CCTV Operational Requirements Manual

J Aldridge
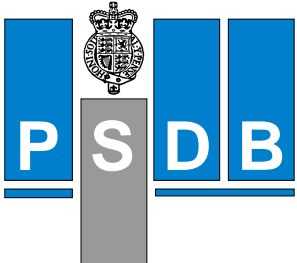
WHO WILL BE THE FIRST TO TEST YOUR CCTV SECURITY OR SAFETY SYSTEM?

A Product of the PSDB
CCTV Effectiveness Programme.

CCTV Operational Requirements Manual Version 3.0

C ontents

What is an Operational Requirement?

A statement of needs based on a thorough and systematic assessment of the problems to be solved and the hoped for solutions.

The purpose of this Manual

A clear understanding of the Operational Requirement is fundamental to the design, test and operation of an effective and economic system. PSDB has designed an easy to use Check List for use when writing Operational Requirements (O.R.) for existing or proposed CCTV Safety or Security Systems. The process identifies key factors which impact on the performance of a system and the way in which it will be operated.

This manual provides guidance on writing O.R. Check Lists (pages 4-7) and illustrates how they can be applied to the acquisition and management of a system (pages 8-11) The work is part of a wider scheme of research and development aimed at improving the effectiveness of CCTV safety and security systems (pages 12-15)

Version 3.0 of the O.R. manual replaces earlier versions which have been extensively trialled by police, the security industry and its customers. The content is fundamentally the same but has been added to and reformatted based on comments and suggestions from users.

Thanks to all those who have contributed, please keep your ideas flowing in as the research programme is continuing. Use the registration form inside the back cover to be kept up to date with new developments or to obtain your own copy of this manual.

Advantages of the O.R. Check-List methodology:

- Applicable to any size or type of system at any time of its life from initial concept to review.
- Provides a framework for discussion and collation of the views of all stakeholders.
- Identifies the role that CCTV will play in an overall security strategy.
- Identifies relevant and realistic performance goals.
- Defines key factors to be included in a test specification and acts as a reference point for the analysis of test results.
- Exposes conflicts of opinion especially in multi-agency schemes.
- Allows priorities to be set for implementation and operation.
- Shows future needs for system expansion at the outset.
- Basis for planning, phased implementation and investment appraisal.
- Separates operational and technical decision making.
- Reassures through commissioning tests and routine audits that performance is linked to current or anticipated needs.
- Provides audit trail for decision making.

Completed O.R. Check Lists include information about:

What is to be Observed: the area to be covered and the purpose of the coverage.

The Security Response to the Activity: the desired response to an incident and the conditions under which the system is expected to operate.

The Observer Interfaces: where the observation is to take place and who will make it; what quality of picture is needed for success; how the observer is expected to perform in response to incidents.

The Risk Analysis: what are the risks, benefits, priorities and the need for success.

G uide-lines to help complete your Operational Requirement statement.

1: A site plan and a supply of blank O.R. Check Lists (copy from page 10) will be needed.

2: To assist with completion of Check Lists suggested entries in the form of "Information Sheets" are being developed appropriate to specific types of installation. In the meantime the Information Sheet for Town Centres (see pages 6 & 7) should be used as a guide. Users are invited to submit contributions for a catalogue of information sheets.

3: Make a list of the activities of concern on a separate sheet and give each an initial priority ranking of Essential or Desirable.

4: Clearly define on the site plan each area where the problems may occur. Important dimensions defining the area to be covered should be noted.

5: For complex systems the first pass may be at a high level stating only the broadest outlines of the problem. A more detailed analysis is produced by subsequent subdivision. This might include identifying known problem areas, zones relating to alarmed areas, high risk areas, likely points of entry and potential weak spots.

6: Use a separate Operational Requirement Check List for each defined area. Information can be entered in any order. Boxes left blank due to insufficient information identify areas for further investigation.

7: The purpose of observing each area must be defined in box 3 of the Checklist as one or more of the following examples. This provides a basis for image quality and content specifications (see page 11) in conjunction with the additional factors shown in box 4.

| Monitor | Detect | Recognise | Identify | Other (specify) |
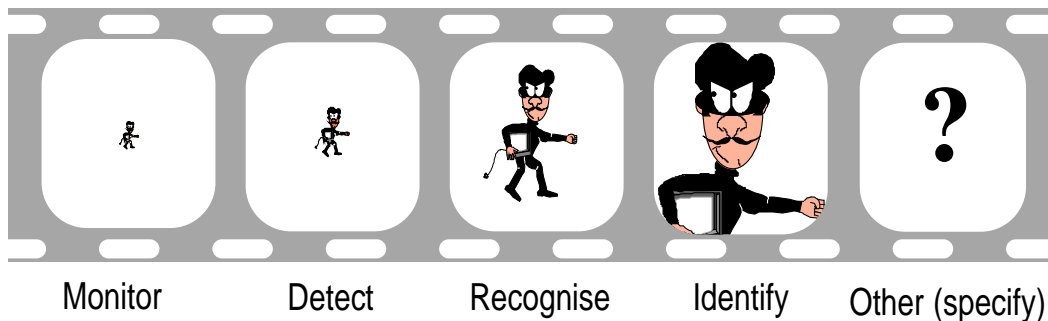
Obtaining more detail in an image is achieved at the cost of each camera covering a smaller area. As higher performance is therefore more expensive and difficult to achieve it should be specified only when necessary.

