media built into the housing of the camera to record images.

Open drugs market – easily accessible by any user who wishes to purchase drugs. Usually street-based markets.

PSDB - Police Scientific and Development Branch

Proactive monitoring – an operator constantly monitors cameras.

PTZ – Pan tilt zoom cameras can be remotely controlled to move both vertically, horizontally and can zoom into an image and be focussed on it.

Radio transmission – a video and /or telemetry data transmission method via radio waves.

Real time – 25 frames per second. This allows the eye to see images as they occur without any time lapse.

RCCTV – an overt, (and sometimes covert), moveable and fast deployable CCTV system, mounted on lampposts or other suitable structures, which can be used for targeting crime hotspots. This evaluation only considered overt use.

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Email: publications.rds@homeoffice.gsi.gov.uk

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