8: If any area is to be observed for more than one purpose then a separate Checklist should be completed for each.

9: Each interest group (Stakeholder) should initially compile their own set of Checklists. When these are combined they provide a comprehensive view, enabling potential conflicts to be resolved and priorities agreed based on factors such as threat and risk assessments. Special needs can be kept confidential if necessary.

10: After prioritisation and rationalisation along with feasibility and budgetary studies, a structured analysis of the problem and anticipated solutions is produced. This is the Operational Requirement Statement.

The methodology described in this document is intended to allow problem analysis without the need for detailed technical knowledge of CCTV systems. Translation of the O.R. statements into an effective system design can involve a wide range of complex technical issues. Expert assistance will be required to help provide a feasible and relevant solution. Your Crime Prevention Officers can help you with the problem analysis. You may also need specialist advice on topics such as risk analysis, threat assessment, project management, contract writing, human factors, design, commissioning, etc.. A list of consultants is being compiled by PSDB and is available to police on request. This list and the latest developments in the project are available on Epi-Centre CCTV conferences (see page 15).

CCTV
Operational Requirements

Information Sheet for
Town Centres *v1.0 Sheet 1 of 2*

A - Area of interest

Shade on your Site Plan each area where the target will need to be observed.

Give each 'Checklist' a unique Reference code for identification. Describe this area at the top of the 'Checklist'.

B - Problem

C - Operational Response

D - Observer Role

E - Miscellaneous

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1. Target to be Observed:
1. Persons
2. Groups or Individuals
3. Packages/Objects (e.g. briefcase)
4. Individual vehicles
5. Traffic
6. Police/Emergency services during operations

If appropriate, define Target as stationary or moving (Note speed, i.e. X mph, if applicable).

2. What Activity by the Target is of concern:
1. Damage to property/litter/graffiti
2. Robbery/Burglary
3. Changing hands of drugs/money/weapons
4. Drug abuse
5. Fighting, assault
6. Handling stolen property
7. Loitering/pickpocketing
8. Bogus collectors, officials
9. Traffic offenses, accidents
10. Ram Raids
11. Car crime: theft of /from/damage to
12. Suspicious actions (define)
13. Anti-social behaviour (drink, vandalism)
14. Other (specify)

6. Result of a successful Response to the Activity:
1. Restore tranquillity
2. Dispersal /control of situation
3. Prevention of /Minimise injury and damage
4. Reduce crime, disorder, improve safety and reassure public
5. Identify suspect, exclude innocent parties
6. Gather intelligence to assist in the subsequent apprehension of offenders
7. Apprehend suspect with evidence
8. Appropriate level of response made
9. Public safety through effective evacuation
10. Traffic flow restored
11. Area secured

7. Who makes the Response:
1. Uniformed Police patrol
2. Traffic Police
3. Armed response team
4. Plain clothes personnel
5. Traffic warden
6. Observer
7. Private security staff employed by the owner
8. Store detectives
9. Key holder (owner of the premises/ vehicle)
10. Car park staff

11. What will the Observer do when the Activity occurs:
1. Switch on recorder
2. Follow action (achieve close-ups)
3. Identify the location of object/activity
4. Notify response team by radio/telephone
5. Investigate personally
6. Direct resources
7. Describe incident to controller
8. Alert Police and direct pictures to Police monitors
9. Search for Target
10. Follow set operational procedures

12. How will the Observer know when and where to look:
Cued or prompted
1. Direct request by the Police Controller
2. Telephone or radio alarm (Police, Local Authority, Shop watch, Time/date on tape and incident log)
Strategy
3. Past experience, training, culture
4. Briefing of specific or daily events
5. Monitor of radio channel/telephone calls
6. Analysis of local crime figures
Luck.
7. Constant monitoring
8. Automatic sequencing of pictures
9. Random picture monitoring

16. Stake-holders:
These are the views of: (Enter names or organisation)

Additional Opinions might also be sought from: (Enter names)

1. Local Authority
2. Community Groups, Public
3. Police
4. Owners of the property
5. Other Emergency services
6. Occupiers
7. Insurers
8. Retailers
9. Car park owners and users
10. Tourism Board

17. What priority is assigned to this task:
1. Essential
2. Desirable
(use subclassification of high, medium and low or rate on scale of 1 to 5)
3. Threat dependent

6

3. Purpose of the Observation:
1. Monitor
2. Detect
3. Recognise
4. Identify

Targets and Activities as defined in boxes

1 & 2

4. Picture Quality/Content factors needed to achieve success:
1. Clear view of suspects body language to identify potential problems
2. Ability to follow the progress of a target
3. True colour
4. Real time
5. Clarification of actions, is the suspect using a key/implement?
6. Pictures showing vehicle/facial details for evidence of identity
7. Automatic alarmed area display
8. Overall view of the scene

5. Spare

This box may be used according to specific needs e.g.
   Threat Assessment
   Rating by assessment panel
   Supplier ability to comply in %

8. Time scale of the Response for it to be successful:
1. As soon as possible
2. Within minutes
3. Within hours
4. Within days
5. Once a video result has been achieved
6. In accordance with graded response

9. When is observation needed:
1. Until arrest/curtailment
2. During whole incident, initiated by alarm
3. 24 hours
4. Between particular times (Rush hour, licensing hours)
5. Days of the week/School holidays
6. During/outside trading hours
7. During pre-organised events based on advance information/special intelligence
8. When few/many people are about
9. On demand by the Police controller
10. When Police are responding to incidents
11. Daylight/Darkness

10. Conditions under which the system needs to be effective:
1. State Normal/Special weather conditions (Wet ground/Snow/Fog)
2. All likely conditions during applicable times
3. Fire/Flood
4. With up to 1,2,3, etc simultaneous inputs of same priority
5. Changing light levels (nightclub doors opening and closing)
6. Using existing lighting only
7. Lighting may be enhanced (designer to specify)

13. How quickly does the Observer need to act:
Search for and detect target:
1. Immediately
2. Within minutes
3. Within hours
4. Within days
5. Depends on each individual case or act from action plan already drafted
6. ASAP

14. Who makes the observation on which the Response is based:
1. Police controller
2. Car park attendant
3. Council Care line
4. Private Security company
5. Store detective
6. Civilian (L.A. employee)
7. Investigator
8. Casual staff

15. Where will the observations take place:
1. Police control room
2. Local authority control room
3. Private security premises
4. Police video facility
5. Police incident control
6. From a mobile/remote location
7. Replay facility separate from control room

Note: P or S for Primary and Secondary observation point.

18. Likelihood of an Activity occurring and how often:

Likelihood	Frequency
1. Very high	**6.** Continuous
2. High	**7.** Hourly
3. Medium	**8.** Daily
4. Low	**9.** Monthly
5. Very unlikely	

19. How effectively does the task have to be done:
1. Right first time every time
2. Initially effective but becoming less so as time passes
3. Standard high enough to meet the needs of the investigation
4. Effective once or twice is sufficient
5. Detect 50% of incidents

20. Benefits of doing the action over not doing it:
1. Safer Prosecutions (less written, better documentary evidence)
2. Enhance Police credibility
3. Reduce crime
4. Enhance public safety
5. Investigation time reduced
6. Tackle unresourced crime
7. Increase public confidence/raise trade level/reduce fear of crime
8. Improve the quality of Policing
9. Reduction of insurance premiums
10. Deal Effectively with complaints

ORs - a security management tool for new systems

Consultation and Partnership

OR Checklists Stakeholder 1

OR Checklists Stakeholder 2

OR Checklists Stakeholder 3

OR Checklists Stakeholder 4

Independent Perceptions of issues from each stakeholder group

Analysis

Prioritisation and scoping

4
3
2
Priority 1

Feasibility & budgetary costing

£x+y+z
£x+y
£x

Implementation Plan

4
3
2
Phase 1

phased if necessary
to allow for pilot trial
or to meet resource
limitations

- - - - - - - - - - - -

Pre-tender Qualification & Invitation to Tender

Contract terms.
Design & build

+

4
3
2
OR Item 1
Phase 1

+

Other Specifications
- Standards
- Codes of Practice

Measurables

Technical & System Performance

Test specifications

Performance Specification

4
3
2
Test Procedure 1

Cost & Compliancy Matrix

	Supplier A	Supplier B	Supplier C	Supplier D
OR Item 1				
OR Item 2				
OR Item 3				
OR Item 4				

Tender Assessment

4
3
2
OR Item 1
Phase 1

- functional compliancy with OR
- technical quality
- cost

- - - - - - - - - - - -

Commissioning Inspection & Test

4
3
2
Test Procedure 1

for compliancy with
- Operational Requirements
- Technical Requirements
- Relevant Standards
- Health & Safety
- Codes of Practice

Test Results Analysis & Action

Pass
- put into service

Fail
- review OR
- relax test criteria
- request remedial action
- reject

ORs and security audits

Consultation to develop a comprehensive understanding of the problem

OR Checklists Stakeholder 1

OR Checklists Stakeholder 2

OR Checklists Stakeholder 3

OR Checklists Stakeholder 4

Independent Perceptions of issues from each stakeholder group

Analysis

Prioritisation and Scoping

4
3
2
Priority 1
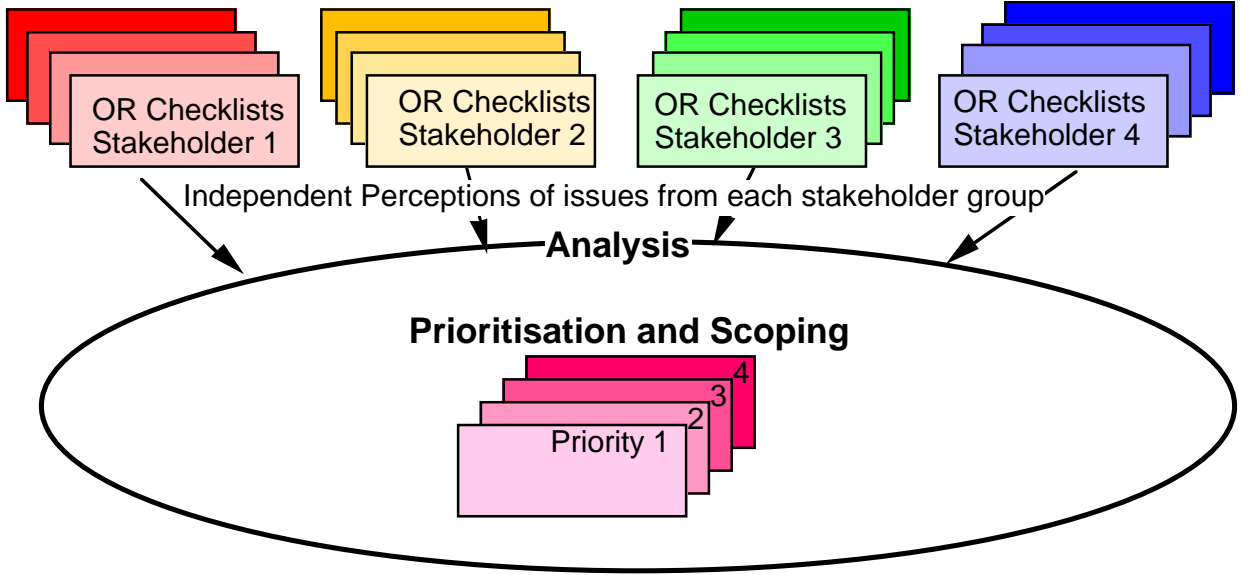
System Performance Assessment

4
3
2
OR Item 1 Phase 1

+

Other Specifications
- Standards
- Codes of Practice

Measurables

Performance Specification

Test specifications

4
3
2
Test Procedure 1
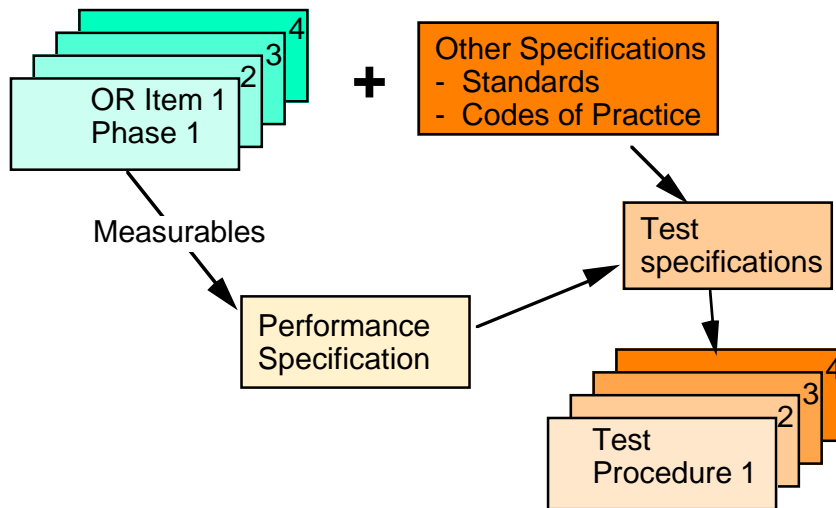
Security Audit, Inspection & Test
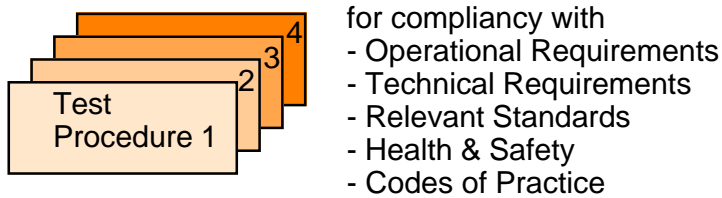
4
3
2
Test Procedure 1

for compliancy with
- Operational Requirements
- Technical Requirements
- Relevant Standards
- Health & Safety
- Codes of Practice

Test Results Analysis & Action

Pass
- put into service

Fail
- review OR
- relax test criteria
- request remedial action
- reject

CCTV
Operational Requirements

'Check List' version 1.0

Ref Code   **Type of Area**

Describe the area of interest in relation to the marked Site Plan;

1: Target to be Observed:	6: Result of a successful Response to the Activity:	11: What will the Observer do when the activity Occurs:	16: Stake-holders:
2: What Activity by the Target is of concern:	7: Who makes the Response:	12: How will Observer know when and where to look:	17: What Priority is assigned to this task:
3: Purpose of the Observation:	8: Time scale of the Response for it to be successful:	13: How quickly does the observer need to act:	18: Likelihood of an Activity occurring and how often:
4: Picture Quality/Content factors needed to achieve success:	9: When is observation needed:	14: Who makes the observation on which the response is based:	19: How effectively does the task have to be done:
5: Spare	10: Conditions under which the System needs to be effective:	15: Where will the observations take place:	20: Benefits of doing the action over not doing it:

10

Observer Tasks & Performance Guide-lines

Box 3 of the O.R. Check List suggests four categories of observer task (the purpose of making the observation.) The following definitions and minimum performance guide-lines are based on research so far. Comments and suggestions are invited.

Monitor & Control
An observer can determine the number, direction and speed of movement of people whose presence is known to him; i.e. they do not have to be searched for.

Detection
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.

Recognition
Viewers can say with a high degree of certainty whether or not the individual shown is the same as someone they have seen before.

Identification
Picture quality and detail should be sufficient to enable the identity of a subject to be established beyond reasonable doubt.
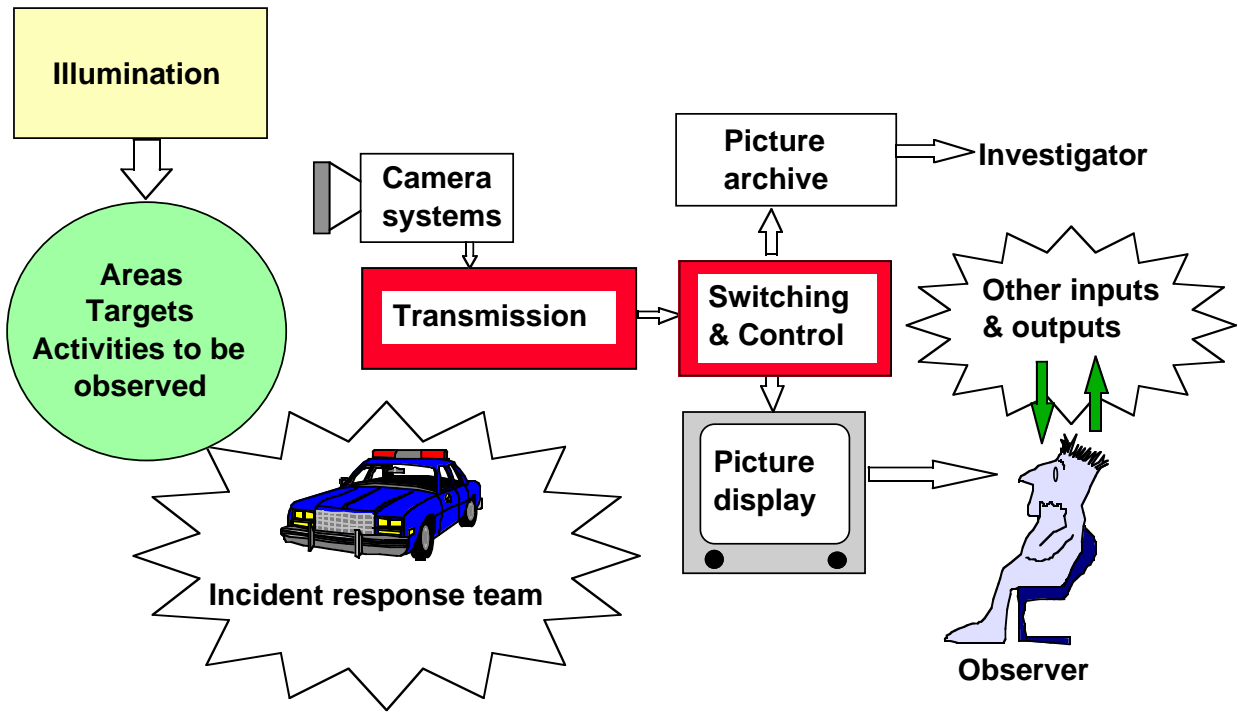
PSDB performance guide-line figures.

These are related to the image height of a standing man defined using the Rotakin® standard test target 1.6 metres high (see page 15). When the image of Rotakin® fills the screen vertically the image height is said to be 100%R.
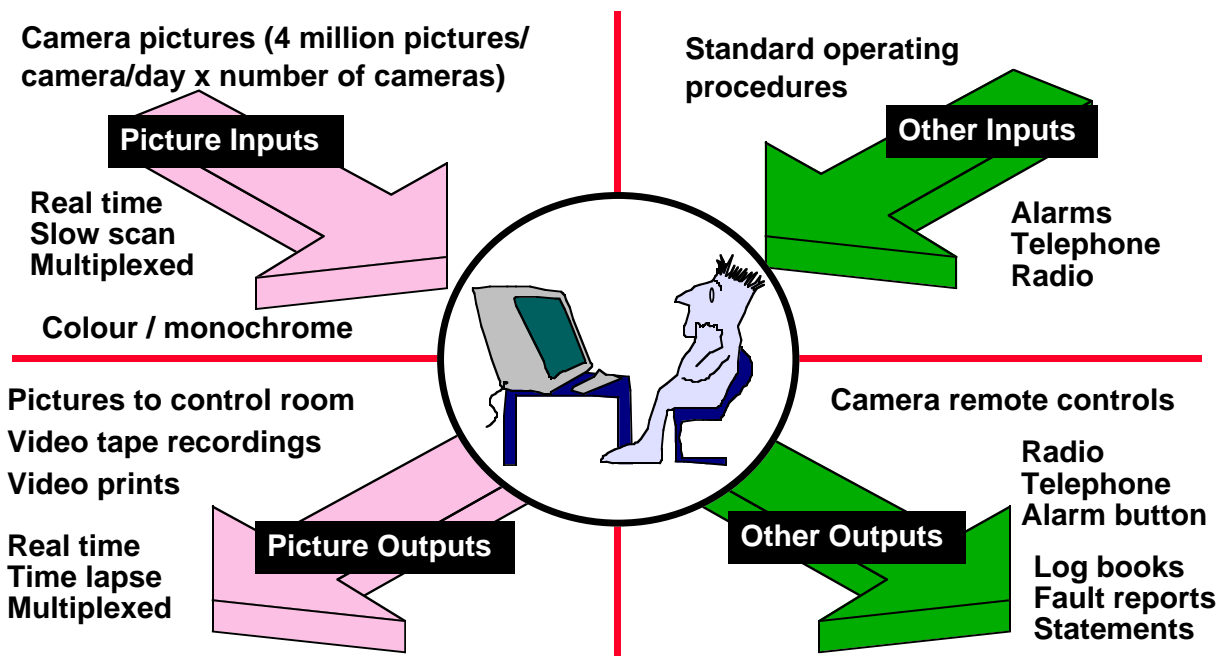
The figures are based on 625 line CCIR standard system and assume all equipment is correctly adjusted and operated within its design range. It is possible to apply some of the criteria to non-standard systems. Enquiries to PSDB please.

Monitor and control	Not less than 5%R	*It is assumed that the image contrast of the target is sufficiently above the threshold of human sensitivity and that the picture is not unduly cluttered with non-targets.*
Detection	Not less than 10%R	

Recognition	Not less than 50%R	*It is assumed that the angle of view and lighting is suitable and no significant degrading effects such as image blur due to motion or out of focus are evident.*
Identification	Not less than 120%R	
Reading a car licence plate	Saloon car not less than 50% picture height.	

CCTV System Components

Illumination

Areas Targets Activities to be observed

Camera systems

Transmission

Picture archive → **Investigator**

Switching & Control

Other inputs & outputs

Picture display

Observer

Incident response team

CCTV Observer Inputs & Outputs

Camera pictures (4 million pictures/camera/day x number of cameras)

Picture Inputs

Real time
Slow scan
Multiplexed

Colour / monochrome

Standard operating procedures

Other Inputs

Alarms
Telephone
Radio

Pictures to control room
Video tape recordings
Video prints

Real time
Time lapse
Multiplexed

Picture Outputs

Camera remote controls

Other Outputs

Radio
Telephone
Alarm button
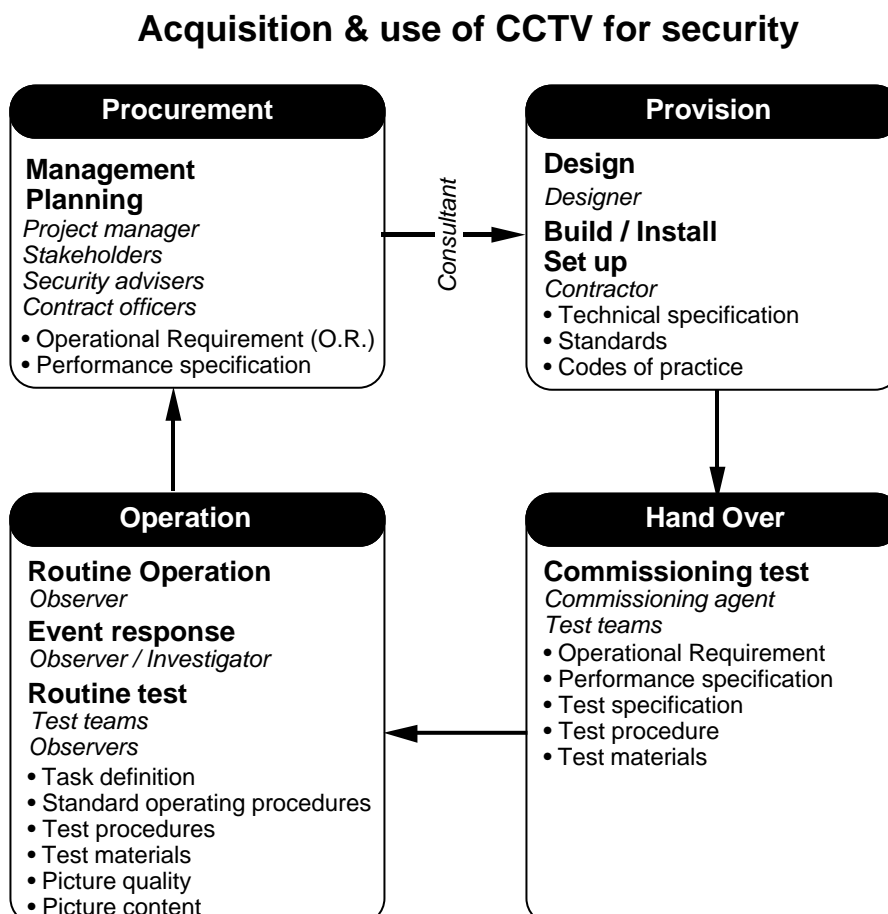
Log books
Fault reports
Statements

Background

A Home Office Research & Development Project aimed at improving the effectiveness of CCTV safety & security systems was begun in April 1992. The original project plan had been to target systems in premises such as banks and building societies where the main picture user was the police investigator after an incident. The rapid growth in public area surveillance systems highlighted the problems of real time observation and control of pictures largely for command and control purposes. Some problems are illustrated in the diagrams opposite which are from material used in a substantial lecture programme necessary to support the project.

The project has three main interlinked objectives on which considerable progress has already been made:

- establish performance guide-lines based on the picture quality and content needs of investigators and observers;
- develop methods of testing the performance of systems;
- develop a method of analysing and documenting the needs of customers.

These elements are linked together in the acquisition and use cycle illustrated below.

Acquisition & use of CCTV for security

Procurement

Management
Planning
Project manager
Stakeholders
Security advisers
Contract officers
- Operational Requirement (O.R.)
- Performance specification

Consultant

Provision

Design
Designer
Build / Install
Set up
Contractor
- Technical specification
- Standards
- Codes of practice

Operation

Routine Operation
Observer
Event response
Observer / Investigator
Routine test
Test teams
Observers
- Task definition
- Standard operating procedures
- Test procedures
- Test materials
- Picture quality
- Picture content

Hand Over

Commissioning test
Commissioning agent
Test teams
- Operational Requirement
- Performance specification
- Test specification
- Test procedure
- Test materials

13

The main tasks carried out by CCTV picture users have been defined and performance guide-lines issued (see page 11).

Performance test materials have been developed and are commercially available (see page 15).

Test procedures have been developed and will be reported at the end of the pilot trial period in early 1995.

This O.R. Manual defines the methodology for analysing and documenting the needs of customers. Information sheets for other environments are being prepared.

The diagrams on pages 8,9 & 13 illustrate how the elements fit into the process of system acquisition and use.

This puts in place the groundwork ready for the launch in April 1995 of a two year campaign aimed at providing every CCTV security and safety system with a written O.R., test procedure and test record. This will be followed up with certification by the picture users of satisfactory performance.

PSDB has also responded with a new programme of research into the human factor issues relating to occupational CCTV observation. Investigations relate to observer viewing conditions, ergonomics of control interfaces, task difficulty,operator loading and picture quality and content.

This major new line of R&D is running alongside the original plan and reports will be issued as results become available.

Another aim of the programme is to link the developments into evolving National and International standards that customers can call for in purchase contracts. This is making good progress with the work taken up by the CENELEC working group developing equipment and system standards for Europe, and by SITO who are developing a wide range of qualifications for security industry staff (see page 15).

I thank everyone who is supporting this project and particularly those who have contributed directly or indirectly to the ideas presented in this document. These include colleagues in government, standards committees, industry and user working groups, and hundreds of police officers.

Jim Aldridge, Programme Manager
PSDB Sandridge, November 1994.

Other Information

Futher useful technical information may be obtained from the following:

Long Term Storage of Video Tape, B Jenkinson, BKSTS Journal, (Mar 1982), pp126.

Long Term Storage of Videotape, J Wheeler, SMPTE Journal, (June 1983), pp650-4.

CCTV Looking out for you, P Edwards and N Tilley, Home Office publication (Nov 94).

Rotakin - A Test Target for CCTV Security Systems, J Aldridge, PSDB report 16/89.

Production of Hard Copy Prints from Video Recordings, S R Wilkes, SRDB report 2/90.

Guidelines for Copying Video Tapes, C J Rampton, PSDB report 11/91.

Low cost Evidential Video Enhancement System, S R Wilkes, PSDB report 19/91.

Child Interview Video Recording - Technical Guidelines, J Aldridge and S Lewis, PSDB report 24/94.

Performance Testing of CCTV Perimeter Surveillance Systems (Using the Rotakin Standard Test Target), J Aldridge and Sqn Ldr C Gilbert RAF, PSDB report 14/95.

CCTV: Making It Work - Recruitment and Selection of CCTV Operators, E Wallace and C Diffley, PSDB report 8/98.

CCTV: Making It Work - Training Practices for CCTV Operators, E Wallace and C Diffley, PSDB report 9/98.

CCTV: Making It Work - CCTV Control Room Ergonomics, E Wallace and C Diffley, PSDB report 14/98.

HM Prison Service Security Manual, May 1998.

Guide for Best Working Practices when using a Hand-held Video Surveilllance Purposes, Metropolitan Police SO11, Oct 96.

Camera Competency, Metropolitan Police SO11, May 94.

A Watching Brief - code of practice for CCTV, Local Government Information Unit, Mar 1996.

Camera installation for the Attack side of an Alarmed Perimeter Barrier, J Greenwood (1995).

Camera installation for visits area type A, J Greenwood (1995).

Camera installation for visits area type B, J Greenwood (1995).

Register Now!

As part of a project aimed at improving the Effectiveness of CCTV Safety and Security Systems, PSDB is producing a series of supporting documents. This Operational Requirements Manual is part of that series. Please use this document or pass it to someone who will. If you have earlier versions replace them now with the updated ones.

Copy this registration form and send it in to ensure that you receive new and updated information as the project develops. Information is also available to the police service through the PSDB Epi-Centre electronic information service (see page 15)

If you need further help with the application of the ideas please contact us at PSDB.

Registration for PSDB Operational Requirements Manual Version 3.0
Name:

Classification, enter as appropriate:
 Police users FCPO, CPO, Force CCTV Liaison Officer,
                Investigating officer, Other (please specify)
 Non-police users: Industry: supplier, manufacturer, consultant,
 	
          other (please specify)
 	
 Customer: government, local authority, commercial,
 Other: (please specify)

Organisation:
If you have previously registered please complete the following
I am using the information
I have not yet used the information
Please delete my name from your database as I no longer have a requirement for this information.
For new or changed registrations only:
Address: **Post code:**
Telephone:
Enter if appropriate:
I have replaced:(name)
I have passed the information to:

Return to:
CCTV OR Registrations,   PSDB, Woodcock Hill, Sandridge, St Albans, Herts, AL4 9HQ, UK.

Monitor	

Detection

Recognition

Identification
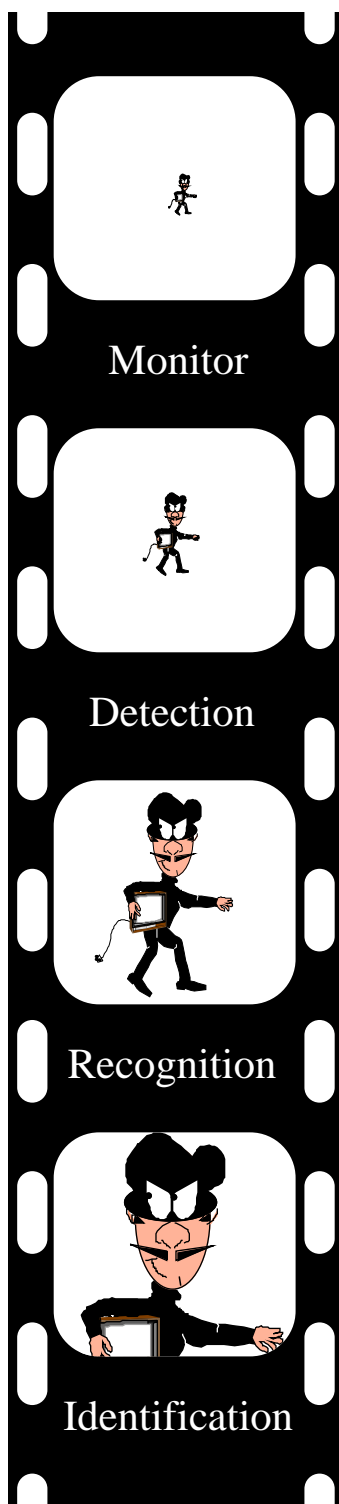
Do you know whether your Video Surveillance System will meet your needs in a crisis?

- *What is its purpose?*

- *Will the performance be adequate?*

- *Can it be improved?*

- *Who will be the first to test it,*

    you or the criminal?

The effectiveness of your CCTV system,

existing or planned, could be improved

by following the advice in this document.

P S D B